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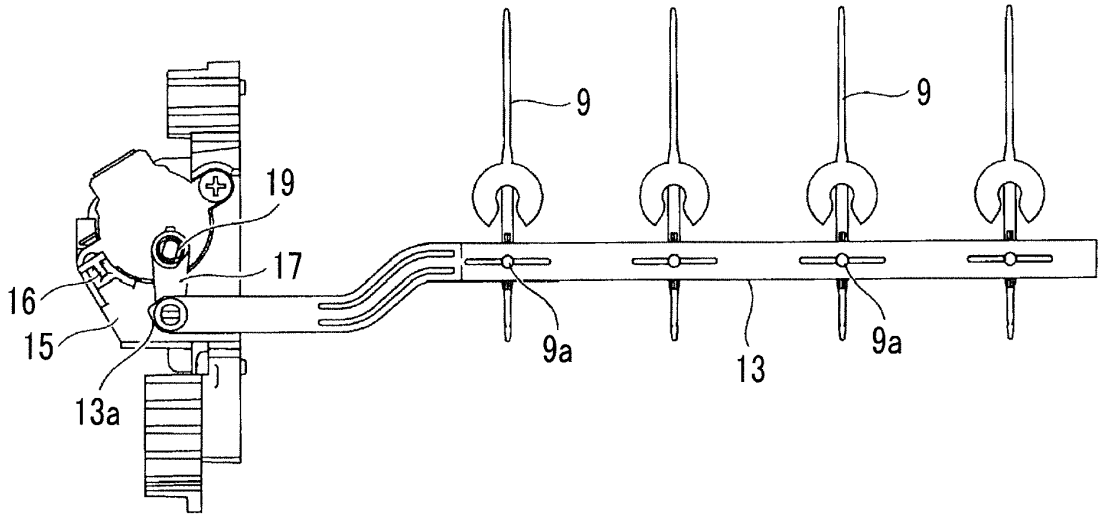
(54) INDOOR UNIT OF AIR CONDITIONER

(57) This indoor unit of an air conditioner is provided with: multiple louvers (9) which are arranged at a prescribed interval in the width direction of a blow port and which change the air flow direction; a connecting member (13) which extends in the width direction and to which the louvers (9) are rotatably attached; a ring member (17) which is rotatably attached to the connecting member (13); a motor which pivots the ring member (17); a motor bracket (15) which fixes the motor to the main body; and a stopper (16) which is provided on the motor bracket (15) and contacts the connecting member (13).

FIG. 3A



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Description

Technical Field

[0001] The present invention relates to an indoor unit of an air conditioner including a louver that changes a wind direction.

Background Art

[0002] Louvers for changing a direction of air after air conditioning are provided in an indoor unit of an air conditioner. The plurality of louvers are arranged in a predetermined interval in a lateral direction in an outlet of the indoor unit (for example, PTL 1).

Citation List

Patent Literature

[0003] [PTL 1] Japanese Unexamined Patent Application Publication No. 11-118186

Summary of Invention

Technical Problem

[0004] A connecting member to which each louver is rotatably attached is used in order to rotate the plurality of louvers in synchronization. The connecting member has a rod shape, and a link member is attached to one end thereof. By a motor oscillating the link member, the connecting member reciprocates in a longitudinal direction, and each louver is rotated, thereby controlling a wind direction.

[0005] However, the connecting member is made long in order to connect each louver, and thereby dimension management is difficult. In addition, when a reference position of the connecting member is not accurately determined, each louver cannot be lined up to face the front, and thus a problem of the indoor unit looking bad arises.

[0006] In view of such circumstances, an object of the present invention is to provide an indoor unit of an air conditioner that can accurately perform positioning of a plurality of louvers.

Solution to Problem

[0007] In order to solve the problems, the indoor unit of an air conditioner of the present invention adopts the following means.

[0008] That is, according to an aspect of the present invention, there is provided an indoor unit of an air conditioner including a plurality of louvers which are arranged at a predetermined interval in one direction and change a wind direction, a connecting member which extends in the one direction and to which each of the louvers is rotatably attached, a link member which is rotatably attached to the connecting member, a motor which oscillates the link member, a motor bracket which fixes the motor to a main body, and a stopper which is provided in the motor bracket and abuts against the connecting member.

[0009] When the motor oscillates the link member, the connecting member to which the link member is attached moves. When the connecting member moves, each louver attached to the connecting member rotates, and a wind direction changes.

[0010] The stopper that abuts against the connecting member is provided in the motor bracket that fixes the motor to the main body. The movement of the connecting member is regulated when the connecting member abuts against the stopper, and thereby positioning of each of the louvers is performed. Since a position is determined by the stopper provided in the motor bracket to which the motor is attached as described above, the positioning of each of the louvers can be accurately performed compared to a case where the stopper is provided in a member different from the motor bracket to which the motor is attached, such as other members including a casing.

[0011] In the indoor unit of an air conditioner according to the aspect of the present invention, the stopper abuts against the connecting member at a position where the stopper faces the connecting member.

[0012] Since the stopper abuts against the connecting member at the position where the stopper faces the connecting member, a shift of the connecting member can be suppressed after the connecting member has abutted against the stopper. Accordingly, more accurate positioning of the louvers can be performed.

[0013] In the indoor unit of an air conditioner according to the aspect of the present invention, a control section which controls the motor is further included. The control section sets a position where the connecting member has abutted against the stopper as a reference position.

[0014] By the control section setting the position where the stopper has abutted against the connecting member as the reference position, a reference position of each of the louvers is accurately determined. Accordingly, a rotation angle of each of the louvers can be controlled as a desired position.

Advantageous Effects of Invention

[0015] Since a position is determined by the stopper provided in the motor bracket to which the motor is attached, the positioning of the plurality of louvers can be accurately performed.

Brief Description of Drawings

[0016]

Fig. 1 is a perspective view illustrating an indoor unit of an air conditioner according to an embodiment of the present invention.

Fig. 2 is a perspective view illustrating an inside of the indoor unit of Fig. 1.

Fig. 3A is a plan view illustrating a state where a connecting member is separated away from a stopper.

Fig. 3B is a partially enlarged plan view of Fig. 3A.

Fig. 4A is a plan view illustrating a state where the connecting member has abutted against the stopper.

Fig. 4B is a partially enlarged plan view of Fig. 4A.

Description of Embodiments

[0017] Hereinafter, an embodiment according to the present invention will be described with reference to the drawings.

[0018] Fig. 1 illustrates an appearance of an indoor unit 1 of an air conditioner. The indoor unit 1 is a wall-hanging type, sucks indoor air from above, and blows air after air conditioning indoors from an outlet below. The indoor unit 1 is connected to an outdoor unit (not illustrated), receives supply of a refrigerant compressed by the outdoor unit, and adjusts indoor air so as to have a predetermined temperature by means of an indoor heat exchanger provided inside the indoor unit 1.

[0019] Fig. 2 illustrates an inside of the indoor unit 1. As illustrated in Fig. 2, an indoor heat exchanger 5 is attached to a base plate 3 that is fixed to an indoor wall surface. An outlet 7 provided in a width direction of the indoor unit 1 is formed below the indoor heat exchanger 5. A plurality of louvers 9 that are at predetermined intervals in the width direction (one direction) are provided in the outlet 7. Each of the louvers 9 is a resin plate. Each of the louvers 9 is rotatably attached to a bearing portion 11 provided on a main body side of the indoor unit 1. An attaching pin 9a (refer to Fig. 3A) is provided in each of the louvers 9, and the attaching pin 9a is rotatably attached to a connecting member 13.

[0020] The connecting member 13 is made of a resin, and has a rod shape extending in the width direction of the indoor unit 1. A left end, which is one end of the connecting member, is disposed to be positioned on a motor bracket 15 side.

[0021] A motor bracket 15 is fixed to a main body of the indoor unit 1, and accommodates a motor for driving the louvers 9.

[0022] Figs. 3A and 3B are enlarged views of surroundings of the connecting member 13 and the motor bracket 15. One end of a link member 17 is rotatably attached to the left end of the connecting member 13. The other end of the link member 17 is attached to a motor shaft 19. Therefore, when the motor shaft 19 is rotated by the motor, the link member 17 oscillates, and accordingly the connecting member 13 reciprocates in a substantially longitudinal direction. In response to the reciprocation of the connecting member 13, a rotation angle of each of the louvers 9 changes. A rotation angle of the motor shaft 19 is transmitted to a control section (not illustrated).

[0023] A stopper 16 is fixed to the motor bracket 15. As illustrated in Figs. 4A and 4B, the stopper 16 regulates the movement of the connecting member 13 by abutting against a tip 13a of the connecting member 13.

[0024] As seen from Figs. 3B and 4B, an abutting surface 13b of the tip 13a of the connecting member 13 comes into surface-contact with an abutting surface 16a of the stopper 16. That is, the abutting surface 16a of the stopper 16 is set to face the abutting surface 13b of the connecting member 13.

[0025] The control section sets a position where the tip 13a of the connecting member 13 has abutted against the stopper 16 as a reference position. Then, based on the reference position, the control section controls the rotation angle of the motor shaft 19 and controls a position of each of the louvers 9.

[0026] For example, the control section is configured with a central processing unit (CPU), a random access memory (RAM), a read only memory (ROM), a computer readable storage medium, and like. For example, a series of processes for realizing various types of functions are stored in a storage medium or the like in the form of a program, and the program is read by the CPU with the RAM or the like to execute an information processing and computing process, thereby realizing the various types of functions. The program may be applied in a form of being installed in advance in the ROM or other storage media, a form of being provided in a state of being stored in the computer readable storage medium, a form of being distributed via communication means in a wired or wireless manner, and the like. The computer readable storage medium refers to a magnetic disk, a magneto-optical disk, a CD-ROM, a DVD-ROM, a semiconductor memory, and the like.

[0027] Positioning of a reference position of each of the louvers 9 is performed as follows.

[0028] First, the motor is driven in accordance with a command from the control section to rotate the motor shaft 19, and thereby the link member 17 oscillates. In response to the oscillation of the link member 17, the tip 13a of the connecting member 13 moves to a stopper 16 side, and the abutting surface 13b of the connecting member 13 comes into surface-contact with the abutting surface 16a of the stopper 16. Accordingly, the movement of the connecting member 13 is regulated, and the control section sets this position as a reference position. With the reference position as reference, the control section rotates the motor shaft 19 and controls a wind direction angle of each of the louvers 9.

[0029] In the aforementioned indoor unit 1, the following operation effects can be achieved.

[0030] The stopper 16 that abuts against the connecting member 13 is provided in the motor bracket 15 that fixes the motor to the main body of the indoor unit 1. The movement of the connecting member 13 is regulated when the connecting member abuts against the stopper 16, and thereby positioning of each of the louvers 9 is performed. Since a position is determined by the stopper 16 provided in the motor bracket 15 to which the motor

is attached as described above, the positioning of each of the louvers 9 can be accurately performed compared to a case where the stopper 16 is provided in a member different from the motor bracket 15 to which the motor is attached, such as other members including a casing.

[0031] Since the stopper 16 abuts against and comes into surface-contact with the connecting member 13 at a position where the stopper faces the connecting member, strong frictional forces act. Thus, after the connecting member 13 has abutted against the stopper 16, a shift of the connecting member 13 can be suppressed. Accordingly, more accurate positioning of the louvers 9 can be performed.

[0032] By the control section setting the position where the stopper 16 has abutted against the connecting member 13 as a reference position, the reference position of each of the louvers 9 is accurately determined. Accordingly, the rotation angle of each of the louvers 9 can be controlled as a desired position.

Reference Signs List

[0033]

1: indoor unit
3: base plate
5: indoor heat exchanger
7: outlet
9: louver
11: bearing portion
13: connecting member
13a: tip
13b: abutting surface
15: motor bracket
16: stopper
16a: abutting surface
17: link member
19: motor shaft

Claims

1. An indoor unit of an air conditioner, comprising:

a plurality of louvers which are arranged at a predetermined interval in one direction and change a wind direction;
a connecting member which extends in the one direction and to which each of the louvers is rotatably attached;
a link member which is rotatably attached to the connecting member;
a motor which oscillates the link member;
a motor bracket which fixes the motor to a main body; and
a stopper which is provided in the motor bracket and abuts against the connecting member.

2. The indoor unit of an air conditioner according to Claim 1,
wherein the stopper abuts against the connecting member at a position where the stopper faces the connecting member.

3. The indoor unit of an air conditioner according to Claim 1 or 2, further comprising:

a control section which controls the motor,
wherein the control section sets a position where the connecting member has abutted against the stopper as a reference position.

Amended claims under Art. 19.1 PCT

1. (Amended) An indoor unit of an air conditioner, comprising:

a plurality of louvers which are arranged at a predetermined interval in one direction and change a wind direction;
a connecting member which extends in the one direction, to which each of the louvers is rotatably attached, and which reciprocates in a longitudinal direction;
a link member which is rotatably attached to the connecting member;
a motor which oscillates the link member;
a motor bracket which fixes the motor to a main body; and
a stopper which is provided in the motor bracket and abuts against a tip of the connecting member.

2. The indoor unit of an air conditioner according to Claim 1,
wherein the stopper abuts against the connecting member at a position where the stopper faces the connecting member.

3. The indoor unit of an air conditioner according to Claim 1 or 2, further comprising:

a control section which controls the motor,
wherein the control section sets a position where the connecting member has abutted against the stopper as a reference position.

FIG. 1

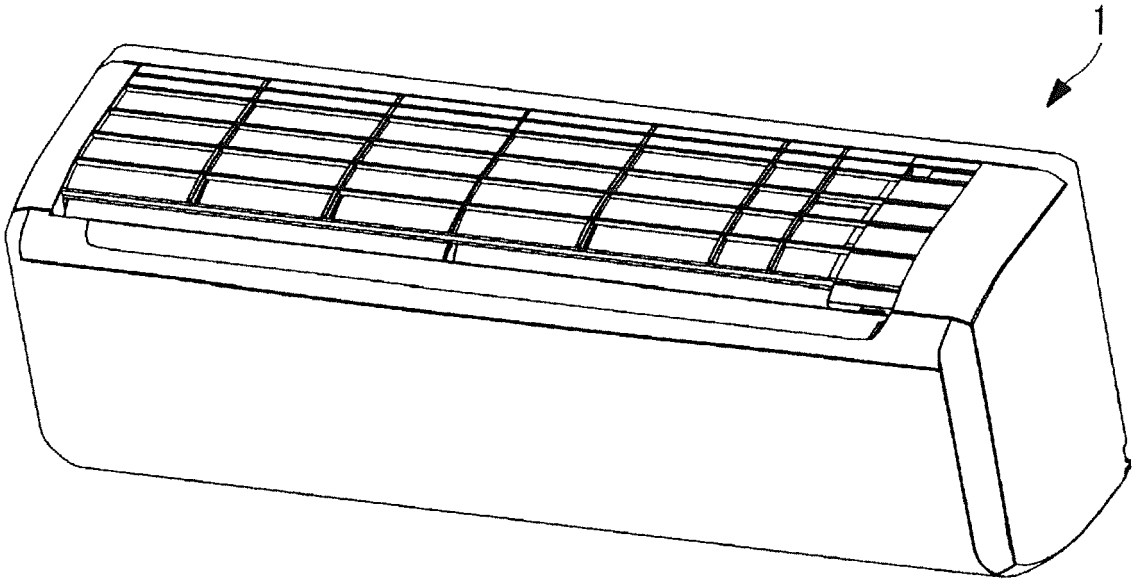


FIG. 2

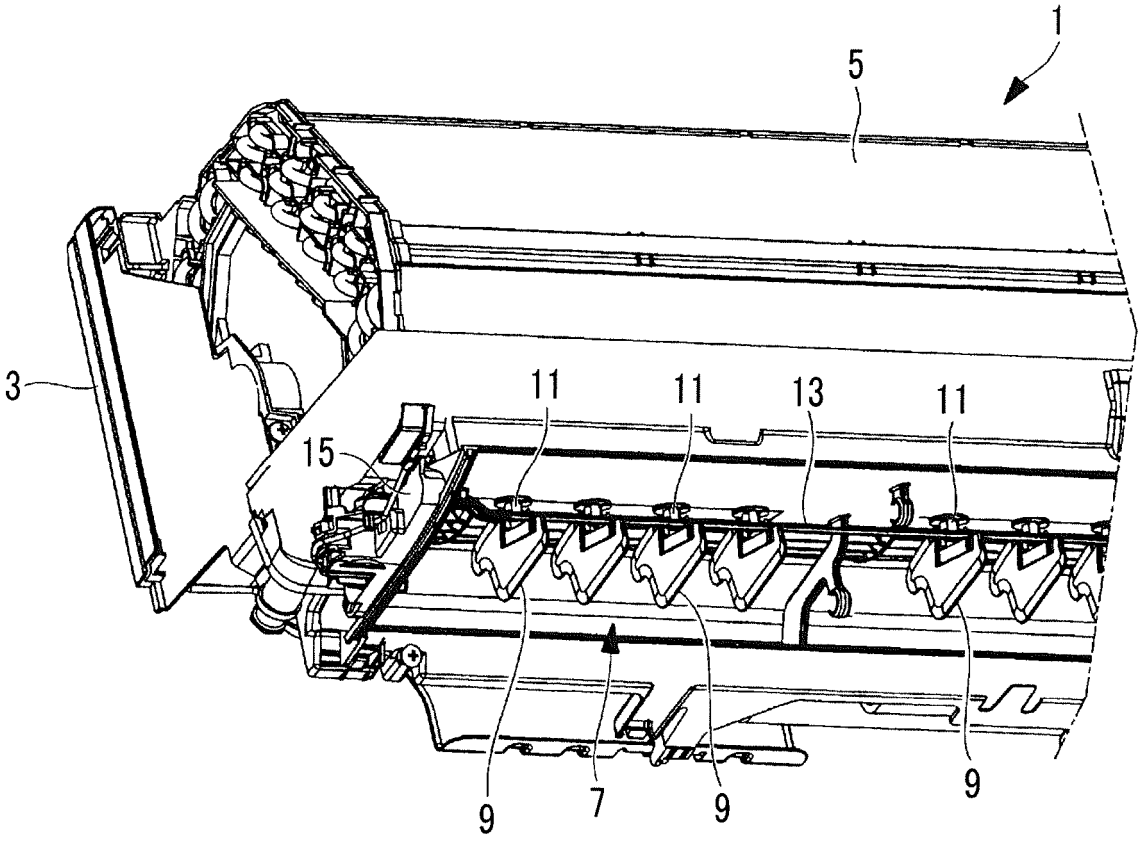


FIG. 3A

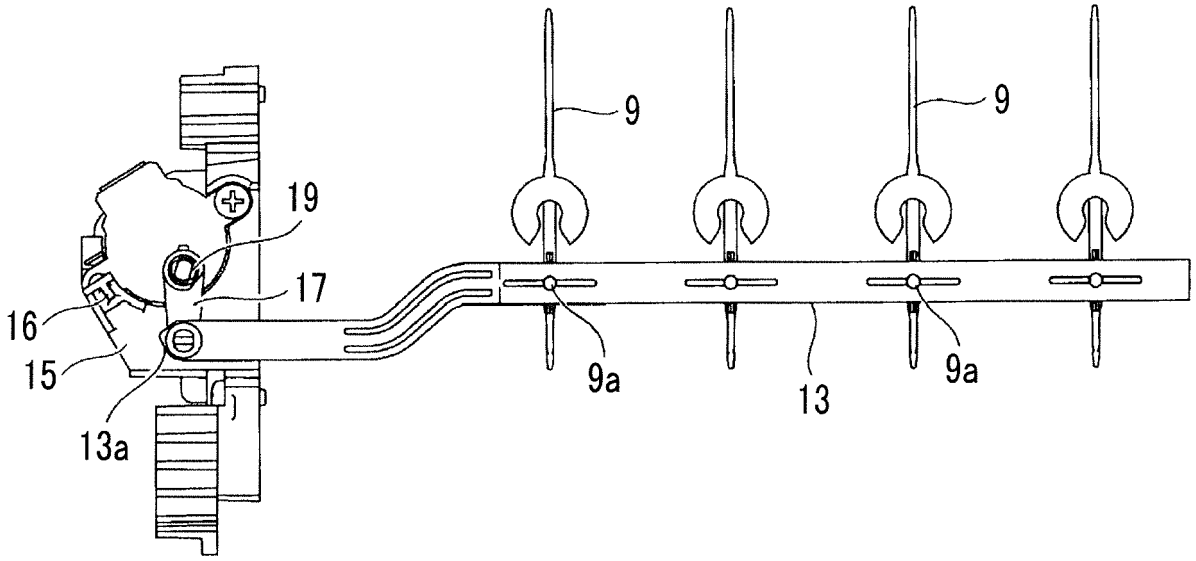


FIG. 3B

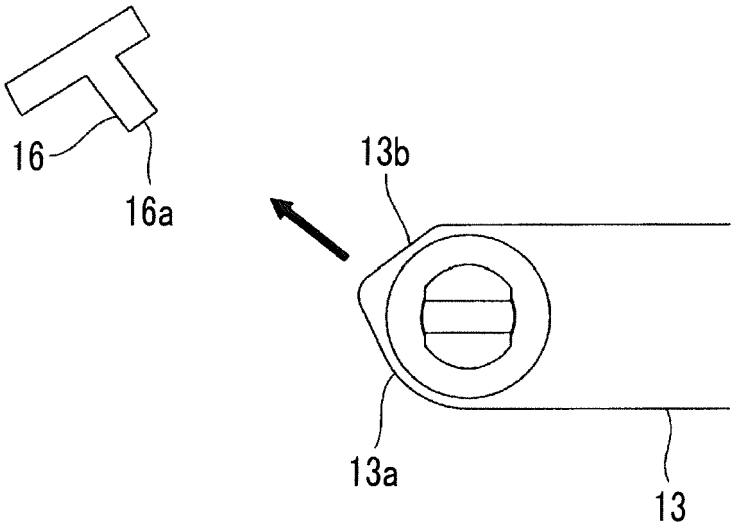


FIG. 4A

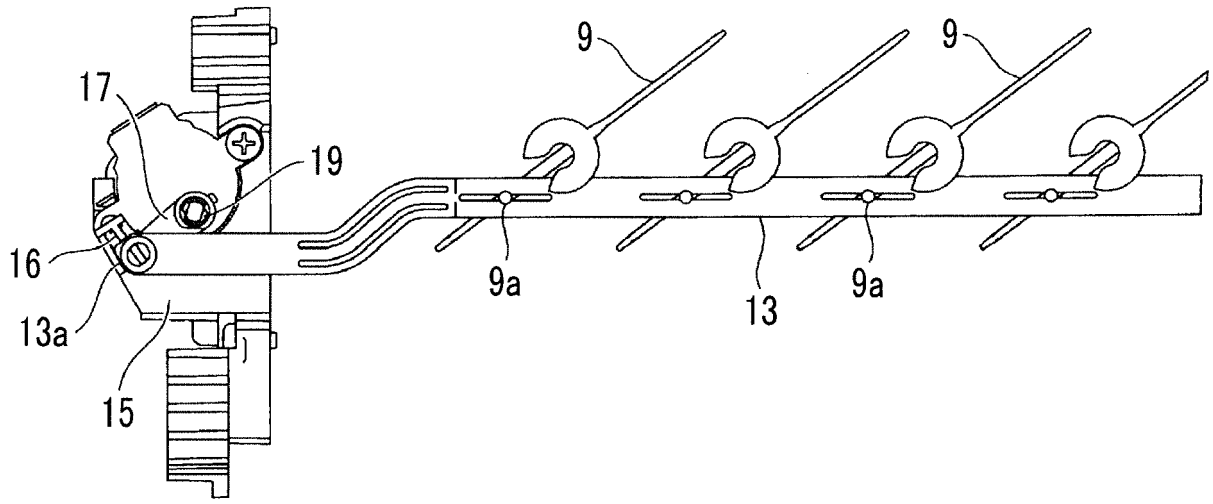
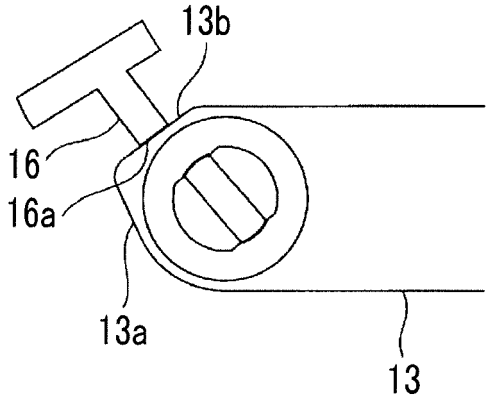


FIG. 4B



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/015599

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. F24F13/20(2006.01)i, F24F13/15(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)
Int.Cl. F24F13/20, F24F13/15

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2014-129956 A (FUJITSU GENERAL LTD.) 10 July 2014, paragraphs [0016]-[0030], fig. 1-3 & US 2015/0354850 A1, paragraphs [0031]-[0045], fig. 1-3 & WO 2014/104275 A1 & EP 2942579 A1 & AU 2013366977 A & CN 104884871 A	1-3
Y	JP 2-225931 A (DAIKYO CO., LTD.) 07 September 1990, page 1, right column, line 3 to page 5, left column, line 6, fig. 1-18 & US 5072657 A, column 1, line 5 to column 6, line 56, fig. 1-15	1-3
Y	JP 2000-168351 A (KOJIMA PRESS INDUSTRY CO., LTD.) 20 June 2000, paragraphs [0023]-[0024], fig. 2-3 (Family: none)	1-3

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

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Date of the actual completion of the international search	Date of mailing of the international search report
13 June 2018 (13.06.2018)	26 June 2018 (26.06.2018)

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/015599

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 6-101903 A (SAMSUNG ELECTRONICS CO., LTD.) 12 April 1994, paragraphs [0024]-[0036], fig. 1-4 & KR 10-0125731 B1 & RU 2082065 C & CN 1082171 A	1-3
Y	JP 2016-95099 A (ZOJIRUSHI CORPORATION) 26 May 2016, paragraphs [0048]-[0061], fig. 6A-12 (Family: none)	3
A	JP 2010-121873 A (MITSUBISHI HEAVY INDUSTRIES, LTD.) 03 June 2010, paragraphs [0025]-[0051], fig. 1-7 (Family: none)	1-3
A	JP 10-103751 A (TOSHIBA CORP.) 21 April 1998, paragraphs [0001]-[0038], fig. 1-7 (Family: none)	1-3

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 11118186 A **[0003]**