



(11)

EP 3 572 734 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
27.11.2019 Bulletin 2019/48

(51) Int Cl.:
F24F 1/00 ^(2019.01) **F25B 1/00** ^(2006.01)
F25B 41/00 ^(2006.01)

(21) Application number: **17893310.7**

(86) International application number:
PCT/JP2017/046194

(22) Date of filing: **22.12.2017**

(87) International publication number:
WO 2018/135238 (26.07.2018 Gazette 2018/30)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD TN

- **NOUCHI, Yoshiteru**
Osaka-shi
Osaka 530-8323 (JP)
- **YASUMATSU, Tarou**
Osaka-shi
Osaka 530-8323 (JP)
- **SAITOU, Masashi**
Osaka-shi
Osaka 530-8323 (JP)

(30) Priority: **20.01.2017 JP 2017008436**

(71) Applicant: **Daikin Industries, Ltd.**
Osaka-shi, Osaka 530-8323 (JP)

(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

(72) Inventors:
• **SHIOHAMA, Kousuke**
Osaka-shi
Osaka 530-8323 (JP)

(54) **INDOOR UNIT**

(57) An indoor unit (3) includes a heat exchanger (22) and a plurality of refrigerant pipes (31, 32). The indoor unit (3) can constitute a refrigeration apparatus (1) including a refrigerant circuit (6). R32 refrigerant is enclosed in the refrigerant circuit (6). At least one of the

plurality of refrigerant pipes (31, 32) has an outer diameter of (Do-1)/8 inches. Here, "Do/8 inches" represents an outer diameter of one of the refrigerant pipes in a case where R410A refrigerant is enclosed in the refrigerant circuit (6).

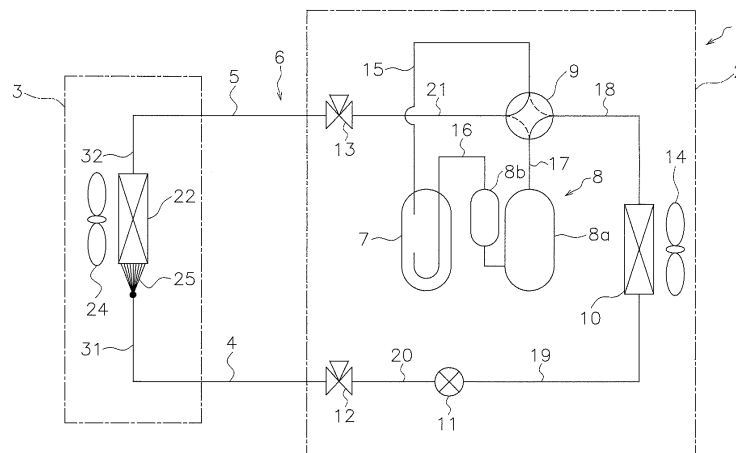


FIG. 1

Description

TECHNICAL FIELD

[0001] The present invention relates to an indoor unit.

BACKGROUND ART

[0002] A refrigerant circuit included in a refrigeration apparatus such as an air conditioner is configured by an indoor unit and an outdoor unit connected to each other. Many of the refrigerant circuits of refrigeration apparatuses currently available in the market use R410A refrigerant. Meanwhile, from the viewpoint of suppressing global warming, R32 refrigerant having a smaller global warming potential (GWP) than that of R410A refrigerant has also been used in refrigeration apparatuses recently.

[0003] Patent Literature 1 (JP 5536817 B2) discloses an air conditioner using R32 refrigerant. In this air conditioner, an outer diameter of a connection pipe that connects an indoor unit and an outdoor unit is set to be smaller than that in a case where R410A refrigerant is enclosed in a refrigerant circuit. The purpose of this configuration is to reduce the amount of refrigerant enclosed in the refrigerant circuit or to reduce the amount of piping materials used.

SUMMARY OF THE INVENTION

<Technical Problem>

[0004] In recent years, however, refrigeration apparatuses such as air conditioners have been required not only to reduce the amount of enclosed refrigerant and the amount of materials used, but also to be installed in a smaller space through downsizing of the apparatuses. Indoor units are also required to have a similar configuration.

[0005] An indoor unit usually includes parts such as a heat exchanger and, if necessary, an expansion valve. The indoor unit also includes a refrigerant pipe connected to these parts. As long as the refrigerant pipe has substantially the same outer diameter as the conventional pipe, the downsizing of the indoor unit is limited.

[0006] An object of the present invention is to downsize an indoor unit including a refrigerant pipe.

<Solution to Problem>

[0007] An indoor unit according to a first aspect of the present invention includes a heat exchanger and a plurality of refrigerant pipes. The indoor unit can constitute a refrigeration apparatus including a refrigerant circuit. R32 refrigerant is enclosed in the refrigerant circuit. At least one of the plurality of refrigerant pipes has an outer diameter of (Do-1)/8 inches. Here, "Do/8 inches" represents an outer diameter of one of the refrigerant pipes in a case where R410A refrigerant is enclosed in the refrigerant circuit.

erant circuit.

[0008] With this configuration, the R32 refrigerant is used, and the outer diameter of at least one refrigerant pipe is smaller than when R410A refrigerant is used. Therefore, the indoor unit can be downsized and the installation space therefor can be reduced.

[0009] An indoor unit according to a second aspect of the present invention includes a heat exchanger and a plurality of refrigerant pipes. The indoor unit can constitute a refrigeration apparatus including a refrigerant circuit. R32 refrigerant is enclosed in the refrigerant circuit. At least one of the plurality of refrigerant pipes has an outer diameter of 2/8 inches or less. The refrigeration apparatus has a rated capacity of 7.1 kW or more.

[0010] With this configuration, the R32 refrigerant is used, and the outer diameter of at least one refrigerant pipe is 2/8 inches or less. In a case where R410A refrigerant is used, it is often difficult to reduce the outer diameter of the refrigerant pipe to such a level. Therefore, the indoor unit can be downsized and the installation space therefor can be reduced.

[0011] An indoor unit according to a third aspect of the present invention is the indoor unit according to the first or second aspect, wherein the plurality of refrigerant pipes includes a liquid refrigerant pipe and a gas refrigerant pipe. The outer diameter of the refrigerant pipe mentioned in the first or second aspect is an outer diameter of the liquid refrigerant pipe.

[0012] With this configuration, the outer diameter of at least the liquid refrigerant pipe is small. Therefore, the size reduction of the liquid refrigerant pipe allows the indoor unit to be downsized.

[0013] An indoor unit according to a fourth aspect of the present invention is the indoor unit according to the third aspect, wherein the heat exchanger includes a refrigerant flow divider. The liquid refrigerant pipe is connected to the refrigerant flow divider.

[0014] With this configuration, the liquid refrigerant pipe is connected to the refrigerant flow divider of the heat exchanger. It is therefore possible to downsize the indoor unit by reducing the outer diameter of the liquid refrigerant pipe that is disposed to be connected to the refrigerant flow divider.

[0015] An indoor unit according to a fifth aspect of the present invention is the indoor unit according to any one of the first to fourth aspects, wherein the rated capacity of the refrigeration apparatus is in a range of 7.1 kW to 16.0 kW inclusive.

[0016] With this configuration, the rated capacity of the refrigeration apparatus including the indoor unit is in the range of 7.1 kW to 16.0 kW inclusive. This makes it possible to reduce the installation space for a refrigeration apparatus that has relatively large rated power and is easily enlarged. The "rated capacity" herein may alternatively be described as the "nominal capacity" in a product catalog or an instruction manual of a refrigeration apparatus.

[0017] A refrigeration apparatus according to a sixth

aspect of the present invention includes a refrigerant circuit that implements a refrigeration cycle by flow of refrigerant. The refrigeration apparatus includes an indoor unit, an outdoor unit, and a connection pipe. The indoor unit is the one according to any one of the first to fifth aspects. The connection pipe connects the indoor unit and the outdoor unit.

[0018] With this configuration, at least one refrigerant pipe in the indoor unit of the refrigeration apparatus has a small outer diameter. Therefore, the refrigeration apparatus can be downsized and the installation space therefor can be reduced.

<Advantageous Effects of Invention>

[0019] The indoor units according to the first to fifth aspects of the present invention are downsized, so that the installation space therefor can be reduced.

[0020] The refrigeration apparatus according to the sixth aspect of the present invention is downsized, so that the installation space therefor can be reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

FIG. 1 is a schematic diagram of a refrigeration apparatus 1 including an indoor unit 3 according to an embodiment of the present invention.

FIG. 2 is a plan view of an internal configuration of the indoor unit 3.

FIG. 3 is a side view of the internal configuration of the indoor unit 3.

FIG. 4 is a plan view of a liquid refrigerant pipe 31 of the indoor unit 3.

FIG. 5 is a side view of the liquid refrigerant pipe 31 of the indoor unit 3.

FIG. 6 is a schematic diagram of a refrigeration apparatus 1 including an indoor unit 3 according to a first modification of the embodiment of FIG. 1.

FIG. 7 is a schematic diagram of a refrigeration apparatus 1 including an indoor unit 3 according to a second modification of the embodiment of FIG. 1.

DESCRIPTION OF EMBODIMENTS

[0022] Hereinafter, an indoor unit according to an embodiment of the present invention and modifications thereof will be described with reference to the drawings. Note that a specific configuration of the indoor unit according to the present invention is not limited to those in the following embodiment and modifications, but can be changed without departing from the spirit of the invention.

(1) Overall configuration of refrigeration apparatus 1

[0023] FIG. 1 illustrates a refrigeration apparatus 1 including an indoor unit 3 according to an embodiment of

the present invention. The refrigeration apparatus 1 is configured as an air conditioner, and can cool or heat the interior of a room in, for example, a building through a vapor compression refrigeration cycle. The refrigeration apparatus 1 includes an outdoor unit 2, an indoor unit 3, and a liquid-refrigerant connection pipe 4 and a gas-refrigerant connection pipe 5 that connect the outdoor unit 2 and the indoor unit 3. The outdoor unit 2, the indoor unit 3, the liquid-refrigerant connection pipe 4, and the gas-refrigerant connection pipe 5 constitute a vapor compression refrigerant circuit 6. R32 refrigerant is enclosed in the refrigerant circuit 6.

[0024] Rated capacity of the refrigeration apparatus 1 is in the range of 7.1 kW to 16.0 kW inclusive. The "rated capacity" herein means a value equivalent to the "nominal capacity" described in a product catalog or an instruction manual of the outdoor unit 2.

(2) Configuration of each part of refrigeration apparatus 1

(2-1) Outdoor unit 2

[0025] The outdoor unit 2 is installed outdoors. The outdoor unit 2 includes a low pressure receiver 7, a compressor 8, a four-way switching valve 9, an outdoor heat exchanger 10, an expansion valve 11, a liquid-side shut-off valve 12, a gas-side shutoff valve 13, and an outdoor fan 14. The compressor 8 includes a compressor body 8a and an attached receiver 8b. The outdoor unit 2 further includes refrigerant pipes 15 to 21 that connect the parts.

[0026] The configuration of the outdoor unit 2 described here is merely an example, and it is possible to use other configurations and parts alternatively.

(2-2) Indoor unit 3

[0027] The indoor unit 3 is installed indoors. The indoor unit 3 includes an indoor heat exchanger 22, an indoor fan 24, a liquid refrigerant pipe 31, and a gas refrigerant pipe 32. The indoor heat exchanger 22 includes a refrigerant flow divider 25. The liquid refrigerant pipe 31 connects the refrigerant flow divider 25 of the indoor heat exchanger 22 to the liquid-refrigerant connection pipe 4. Here, the liquid refrigerant pipe 31 may be either separate from or integral with the liquid-refrigerant connection pipe 4. The gas refrigerant pipe 32 connects the indoor heat exchanger 22 and the gas-refrigerant connection pipe 5. Here, the gas refrigerant pipe 32 may be either separate from or integral with the gas-refrigerant connection pipe 5.

(2-3) Liquid-refrigerant connection pipe 4 and gas-refrigerant connection pipe 5

[0028] The liquid-refrigerant connection pipe 4 and the gas-refrigerant connection pipe 5 are constructed on site when the refrigeration apparatus 1 configured as an air conditioner is installed in an installation place in, for ex-

ample, a building. One end of the liquid-refrigerant connection pipe 4 is connected to the liquid-side shutoff valve 12 of the outdoor unit 2. The other end of the liquid-refrigerant connection pipe 4 is connected to a liquid-side end of the indoor heat exchanger 22 of the indoor unit 3 directly, or indirectly through the liquid refrigerant pipe 31 separate from the liquid-refrigerant connection pipe 4. One end of the gas-refrigerant connection pipe 5 is connected to the gas-side shutoff valve 13 of the outdoor unit 2. The other end of the gas-refrigerant connection pipe 5 is connected to a gas-side end of the indoor heat exchanger 22 of the indoor unit 3 directly, or indirectly through the gas refrigerant pipe 32 separate from the gas-refrigerant connection pipe 5.

(3) Operation of refrigeration apparatus 1

[0029] At the time of cooling, the refrigeration apparatus 1 performs a refrigeration cycle in which the refrigerant is circulated through the outdoor unit 2, the liquid-refrigerant connection pipe 4, the indoor unit 3, and the gas-refrigerant connection pipe 5 in that order. At this time, the indoor heat exchanger 22 functions as a heat absorber that removes heat from indoor air.

[0030] At the time of heating, the refrigeration apparatus 1 performs a refrigeration cycle in which the refrigerant is circulated through the outdoor unit 2, the gas-refrigerant connection pipe 5, the indoor unit 3, and the liquid-refrigerant connection pipe 4 in that order. At this time, the indoor heat exchanger 22 functions as a heat radiator that releases heat into the indoor air.

(4) Detailed configuration of indoor unit 3

[0031] Generally, the indoor unit 3 is required to be installed in a smaller space. The size of the indoor unit 3 tends to be larger as the refrigeration apparatus 1 has a larger rated capacity. In order to reduce the installation space for the indoor unit 3, it is necessary to downsize the refrigerant pipes such as the liquid refrigerant pipe 31 and the gas refrigerant pipe 32 as well as downsizing the parts such as the indoor heat exchanger 22.

[0032] In this case, therefore, R32 refrigerant is enclosed in the refrigerant circuit 6, and an outer diameter of the liquid refrigerant pipe 31, among the refrigerant pipes 31 and 32, is smaller than that in an outdoor unit used in a refrigeration apparatus having the same rated capacity and in which R410A refrigerant is enclosed in the refrigerant circuit 6.

[0033] As described above, the rated capacity of the refrigeration apparatus 1 according to the present embodiment is in the range of 7.1 kW to 16.0 kW inclusive. In an indoor unit of a conventional refrigeration apparatus having this level of rated capacity and using R410A refrigerant, an outer diameter of a liquid refrigerant pipe is, for example, 3/8 inches, and an outer diameter of a gas refrigerant pipe is, for example, 5/8 inches. This is generically referred to herein as "in the indoor unit for

R410A, the outer diameter of the refrigerant pipe is Do/8 inches".

[0034] On the other hand, an outer diameter of at least one of the refrigerant pipes installed inside the indoor unit 3 of the refrigeration apparatus 1 is set to (Do-1)/8 inches, which is one size smaller than that in the indoor unit for R410A. For example, the liquid refrigerant pipe 31 of the indoor unit 3 is manufactured to have an outer diameter of 2/8 inches or less. With this configuration, herein, the liquid refrigerant pipe 31 having a reduced pipe diameter can reduce the installation space for the indoor unit 3.

[0035] FIGS. 2 and 3 illustrate an internal configuration of the indoor unit 3. The liquid refrigerant pipe 31 is connected to the refrigerant flow divider 25 of the heat exchanger 22. The gas refrigerant pipe 32 is connected to an end of the heat exchanger 22 without the refrigerant flow divider 25. As illustrated in FIGS. 4 and 5, the liquid refrigerant pipe 31 has a bent portion B1 and a bent portion B2, which are bent. The shape of the liquid refrigerant pipe 31 is not limited to this. For example, the liquid refrigerant pipe 31 may have only one bent portion. Alternatively, the liquid refrigerant pipe 31 may have three or more bent portions.

[0036] In a case of reducing the outer diameter of the refrigerant pipe having at least one bent portion, a bending radius of the bent portion can be reduced as compared with before reducing the outer diameter of the refrigerant pipe. Such a reduction in the bending radius can lead to a further reduction in the space occupied by the refrigerant pipe. Therefore, the bending radius is expected to be reduced also at the bent portion B1 and the bent portion B2 in the liquid refrigerant pipe 31 of the present embodiment. This can lead to a significant reduction in the installation space for the indoor unit 3.

(5) Characteristics

(5-1)

[0037] The R32 refrigerant is used, and the outer diameter of at least the liquid refrigerant pipe 31 is 2/8 inches or less, which is smaller than when R410A refrigerant is used. Therefore, the indoor unit 3 can be downsized and the installation space therefor can be reduced.

(5-2)

[0038] The liquid refrigerant pipe 31 is connected to the refrigerant flow divider 25 of the heat exchanger 22. It is therefore possible to downsize the indoor unit 3 by reducing the outer diameter of the liquid refrigerant pipe 31 that is designed to be connected to the refrigerant flow divider 25.

(5-3)

[0039] The rated capacity of the refrigeration apparatus

tus 1 including the indoor unit 3 is in the range of 7.1 kW to 16.0 kW inclusive. Therefore, the refrigeration apparatus 1 having a rated capacity in this range can be installed in a smaller space.

(5-4)

[0040] Since the refrigeration apparatus 1 includes such an indoor unit 3, the installation space for the entire refrigeration apparatus 1 can be reduced.

(6) Modifications

(6-1) First modification

[0041] In the above embodiment, the refrigerant circuit 6 in the indoor unit 3 does not include an expansion valve. Alternatively, as illustrated in FIG. 6, an indoor unit 3 may include an indoor expansion valve 23. The indoor expansion valve 23 is provided on a liquid refrigerant pipe 31. Therefore, the liquid refrigerant pipe 31 is divided into a first liquid pipe 33 and a second liquid pipe 34 by the indoor expansion valve 23. The first liquid pipe 33 is connected to a heat exchanger 22 and the indoor expansion valve 23. The second liquid pipe 34 connects the indoor expansion valve 23 and a liquid-refrigerant connection pipe 4. The second liquid pipe 34 may be either separate from or integral with the liquid-refrigerant connection pipe 4.

[0042] An outer diameter of at least one of the refrigerant pipes 32, 33, and 34 is (Do-1)/8 inches, which is one size smaller than Do/8 inches, i.e., the outer diameter of one of the refrigerant pipes in the indoor unit of the refrigeration apparatus using R410 refrigerant. For example, the outer diameter of the first liquid pipe 33 is reduced from 3/8 inches to 2/8 inches as in the above embodiment. With this configuration, the installation space for the indoor unit 3 including the indoor expansion valve 23 can be reduced.

(6-2) Second modification

[0043] In the above embodiment, the refrigeration apparatus 1 is of a so-called pair type; in other words, one indoor unit 3 is connected to one outdoor unit 2. Alternatively, as illustrated in FIG. 7, a refrigeration apparatus 1 of a so-called multiple type may be configured with a plurality of indoor units 3 connected to one outdoor unit 2. Note that the indoor fan 24 is not illustrated in the drawing. Alternatively, each indoor unit 3 may be a product including the indoor expansion valve 23 according to the first modification. This makes it possible to downsize the multiple-type refrigeration apparatus 1.

(6-3) Third modification

[0044] In the above embodiment, the refrigeration apparatus 1 is configured as an air conditioner. Alternative-

ly, the refrigeration apparatus 1 may be configured as a freezer, a hot water supply apparatus, or any other apparatus that uses a refrigeration cycle. As a result, a refrigeration apparatus other than an air conditioner can be downsized.

REFERENCE SIGNS LIST

[0045]

1	Refrigeration apparatus
2	Outdoor unit
3	Indoor unit
4	Liquid-refrigerant connection pipe
5	Gas-refrigerant connection pipe
6	Refrigerant circuit
22	Indoor heat exchanger
23	Indoor expansion valve
31 to 34	Refrigerant pipe

CITATION LIST

PATENT LITERATURE

[0046] [Patent Literature 1] JP 5536817 B2

Claims

1. An indoor unit (3) comprising:
 - a heat exchanger (22); and
 - a plurality of refrigerant pipes (31 to 34),
 the indoor unit (3) being configured to constitute a refrigeration apparatus (1) including a refrigerant circuit (6), wherein R32 refrigerant is enclosed in the refrigerant circuit, and at least one of the plurality of refrigerant pipes has an outer diameter of (Do-1)/8 inches, where "Do/8 inches" represents an outer diameter of one of the refrigerant pipes in a case where R410A refrigerant is enclosed in the refrigerant circuit.
2. An indoor unit (3) comprising:
 - a heat exchanger (22); and
 - a plurality of refrigerant pipes (31 to 34),
 the indoor unit (3) being configured to constitute a refrigeration apparatus (1) including a refrigerant circuit (6), wherein R32 refrigerant is enclosed in the refrigerant circuit, at least one of the plurality of refrigerant pipes has an outer diameter of 2/8 inches or less, and the refrigeration apparatus has a rated capacity of 7.1 kW or more.

3. The indoor unit according to claim 1 or 2, wherein the plurality of refrigerant pipes includes:
- a liquid refrigerant pipe (31); and
a gas refrigerant pipe (32), and
the outer diameter of one of the refrigerant pipes is an outer diameter of the liquid refrigerant pipe.
4. The indoor unit according to claim 3, wherein
- the heat exchanger includes a refrigerant flow divider (25), and
the liquid refrigerant pipe is connected to the refrigerant flow divider.
5. The indoor unit according to any one of claims 1 to 4, wherein the rated capacity of the refrigeration apparatus is in a range of 7.1 kW to 16.0 kW inclusive.
6. A refrigeration apparatus (1) including a refrigerant circuit (6) that implements a refrigeration cycle by flow of refrigerant, the refrigeration apparatus (1) comprising:
- the at least one indoor unit (3) according to any one of claims 1 to 5;
an outdoor unit (2); and
a connection pipe (4, 5) that connects the indoor unit and the outdoor unit.

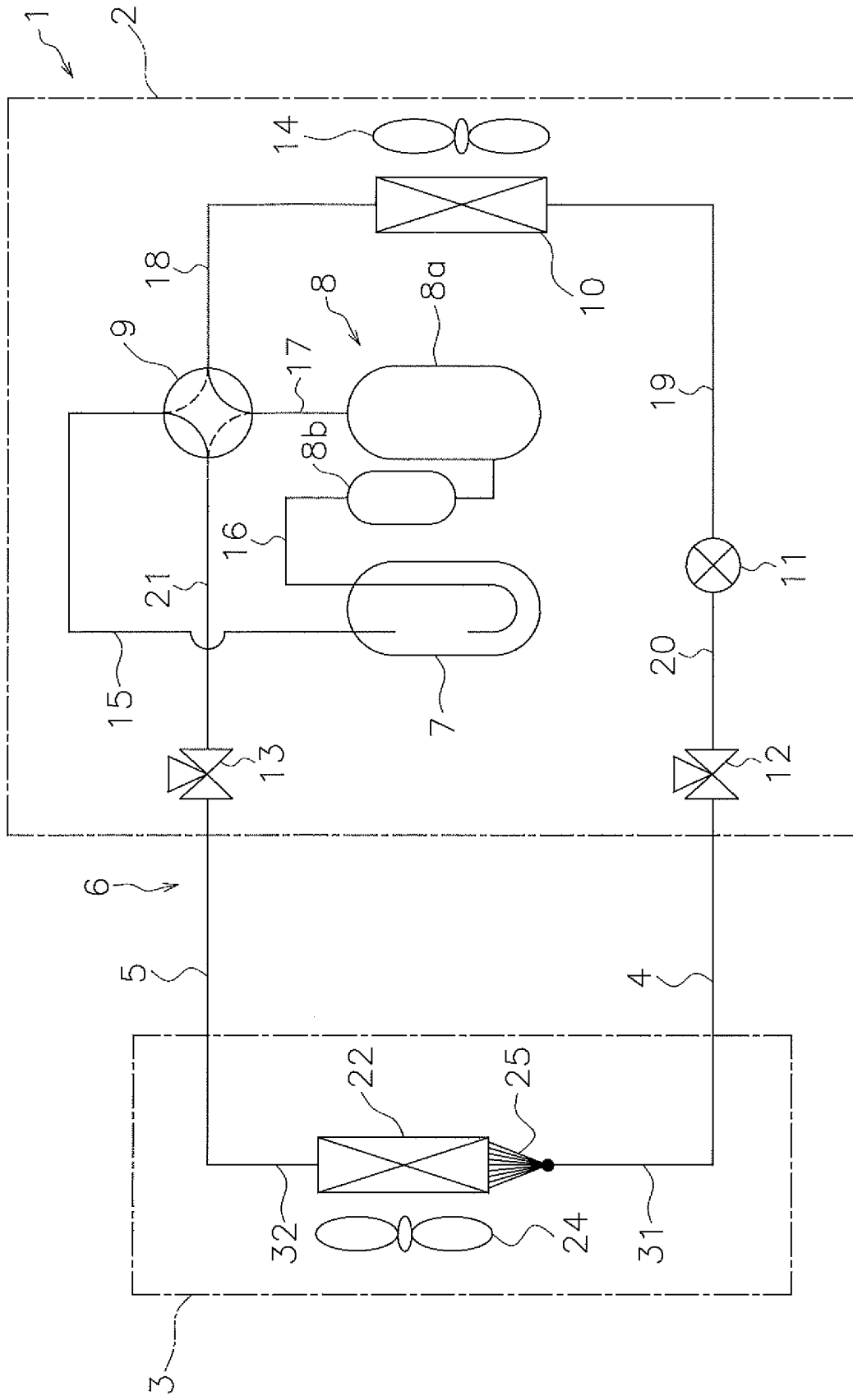


FIG. 1

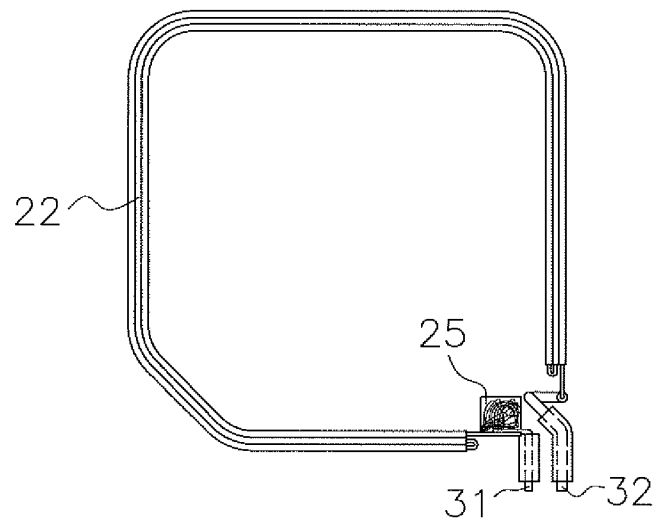


FIG. 2

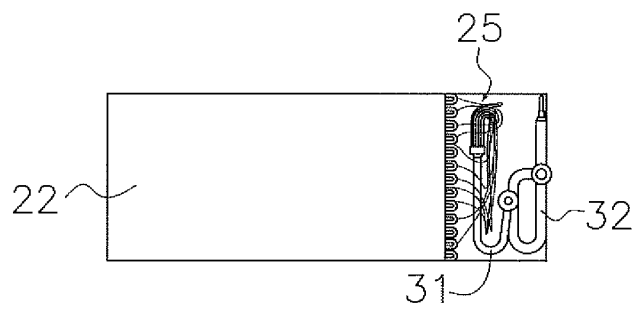


FIG. 3

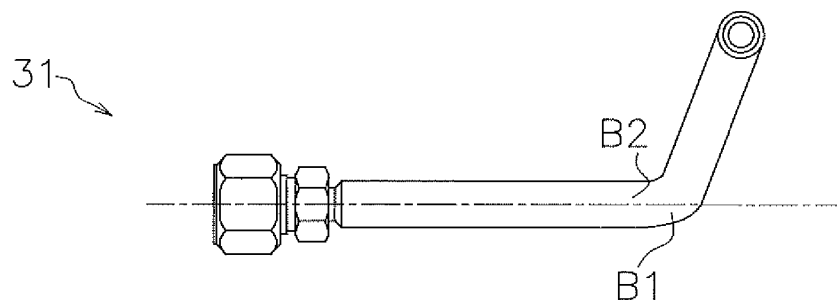


FIG. 4

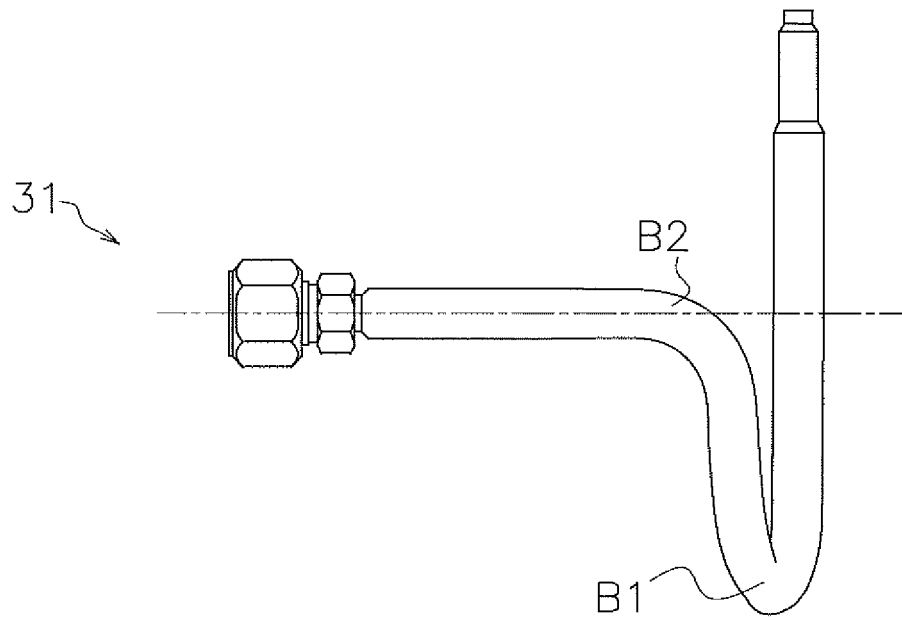


FIG. 5

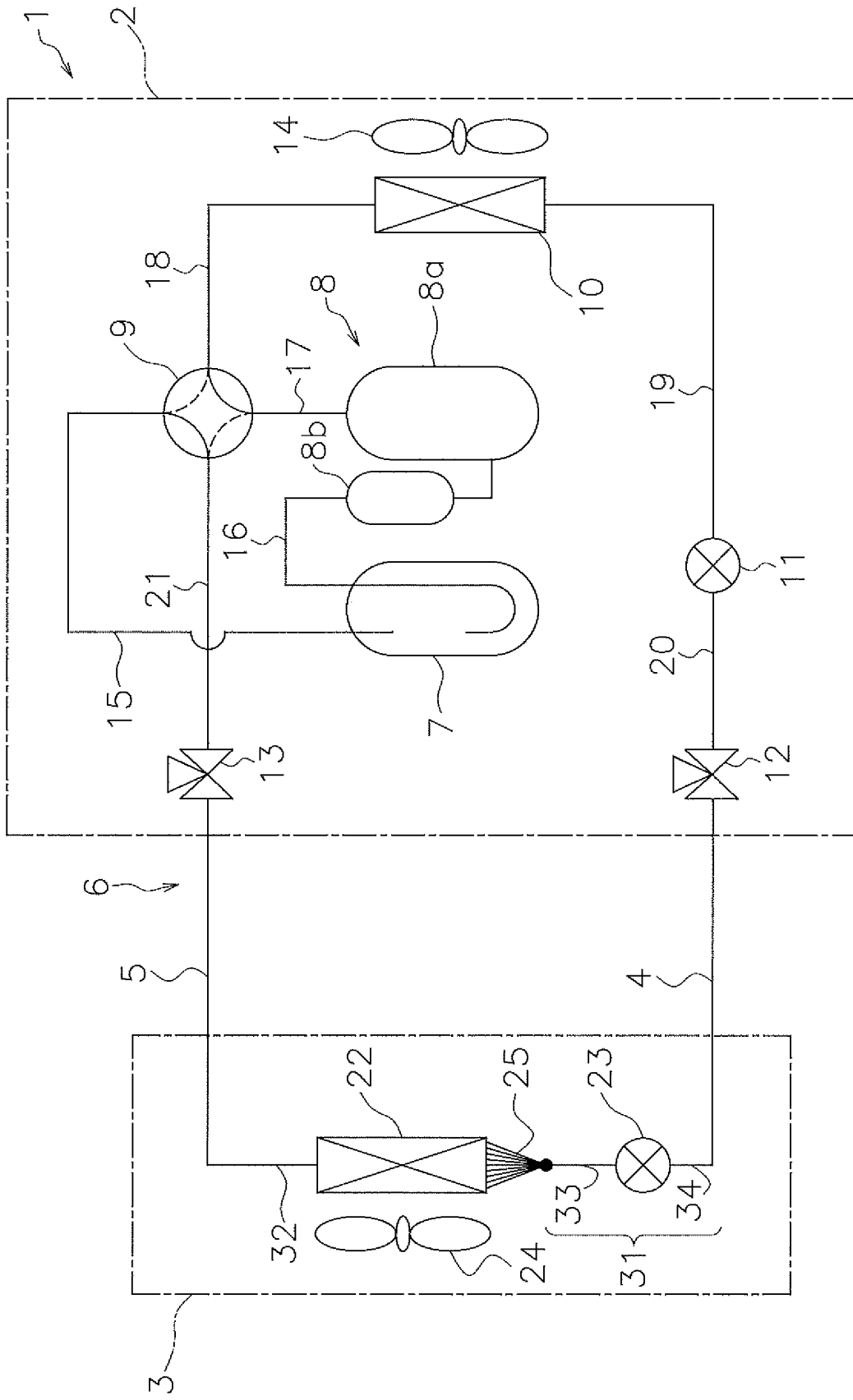


FIG. 6

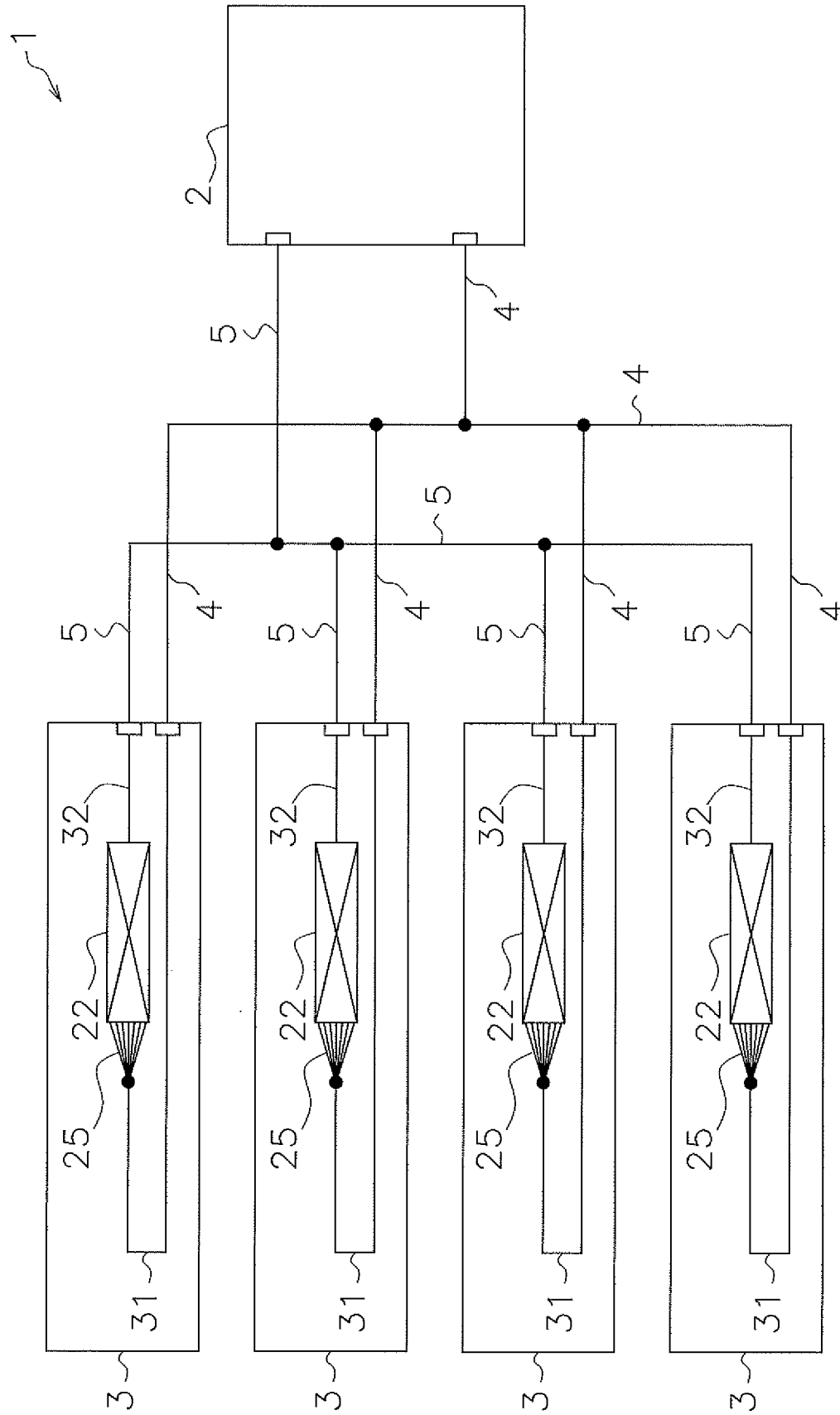


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2017/046194

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. F24F1/00 (2011.01) i, F25B1/00 (2006.01) i, F25B41/00 (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. F24F1/00, F25B1/00, F25B41/00

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 2013-200090 A (HITACHI APPLIANCES INC.) 03 October 2013, paragraphs [0022]-[0033], fig. 1, 2 & US 2014/0373569 A1, paragraphs [0031]-[0045], fig.1, 2 & EP 2840335 A1 & CN 104094069 A	1-6
Y	JP 11-63710 A (TOSHIBA CORPORATION) 05 March 1999, paragraph [0044] (Family: none)	1-6
Y	JP 2008-196762 A (DAIKIN INDUSTRIES, LTD.) 28 August 2008, paragraph [0047], fig. 1 (Family: none)	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
19.02.2018Date of mailing of the international search report
27.02.2018

Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/046194

5

10

15

20

25

30

35

40

45

50

55

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-248941 A (DAIKIN INDUSTRIES, LTD.) 14 September 2001, entire text, all drawings & US 2003/0056525 A1, entire text, all drawings & EP 1243876 A1 & CN 1415063 A	1-6

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 5536817 B [0003] [0046]