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(54) **CONTROL METHOD FOR AIR DEFLECTORS OF AIR CONDITIONER AND AIR CONDITIONER**

(57) The present disclosure relates to the technical field of air conditioners, and in particular to a control method of air deflectors of an air conditioner, and the air conditioner. In the control method of the air deflectors of the air conditioner, after a startup command is received, before the air deflectors of the air conditioner move from an air outlet of the air conditioner to preset positions, the air deflectors start to rotate for unfolding, wherein the preset positions are final positions where the air deflectors move outward and downward relative to the air outlet, and the process when the air deflectors move outward and downward is partially overlapped with the process when the air deflectors rotate for unfolding in time. In the present disclosure, since the rotation unfolding of the air deflectors in a startup phase does not need to be performed after the air deflectors move to the preset positions, but start before the air deflectors move to the preset positions, the rotation unfolding of the air deflectors does not need to take a separate time. Therefore, the startup time would be considerably shortened, which facilitates im-

proving the user experience.

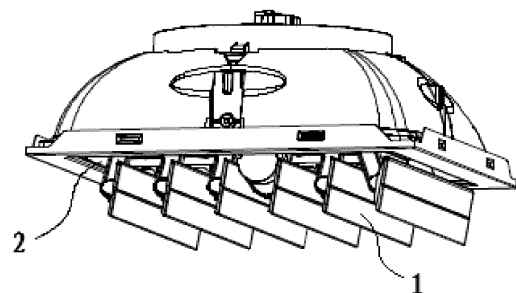


Fig.1

Description

[0001] The present application is based on the application with a CN application number of 201710156104.5 and filed on March 16, 2017, and claims the its priority, and the disclosure content of the CN application is hereby incorporated herein by reference in its entirety.

Field of the Invention

[0002] The present disclosure relates to the technical field of air conditioners, and in particular, to a control method of air deflectors of an air conditioner, and the air conditioner.

Background of the Invention

[0003] An air outlet structure of an air conditioner generally includes an air outlet and a plurality of air deflectors arranged at the air outlet. In related art, in an air conditioner startup phase, the air deflectors are generally controlled to move outward and downward relative to the air outlet to preset positions, and then the air deflectors rotate to unfold the air deflectors, wherein the preset positions are final positions where the air deflectors move outward and downward relative to the air outlet.

[0004] Since the rotation unfolding of the air deflectors in the startup phase would be performed after the air deflectors move to the preset positions, the startup time is relatively long, and the user experience is worse.

Summary of the Invention

[0005] According to one aspect of the present disclosure, a control method of air deflectors of an air conditioner, and the air conditioner, in order to improve the problem of a relatively long startup time of the air conditioner in the related art.

[0006] In order to solve the above technical problem, a first aspect of the present disclosure provides a control method of air deflectors of an air conditioner, wherein after a startup command is received, before air deflectors of the air conditioner move from an air outlet of the air conditioner to preset positions, the air deflectors rotate for unfolding, wherein the preset positions are final positions where the air deflectors move outward and downward relative to the air outlet, and the process when the air deflectors move outward and downward is partially overlapped with the process when the air deflectors rotate for unfolding in time.

[0007] Alternatively, after the startup command is received, while the air deflectors start to move from the air outlet to the preset positions, the air deflectors start to rotate for unfolding.

[0008] Alternatively, after the startup command is received, when the air deflectors (1) move from the air outlet to anti-interference positions located above the preset positions, the air deflectors rotate for unfolding, wherein

the anti-interference positions are positions configured to prevent upper parts of the air deflectors from interfering with the air outlet in the process when the air deflectors rotate for unfolding.

[0009] Alternatively, after a shutdown command is received, the air deflectors move in anyone of the following manners:

while the air deflectors start to move from the preset positions to the air outlet (2), the air deflectors start to rotate for folding;

after the air deflectors rotate for folding, the air deflectors move from the preset positions to the air outlet; and

after the air deflectors move from the preset positions to the air outlet, the air deflectors rotate for folding.

[0010] A second aspect of the present disclosure provides an air conditioner, comprising an air outlet, a plurality of air deflectors, a first power means and a second power means, wherein the first power means is configured to control the air deflectors to move between the air outlet and preset positions below an outer side of the air outlet, the second power means is configured to control the air deflectors to rotate for unfolding or folding, wherein after a startup command is received, the second power means is configured to control the air deflectors to rotate for unfolding before the first power means starts to control the air deflectors to move from the air outlet to the preset positions, and the process when the air deflectors move outward and downward is partially overlapped with the process when the air deflectors rotate for unfolding in time.

[0011] Alternatively, after the startup command is received, the second power means is configured to start to rotate the air deflectors to unfold, while the first power means starts to move the air deflectors from the air outlet to the preset positions.

[0012] Alternatively, after the startup command is received, the second power means is configured to start to control the air deflectors to rotate for unfolding, when the first power means controls the air deflectors to move from the air outlet to anti-interference positions located above the preset positions, wherein the anti-interference positions are positions configured to prevent the upper parts of the air deflectors from interfering with the air outlet in the process when the air deflectors rotate for unfolding.

[0013] Alternatively, the first power means comprises a first stepping motor, the second power means comprises a second stepping motor, after the startup command is received, the second power means is configured to control the air deflectors to rotate for unfolding after the first power means acts for X steps, wherein when the first power means acts for the X steps, the air deflectors is configured to move from the air outlet to the anti-interference positions.

[0014] Alternatively, after a shutdown command is re-

ceived, the first power means and the second power means is configured to start acting at the same time, in order to start to rotate the air deflectors to fold while starting to move the air deflectors from the preset positions to the air outlet.

[0015] Alternatively, after a shutdown command is received, the first power means is configured to control the air deflectors to move from the preset positions to the air outlet, after the second power means controls the air deflectors to rotate for folding; or, after a shutdown command is received, the second power means is configured to control the air deflectors to rotate for folding, after the first power means controls the air deflectors to move from the preset positions to the air outlet.

[0016] According to the control method of the air deflectors of the air conditioner provided by the present disclosure, before the air deflectors move from the air outlet to the preset positions, the air deflectors start to rotate for unfolding, since the rotation folding of the air deflectors in the startup phase does not need to be performed after the air deflectors move to the preset positions, the startup time would be considerably shortened, which facilitates improving the user experience.

[0017] Other features of the present disclosure and advantages thereof would become apparent from the following detailed description of exemplary embodiments of the present disclosure with reference to the drawings.

Brief Description of the Drawings

[0018] To illustrate technical solutions in the embodiments of the present disclosure or in the prior art more clearly, a brief introduction on the drawings which are needed in the description of the embodiments or the prior art is given below. Apparently, the drawings in the description below are merely some of the embodiments of the present disclosure, based on which other drawings would be obtained by those of ordinary skill in the art without any creative effort.

Fig.1 shows a state schematic diagram of air deflectors in a startup phase according to one embodiment of the present disclosure.

Fig.2 shows a state schematic diagram of air deflectors after shutdown is completed according to one embodiment of the present disclosure.

Fig.3 shows a control flow diagram of air deflectors in a startup phase according to one embodiment of the present disclosure.

[0019] Reference signs: 1. air deflectors; 2. air outlet.

Detailed Description of the Embodiments

[0020] A clear and complete description of technical solutions in the embodiments of the present disclosure will be given below, in combination with the drawings in the embodiments of the present disclosure. Apparently,

the embodiments described below are merely a part, but not all, of the embodiments of the present disclosure. The following description of at least one exemplary embodiment is merely illustrative and is in no way used as a limitation to the present disclosure or the application or use thereof. All of other embodiments, obtained by those of ordinary skill in the art based on the embodiments in the present disclosure without any creative effort, fall into the protection scope of the present disclosure.

[0021] Techniques, methods and devices known to those of ordinary skill in related art may not be discussed in detail, but where appropriate, the techniques, methods and devices should be considered as a part of the authorized specification.

[0022] In the description of the present disclosure, it should be understood that the terms "first", "second" and the like are used for defining part and components, and are only for the purpose of facilitating the distinction between the corresponding parts and components. If not stated otherwise, the above words have no special meaning, and thus cannot be construed as limitations to the protection scope of the present disclosure.

[0023] In the description of the present disclosure, it should be understood that orientation or positional relationships indicated by orientation words such as "front, back, up, lower, left, right", "transverse, vertical, perpendicular, horizontal" and "top, bottom" and the like are generally based on orientation or positional relationships when an air conditioner is normally used; and the orientation words "inside and outside" refer to the inside and outside of the contour of each component itself.

[0024] Fig.1 and Fig.2 respectively show state schematic diagrams of air deflectors in a startup completion phase and a shutdown completion phase, and Fig.3 shows a control flow diagram of the air deflectors in a startup phase according to one embodiment of the present disclosure. With reference to Fig.1 to Fig.3, a control method of air deflectors of an air conditioner provided by the present disclosure includes the following steps: after a startup command is received, before the air deflectors 1 of the air conditioner start to move from an air outlet 2 of the air conditioner to preset positions, starting to control the air deflectors 1 to rotate for unfolding

[0025] As in the prior art, in the present disclosure, the preset positions still refer to final positions where the air deflectors 1 move outward and downward relative to the air outlet 2, that is to say, in the startup phase, the air deflectors 1 do not continue to move downward and outward after moving to the preset positions.

[0026] In the present disclosure, since the rotation unfolding of the air deflectors 1 in the startup phase does not need to be performed after the air deflectors 1 move to the preset positions, but would be performed before the air deflectors 1 move to the preset positions, the rotation unfolding of the air deflectors 1 does not need to take a separate time, therefore, the startup time would be considerably shortened, which facilitates improving

the user experience.

[0027] As an embodiment of the present disclosure, after the startup command is received, while starting to control the air deflectors 1 to move from the air outlet 2 to the preset positions, the air deflectors 1 start to rotate for unfolding. In this way, the rotation unfolding of the air deflectors 1 in the startup phase would be performed at the same time as the movement of the air deflectors 1, and the rotation unfolding of the air deflectors 1 does not need to take an additional time, so that the startup time would be shortened.

[0028] In another embodiment of the present disclosure, after the startup command is received, when the air deflectors 1 start to move from the air outlet 2 to anti-interference positions located above the preset positions, the air deflectors 1 start to rotate for unfolding. Of course, in this case, when the air deflectors 1 rotate for unfolding, the air deflectors continue to move downward and outward from the anti-interference positions, until moving to the preset positions, and the movement process in the startup phase is completed.

[0029] In the present disclosure, the anti-interference positions are positions configured to prevent the upper parts of the air deflectors 1 from interfering with the air outlet 2 in the process when the air deflectors 1 rotate for unfolding.

[0030] In the above another embodiment, in the startup phase, the rotation unfolding of the air deflectors 1 is started when the air deflectors 1 move to the anti-interference positions. On one hand, since the rotation unfolding of the air deflectors 1 is started before the air deflectors 1 move to the preset positions, the movement process of the air deflectors 1 is partially overlapped with the rotation unfolding process of the air deflectors 1, and the rotation unfolding of the air deflectors 1 does not need to take an additional time, so that the startup time can be considerably shortened, on the other hand, since the rotation unfolding of the air deflectors 1 is not simultaneously performed with the movement of the air deflectors 1, but is started when the air deflectors 1 move to the anti-interference positions, the rotation unfolding of the air deflectors 1 is slightly later than the movement of the air deflectors 1. Therefore, the interference between the upper part of the air deflectors 1 with the air outlet 2 in the rotation unfolding process would also be effectively avoided, such that the rotation unfolding process of the air deflectors 1 is smoother.

[0031] Since the time taken for the rotation unfolding or rotation folding of the air deflectors 1 is shorter than the movement time of the air deflectors 1 between the air outlet and the preset positions, the slight interference between the air deflectors 1 and the air outlet 2 is only present in the early stage of the startup phase in general, in the shutdown phase, even if the rotation of the air deflectors 1 and the movement of the air deflectors 1 are performed at the same time, since the air deflectors 1 have been folded prior to the interference with the air outlet 2, no interference is generated. Therefore, in the

present disclosure, in the shutdown phase, the rotation folding of the air deflectors 1 and the movement of the air deflectors 1 would be performed simultaneously or sequentially, wherein when the rotation folding of the air deflectors 1 and the movement of the air deflectors 1 are performed sequentially, the rotation folding of the air deflectors 1 would be performed before the movement of the air deflectors 1, or the rotation folding of the air deflectors 1 would be performed after the movement of the air deflectors 1. Based on this, in the control method provided by the present disclosure, after the shutdown command is received, the air deflectors 1 could be controlled to move in any of the following manners:

while starting to control the air deflectors 1 to move from the preset positions to the air outlet 2, starting to control the air deflectors 1 to rotate for folding; after the air deflectors 1 rotate for folding, starting to control the air deflectors 1 to move from the preset positions to the air outlet 2; and after the air deflectors 1 move from the preset positions to the air outlet 2, starting to control the air deflectors 1 to rotate for folding.

[0032] In order to shorten the shutdown time, alternatively, the rotation folding of the air deflectors 1 and the movement of the air deflectors 1 are performed at the same time.

[0033] The present disclosure further provides an air conditioner, including an air outlet 2, a plurality of air deflectors 1, a first power means and a second power means, wherein the first power means is configured to control the air deflectors 1 to move between the air outlet 2 and preset positions below the outer side of the air outlet 2, the second power means is configured to control the air deflectors 1 to rotate for unfolding or to rotate for folding, wherein after a startup command is received, the second power means starts to control the air deflectors 1 to rotate for unfolding before the first power means controls the air deflectors 1 to move from the air outlet 2 to the preset positions.

[0034] Unlike the air conditioner in the prior art, in the air conditioner of the present disclosure, in the startup phase, the second power means for controlling the rotation of the air deflectors 1 does not start to act after the first power means for controlling the movement of the air deflectors 1 completes the action, but starts to act before the first power means completes the action, so that the air deflectors 1 start to rotate for unfolding before moving to the preset positions, so that the startup time is relatively short, the startup efficiency is relatively high, and the user experience is better.

[0035] In order to cause the second power means to start to act before the first power means completes the action, in the air conditioner of the present disclosure, after the startup command is received, the second power means start to control the air deflectors 1 to rotate for unfolding, while the first power means starts to control

the air deflectors 1 to move from the air outlet 2 to the preset positions, in this way, the second power means and the first power means start to act at the same time, and the action of the second power means does not need to take an additional time, so that the startup time would be shortened.

[0036] In another embodiment, the second power means would also start to control the air deflectors 1 to rotate for unfolding, when the first power means controls the air deflectors 1 to move from the air outlet 2 to anti-interference positions located above the preset positions, the second power means acts slightly later than the first power means, thereby being not only able to shorten the startup time, but also being able to prevent the interference between the air deflectors 1 and the air outlet 2, and the startup process would be smoother. Of course, after the first power means controls the air deflectors 1 to move from the air outlet 2 to anti-interference positions, it still continues to control the air deflectors 1 to move from the anti-interference positions to the preset positions, until controlling the air deflectors 1 to move to the preset positions, and the action of the first power means in the startup phase is completed.

[0037] In the above embodiment, the first power means includes a first stepping motor, the second power means includes a second stepping motor. Furthermore, after the startup command is received, the second power means start to control the air deflectors 1 to rotate for unfolding after the first power means acts for X steps, $X=1,2,3,\dots$, wherein when the first power means acts for the X steps, the air deflectors 1 move from the air outlet 2 to the anti-interference positions. Based on this, the second stepping motor is delayed behind the first stepping motor for X steps, and then the air deflectors 1 are controlled to start to rotate for unfolding when moving to the anti-interference positions in the startup phase. Accordingly, the startup time is shortened, and the startup smoothness is improved.

[0038] In addition, in the air conditioner of the present disclosure, after the shutdown command is received, the first power means and the second power means act according to any one of the following manners:

the first power means and the second power means start to act at the same time;
the first power means starts to control the air deflectors 1 to move from the preset positions to the air outlet 2, after the second power means controls the air deflectors 1 to rotate for folding; and,
the second power means starts to control the air deflectors 1 to rotate for folding, after the first power means controls the air deflectors 1 to move from the preset positions to the air outlet 2.

[0039] If the first power means and the second power means start to act at the same time, it means that while starting to control the air deflectors 1 to move from the preset positions to the air outlet 2, the air deflectors 1 is

started to be controlled to rotate for folding, since the rotation folding and the movement of the air deflectors 1 in the shutdown phase are performed at the same time, the rotation folding of the air deflectors 1 does not need to take an additional time, so that the shutdown time would be shortened considerably.

[0040] Therefore, based on the control method and the air conditioner provided by the present disclosure, the startup time would be shortened, and experiments show that the present disclosure would shorten the startup time by 50% compared with the prior art, would considerably improve the efficiency, and significantly improve the user experience.

[0041] The above descriptions are only exemplary embodiments of the present disclosure, and are not intended to limit the disclosure, and any modifications, equivalents, improvements and the like, made within the spirit and principles of the present disclosure, should be included in the protection scope of the present disclosure.

Claims

1. A control method of air deflectors of an air conditioner, wherein after a startup command is received, before air deflectors (1) of the air conditioner move from an air outlet (2) of the air conditioner to preset positions, the air deflectors (1) rotate for unfolding, wherein the preset positions are final positions where the air deflectors (1) move outward and downward relative to the air outlet, and the process when the air deflectors (1) move outward and downward is partially overlapped with the process when the air deflectors (1) rotate for unfolding in time.
2. The control method according to claim 1, wherein after the startup command is received, while the air deflectors (1) start to move from the air outlet (2) to the preset positions, the air deflectors (1) start to rotate for unfolding.
3. The control method according to claim 1, wherein after the startup command is received, when the air deflectors (1) move from the air outlet (2) to anti-interference positions located above the preset positions, the air deflectors (1) rotate for unfolding, wherein the anti-interference positions are positions configured to prevent upper parts of the air deflectors (1) from interfering with the air outlet (2) in the process when the air deflectors (1) rotate for unfolding.
4. The control method according to claim 1, wherein after a shutdown command is received, the air deflectors (1) move in any one of the following manners:

while the air deflectors (1) start to move from the preset positions to the air outlet (2), the air deflectors (1) start to rotate for folding;

after the air deflectors (1) rotate for folding, the air deflectors (1) move from the preset positions to the air outlet (2); and
after the air deflectors (1) move from the preset positions to the air outlet (2), the air deflectors (1) rotate for folding.

5. An air conditioner, comprising an air outlet (2), a plurality of air deflectors (1), a first power means and a second power means, wherein the first power means is configured to control the air deflectors (1) to move between the air outlet (2) and preset positions below an outer side of the air outlet (2), the second power means is configured to control the air deflectors (1) to rotate for unfolding or folding, wherein after a startup command is received, the second power means is configured to control the air deflectors (1) to rotate for unfolding before the first power means starts to control the air deflectors (1) to move from the air outlet (2) to the preset positions, and the process when the air deflectors (1) move outward and downward is partially overlapped with the process when the air deflectors (1) rotate for unfolding in time.
6. The air conditioner according to claim 5, wherein after the startup command is received, the second power means is configured to start to rotate the air deflectors (1) to unfold, while the first power means starts to move the air deflectors (1) from the air outlet (2) to the preset positions.
7. The air conditioner according to claim 5, wherein after the startup command is received, the second power means is configured to start to control the air deflectors (1) to rotate for unfolding, when the first power means controls the air deflectors (1) to move from the air outlet (2) to anti-interference positions located above the preset positions, wherein the anti-interference positions are positions configured to prevent the upper parts of the air deflectors (1) from interfering with the air outlet (2) in the process when the air deflectors (1) rotate for unfolding.
8. The air conditioner according to claim 7, wherein the first power means comprises a first stepping motor, the second power means comprises a second stepping motor, after the startup command is received, the second power means is configured to control the air deflectors (1) to rotate for unfolding after the first power means acts for X steps, $X=1,2,3\dots$, wherein when the first power means acts for the X steps, the air deflectors (1) is configured to move from the air outlet (2) to the anti-interference positions.
9. The air conditioner according to claim 5, wherein after a shutdown command is received, the first power means and the second power means is configured to start acting at the same time, in order to start to

rotate the air deflectors (1) to fold while starting to move the air deflectors (1) from the preset positions to the air outlet (2).

10. The air conditioner according to claim 5, wherein after a shutdown command is received, the first power means is configured to control the air deflectors (1) to move from the preset positions to the air outlet (2), after the second power means controls the air deflectors (1) to rotate for folding; or, after a shutdown command is received, the second power means is configured to control the air deflectors (1) to rotate for folding, after the first power means controls the air deflectors (1) to move from the preset positions to the air outlet (2).

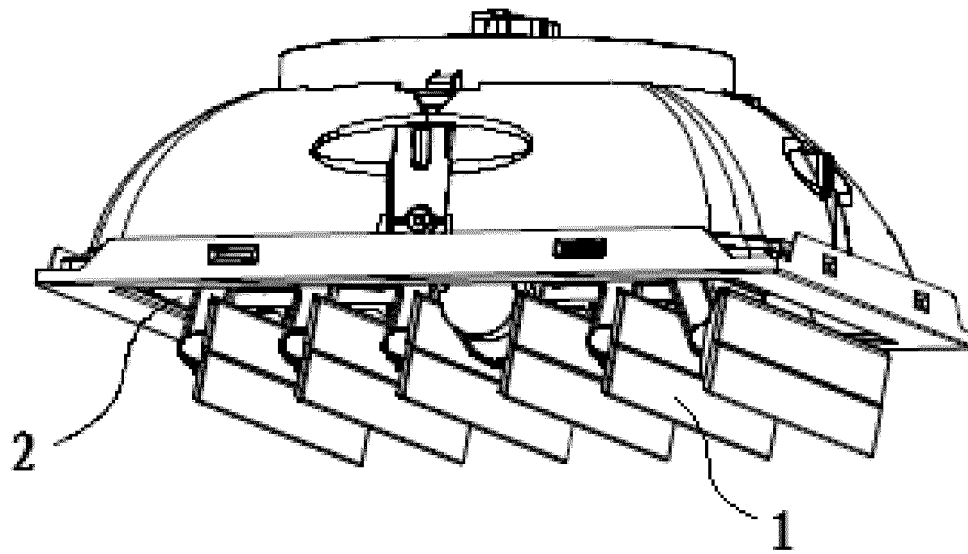


Fig.1

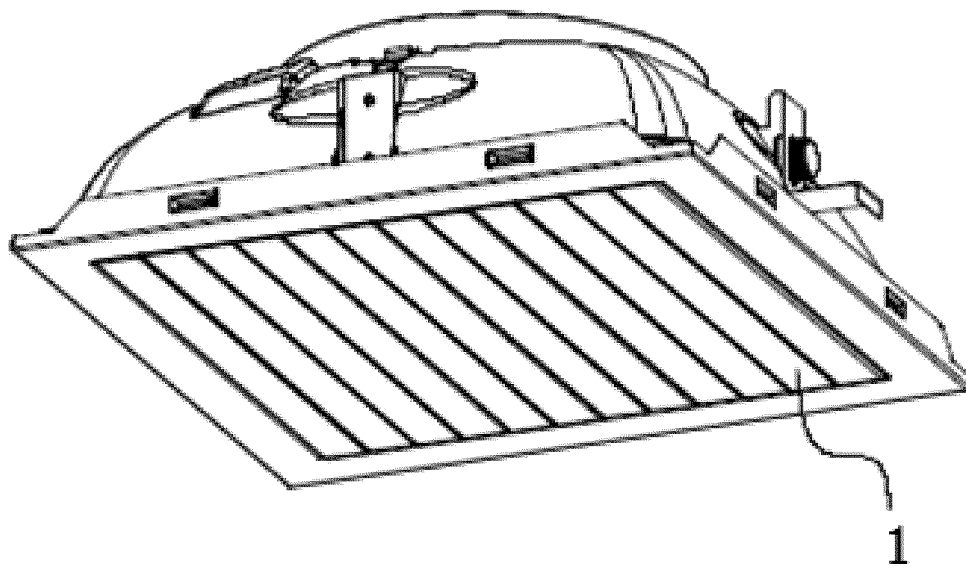


Fig.2

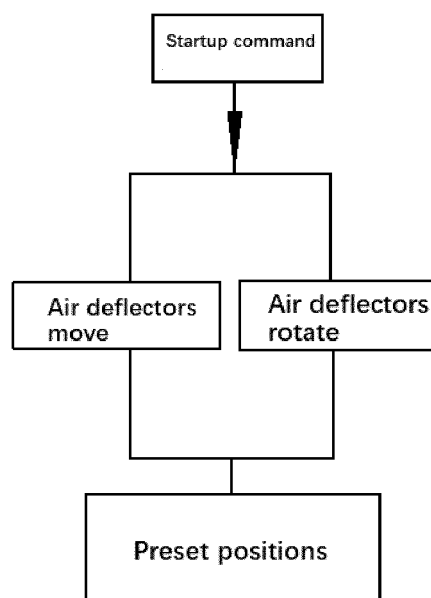


Fig.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/106673

A. CLASSIFICATION OF SUBJECT MATTER

F24F 11/00 (2018.01) i; F24F 13/15 (2006.01) i
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, CNTXT, CNKI, VEN: 空调, 空气调节, 空气调和, 开机, 打开, 开启, 起动, 启动, 导风板, 导向板, 风向板, 导风装置, 风门, 叶片, 移动, 平移, 平推, 推出, 转动, 旋转, 展开, 干涉, 避让, air conditioner, start, open, initiate, turn on, louvre, louver, flapper, damper, shutter, baffle, vane, move, shift, rotate, rotary, spin, revolute, gyrate, interference

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 101182952 A (PANASONIC CORPORATION) 21 May 2008 (21.05.2008), description, page 4, paragraph 4 to page 7, paragraph 6, and figures 1-7	1-3, 5-8
Y	CN 101182952 A (PANASONIC CORPORATION) 21 May 2008 (21.05.2008), description, page 4, paragraph 4 to page 7, paragraph 6, and figures 1-7	4, 9, 10
Y	CN 202692366 U (GREE ELECTRIC APPLIANCES INC. ZHUHAI) 23 January 2013 (23.01.2013), description, paragraphs [0045]-[0048], and figures 1 and 2	4, 9, 10
Y	CN 103574871 A (GREE ELECTRIC APPLIANCES INC. ZHUHAI) 12 February 2014 (12.02.2014), description, paragraphs [0059]-[0062], and figures 1 and 2	4, 9, 10
PX	CN 106907835 A (GREE ELECTRIC APPLIANCES INC. ZHUHAI) 30 June 2017 (30.06.2017), claims 1-10	1-10

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* 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
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"E" earlier application or patent but published on or after the international filing date	"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	
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Date of the actual completion of the international search 10 January 2018	Date of mailing of the international search report 18 January 2018
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer HUO, Fang Telephone No. (86-10) 62084833

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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JP 2007101144 A	19 April 2007	None	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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