US 20080220713A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2008/0220713 A1

(43) Pub. Date: Sep. 11, 2008

Kim et al.

(54) AIR CONDITIONER HAVING OUTLET PORT

(75) Inventors: **Dong Won Kim**, Suwon-si (KR); **Jae Man Joo**, Suwon-si (KR); **Seon Uk Na**, Yongin-si (KR); **Byoung In Lee**, Suwon-si (KR)

Correspondence Address:
STAAS & HALSEY LLP
SUITE 700, 1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005 (US)

(73) Assignee: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-si (KR)

(21) Appl. No.: **11/979,736**

(22) Filed: **Nov. 7, 2007**

(30) **Foreign Application Priority Data**

Mar. 6, 2007 (KR) 10-2007-0022216

Publication Classification

(51) **Int. Cl.**
F24F 13/08 (2006.01)

(52) **U.S. Cl.** **454/339**; 454/341

(57) **ABSTRACT**

Disclosed herein is an air conditioner in which the structure of an outlet port is improved to prevent dew condensation at the outlet port. The air conditioner includes an outlet port to discharge air and a guide forming a discharge channel to guide air to the outlet port side. The guide is formed in a step shape to expand the discharge channel. The air conditioner has the effect of preventing dew condensation at the outlet port.

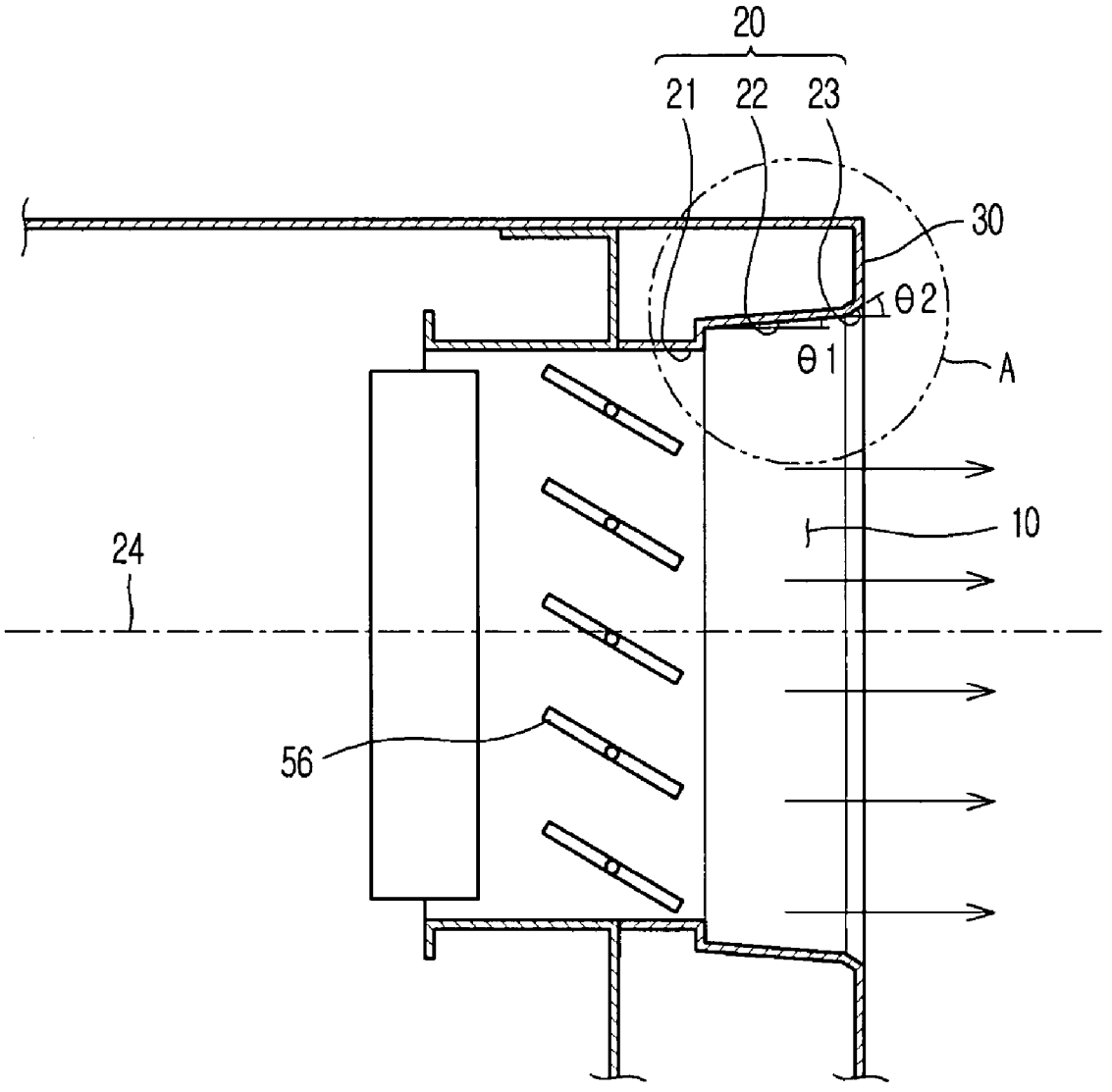


Fig. 1

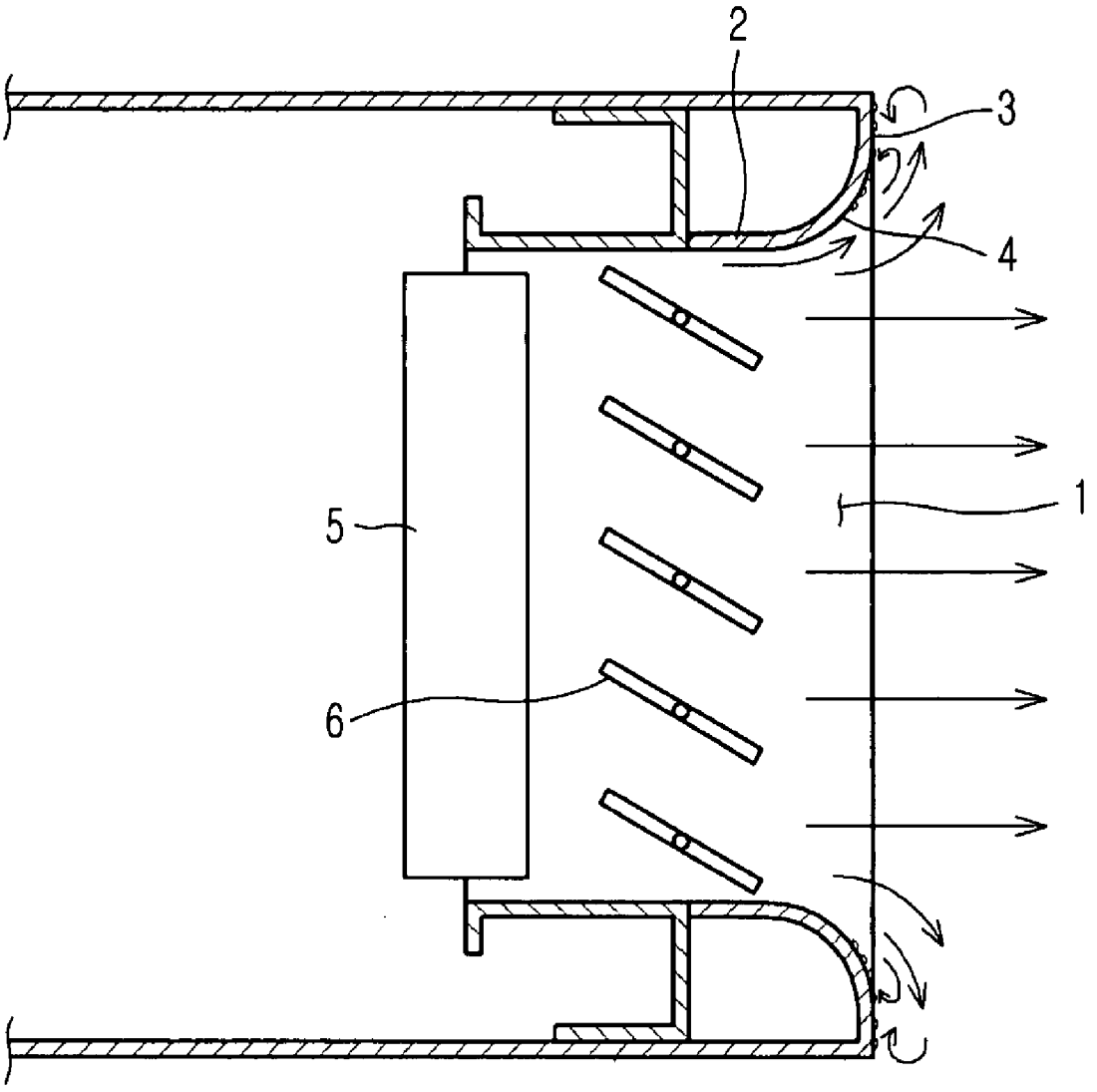


Fig. 2

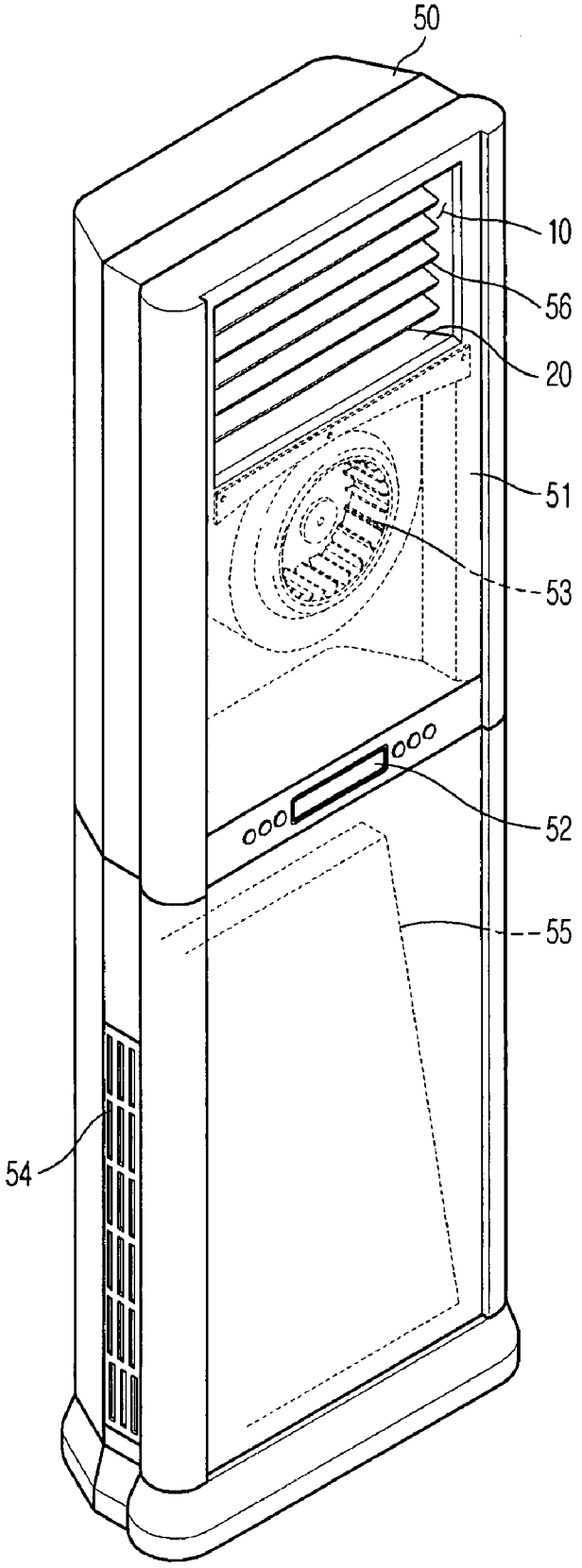


Fig. 3

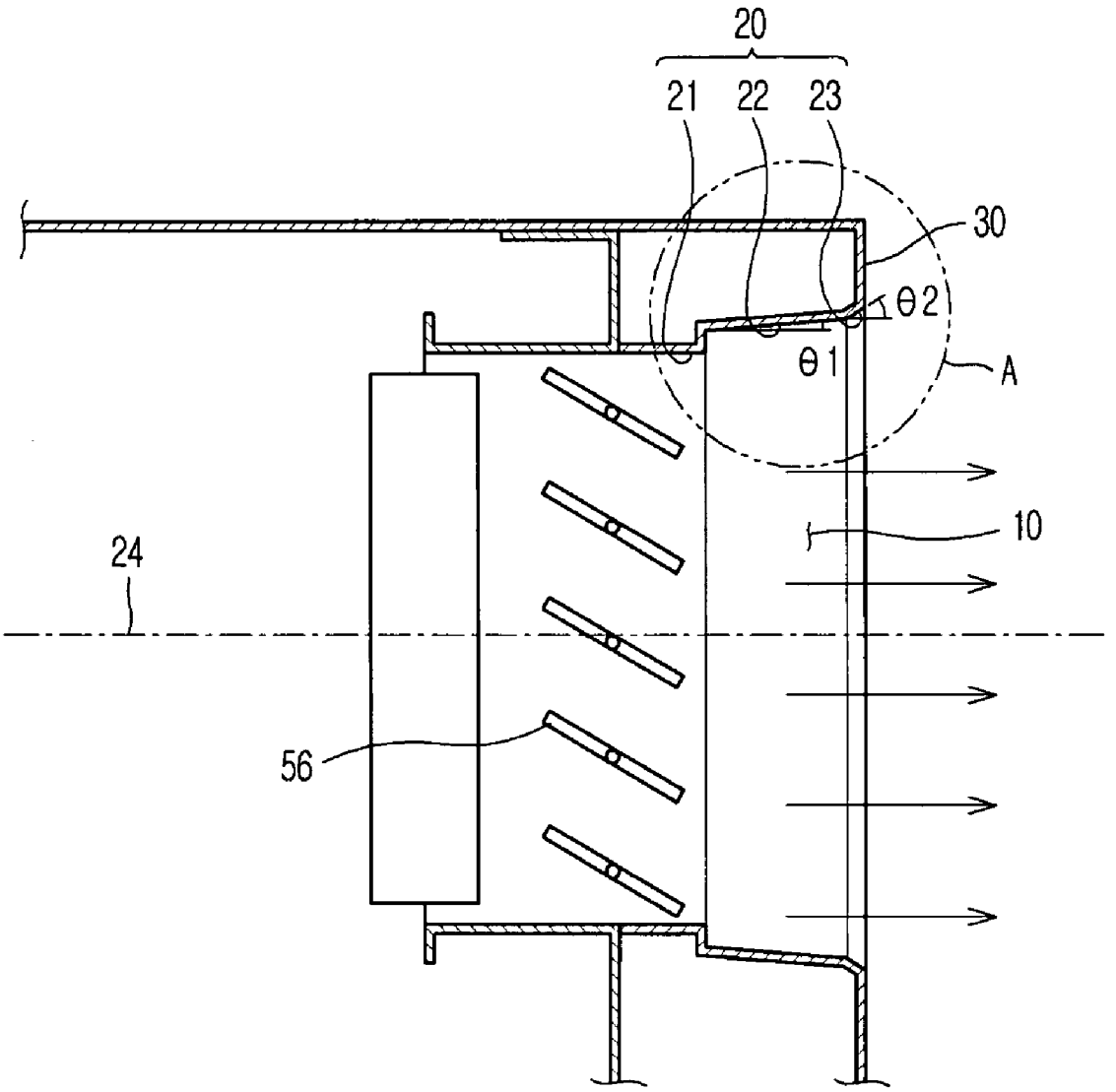
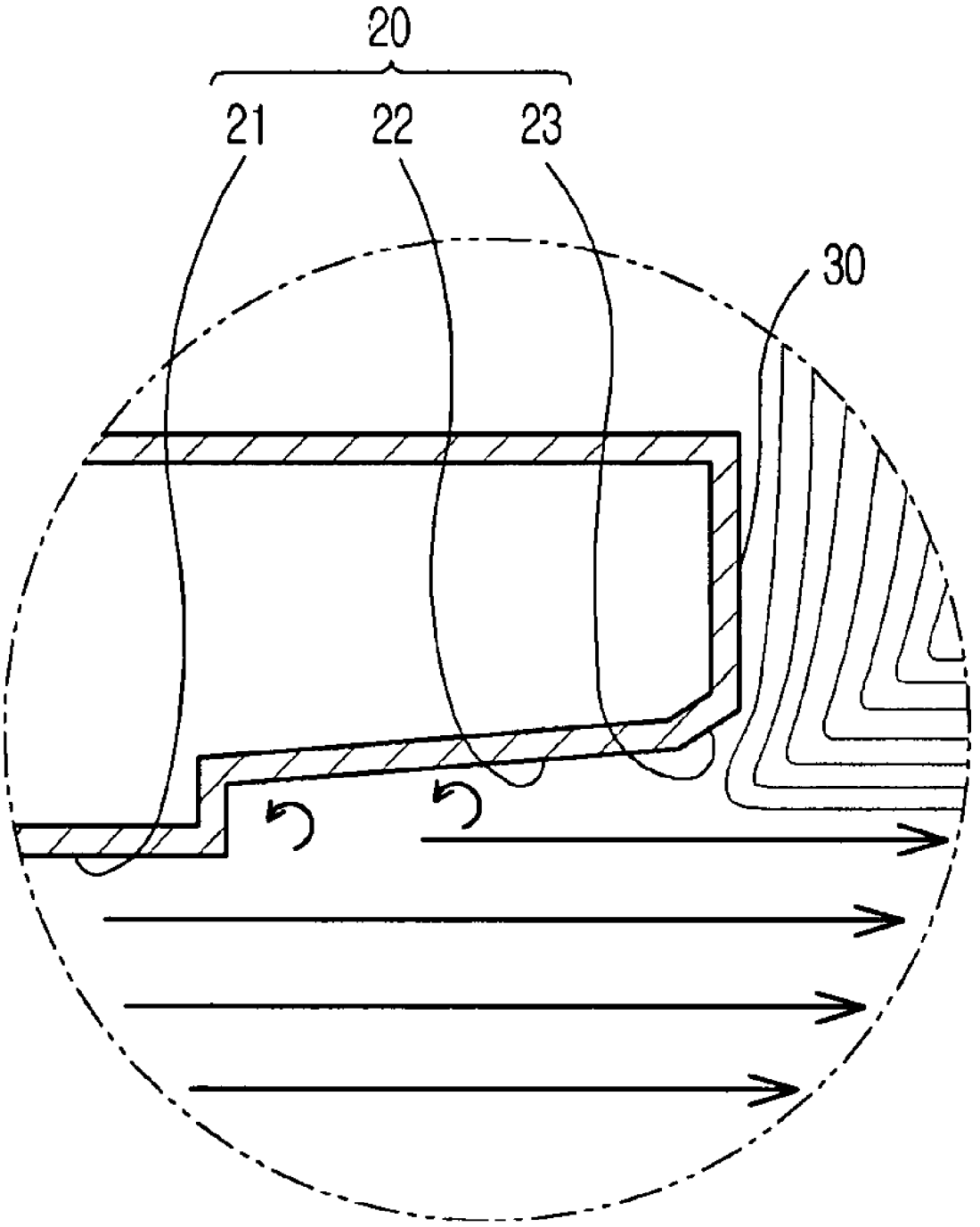


Fig. 4



AIR CONDITIONER HAVING OUTLET PORT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 2007-022216, filed on Mar. 6, 2007 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND

[0002] 1. Field

[0003] The present invention relates to an air conditioner, and, more particularly, to an air conditioner where the structure of an outlet port is improved to prevent dew condensation at the outlet port.

[0004] 2. Description of the Related Art

[0005] Generally, an air conditioner to air-condition a room includes a heat exchanger and a blower mounted in a main body. An outlet port is formed in an upper front of the main body and an inlet port is formed in a lower front of the main body such that indoor air in a place to be air-conditioned is circulated by convection to accomplish air conditioning.

[0006] FIG. **1** is a sectional view illustrating an outlet port of a conventional air conditioner.

[0007] Referring to FIG. **1**, the conventional air conditioner includes an outlet port **1** to discharge air-conditioned air, a blowing fan **5** mounted inside the outlet port **1** to blow air-conditioned air to the outlet port **1**, and blades **6** to control the direction of air discharged by the blowing fan **5**.

[0008] Korean Registered Utility Model No. 20-0258460 discloses an air conditioner that is capable of preventing dew condensation. This air conditioner includes a guide **2** forming a discharge channel to guide air to the outlet port **1** side, a discharge boundary **3** formed adjacent to the outlet port **1** to face indoor air, and an arc-shaped curve **4** formed between the guide **2** and the discharge boundary **3** and having a predetermined curvature.

[0009] Low-temperature air discharged by the blowing fan **5** passes through the guide **2** and flows to the discharge boundary **3** along the curve **4**. When the low-temperature discharged air is continuously supplied to the curve **4**, the low-temperature discharged air does not mix with high-temperature and high-humidity ambient air at the curve **4**, and therefore, dew condensation at the curve **4** is prevented.

[0010] However, the low-temperature discharged air mixes with high-temperature and high-humidity ambient air at the discharge boundary **3** with the result that dew condensation occurs at the discharge boundary **3**. That is, the discharge boundary **3** contacts indoor air, and therefore, dew condensation occurs at the discharge boundary **3**. Consequently, it is necessary for a user to remove dew condensed at the discharge boundary **3**, which increases the inconvenience of the user and decreases a consumer's satisfaction.

SUMMARY

[0011] Therefore, it is an aspect to provide an air conditioner that reduces the amount of cool air transmitted to a discharge boundary to prevent dew condensation at the discharge boundary.

[0012] Additional aspects and/or advantages will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the invention.

[0013] The foregoing and/or other aspects are achieved by providing an air conditioner including an outlet port to discharge air and a guide forming a discharge channel to guide air to an outlet port side, wherein the guide is formed in a step shape to expand the discharge channel.

[0014] The guide includes a first guide part forming the discharge channel and a second guide part connected to the first guide part, the second guide part having a step to expand the discharge channel.

[0015] Preferably, a step is formed between the first guide part and the second guide part.

[0016] The discharge channel has a central axis and the second guide part is inclined at a first predetermined angle $\theta 1$ to the central axis of the discharge channel.

[0017] The guide includes an incline connected to the second guide part, the incline being inclined at a predetermined angle $\theta 2$ to the central axis of the discharge channel.

[0018] The foregoing and/or other aspects are achieved by providing an air conditioner including a guide forming a discharge channel to guide air, an outlet port to discharge the air guided by the guide, and a discharge boundary formed adjacent to the outlet port to face indoor air, where the guide is formed in a shape to expand the discharge channel such that dew condensation is prevented at the discharge boundary.

[0019] The guide includes a first guide part forming the discharge channel and a second guide part connected to the first guide part, the second guide part having a step to expand the discharge channel.

[0020] The guide includes an incline inclined at a predetermined angle $f2$ to the central axis of the discharge channel, and the second guide part is inclined at a predetermined angle $\theta 1$ to the central axis of the discharge channel.

[0021] The inclined angle $\theta 1$ of the second guide part is less than the inclined angle $\theta 2$ of the incline.

[0022] The foregoing and/or other aspects are achieved by providing an air conditioner including an outlet port having a stepped guide; a discharge boundary adjacent the outlet port; and a fan blowing air through the outlet port, where the stepped guide is inclined with respect to the discharge boundary.

BRIEF DESCRIPTION OF THE DRAWINGS

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

[0024] FIG. **1** is a sectional view illustrating an outlet port of a conventional air conditioner;

[0025] FIG. **2** is a perspective view illustrating an air conditioner according to the present embodiment;

[0026] FIG. **3** is a partial sectional view illustrating an outlet port side of the air conditioner according to the present embodiment; and

[0027] FIG. **4** is an enlarged view of part A of FIG. **3**.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0028] Reference will now be made in detail to the embodiment, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiment is described below to explain the present invention by referring to the figures.

[0029] FIG. **2** is a perspective view illustrating an air conditioner according to the present embodiment.

[0030] Referring to FIG. **2**, the air conditioner includes an outlet port **10** formed in an upper part of a main body **50** to discharge air cooled or heated while passing through the main body **50** into a room, an air flow direction control unit mounted inside the outlet port **10** to control the flow direction of the air-conditioned air, and a guide **20** forming a discharge channel to guide the air to the outlet port **10** side. The guide **20** is formed in a step shape to expand a discharge channel toward the outlet port **10**.

[0031] The outlet port **10** is formed in an upper part of a front panel **51** mounted at the upper part of the main body **50**. The outlet port **10** is disposed at an end of the guide **20** forming the discharge channel, through which the air-conditioned air flows to the room side. In addition, a discharge boundary **30** (shown in FIG. **3**) is formed adjacent to the outlet port **10**.

[0032] The air flow direction control unit includes a plurality of horizontal blades **56** mounted inside the outlet port **10** to control the vertical flow direction of the air-conditioned air, a plurality of vertical blades (not shown) mounted at the rear of the horizontal blades **56** to control a horizontal flow direction of the air-conditioned air, and a motor (not shown) to drive the horizontal blades **56** and the vertical blades.

[0033] FIG. **3** is a partial sectional view illustrating the outlet port side of the air conditioner according to the present embodiment.

[0034] Referring to FIG. **3**, a guide **20** includes a first guide part **21** formed in parallel with the central axis **24** of the outlet port **10** to guide air-conditioned air to the room side while contacting the air-conditioned air, and a second guide part **22** connected to the first guide part **21** and formed in the sectional shape of a step to expand the discharge channel. The second guide part **22** is inclined at a predetermined angle θ**1** to the central axis **24** of the outlet port **10**, and thus inclined with respect to the first guide part **21**. The guide **10** further includes an incline **23** connected to the second guide part **22** such that the incline **23** is inclined at a predetermined angle θ**2** to the central axis **24** of the outlet port **10**.

[0035] Hereinafter, the operation of the air conditioner according to the present embodiment will be described.

[0036] A user presses a power button on a control panel **52** mounted at the front panel **51** of the air conditioner shown in FIG. **2** to operate the air conditioner. Then, a blowing fan **53** is rotated, and indoor air is introduced into the main body **50** through an inlet port **54** formed in, for example, a side of the main body **50** by the rotating force of the blowing fan **53**. The air introduced through the inlet port **54** passes by a heat exchanger **55** where the air is heat-exchanged with a coolant flowing through the heat exchanger **55**, with the result that the air is cooled. The air that is air-conditioned by the heat exchanger **55** flows to the blowing fan **53** side and is then discharged through the outlet port **10**, which is formed in the upper part of the main body **50**.

[0037] FIG. **4** is an enlarged view of part A of FIG. **3** illustrating the flow of the discharged air and indoor air at the outlet port side of the air conditioner according to the present embodiment.

[0038] Referring to FIG. **4**, the first guide part **21** forms the discharge channel in parallel with the central axis **24** of the outlet port **10**, and therefore, the air-conditioned air moves to the room side while contacting the first guide part **21**. The step is formed between the first guide part **21** and the second guide part **22** to expand the discharge channel. Consequently, when moving from the first guide part **21** to the second guide part **22**, the air-conditioned air creates whirlpools at the step.

[0039] Also, the second guide part **22** is connected to the first guide part **21** such that the step is formed between the first guide part **21** and the second guide part **22**, and the second guide part **22** is inclined at the predetermined angle θ**1** to the central axis **24** of the outlet port **10** to expand the discharge channel. The incline **23** is connected to the second guide part **22** such that the incline **23** is inclined at the predetermined angle θ**2** to the central axis **24** of the outlet port **10**.

[0040] Consequently, when comparing the amount of discharged air contacting the first guide part **21** per unit time with the amount of discharged air contacting the incline **23** per unit time, the amount of discharged air contacting the incline **23** per unit time greatly reduces, and therefore, it is difficult to cool the incline **23** by the discharged air. Furthermore, when the inclined angle θ**2** of the incline is greater than the inclined angle θ**1** of the second guide part **22**, it is further difficult to cool the incline **23** using the discharged air.

[0041] Also, the discharge speed of the air-conditioned air is greater than the free movement speed of indoor air with the result that the pressure of the discharged air is lower than that of the indoor air. Consequently, indoor air moves toward the discharge channel of the discharged air. As a result, indoor air moves between the incline **23** and the discharged air moving along the discharge channel, whereby the indoor air is introduced to the second guide part **22** side.

[0042] In conclusion, the amount of the air-conditioned air, i.e., the cool air, contacting the incline **23** per unit time greatly decreases, and a large amount of air-conditioned air does not move to the discharge boundary **30**. As a result, the air-conditioned air does not mix with indoor air at the discharge boundary **30**, thereby preventing dew condensation at the discharge boundary **30**.

[0043] The air-conditioned air does mix with indoor air due to the whirlpools of the air-conditioned air caused by the step formed between the first guide part **21** and the second guide part **22** and due to the introduction of the indoor air to the second guide part **22** side. The result is that dew condensation occurs at the second guide part **22** side. However, the amount of condensed dew is very small, and therefore, the condensed dew does not drop or is not dispersed by the discharged air.

[0044] As apparent from the above description, the present embodiment has the effect of preventing dew condensation at the outlet port and thus eliminating the necessity for a user to remove dew, thereby increasing consumer's satisfaction of the products.

[0045] Furthermore, the present embodiment has the effect of preventing contamination due to various kinds of dust generated by dew condensation at the outlet port.

[0046] Although an embodiment has been shown and described, it would be appreciated by those skilled in the art that changes may be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. An air conditioner, comprising:

an outlet port discharging air; and

a guide forming a discharge channel to guide air to an outlet port side, the guide being formed in a step shape to expand the discharge channel.

2. The air conditioner according to claim **1**, wherein the guide includes a first guide part forming the discharge chan-

nel and a second guide part connected to the first guide part, the second guide part being stepped from the first guide part to expand the discharge channel.

3. The air conditioner according to claim **2**, wherein a step is formed between the first guide part and the second guide part.

4. The air conditioner according to claim **2**, wherein the discharge channel has a central axis and the second guide part is inclined at a first predetermined angle to the central axis of the discharge channel.

5. The air conditioner according to claim **2**, wherein the discharge channel has a central axis and the guide includes an incline connected to the second guide part, the incline being inclined at a second predetermined angle to the central axis of the discharge channel.

6. An air conditioner, comprising:

a guide forming a discharge channel to guide air;

an outlet port discharging the air guided by the guide; and

a discharge boundary formed adjacent to the outlet port to face indoor air, the guide being formed in a step shape to expand the discharge channel such that dew condensation is prevented at the discharge boundary.

7. The air conditioner according to claim **6**, wherein the guide includes a first guide part forming the discharge channel and a second guide part connected to the first guide part, the second guide part being stepped from the first guide part to expand the discharge channel.

8. The air conditioner according to claim **7**, wherein the discharge channel has a central axis and, the second guide part is inclined at a first predetermined angle to the central axis of the discharge channel, and the guide includes an incline inclined at a second predetermined angle to the central axis of the discharge channel.

9. The air conditioner according to claim **8**, wherein the inclined angle of the second guide part is less than the inclined angle of the incline.

10. An air conditioner, comprising:

an outlet port having a stepped guide;

a discharge boundary adjacent the outlet port; and

a fan blowing air through the outlet port,

wherein the stepped guide is inclined with respect to the discharge boundary.

11. The air conditioner according to claim **10**, wherein the stepped guide includes a first guide part, a second guide part and an incline, the first guide part being stepped with respect to the second guide part, the second guide part being inclined with respect to the incline, and the incline being angled with respect to the discharge boundary.

12. The air conditioner according to claim **11**, wherein the output port has a central axis, the second guide part is inclined at a first predetermined angle to the central axis and the incline is inclined at a second predetermined angle to the central axis.

* * * * *