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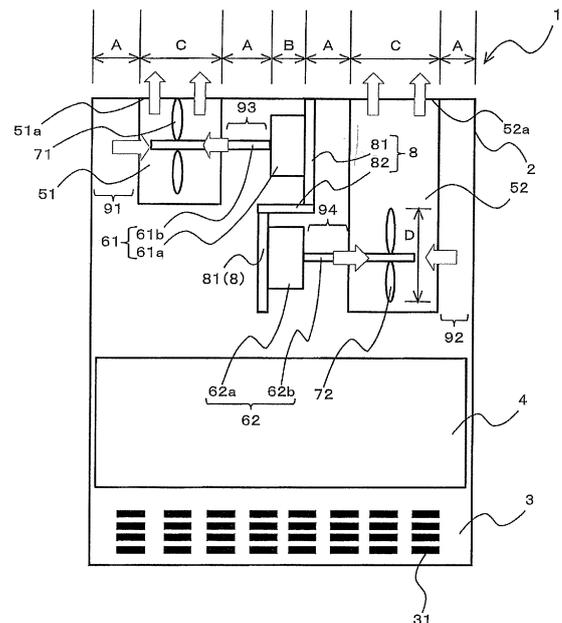
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(54) **AIR CONDITIONER**

(57) An air-conditioning apparatus of the present invention includes a plurality of ducts (51 and 52) arranged in a casing (2) in parallel to one another and configured to blow air subjected to heat exchange in a heat exchanger (4) to an indoor space, a plurality of motors (61 and 62) each including a rotary shaft (61 b or 62b) and a main body portion (61 a or 62a) configured to fix one end of the rotary shaft (61 b or 62b), the rotary shafts (61 b and 62b) being arranged to be oriented alternately opposite to one another in a direction perpendicular to a longitudinal direction of the plurality of ducts (51 and 52), the main body portions (61 a and 62a) being arrayed between the plurality of ducts (51 and 52) in parallel to the longitudinal direction of the plurality of ducts (51 and 52), a plurality of centrifugal fans (71 and 72) each arranged in a corresponding one of the plurality of ducts (51 and 52), and each driven by the plurality of motors (61 and 62), and a partition member (8) including a plurality of motor support portions (81) extending between the plurality of ducts (51 and 52) in parallel to the plurality of ducts (51 and 52) and configured to fix the main body portions (61 a and 62a) of the plurality of motors (61 and 62) on sides opposite to the rotary shafts (61 b and 62b).

FIG. 1



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Description

Technical Field

[0001] The present invention relates to an air-conditioning apparatus.

Background Art

[0002] As a related-art air-conditioning apparatus, a known air-conditioning apparatus is downsized by forming two air passages oriented in the same direction (for example, Patent Literatures 1 and 2).

Citation List

Patent Literature

[0003]

Patent Literature 1: Japanese Examined Utility Model Publication No. Sho 61-1292

Patent Literature 2: Japanese Unexamined Patent Application Publication No. 2012-17941

Summary of Invention

Technical Problem

[0004] However, in the air-conditioning apparatus described in Patent Literatures 1 and 2, a set of a fan and a motor arranged in each of the air passages, are arrayed parallel to each other in a height direction, and the fans are arranged to be oriented in the same direction. Further, in the air-conditioning apparatus described in Patent Literatures 1 and 2, one fan is positioned behind another fan in an airflow direction. Thus, in the air-conditioning apparatus described in Patent Literatures 1 and 2, the air passages of the two fans overlap with each other on downstream. Consequently, in some cases, the airflow is abruptly reduced, and the air collides with a wall surface. As a result, a pressure loss is increased due to the air passages.

[0005] The present invention has been made to solve the above-mentioned problem, and has an object to provide an air-conditioning apparatus capable of reducing a pressure loss in the air passages and configured downsized.

Solution to Problem

[0006] According to one embodiment of the present invention, an air-conditioning apparatus including a casing, a heat exchanger arranged in the casing and configured to exchange heat with air sucked into the casing, a plurality of ducts arranged in the casing in parallel to one another and configured to blow the air subjected to heat exchange in the heat exchanger to an indoor space,

a plurality of motors each including a rotary shaft and a main body portion configured to fix one end of the rotary shaft, each of the rotary shafts being arranged to be oriented alternately opposite to one another in a direction perpendicular to a longitudinal direction of the plurality of ducts, the main body portions being arrayed between the plurality of ducts in parallel to the longitudinal direction of the plurality of ducts, a plurality of centrifugal fans each arranged in a corresponding one of the plurality of ducts, and each driven by the plurality of motors, and a partition member including a plurality of motor support portions extending between the plurality of ducts in parallel to the plurality of ducts and configured to fix the main body portions of the plurality of motors on sides opposite to the rotary shafts, and at least one connecting portion configured to connect a pair of the plurality of motor support portions located next to each other.

Advantageous Effects of Invention

[0007] According to the one embodiment of the present invention, the air passages, which communicate with the plurality of ducts, do not interfere with each other and do not block the airflow, reducing the pressure loss in the air passages. Further, according to the one embodiment of the present invention, the main body portion of the motor is arranged between the plurality of ducts, downsizing the air-conditioning apparatus.

Brief Description of Drawings

[0008]

[Fig. 1] Fig. 1 is a schematic sectional view for illustrating an example of an air-conditioning apparatus 1 according to Embodiment 1 of the present invention.

[Fig. 2] Fig. 2 is a schematic sectional view for illustrating an example of a related-art air-conditioning apparatus 1.

[Fig. 3] Fig. 3 is a schematic sectional view for illustrating an example of an air-conditioning apparatus 1 according to Embodiment 2 of the present invention.

Description of Embodiments

Embodiment 1

[0009] Description is made of an air-conditioning apparatus 1 according to Embodiment 1 of the present invention. Fig. 1 is a schematic sectional view for illustrating an example of the air-conditioning apparatus 1 according to Embodiment 1. In the drawings below including Fig. 1, a dimensional relationship and shapes of components are different from the actual dimensional relationship and shapes of the components. Further, in the drawings below, the same or similar members or portions are denoted

by the same reference signs, or reference signs are omitted.

[0010] As illustrated in Fig. 1, the air-conditioning apparatus 1 according to Embodiment 1 is of a vertical installation type, and is configured to suck indoor air from a lower part of the air-conditioning apparatus 1 and to blow the air subjected to heat exchange from an upper side of the air-conditioning apparatus 1. The air-conditioning apparatus 1 of Fig. 1 includes a casing 2, a suction grille 3, a heat exchanger 4, a first duct 51, a second duct 52, a first motor 61, a second motor 62, a first centrifugal fan 71, a second centrifugal fan 72, and a partition member 8.

[0011] The casing 2 is a hollow box body, which may be, for example, formed of a zinc-plated steel sheet. The suction grille 3 is arranged on at least one surface of the casing 2 to suck the indoor air into the casing 2. The suction grille 3 has, for example, a plurality of rectangular inlet ports 31. The suction grille 3 may be formed integrally with the casing 2, or may be removable from the casing 2. Further, an air filter (not shown) configured to remove dust may be mounted to the suction grille 3.

[0012] The heat exchanger 4 is arranged in the casing 2. The heat exchanger 4 is configured to exchange heat with air sucked from the suction grille 3, to thereby adjust humidity or temperature. For example, in the heat exchanger 4, heat is exchanged between water or refrigerant flowing in the heat exchanger 4 and the air.

[0013] The first duct 51 and the second duct 52 are pipes arranged in the casing 2 and are configured to blow the air subjected to heat exchange in the heat exchanger 4 to the indoor space. The first duct 51 and the second duct 52 may have a cross section having, for example, a rectangular shape, a circular shape, or an oval shape. The first duct 51 and the second duct 52 each have one end fixed to an inner surface of the casing 2. In a surface of the casing 2 to which the first duct 51 and the second duct 52 are fixed, outlet ports are formed so that an inside and outside of the casing 2 are communicated with each other. Further, the first duct 51 and the second duct 52 are arranged at a certain distance from inner side surfaces of the casing 2 that are parallel to the first duct 51 and the second duct 52. In Embodiment 1, the first duct 51 and the second duct 52 are fixed to an upper portion of the casing 2, and are arranged in parallel to each other in a height direction. Further, first air outlets 51 a are formed in a fixed portion of the first duct 51, and second air outlets 52a are formed in a fixed portion of the second duct 52. The first duct 51 and the second duct 52 may be, for example, pipes formed of a zinc-plated steel sheet.

[0014] The first motor 61 is arranged so that a rotary shaft 61 b is oriented in a direction perpendicular to a longitudinal direction of the first duct 51, and that a tip portion of the rotary shaft 61 b is positioned in the first duct 51. An end portion of the rotary shaft 61 b is fixed to a main body portion 61 a of the first motor 61. The second motor 62 is arranged so that a rotary shaft 62b is oriented in a direction perpendicular to a longitudinal

direction of the second duct 52, and that a tip portion of the rotary shaft 62b is positioned in the second duct 52. An end portion of the rotary shaft 62b is fixed to a main body portion 62a of the second motor 62. That is, an orientation of the rotary shaft 62b of the second motor 62 is set to be alternately opposite to an orientation of the rotary shaft 61 b of the first motor 61. The main body portion 61 a of the first motor 61 and the main body portion 62a of the second motor 62 are arrayed between the first duct 51 and the second duct 52 in parallel to the longitudinal direction of the first duct 51 and the second duct 52. In Embodiment 1, the main body portion 61 a of the first motor 61 is arranged above the main body portion 62a of the second motor 62. However, the main body portion 62a of the second motor 62 may be arranged above the main body portion 61 a of the first motor 61. Further, the first motor 61 and the second motor 62 may be the motors of the same type, for example, an induction motor or a DC brushless motor.

[0015] The first centrifugal fan 71 and the second centrifugal fan 72 are air-sending devices configured to push out air sucked from a rotary shaft direction to a centrifugal direction. The first centrifugal fan 71 is arranged in the first duct 51 and driven by the first motor 61. A rotary shaft of the first centrifugal fan 71 is fixed to the tip portion of the rotary shaft 61 b of the first motor 61. The second centrifugal fan 72 is arranged in the second duct 52 and driven by the second motor 62. A rotary shaft of the second centrifugal fan 72 is fixed to the tip portion of the rotary shaft 62b of the second motor 62. That is, the first centrifugal fan 71 is arranged above the second centrifugal fan 72. The first centrifugal fan 71 and the second centrifugal fan 72 are arranged at a distance not to overlap with each other in the rotary shaft direction. Further, mounting directions of the first centrifugal fan 71 and the second centrifugal fan 72 are opposite to each other. The rotary shaft of the first centrifugal fan 71 and the rotary shaft of the second centrifugal fan 72 are arranged in parallel to each other.

[0016] One side surface or both side surfaces of the first centrifugal fan 71 on the air suction sides are fixed to an inner side surface of the first duct 51. In the first duct 51, a suction port (not shown) is further formed at a position opposed to an air suction port of the first centrifugal fan 71. One side surface or both side surfaces of the second centrifugal fan 72 on the air suction sides are fixed to an inner side surface of the second duct 52. In the second duct 52, a suction port (not shown) is further formed at a position opposed to an air suction port of the second centrifugal fan 72.

[0017] The first centrifugal fan 71 and the second centrifugal fan 72 may each be a sirocco fan or a turbofan. Further, the first centrifugal fan 71 and the second centrifugal fan 72 may have an equal fan diameter.

[0018] The partition member 8 is arranged between the first duct 51 and the second duct 52. The partition member 8 includes flat-plate-shaped motor support portions 81 extending between the first duct 51 and the sec-

ond duct 52 in parallel to those ducts and one of the motor support portions 81 is configured to fixing the main body portion 61 a of the first motor 61 on a side opposite to the rotary shaft 61 b. Similarly, the main body portion 62a of the second motor 62 is also fixed to the other one of motor support portions 81, which extends between the first duct 51 and the second duct 52 in parallel to those ducts, on a side opposite to the rotary shaft 62b of the second motor 62. The partition member 8 further includes a flat-plate-shaped connecting portion 82 configured to connect the plurality of motor support portions 81, which are next to each other. The partition member 8 may be a single plate-shaped member alternately having a step. Alternatively, the partition member 8 may be formed of the motor support portions 81 and the connecting portion 82 that are prepared as separate plate-shaped members and connected through, for example, brazing. At least one side of the partition member 8 is fixed to an inside of the casing 2 through, for example, brazing. The partition member 8 may be formed of, for example, a zinc-plated steel sheet.

[0019] In the air-conditioning apparatus 1 according to Embodiment 1, the first duct 51 is arranged at a certain distance from the inner side surface of the casing 2, which is parallel to the first duct 51, so that a part of a space between the first duct 51 and the inner side surface of the casing 2 serves as a first casing-side air passage 91 for sucking the air into the first duct 51. Further, the second duct 52 is arranged at a certain distance from the inner side surface of the casing 2, which is parallel to the second duct 52, so that a part of a space between the second duct 52 and the inner side surface of the casing 2 serves as a second casing-side air passage 92 for sucking the air into the second duct 52.

[0020] Further, the air-conditioning apparatus 1 according to Embodiment 1 includes the partition member 8 so that a space having the first duct 51 and a space having the second duct 52 are partitioned to form independent air passages that do not interfere with each other. With this structure, in the air-conditioning apparatus 1 according to Embodiment 1, a space between the first duct 51 and the main body portion 61 a of the first motor 61 serves as a first motor-side air passage 93 for sucking the air into the first duct 51. Further, a space between the second duct 52 and the main body portion 62a of the second motor 62 serves as a second motor-side air passage 94 for sucking the air into the second duct 52.

[0021] Next, description is made of an operation of the air-conditioning apparatus 1 according to Embodiment 1. In Fig. 1, the airflow in the first duct 51 and the second duct 52 is indicated by the outlined arrows.

[0022] Through rotation of the first centrifugal fan 71 and the second centrifugal fan 72, the indoor air is sucked into the casing 2 through the suction grille 3. The sucked air is subjected to heat exchange in the heat exchanger 4, and divided into a direction of the first duct 51 and a direction of the second duct 52 by the partition member 8. The air divided into the direction of the first duct 51

flows into the first casing-side air passage 91 and the first motor-side air passage 93 to be sucked into the first duct 51 through the suction ports (not shown) of the first duct 51 by the first centrifugal fan 71. The air sucked into the first duct 51 is pushed out in the centrifugal direction by the first centrifugal fan 71, and is blown to the indoor space through the first air outlets 51 a. Further, the air divided into the direction of the second duct 52 flows into the second casing-side air passage 92 and the second motor-side air passage 94 to be sucked into the second duct 52 through the suction ports (not shown) of the second duct 52 by the second centrifugal fan 72. The air sucked into the second duct 52 is pushed out in the centrifugal direction by the second centrifugal fan 72, and is blown out to the indoor space through the second air outlets 52a.

[0023] As described above, in the air-conditioning apparatus 1 according to Embodiment 1, the main body portion 61 a of the first motor 61 and the main body portion 62a of the second motor 62 are arrayed between the first duct 51 and the second duct 52 in parallel to the longitudinal direction of the first duct 51 and the second duct 52. Further, in the air-conditioning apparatus according to Embodiment 1, the rotary shaft 61 b of the first motor 61 and the rotary shaft 62b of the second motor 62 are arranged to extend in a direction perpendicular to the first duct 51 and the second duct 52 and to be oriented alternately opposite to one another. Further, in the air-conditioning apparatus 1 according to Embodiment 1, the partition member 8 extends between the first duct 51 and the second duct 52 in parallel to those ducts. The partition member 8 includes the plurality of motor support portions 81 configured to fix the main body portion 61 a of the first motor 61 and the main body portion 62a of the second motor 62 on the sides opposite to the rotary shafts 61 b and 62b, respectively, and the connecting portion 82 configured to connect the plurality of motor support portions 81, which are next to each other. In Embodiment 1, two motor support portions 81 and one connecting portion 82 are provided.

[0024] According to Embodiment 1, the space having the first duct 51 and the space having the second duct 52 are partitioned by the partition member 8 configured to fix the main body portion 61 a of the first motor 61 and the main body portion 62a of the second motor 62. Those spaces serve as the independent air passages, which do not interfere with each other, with the result that the pressure loss in the air passages can be reduced. Consequently, according to Embodiment 1, efficiency of the first centrifugal fan 71 and the second centrifugal fan 72 can be enhanced, eliminating or reducing power consumption of the first motor 61 and the second motor 62. As a result, energy consumption of the first motor 61 and the second motor 62 can be reduced, enabling a long-time use of the first motor 61 and the second motor 62.

[0025] Further, according to Embodiment 1, the air-conditioning apparatus 1 can be downsized. Description below is made of the downsizing with reference to Fig. 1

and Fig. 2. The outlined arrows of Fig. 2 indicate the airflow.

[0026] Fig. 2 is a schematic sectional view for illustrating an example of a related-art air-conditioning apparatus 1. In Fig. 2, the first motor 61 and the second motor 62 are arranged at the same level in the height direction and are arranged in parallel to each other in a horizontal direction with an orientation in the same direction. That is, unlike the air-conditioning apparatus 1 of Embodiment 1, the first motor 61 and the second motor 62 of Fig. 2 are not arranged between the first duct 51 and the second duct 52 in parallel to the longitudinal direction of the first duct 51 and the second duct 52. Further, the first centrifugal fan 71 and the second centrifugal fan 72 are arranged at the same level in the height direction and are arranged in parallel to each other in the horizontal direction. Moreover, the first motor 61 is fixed to an L-shaped partition member 8 arranged between the first duct 51 and the second duct 52, and the second motor 62 is fixed to the inner side surface of the casing 2.

[0027] In the following description, the first casing-side air passage 91, the second casing-side air passage 92, the first motor-side air passage 93, and the second motor-side air passage 94 have an equal minimum width A. The first motor 61 and the second motor 62 are of the same type, and the main body portion 61 a of the first motor 61 and the main body portion 62a of the second motor 62 have an equal motor width B in the rotary shaft direction. The first duct 51 and the second duct 52 have an equal cross-sectional width C. The first centrifugal fan 71 and the second centrifugal fan 72 have an equal fan diameter D.

[0028] To allow the first centrifugal fan 71 and the second centrifugal fan 72 to suck the air, the first casing-side air passage 91, the second casing-side air passage 92, the first motor-side air passage 93, and the second motor-side air passage 94 are required to be formed so that the minimum width A is equal to or larger than one-half of the fan diameter D, that is, a relationship of $A \geq D/2$ is satisfied.

[0029] In a case of the related-art air-conditioning apparatus 1 illustrated in Fig. 2, a width of the casing 2 corresponds to $4A + 2B + 2C$. Meanwhile, in a case of the air-conditioning apparatus 1 according to Embodiment 1 illustrated in Fig. 1, a width of the casing 2 corresponds to $4A + B + 2C$. Thus, the casing 2 can be downsized by the motor width B.

[0030] As described above, according to Embodiment 1, the air-conditioning apparatus 1 can be downsized while the air passages, through which the first centrifugal fan 71 and the second centrifugal fan 72 suck the air, are secured.

[0031] Further, through use of the first motor 61 and the second motor 62 that are of the same type and have an equal width, manufacturing cost can be reduced. The reduction in manufacturing cost can also be achieved by setting an equal fan diameter to the first centrifugal fan 71 and the second centrifugal fan 72.

Embodiment 2

[0032] Description is made of an air-conditioning apparatus 1 according to Embodiment 2 of the present invention. The outlined arrows of Fig. 3 indicate the airflow.

[0033] Fig. 3 is a schematic sectional view for illustrating an example of the air-conditioning apparatus 1 according to Embodiment 2. In the air-conditioning apparatus 1 according to Embodiment 2 of the present invention, similarly to the main body portion 61 a of the first motor 61 and the main body portion 62a of the second motor 62 according to Embodiment 1 described above, a main body portion 63a of a third motor 63 and a main body portion 64a of a fourth motor 64 are arranged between the first duct 51 and the second duct 52 in parallel to the longitudinal direction of the first duct 51 and the second duct 52. Further, similarly to the rotary shaft 61 b of the first motor 61 and the rotary shaft 62b of the second motor 62 according to Embodiment 1 described above, a rotary shaft 63b of the third motor 63 and a rotary shaft 64b of the fourth motor 64 are arranged to be oriented alternately opposite to one another in the direction perpendicular to the first duct 51 and the second duct 52.

[0034] Further, in the air-conditioning apparatus 1 according to Embodiment 2 of the present invention, in addition to the first centrifugal fan 71, a third centrifugal fan 73 driven by the third motor 63 is arranged in the first duct 51. A rotary shaft of the third centrifugal fan 73 is fixed to a tip portion of the rotary shaft 63b of the third motor 63. One side surface or both side surfaces of the third centrifugal fan 73 on the air suction sides are fixed to the inner side surface of the first duct 51. In the first duct 51, a suction port (not shown) is further formed at a position opposed to an air suction port of the third centrifugal fan 73. In the first duct 51, a suction port (not shown) is further formed at a position opposed to the air suction port of the first centrifugal fan 71.

[0035] Further, in the air-conditioning apparatus 1 according to Embodiment 2 of the present invention, in addition to the second centrifugal fan 72, a fourth centrifugal fan 74 driven by the fourth motor 64 is arranged in the second duct 52. A rotary shaft of the fourth centrifugal fan 74 is fixed to a tip portion of the rotary shaft 64b of the fourth motor 64. One side surface or both side surfaces of the fourth centrifugal fan 74 on the air suction sides are fixed to the inner side surface of the second duct 52. In the second duct 52, a suction port (not shown) is further formed at a position opposed to an air suction port of the fourth centrifugal fan 74.

[0036] Further, in the air-conditioning apparatus 1 according to Embodiment 2 of the present invention, the main body portion 63a of the third motor 63 is fixed to one of the motor support portions 81, which extends between the first duct 51 and the second duct 52 in parallel to those ducts, on a side opposite to the rotary shaft 63b of the third motor 63. Further, the main body portion 64a of the fourth motor 64 is fixed to another one of the motor

support portions 81, which extends between the first duct 51 and the second duct 52 in parallel to those ducts, on a side opposite to the rotary shaft 64b of the fourth motor 64. The remaining structure of the air-conditioning apparatus 1 is the same as that of Embodiment 1, and the description of the same structure is omitted.

[0037] In the air-conditioning apparatus 1 according to Embodiment 2, a plurality of centrifugal fans and motors are arranged. Thus, the performance of the air-conditioning apparatus 1 can be maintained even when the performance of each centrifugal fan and each motor is degraded. Consequently, in the air-conditioning apparatus 1 according to Embodiment 2, the fan diameter D of the centrifugal fan, the motor width B, and the minimum width A of the air passage can be reduced, with the result that the casing 2 can be downsized.

Other Embodiments

[0038] The present invention is not limited to the above-mentioned Embodiments, and various modifications may be made to the above-mentioned Embodiments. For example, the air-conditioning apparatus 1 according to Embodiments described above is an air-conditioning apparatus of a vertical installation type, but the present invention is not limited to this configuration. The air-conditioning apparatus 1 of a ceiling embedded type or other type may be adopted.

[0039] Further, the air-conditioning apparatus 1 according to Embodiments described above may be, for example, an air-conditioning apparatus of a fan coil type, an air purifier, a dehumidifier, a humidifier, a cooler, a heater, or a device having a plurality of such functions.

[0040] Further, in Embodiments described above, one motor is configured to drive one centrifugal fan. However, two or more centrifugal fans arranged in the same duct may be driven by a single motor.

[0041] Further, in Embodiments described above, two ducts are arranged in parallel to each other in the height direction. However, three or more ducts may be arranged in parallel to one another in any directions. Further, in the above-mentioned Embodiments, the air outlets are formed on the upper side of the air-conditioning apparatus. However, the position of the air outlets may be changed to any positions corresponding to the type of the air-conditioning apparatus.

[0042] Further, Embodiments described above can be used in combination with each other.

Reference Signs List

[0043]

1 air-conditioning apparatus 2 casing 3 suction grille
4 heat exchanger 8 partition member 31 inlet port 51
first duct 51 a first air outlet 52 second duct 52a sec-
ond air outlet 61 first motor 62 second motor 63 third
motor 64 fourth motor 61 a, 62a, 63a, 64a main body

portion 61 b, 62b, 63b, 64b rotary shaft 71 first cen-
trifugal fan 72 second centrifugal fan 73 third centrif-
ugal fan 74 fourth centrifugal fan 81 motor support
portion 82 connecting portion 91 first casing-side air
passage

92 second casing-side air passage 93 first motor-
side air passage 94 second motor-side air passage

10 Claims

1. An air-conditioning apparatus, comprising:

a casing;

a heat exchanger arranged in the casing and
configured to exchange heat with air sucked into
the casing;

a plurality of ducts arranged in the casing in par-
allel to one another and configured to blow the
air subjected to heat exchange in the heat ex-
changer to an indoor space;

a plurality of motors each including a rotary shaft
and a main body portion configured to fix one
end of the rotary shaft, each of the rotary shafts
being arranged to be oriented alternately oppo-
site to one another in a direction perpendicular
to a longitudinal direction of the plurality of ducts,
the main body portions being arrayed between
the plurality of ducts in parallel to the longitudinal
direction of the plurality of ducts;

a plurality of centrifugal fans each arranged in a
corresponding one of the plurality of ducts, and
each driven by the plurality of motors; and

a partition member including

a plurality of motor support portions extending
between the plurality of ducts in parallel to the
plurality of ducts and configured to fix the main
body portions of the plurality of motors on sides
opposite to the rotary shafts, and

at least one connecting portion configured to
connect a pair of the plurality of motor support
portions located next to each other.

2. The air-conditioning apparatus of claim 1, wherein
the plurality of centrifugal fans are each driven by a
corresponding one of the plurality of motors.

3. The air-conditioning apparatus of claim 1 or 2,
wherein each of the plurality of centrifugal fans com-
prises a sirocco fan or a turbofan.

4. The air-conditioning apparatus of any one of claims
1 to 3, wherein each of the plurality of centrifugal
fans has an equal fan diameter.

5. The air-conditioning apparatus of any one of claims
1 to 4, wherein the plurality of motors each comprise
the same type of a motor.

FIG. 1

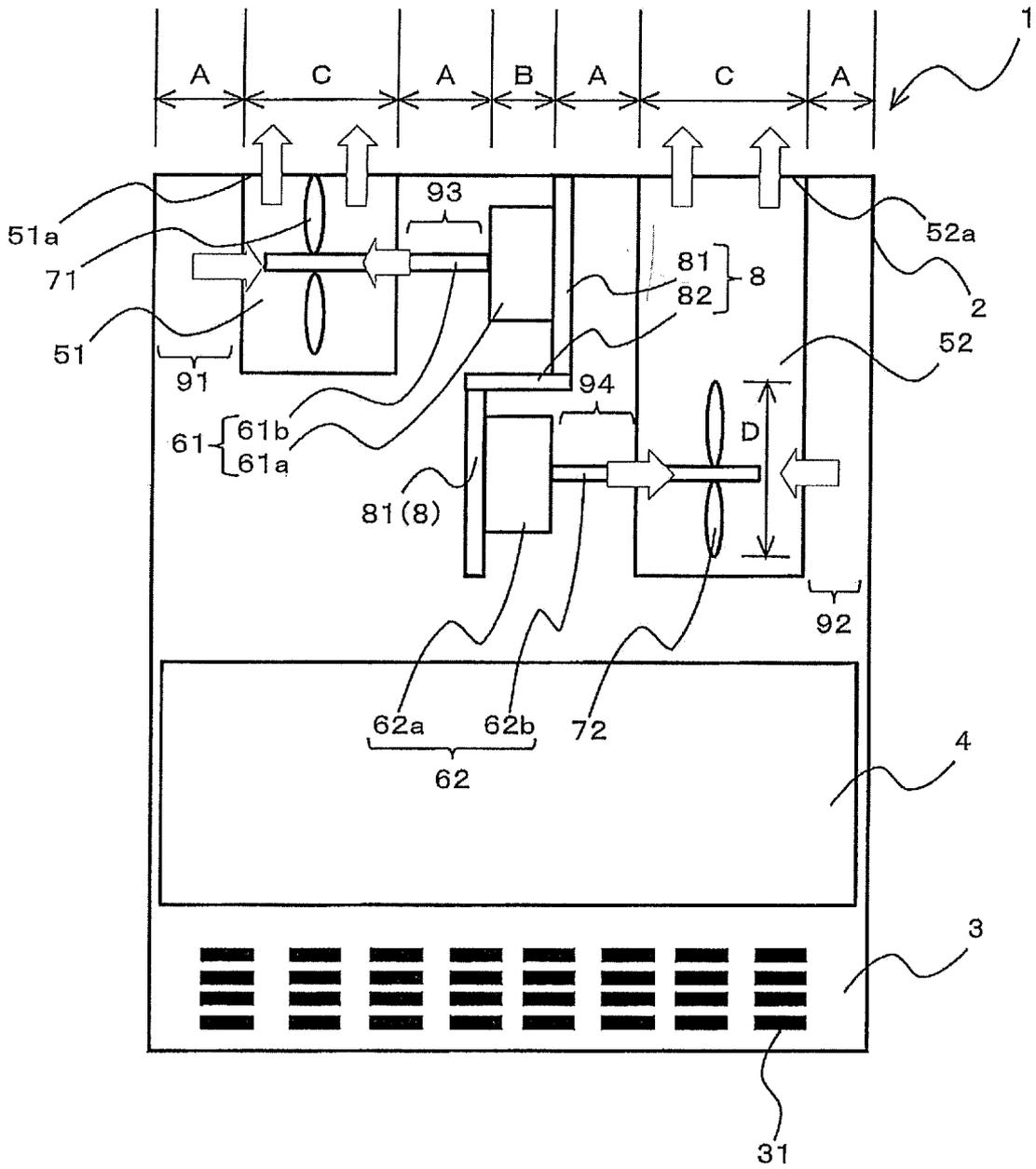


FIG. 2

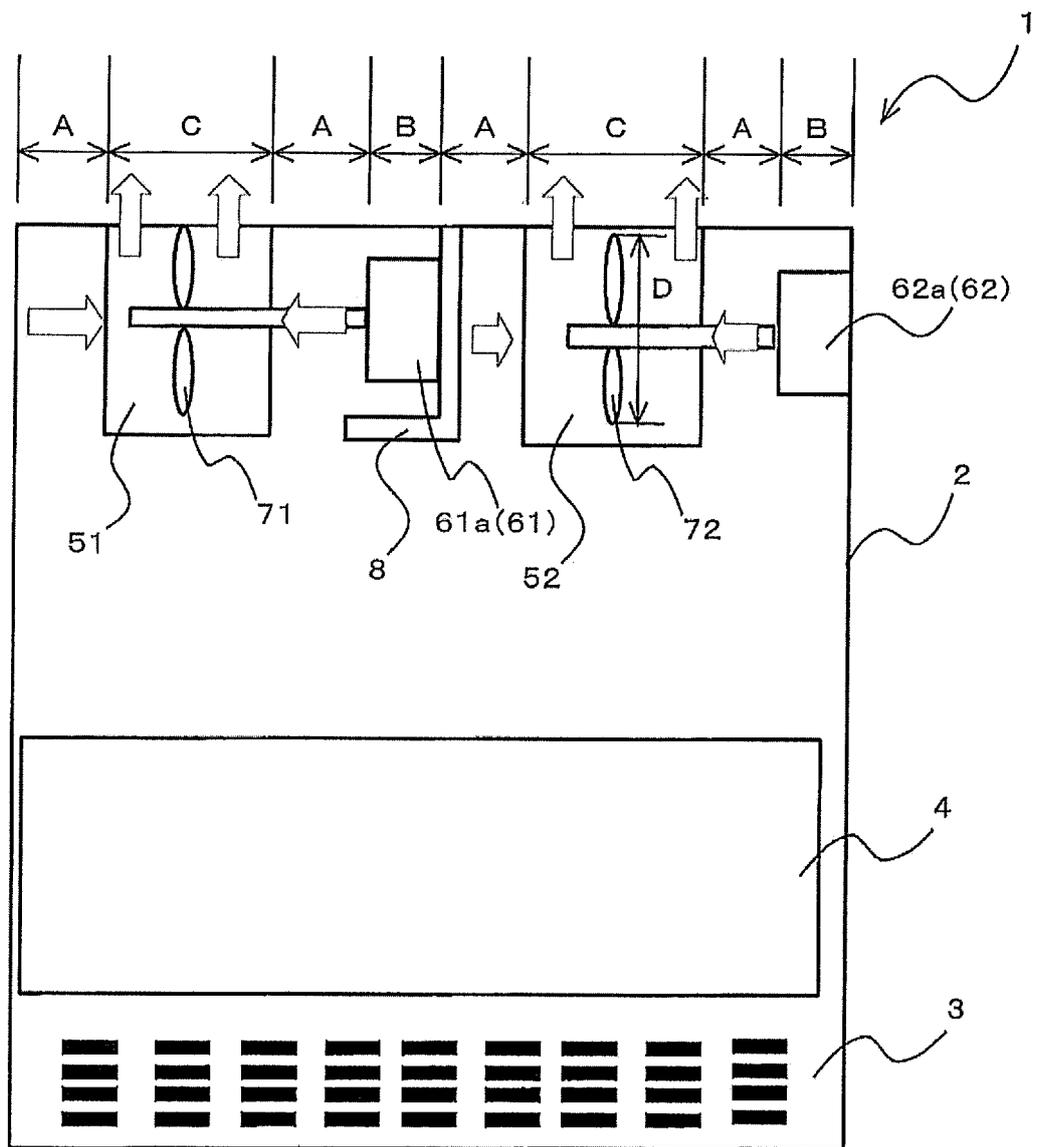
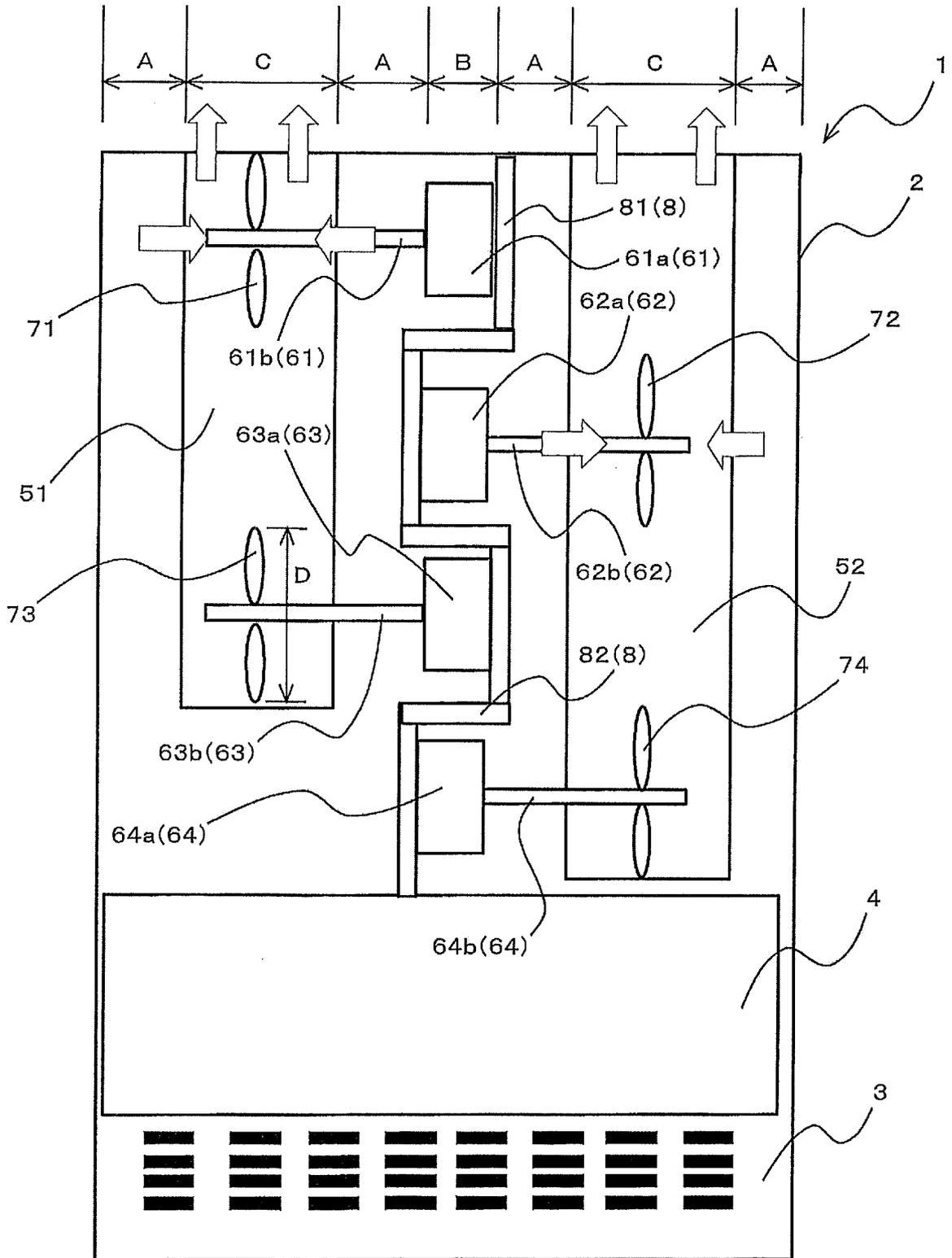


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/052592

5	A. CLASSIFICATION OF SUBJECT MATTER F24F1/00(2011.01) i	
	According to International Patent Classification (IPC) or to both national classification and IPC	
10	B. FIELDS SEARCHED	
	Minimum documentation searched (classification system followed by classification symbols) F24F1/00	
15	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015 Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015	
	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)	
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
	Category*	Citation of document, with indication, where appropriate, of the relevant passages
25	A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 5867/1983(Laid-open No. 110824/1984) (Mitsubishi Heavy Industries, Ltd.), 26 July 1984 (26.07.1984), specification, page 1, line 11 to page 4, line 1; drawings (Family: none)
30		Relevant to claim No. 1-5
35		
40	<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.	
45	* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
	"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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	"O" document referring to an oral disclosure, use, exhibition or other means	
	"P" document published prior to the international filing date but later than the priority date claimed	
50	Date of the actual completion of the international search 22 April 2015 (22.04.15)	Date of mailing of the international search report 12 May 2015 (12.05.15)
55	Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/052592

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 46159/1990 (Laid-open No. 4614/1992) (Daikin Industries, Ltd.), 16 January 1992 (16.01.1992), specification, page 6, line 20 to page 10, line 5; fig. 1 to 2 (Family: none)	1-5
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 148604/1986 (Laid-open No. 54505/1988) (Honda Motor Co., Ltd.), 12 April 1988 (12.04.1988), specification, page 5, line 8 to page 8, line 18; fig. 2 to 5 (Family: none)	1-5
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 1711/1982 (Laid-open No. 103626/1983) (Daikin Industries, Ltd.), 14 July 1983 (14.07.1983), claims; fig. 1 to 2 (Family: none)	1-5

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP SHO611292 B [0003]
- JP 2012017941 A [0003]