



US 20160153457A1

(19) **United States**(12) **Patent Application Publication**
JANG et al.(10) **Pub. No.: US 2016/0153457 A1**(43) **Pub. Date: Jun. 2, 2016**(54) **FAN ASSEMBLY FOR CENTRIFUGAL
BLOWER AND AIR CONDITIONING
APPARATUS INCLUDING THE SAME****Publication Classification**(71) Applicant: **SAMSUNG ELECTRONICS CO.,
LTD.**, Suwon-si (KR)(72) Inventors: **Keun-jeong JANG**, Yongin-si (KR);
Byung-ghun KIM, Suwon-si (KR);
Yong-ho SEO, Hwaseong-si (KR);
Hyung-jin KWON, Hwaseong-si (KR);
Young-jae KIM, Yongin-si (KR);
Hyeong-joon SEO, Suwon-si (KR)(73) Assignee: **SAMSUNG ELECTRONICS CO.,
LTD.**, Suwon-si (KR)(21) Appl. No.: **14/884,901**(22) Filed: **Oct. 16, 2015**(30) **Foreign Application Priority Data**

Nov. 27, 2014 (KR) 10-2014-0167420

(51) **Int. Cl.**
F04D 17/10 (2006.01)
F04D 29/42 (2006.01)
(52) **U.S. Cl.**
CPC **F04D 17/10** (2013.01); **F04D 29/4226**
(2013.01)(57) **ABSTRACT**

A fan assembly for a centrifugal blower and an air conditioning apparatus including the same are provided. The fan assembly for the centrifugal blower includes a first support configured to receive a driving force from a driving source to rotate, a plurality of blades having one end supported by the first support and arranged with an interval in a circumferential direction of the first support, and a second support configured to support the other end of the plurality of blades and including an air inlet formed therein, wherein the plurality of blades include a first portion disposed adjacent to the air inlet, and a second portion further from the air inlet than the first portion and having a wider width than the first portion, and at least one of the first and second portions has a constant width.

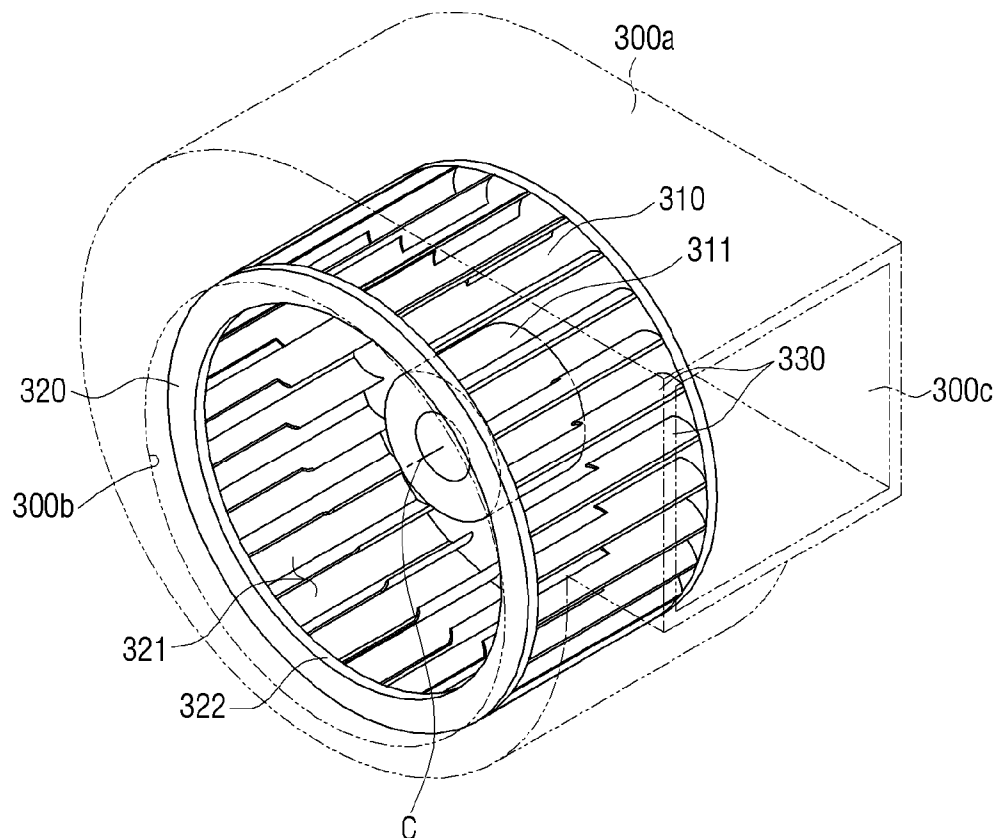
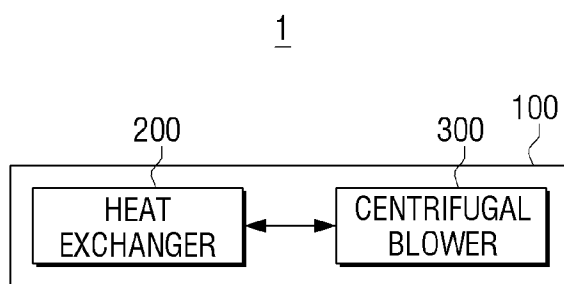
301

FIG. 1



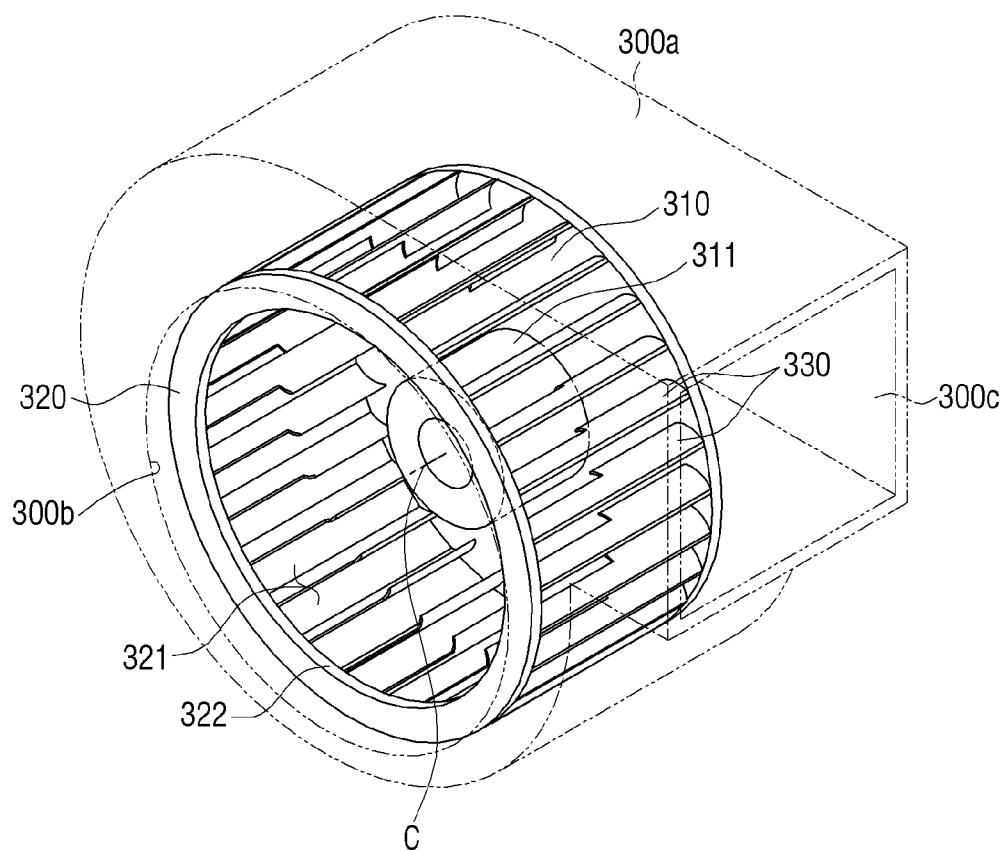
301

FIG. 3

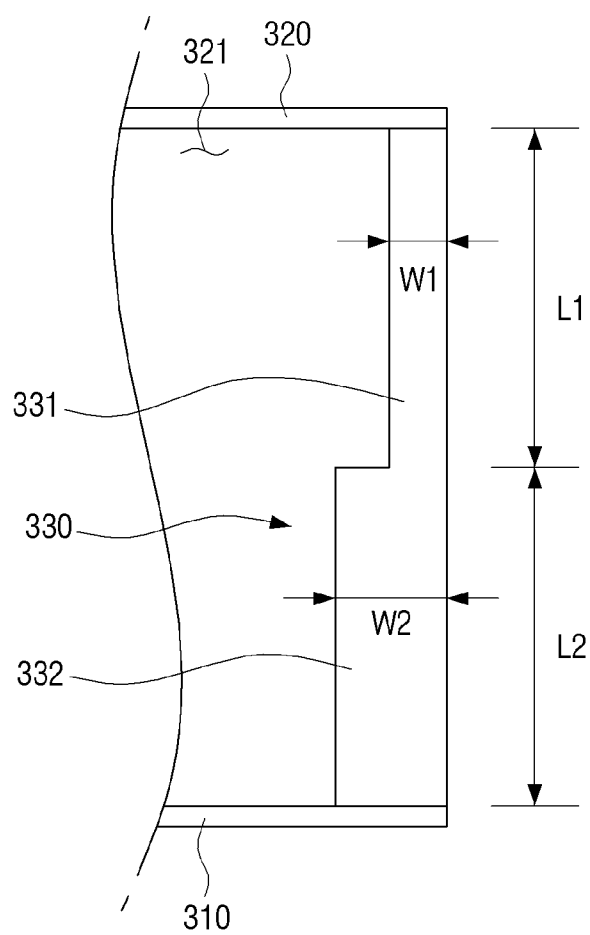


FIG. 4

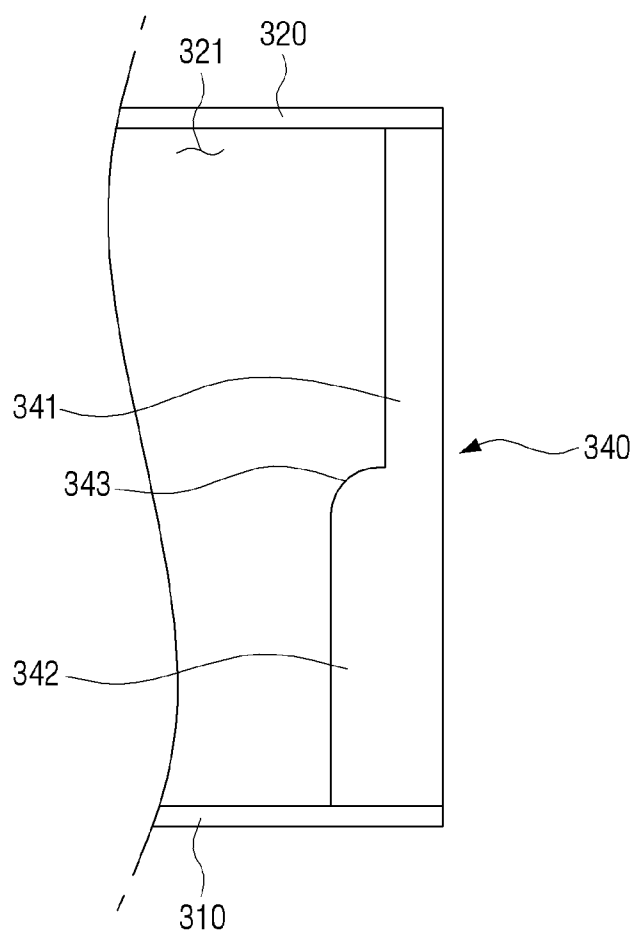


FIG. 5

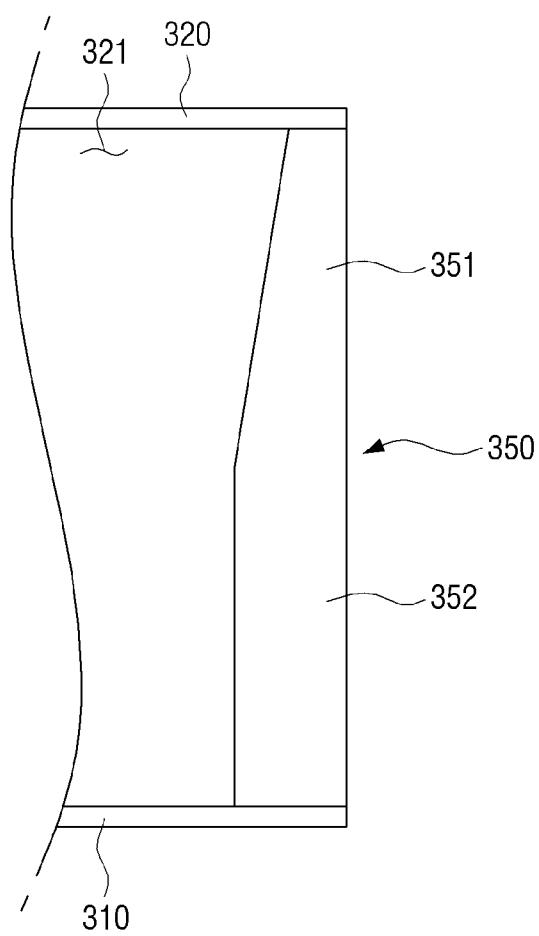


FIG. 6

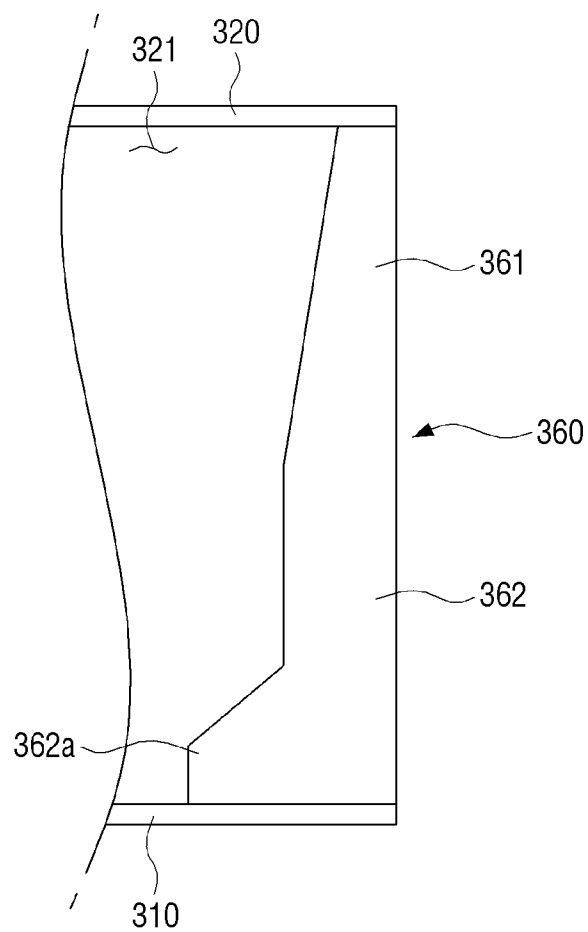


FIG. 7

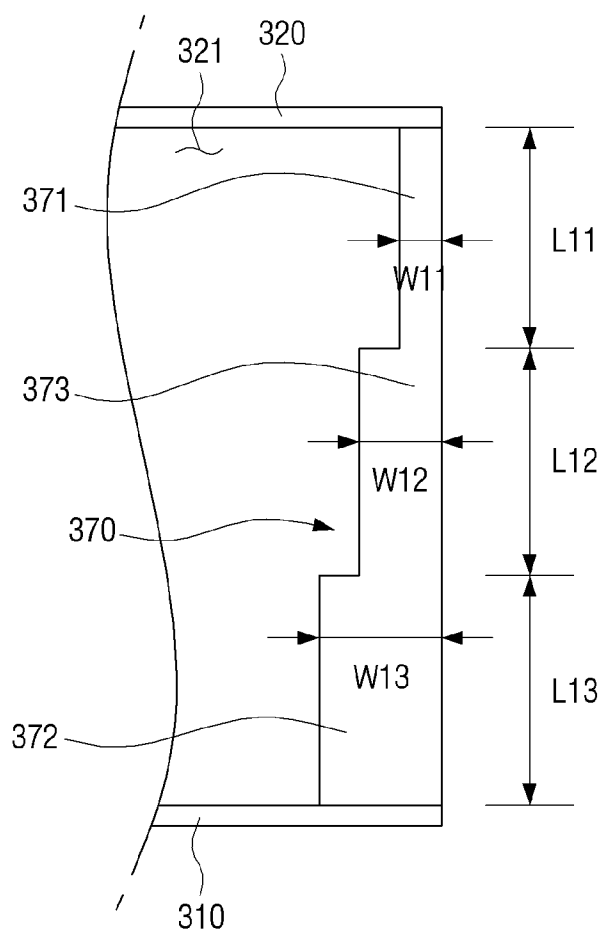


FIG. 8

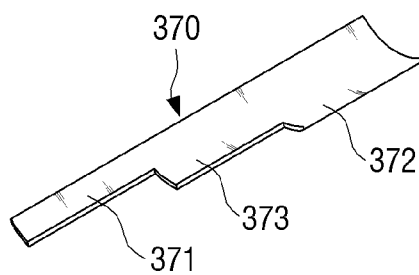
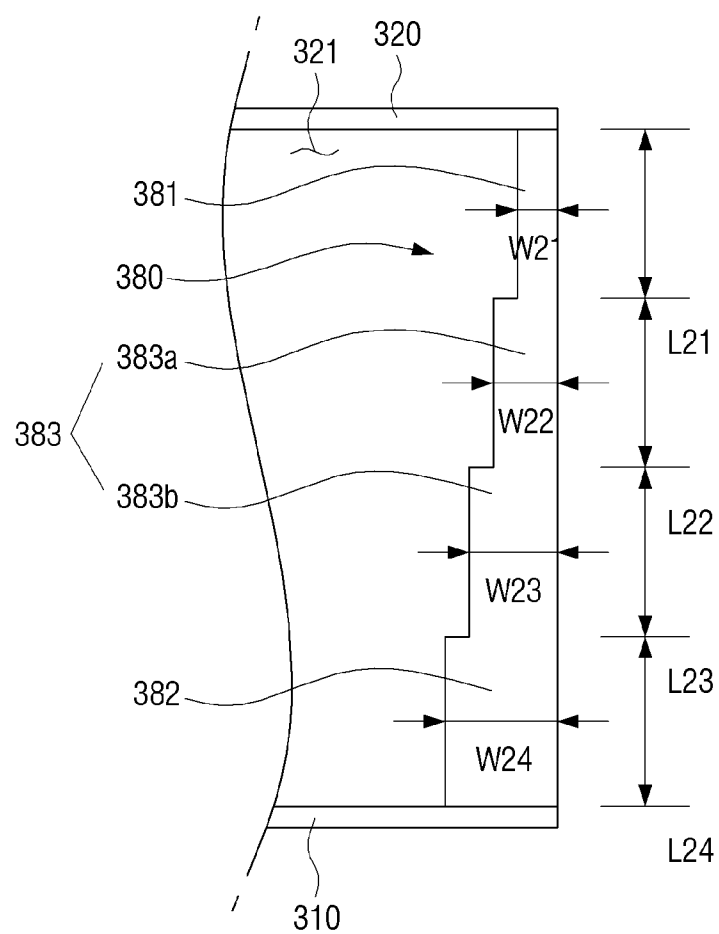


FIG. 9



**FAN ASSEMBLY FOR CENTRIFUGAL
BLOWER AND AIR CONDITIONING
APPARATUS INCLUDING THE SAME**

**CROSS-REFERENCE TO RELATED
APPLICATIONS**

[0001] This application claims priority from Korean Patent Application No. 10-2014-0167420, filed on Nov. 27, 2014, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] 1. Field

[0003] Apparatuses and methods consistent with the present disclosure relate to a fan assembly for a centrifugal blower and an air conditioning apparatus including the same, and more particularly, to a fan assembly for a centrifugal blower, for reducing consumption power, and an air conditioning apparatus including the same.

[0004] 2. Description of the Related Art

[0005] In general, a fan for a centrifugal blower introduces air in a rotation axis direction, discharges air in a radial direction, and has a greater flow rate than other fans with the same size and rotational speed. In other words, since the fan for the centrifugal blower may have a lower external circumference or rotational speed than other fans in order to achieve the same flow rate, the fan for the centrifugal blower may be applied to a blower that requires a high flow rate with a small volume. In addition, the fan for the centrifugal blower is advantageous to increase the amount of air flow despite low rotation and to reduce noise.

[0006] When the fan for the centrifugal blower is rotated by a driving source, a pressure difference is generated between internal and external parts of the fan by a centrifugal force, and accordingly, air is discharged in a radial direction of the fan for the centrifugal blower.

[0007] In this case, since a flow path of air needs to be steeply changed with a great curvature in order to discharge air introduced into an inlet through a blade portion close to the inlet, the amount of air discharged through the blade portion close to the inlet is substantially smaller than the amount of air discharged through a blade portion far from the inlet. However, air introduced in a rotation axis direction collides with a shielding plate disposed at a connection portion with the driving source of the fan for the centrifugal blower to be lost prior to being introduced to the blade portion farthest from the inlet, and thus the amount of air discharged through the blade portion adjacent to the shielding plate is greater than the amount of air discharged through a blade portion closest to the inlet but is smaller than the amount of air discharged through an intermediate portion of a blade.

[0008] A conventional fan for a centrifugal blower does not consider this and uses a blade with a constant width irrespective of a distance from an inlet. The blade with this structure includes an area in which it is not necessary to discharge air, and thus a problem arises in that unnecessary power is consumed.

[0009] To overcome this problem, conventionally, a blade with a width that is gradually increased away from the inlet is proposed. However, the blade is conceived to discharge a greater amount of air but does not consider consumption power.

[0010] In addition, although a greatest amount of air is substantially discharged through an intermediate portion of a blade, only a fan with a width that is gradually increased away from an inlet is proposed, but amounts of air that is differently discharged according to portions of the overall blade are not considered. Accordingly, there is a need to develop a fan assembly for a centrifugal blower, for reducing consumption power as well as supplying a maximum air amount.

SUMMARY

[0011] Exemplary embodiments of the present disclosure overcome the above disadvantages and other disadvantages not described above. Also, the present disclosure is not required to overcome the disadvantages described above, and an exemplary embodiment of the present disclosure may not overcome any of the problems described above.

[0012] The present disclosure provides a fan assembly for a centrifugal blower, for reducing consumption power of the centrifugal blower to enhance efficiency by applying a blade including a plurality of portions with different widths.

[0013] According to an aspect of the present disclosure, a fan assembly for a centrifugal blower includes a first support configured to receive a driving force from a driving source to rotate, a plurality of blades having one end supported by the first support and arranged with an interval in a circumferential direction of the first support, and a second support configured to support the other end of the plurality of blades and including an air inlet formed therein, wherein the plurality of blades include a first portion disposed adjacent to the air inlet, and a second portion further from the air inlet than the first portion and having a wider width than the first portion, and at least one of the first and second portions has a constant width.

[0014] Any one of the first and second portions may be gradually or non-gradually tapered towards the air inlet.

[0015] A length of the first portion may be equal to or smaller than a length of the second portion.

[0016] The second portion may more protrude towards an inner side of the fan assembly than the first portion.

[0017] A portion of an internally protruding portion of the second portion, adjacent to the first portion, may be rounded.

[0018] The second portion may further include an extension portion disposed adjacent to the first support and extending towards a rotation center of the first support.

[0019] Each of the plurality of blades may be curved in a direction from an external side to an internal side of the first support.

[0020] Each of the plurality of blades may further include a third portion between the first portion and the second portion, and the third portion may be wider than a width of the first portion and may be narrower than a width of the second portion.

[0021] A length of the third portion may be equal to or greater than the sum of the first and second portions.

[0022] The third portion may include a plurality of sections with different widths, and the plurality of sections may have a width tapered towards the air inlet.

[0023] The third portion may have a constant width or a width tapered towards the air inlet.

[0024] According to another aspect of the present disclosure, a fan assembly for a centrifugal blower includes a first support configured to receive a driving force from a driving source to rotate, a plurality of blades having one end supported by the first support and arranged with an interval in a circumferential direction of the first support, and a second

support configured to support the other end of the plurality of blades and including an air inlet formed therein, wherein the plurality of blades include a first portion disposed adjacent to the air inlet and tapered towards the air inlet, and a second portion further from the air inlet than the first portion and having a wider width than the first portion.

[0025] A length of the first portion may be equal to or smaller than a length of the second portion.

[0026] The second portion may more protrude towards a rotation center of the first support than the first portion.

[0027] The second portion may further include an extension portion disposed adjacent to the first support and extending towards a rotation center of the first support.

[0028] Each of the plurality of blades may be curved in a direction to an internal side to an external side of the first support.

[0029] According to another aspect of the present disclosure, an air conditioning apparatus includes a housing including a suction port and a discharge port of air, formed therein, a heat exchanger disposed on an air path of the air, formed in the housing, and a centrifugal blower disposed in the housing and including a fan assembly for discharging air introduced through the suction port to the discharge port, wherein the fan assembly includes a plurality of blades including a first portion disposed adjacent to the suction port and a second portion further from the suction port than the first portion and having a wider width than the first portion, and at least one of the first and second portions has a constant width.

[0030] Any one of the first and second portions may be gradually or non-gradually tapered towards the suction port.

[0031] A length of the first portion may be equal to or smaller than a length of the second portion.

[0032] Each of the plurality of blades may further include a third portion between the first portion and the second portion, and the third portion may be wider than a width of the first portion and may be narrower than a width of the second portion.

[0033] According to an aspect of the present disclosure, a fan assembly for a centrifugal blower that is configured to move air in an air conditioner is described. The fan assembly may include a first circular support member, a second circular support member, and a plurality of blades each having a first end fixed to the first circular support member and a second end fixed to the second circular support member. Each of the plurality of blades may be comprised of a first length portion having a first width and a second length portion having a second width.

[0034] According to an aspect of the present disclosure, an air conditioner is described. The air conditioner may include a housing comprising an air suction port and an air discharge port formed therein, a centrifugal blower disposed within the housing, and a fan assembly, disposed within the centrifugal blower, to move air introduced through the suction port to the discharge port of the housing. The fan assembly may include a first circular support member, a second circular support member, and a plurality of blades each having a first end fixed to the first circular support member and a second end fixed to the second circular support member. Each of the plurality of blades may be comprised of a first length portion having a first width and a second length portion having a second width.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035] The above and/or other aspects of the present disclosure will be more apparent by describing certain exem-

plary embodiments of the present disclosure with reference to the accompanying drawings, in which:

[0036] FIG. 1 is a schematic diagram illustrating an air conditioning apparatus according to an embodiment of the present disclosure;

[0037] FIG. 2 is a perspective view of a fan assembly for a centrifugal blower of an air conditioning apparatus according to an embodiment of the present disclosure;

[0038] FIG. 3 is a plan view of a blade of the fan assembly for the centrifugal blower illustrated in FIG. 2; and

[0039] FIGS. 4 to 9 are diagrams illustrating embodiments modified the blade illustrated in FIG. 3 in various ways.

DETAILED DESCRIPTION

[0040] In the following description of the present disclosure, a detailed description of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present disclosure unclear. For the purposes of promoting an understanding of the present disclosure, some elements in the following drawings may be exaggerated instead of using a real scale.

[0041] Here, an air conditioning apparatus 1 according to embodiments of the present disclosure will be described with reference to the attached drawings and a fan assembly 301 for a centrifugal blower will be mainly described in detail.

[0042] Referring to FIG. 1, the air conditioning apparatus 1 according to an embodiment of the present disclosure includes a housing 100, a heat exchanger 200, and a centrifugal blower 300 in order to heat and cool indoors by introducing air from outdoors or indoors and then exchanging heat.

[0043] The housing 100 forms an outer appearance of the air conditioning apparatus 1 and includes a suction port (not shown) for introducing air from outdoors or indoors and a discharge port (not shown) for exchanging heat with the introduced air and then discharging the air to indoors. In addition, the housing 100 protects the heat exchanger 200, the centrifugal blower 300, and other electronic components (not shown), which are disposed in the housing 100, from outside.

[0044] The heat exchanger 200 is disposed on an air path from the suction port formed in the housing 100 to the discharge port and exchanges heat with air passing through the heat exchanger 200. That is, the heat exchanger 200 absorbs air in order to cool the indoors and discharges heat in order to heat the indoors. The heat exchanger 200 may form a temperature difference from air via circulation of a refrigerant to exchange heat with air.

[0045] The aforementioned housing 100 and heat exchanger 200 are applied to a general air conditioning apparatus and a detailed description of components will be omitted.

[0046] Referring to FIG. 2, the centrifugal blower 300 is disposed on an air path formed in the housing 100 and includes a case 300a, the fan assembly 301 for a centrifugal blower (hereinafter, referred to as the 'fan assembly 301'), and a driving source (not shown) disposed outside the case 300a and providing a rotational force to the fan assembly 301.

[0047] The centrifugal blower 300 may be any one of a multi-blade fan, a turbo fan, and a plate fan.

[0048] The case 300a includes the fan assembly 301 disposed therein so as to be rotatable and includes an entrance 300b for introducing air into the case 300a and an outlet 300c for discharging air out of the case 300a, which are formed in one surface of the case 300a.

[0049] The driving source is connected to the fan assembly 301 and rotationally drives the fan assembly 301. A variety of types of motors may be used as the motor.

[0050] The fan assembly 301 includes a first support 310, a second support 320, and a plurality of blades 330. The fan assembly 301 receives a driving force from the driving source to rotate in one direction, introduces air introduced into a suction port of the housing 100 in a direction approximately parallel to a rotation center C through an inlet 321, and discharges the air in a radial direction approximately perpendicular to the rotation center C through the plurality of blades 330.

[0051] The first support 310 is formed as an approximately circular plate and supports one end of the plurality of blades 330. The first support 310 includes a coupling portion 311 integrated with a central portion thereof and connected to the driving source. The coupling portion 311 is coupled to a rotation axis (not shown) of the driving source and receives a driving force directly from the driving source.

[0052] The second support 320 is formed as an approximately ring shape and supports the other end of the plurality of blades 330 along an inner side of the second support 320. In addition, the second support 320 includes the inlet 321 formed in a central portion thereof and connected to the entrance 300b of the case 300a. The second support 320 may be formed in such a way that an internal surface 322 thereof that contacts air flow has a predetermined curvature so as to smoothly discharge air, introduced into the fan assembly 301 through the inlet 321, through the plurality of blades 330.

[0053] The plurality of blades 330 may be arranged at a predetermined interval in a circumferential direction of the first support 310 and may have one end fixed to the first support 310 and the other end fixed to the second support 320. The plurality of blades 330 generates a pressure difference between internal and external parts of the case 300a by a centrifugal force to introduce air in a direction approximately parallel to the rotation center C and to discharge the air in a radial direction approximately perpendicular to the rotation center C. In this case, the air discharged out of the fan assembly 301 is discharged out of the case 300a through the outlet 300c of the case 300a and is finally discharged out of the air conditioning apparatus 1 through an air discharge port (not shown) of the housing 100.

[0054] In the case of a multi-blade fan and a turbo fan, the plurality of blades 330 may be curved in a direction from an external side to an internal side of the second support 320, and in the case of a plate fan, the plurality of blades 330 may be horizontally formed. In addition, in the case of a multi-blade fan, an external end of the plurality of blades 330 may be disposed towards a rotation direction, and in the case of a turbo fan, the external end of the plurality of blades 330 may be disposed towards an opposite direction to the rotation direction.

[0055] Referring to FIG. 3, a blade 330 according to a first embodiment of the present disclosure is divided into a first portion 331 and a second portion 332 which have different widths according to the amount of air that is introduced through the inlet 321 and discharged in a radial direction of the fan assembly 301.

[0056] The first portion 331 is disposed adjacent to the inlet 321 and formed with a narrow and fixed or constant width W1 compared with a width W2 of the second portion 332, which in the embodiment also has a fixed or constant width W2.

[0057] In detail, in order to discharge the air introduced through the inlet 321, through the first portion 331 in the radial direction, a flow path of the air needs to be steeply changed to the radial direction immediately after the air passes through the inlet 321, and thus the amount of air discharged through the first portion 331 is smaller than the amount of air discharged through the second portion 332. Accordingly, the first portion 331 need not necessarily have a wide width for suction of a large amount of air, and thus needs to be formed with the smaller width W1 than the width W2 of the second portion 332.

[0058] On the other hand, the second portion 332 is disposed adjacent to the first support 310, which is further from the inlet 321 than the first portion 331. The second portion 332 is formed with the wider and constant width W2 than the first portion 331. In detail, a larger amount of air introduced through the inlet 321 passes through the second portion 332 than the first portion 331, the second portion 332 is formed with the wider width W2 than the width W1 of the first portion 331.

[0059] In this case, the second portion 332 may be disposed to protrude more towards an inner side of the fan assembly 301 than the first portion 331 so as to bring a large amount of air introduced through the inlet 321.

[0060] In addition, a length L1 of the first portion 331 and a length L2 of the second portion 332 may be the same, as illustrated in FIG. 3. However, embodiments of the present disclosure are not limited thereto, and the length L1 of the first portion 331 may be smaller than the length L2 of the second portion 332.

[0061] In detail, the amount of air discharged through a section (a section in a direction towards the first support 310 from the second support 320) between about 30% to 80% of the blade 330 from the second support 320 is greatest, and thus in consideration of this, the length L1 of the first portion 331 may be formed with about 30% of the length of the blade 330 and the length L2 of the second portion 332 may be formed with about 70% as the remaining length of the blade 330.

[0062] Hereinafter, a blast process using the fan assembly 301 of the centrifugal blower 300 configured above will be described.

[0063] Referring to FIGS. 2 and 3, a flow direction of air that is sequentially introduced into the entrance 300b of the case 300a and the inlet 321 of the fan assembly 301 is changed towards the plurality of blades 330 with a predetermined curvature. In this case, the amount of air directed towards the first portion 331 of the blade 330 is relatively small and the amount of air directed toward the second portion 332 of the blade 330 is relatively large.

[0064] In this case, the blade 330 may be formed in such a way that the width W1 of the first portion 331 with a relatively small amount of air introduced thereto is smaller than the width W2 of the second portion 332 with a relatively large amount of air introduced thereto so as to omit an unnecessary portion of the blade 330 for discharging air, thereby reducing power consumed to rotate the unnecessary portion from whole consumption power for rotation of the fan assembly 301. Accordingly, the fan assembly 301 may reduce consumption power compared with in a case in which a blade that unnecessarily has a wide width is driven.

[0065] Hereinafter, modified embodiments in various forms of the aforementioned blade 330 will be sequentially described with reference to FIGS. 4 to 9. For convenience of

description, the aforementioned blade **330** illustrated in FIG. **3** is defined as a first embodiment, a blade **340** illustrated in FIG. **4** is defined as a second embodiment, a blade **350** illustrated in FIG. **5** is defined as a third embodiment, a blade **360** illustrated in FIG. **6** is defined as a fourth embodiment, a blade **370** illustrated in FIGS. **7** and **8** is defined as a fifth embodiment, and a blade **380** illustrated in FIG. **9** is defined as a sixth embodiment.

[0066] In addition, the first support **310** and the second support **320** that are commonly illustrated for description of blades of the following second to sixth embodiments are the same as in the aforementioned first embodiment of the present disclosure, and thus a detailed description thereof will be omitted herein.

[0067] Referring to FIG. **4**, the blade **340** according to the second embodiment is formed in such a way that a portion **343** of an internally protruding portion of a second portion **342**, adjacent to a first portion **341**, is rounded. That is, the blade **340** is formed such that a width between the first portion **341** and the second portion **342** is not steeply changed, that is, the width is changed gradually.

[0068] Although not illustrated, a portion of an internally protruding portion of the first portion **341**, adjacent to the second portion **342**, may also be rounded.

[0069] Like in the first embodiment, the length of the first portion **341** is smaller than the length of the second portion **342**.

[0070] When the blade **340** according to the second embodiment of the present disclosure is applied to the fan assembly **301**, a flow direction of air introduced into the inlet **321** is changed towards the plurality of blades **340** with a predetermined curvature, like the blade **330** according to the first embodiment. In this case, as described above, the amounts of air directed towards the first portion **341** and the second portion **342** are different.

[0071] In this case, the blade **340** is configured in such a way that a portion of an internally protruding portion of the second portion **342**, adjacent to the first portion **341**, is rounded, thereby preventing the amount of discharged air from being reduced due to fluid turbulence generated while air passes through the portion **343** of the internally protruding portion of the second portion **342**, adjacent to the first portion **341**, compared with in a case in which the portion of the internally protruding portion of the second portion **342** is angularly formed.

[0072] With reference to FIG. **5**, the blade **350** according to the third embodiment will be described.

[0073] The blade **350** according to the third embodiment is formed in such a way that the width of a first portion **351** is tapered towards the inlet **321**. However, although the width of the first portion **351** is gradually tapered in FIG. **5**, embodiments of the present disclosure are limited thereto, and the width of the first portion **351** may be non-gradually tapered. In addition, the first portion **351** may have a constant width, but a second portion **352** may have a width that is gradually or non-gradually tapered towards the inlet **321**.

[0074] In addition, like the aforementioned blade **330** according to the first embodiment, the length of the first portion **351** may be smaller than the length of the second portion **352**.

[0075] When the blade **350** according to the third embodiment is applied to the fan assembly **301**, a flow direction of air introduced to the inlet **321** is changed towards the plurality of blades **350** with a predetermined curvature like the aforemen-

tioned blade **330** according to the first embodiment. In this case, the amount of air introduced to the first portion **351** is increased away from the inlet **321**, and correspondingly the width of the first portion **351** is increased away from the inlet **321**. That is, the blade **350** according to the third embodiment may reflect the amount of discharged air, which is changed away from the inlet **321**, in more detail than the blade **330** according to the first embodiment so as to minimize consumption power, thereby reducing the amount of lost air due to fluid turbulence to increase the amount of discharged air.

[0076] The blade **360** according to the fourth embodiment will be described with reference to FIG. **6**.

[0077] The blade **360** according to the fourth embodiment includes an extension portion **362a** formed at a second portion **362**. In detail, the extension portion **362a** is formed at a portion of the second portion **362**, adjacent to the first support **310**, and extends towards an internal side of the fan assembly **301** for a centrifugal blower.

[0078] Although FIG. **6** illustrates the case in which the width of a section of the extension portion **362a**, close to the inlet **321**, is increased away from the inlet **321**, and the width of a section of the extension portion **362a**, far from the inlet **321**, is constant, the extension portion **362a** may be formed with only a section with a width that is gradually or non-gradually increased away from the inlet **321**.

[0079] When the blade **360** according to the fourth embodiment is applied to the fan assembly **301**, a flow direction of introduced air is changed towards the plurality of blades **360** with a predetermined curvature like the aforementioned blades **330**, **340**, and **350** according to the first to third embodiments. In this case, the blade **360** according to the fourth embodiment is formed in such a way that the extension portion **362a** is formed at the second portion **362** so as to further bring air that collides with the first support **310** to be lost prior to the collision. Accordingly, lost air at a portion of the blade **360**, adjacent to the first support **310**, may be further discharged, thereby enhancing efficiency of the centrifugal blower **300**.

[0080] The blade **370** according to the fifth embodiment will be described with reference to FIGS. **7** and **8**.

[0081] The blade **370** according to the fifth embodiment may include a third portion **373** disposed between a first portion **371** and a second portion **372**. A width **W13** of the third portion **373** is smaller than a width **W11** of the first portion **371** and is wider than a width **W12** of the second portion **372**. That is, the blade **370** is formed with a portion, a width of which is increased away from the inlet **321**.

[0082] In addition, like the aforementioned blades **330**, **340**, **350**, and **360** according to the first to fourth embodiments, the width of the blade **370** may be gradually or non-gradually increased away from the inlet **321**.

[0083] In addition, although FIG. **7** illustrates the case in which a length **L11** of the first portion **371**, a length **L12** of the second portion **372**, and a length **L13** of the third portion **373** are the same, embodiments of the present disclosure are not limited thereto, and the sum of the length **L11** of the first portion **371** and the length **L12** of the second portion **372** may be equal to or smaller than the length **L13** of the third portion **373**.

[0084] In detail, the first portion **371** may be formed at a portion from the inlet **321** up to about 30% of the blade **370**, in which a relatively small amount of air passes, the third portion **373** may be formed at a portion from the inlet **321** up to a portion between about 30% and about 80% of the blade

370, in which a relatively large amount of air passes, and the second portion **372** may be formed at a portion from the inlet **321** to a portion after about 80% of the blade **370**, in which introduced air collides with the first support **310** and is partially lost.

[0085] When the blade **370** according to the fifth embodiment is applied to the fan assembly **301**, a flow direction of introduced air is changed towards the plurality of blades **370** with a predetermined curvature like in the aforementioned embodiments.

[0086] In this case, the blade **370** according to the fifth embodiment includes the first portion **371** for drawing and discharging a smallest amount of air introduced through the inlet **321**, the third portion **373** for drawing and discharging a largest amount of air, and the second portion **372** for drawing and discharging some of air lost by the first support **310**. Accordingly, air is discharged such that a smallest amount of air is discharged through the first portion **371** and a largest amount of air is discharged through the third portion **373**. In addition, the second portion **372** may discharge a larger amount of air than in the blades **330**, **340**, **350**, and **360** according to the aforementioned first to fourth embodiments.

[0087] That is, the blade **370** according to the fifth embodiment is configured in such a way that the first portion **371** for discharging a small amount of air introduced from the inlet **321** is formed with a narrow width to reduce unnecessary power consumption and the second portion **372** in which air introduced from the inlet **321** collides with the first support **310** and is lost to reduce a flow rate is formed with a wide width to reduce lost air, thereby enhancing overall efficiency of the centrifugal blower **300**.

[0088] With reference to FIG. 9, the blade **380** according to the sixth embodiment will be described.

[0089] The blade **380** according to the sixth embodiment is formed in such a way that a third portion **383** includes a plurality of sections **383a** and **383b** with different widths. Although FIG. 9 illustrates the case in which the blade **380** includes two sections, embodiments of the present disclosure are not limited thereto, and the blade **380** may include two or more sections.

[0090] In addition, a section that is further from an inlet among the plurality of sections **383a** and **383b** may have a wider width. Accordingly, in FIG. 9, a width **W23** of a second section **383b** is greater than a width **W22** of a first section **383a**. In this case, like in the aforementioned embodiments, each width of the plurality of sections **383a** and **383b** may be greater than a width **W21** of a first portion **381** and smaller than a width **W24** of a second portion **382**.

[0091] Like in the aforementioned embodiments, a width of each portion may be gradually or non-gradually increased away from the inlet **321**.

[0092] In addition, although FIG. 9 illustrates the case in which a length **L21** of the first portion **381**, a length **L22** of the second portion **382**, a length **L23** of the first section **383a**, and a length **L24** of the second section **383b** are equal to each other, embodiments of the present disclosure are not limited thereto, and the length (the sum of **L22** and **L23**) of the third portion **383** may be equal to or greater than the sum of the length **L21** of the first portion **381** and the length **L24** of the second portion **382**. This reflects the features in that the amount of discharged air is varied according to the length of the blade **380**. In addition, although the length **L22** of the first

section **383a** and the length **L23** of the second section **383b** are also equal to each other, the length **L22** and the length **L23** may be different.

[0093] When the blade **380** according to the sixth embodiment is applied to the fan assembly **301**, a flow direction of air introduced to the fan assembly **301** is changed towards the plurality of blades **380** with a predetermined curvature. Then air is discharged in such a way a largest amount of air is discharged in the first section **383a** and the second section **383b**, a next largest amount of air is discharged in the second portion **382**, and a smallest amount of air is discharged in the first portion **381**.

[0094] In this case, the blade **380** according to the sixth embodiment is configured in such a way that the third portion **383** for drawing and discharging a largest amount of air introduced through the inlet **321** is divided into the first section **383a** and the second section **383b**, thereby optimizing the amount of discharged air based on consumption power.

[0095] The blades **370** and **380** according to the aforementioned embodiments include portions with a constant width, and thus advantageously may be easily manufactured compared with the case in which a blade includes a portion with a changeable width.

[0096] Like the blades **330**, **340**, **350**, **360**, **370**, and **380** according to the aforementioned first to sixth embodiments, a blade may be manufactured whereby the blade is configured to be divided into a plurality of portions with different widths in consideration of different amounts of discharged air according to the length of the blade, thereby reducing consumption power to enhance overall efficiency of a centrifugal blower.

[0097] The foregoing exemplary embodiments and advantages are merely exemplary and are not to be construed as limiting the present disclosure. Also, the description of the exemplary embodiments of the present disclosure is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is:

1. A fan assembly for a centrifugal blower, the fan assembly comprising:

a first support to receive a driving force from a driving source;

a plurality of blades having a first end supported by the first support and arranged at an interval in a circumferential direction of the first support; and

a second support configured to support a second end of the plurality of blades and comprising an air inlet formed therein,

wherein the plurality of blades each comprise a first portion and a second portion, wherein the second portion is disposed further from the air inlet than the first portion and has a wider width than the first portion, and

wherein at least one of the first and second portions has a constant width.

2. The fan assembly for the centrifugal blower as claimed in claim 1, wherein any one of the first and second portions is tapered towards the air inlet.

3. The fan assembly for the centrifugal blower as claimed in claim 1, wherein a length of the first portion is equal to or smaller than a length of the second portion.

4. The fan assembly for the centrifugal blower as claimed in claim 1, wherein the second portion protrudes more towards an inner side of the fan assembly than the first portion.

5. The fan assembly for the centrifugal blower as claimed in claim 4, wherein a portion of an internally protruding portion of the second portion, adjacent to the first portion, is rounded.

6. The fan assembly for the centrifugal blower as claimed in claim 1, wherein the second portion comprises an extension portion disposed adjacent to the first support and extending towards a rotation center of the first support.

7. The fan assembly for the centrifugal blower as claimed in claim 1, wherein each of the plurality of blades is curved in a direction from an external side to an internal side of the first support.

8. The fan assembly for the centrifugal blower as claimed in claim 1, wherein:

each of the plurality of blades further comprises a third portion disposed between the first portion and the second portion; and

the third portion is wider than a width of the first portion and is narrower than a width of the second portion.

9. The fan assembly for the centrifugal blower as claimed in claim 8, wherein a length of the third portion is equal to or greater than the sum of the first and second portions.

10. The fan assembly for the centrifugal blower as claimed in claim 8, wherein:

the third portion comprises a plurality of sections with different widths; and

the plurality of sections have a width tapered towards the air inlet.

11. The fan assembly for the centrifugal blower as claimed in claim 8, wherein the third portion has a constant width or a width tapered towards the air inlet.

12. A fan assembly for a centrifugal blower, the fan assembly comprising:

a first support to receive a driving force from a driving source;

a plurality of blades having a first end supported by the first support and arranged at an interval in a circumferential direction of the first support; and

a second support configured to support a second end of the plurality of blades and comprising an air inlet formed therein,

wherein the plurality of blades each comprise a first portion that is tapered towards the air inlet, and a second portion,

wherein the second portion is disposed further from the air inlet than the first portion and has a wider width than the first portion.

13. The fan assembly for the centrifugal blower as claimed in claim 12, wherein a length of the first portion is equal to or smaller than a length of the second portion.

14. The fan assembly for the centrifugal blower as claimed in claim 12, wherein the second portion protrudes more towards a rotation center of the first support than the first portion.

15. The fan assembly for the centrifugal blower as claimed in claim 12, wherein the second portion further comprises an extension portion disposed adjacent to the first support and extending towards a rotation center of the first support.

16. The fan assembly for the centrifugal blower as claimed in claim 12, wherein each of the plurality of blades is curved in a direction from an internal side to an external side of the first support.

17. An air conditioning apparatus comprising:

a housing comprising a suction port for air and a discharge port for air, formed therein;

a heat exchanger disposed on an air path of the air, formed within the housing; and

a centrifugal blower disposed within the housing and comprising a fan assembly for discharging air introduced through the suction port to the discharge port,

wherein the fan assembly comprises a plurality of blades each comprising a first portion and a second portion, wherein the second portion is disposed further from the suction port than the first portion and has a wider width than the first portion, and

wherein at least one of the first and second portions has a constant width.

18. The air conditioning apparatus as claimed in claim 17, wherein any one of the first and second portions is gradually or non-gradually tapered towards the suction port.

19. The air conditioning apparatus as claimed in claim 17, wherein a length of the first portion is equal to or smaller than a length of the second portion.

20. The air conditioning apparatus as claimed in claim 17, wherein:

each of the plurality of blades further comprises a third portion disposed between the first portion and the second portion; and

the third portion is wider than a width of the first portion and is narrower than a width of the second portion.

* * * * *