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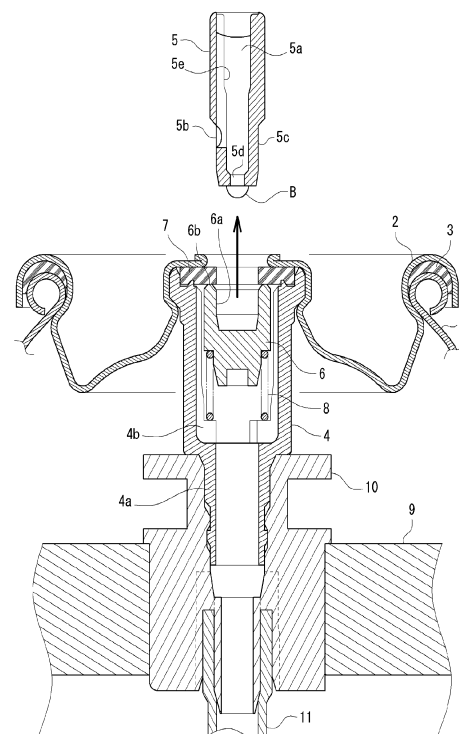
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(54) **MECHANISM FOR EJECTING CONTENTS AND AEROSOL PRODUCT EQUIPPED WITH THIS MECHANISM FOR EJECTING CONTENTS**

(57) In a content injection mechanism having a detachable stem, contamination around a valve such as a stem passage is minimized and cleaning is facilitated. The content injection mechanism includes a detachable cylindrical stem 5 having a side opening 5b through which the content to be injected flows from a side surface and a passage 5a downstream thereof; a bowl-shaped valve seat 6 whose inner surface engages with a lower end of the stem 5; a housing 4 which accommodates the valve seat 6 and into which the content of an aerosol container 1 flow, and a stem gasket 7 that has a central opening through which the stem 5 passes and that is held by the housing 4 and exhibits a valve action between the stem gasket 7 and the valve seat 6. The valve seat 6 includes a sheath-shaped inner circumferential surface 6a that is formed on an inner surface thereof and is in close contact with a lower-end-side outer circumferential surface 5c at an end of the stem 5. The stem 5 is provided with a lower-end-side opening 5d through which a space between the valve seat 6 and the stem 5 communicates with the passage 5a when the stem 5 is attached and detached, thereby facilitating the attachment and detachment of the stem 5.

[Fig. 4]



Description

TECHNICAL FIELD

[0001] The present invention relates to a content injection mechanism for related components, such as a stem, a valve seat, a stem gasket, and a housing, for injecting a content stored in a container body of an aerosol product into an external space area.

[0002] In particular, the present invention relates to a content injection mechanism that allows a content that does not easily pass through a narrow cross-sectional passage, such as a high-viscosity content, to be easily filled through a valve mechanism, and that allows for easy removal of a residual content in a stem.

[0003] In this specification, a content including fibers and having low apparent fluidity is also referred to as a high-viscosity content.

[0004] Further, the longitudinal direction of the stem, that is, the vertical direction in each figure is referred to as "upper" or "lower".

BACKGROUND ART

[0005] Conventionally, there has been a content injection mechanism that is suitable for high-viscosity contents and is equipped with an injection valve that opens and closes annularly around a stem (see PTL 1).

[0006] A high-viscosity content does not easily separate into two layers when stored together with a propellant gas in a fixed capacity space area. Thus, the high-viscosity content and the propellant gas need to be stored individually in a bag (inner bag 60) or the like that is pressurized with gas (release gas B). Moreover, since the viscosity is high, it is impossible to directly fill the content into the container from between a mounting cup (mounting cup 10) and a stem gasket (stem rubber 40) or a housing (housing 20) at a high speed.

[0007] In this content injection mechanism, the content bypasses the lower end of the stem portion (columnar portion 31) during injection or filling, but the stem portion that provides resistance to filling at this time is removed from the valve seat (cup-shaped portion 32). Thus, the filling speed can be increased.

[0008] Since the content is injected from the outer circumferential surface of the detachable stem portion, bypassing the lower end and passing through the passage inside the stem, into the external space area, the stem portion can be removed after use to facilitate the cleaning of the interior thereof.

CITATION LIST

Patent Literature

[0009] PTL 1: Japanese Patent Application Publication No. 2005-162327

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0010] However, in the case of the above-mentioned conventional content injection mechanism, there is a problem in that, when the stem portion is removed, a large amount of the content remaining in the internal passage is drawn into the valve seat and remains therein.

[0011] In addition, the content flows in such a manner that it passes between the outer circumferential surface of the lower end of the stem portion and the inner circumferential surface of the valve seat and bypasses into the interior from the lower end. Thus, there is a problem that the content adheres to and remains widely on the outer circumferential surface of the stem portion and the inner circumferential surface of the valve seat.

[0012] Furthermore, when removed, the outer circumferential surface of the stem portion to which the content has adhered comes into contact with the central hole of the mounting cup (mounting cup 10) or the stem gasket (stem rubber 40), which tends to contaminate the surrounding area.

[0013] Such residual content may cause safety problems, especially when the content is food or medicine, due to the contamination of deteriorated materials such as putrefaction or oxidation.

[0014] An object of the present invention is to minimize contamination around the valve, such as the stem passage, and to facilitate cleaning when high-viscosity contents are used.

SOLUTIONS TO PROBLEMS

[0015] The present invention solves the above-mentioned problems using the following configuration modes.

(1) A content injection mechanism including:

a detachable cylindrical stem (for example, a stem 5 described later) having an inflow hole (for example, a side opening 5b described later) through which a content stored in a container body (for example, an aerosol container 1 described later) flows from a side surface and a passage (for example, a passage 5a described later) downstream thereof;

a bowl-shaped valve seat (for example, a valve seat 6 described later) whose inner surface engages with a lower end of the stem;

a housing (for example, a housing 4 described later) which accommodates the valve seat and into which the content in the container body flows; and

a stem gasket (for example, a stem gasket 7 described later) that has a central opening through which the stem passes and that is held in the housing and exhibits a valve action be-

tween the stem gasket and the valve seat, wherein the valve seat includes:

an inner circumferential surface (for example, a sheath-shaped inner circumferential surface 6a described later) that is formed on the inner surface and is in close contact with an outer circumferential surface (for example, an lower-end-side outer circumferential surface 5c) of the lower end; and an upward annular contact portion (for example, an annular protrusion 6b described later) formed around a bowl-shaped opening of the valve seat, the inflow hole is provided in such a manner that it is exposed inside the annular contact portion from the bowl-shaped opening of the valve seat when the stem and the valve seat are engaged, and the stem gasket is held in the housing in such a manner that a bottom surface near an outer side of the central opening is in close contact with the annular contact portion in a rest mode.

(2) The content injection mechanism according to (1), in which

a hole (for example, a lower-end-side opening 5d described later) communicating with the passage is provided in the lower end of the stem.

(3) The content injection mechanism according to (1) or (2), in which

an outer circumferential surface of the lower end includes:

a cylindrical outer circumferential surface and a tapered surface that continuously tapers below the cylindrical outer circumferential surface.

[0016] The present invention provides the content injection mechanism having such a configuration and an aerosol product using the content injection mechanism.

EFFECTS OF THE INVENTION

[0017] By adopting the above-mentioned configuration, the present invention can facilitate cleaning of the vicinity of the valve, such as the stem passage, when a high-viscosity content is used.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

FIG 1 is an explanatory diagram showing an initial mode of the present invention.

FIG 2 is an explanatory diagram showing an injection mode in which a stem 5 is pressed.

FIG 3 is an explanatory diagram showing a rest mode in which the pressed stem 5 is released and returns to the position shown in FIG 1.

FIG 4 is an explanatory diagram showing a state in which the stem 5 is removed from the rest mode of FIG 3.

MODE FOR CARRYING OUT THE INVENTION

[0019] The mode for carrying out the invention will be described using FIGS. 1 to 4.

[0020] Note that the constituent elements (for example, a small-diameter portion 4a) indicated by alphabetic reference numbers below are in principle part of the constituent elements (for example, a housing 4) indicated by the numerical parts of the reference numbers.

[0021] Here, in FIGS. 1 to 4,

1 is an aerosol container storing compressed gas as a propellant for externally pressurizing a bag 9, which will be described later;

2 is a mounting cup attached to the upper opening of the aerosol container 1;

3 is a container gasket for airtightly sealing the space between the aerosol container 1 and the mounting cup 2;

4 is a content passage housing that accommodates a valve seat 6 and a spring 8, which will be described later, and is fitted and fixed to the mounting cup 2;

4a is a small-diameter portion for content inflow, formed at the lower end of the housing 4;

4b is a rib that guides the valve seat 6 in the vertical direction and receives the lower end of the spring 8, which will be described later;

5 is a cylindrical stem that is provided in a manner that passes through the central opening of the mounting cup 2 and is the target of the injection operation;

5a is a passage through which the content flows out in the injection mode;

5b is a side opening into which the content flows in during the injection mode;

5c is a lower-end-side outer circumferential surface including a cylindrical outer circumferential surface and a tapered surface continuing therebelow;

5d is a lower-end-side opening that communicates the inside and outside of the stem 5 to eliminate a pressure difference when the stem 5 is attached or detached;

5e is a rib provided on the inner circumferential surface of the stem 5 in a manner to connect the upper and lower sides of the side opening 5b;

6 is a valve seat housed in the housing 4 and having a sheath-shaped recess at its upper end that engages with the stem 5;

6a is a sheath-shaped inner circumferential surface provided at the upper end of the valve seat 6 and closely engaged with the lower end of the stem 5;

6b is an annular protrusion that is formed upward to surround the sheath-shaped recess at the upper end of the housing 4 and forms an injection valve between the annular protrusion and a stem gasket 7, which will be described later;

7 is a stem gasket which is provided in a manner of being sandwiched between the mounting cup 2 and the housing 4 and forms the injection valve between the stem gasket and the annular protrusion 6b of the valve seat 6;

8 is a spring provided between the valve seat 6 and the rib 4b to bias the valve seat 6 toward the closed state of the injection valve;

9 is a bag formed by laminating and welding the outer periphery of a resin film and storing a content;

10 is a connection port which is welded in a pinched manner to the outer periphery lamination of the upper part of the bag 9, serves as a content outlet of the bag 9 and is connected to the small-diameter portion 4a of the housing 4;

11 is a suction tube connected to the lower end of the connection port 10 to guide the content at the bottom of the bag 9 to the connection port 10 side;

A is the liquid level of the content penetrating downward within the stem 5 in the injection mode; and B is the liquid level of the content leaked to the bottom surface from the lower-end-side opening 5d of the removed stem 5.

[0022] Here, the housing 4, stem 5, valve seat 6, bag 9, connection port 10, and suction pipe 11 are made of plastic, such as polypropylene, polyethylene, polyacetal, nylon, polybutylene terephthalate, or the like.

[0023] Further, the aerosol container 1 and the spring 9 are made of plastic or metal, for example, the mounting cup 2 is made of metal, for example, and the container gasket 3 and the stem gasket 7 are made of elastomer or rubber, for example.

[0024] In use, an operating portion provided with a passage to an injection port (not shown) is connected to the upper end of the stem 5.

[0025] FIG 1 shows an aerosol product in its initial state without the stem 5 being pressed.

[0026] The container used for this aerosol product is assembled without any content in the bag 9.

[0027] First, the housing 4 in which the spring 8, the valve seat 6, and the stem gasket 7 are incorporated is housed inside the central columnar part of the mounting cup 2 and attached by caulking from the outside. The bag 9 in which the content is stored is formed by welding the peripheries of two resin films to each other in a manner to sandwich the connection port 10 to which the suction tube 11 is attached.

[0028] The connection port 10 of this bag 9 is engaged with the small-diameter portion 4a of the housing 4 and integrated. This integrated product is inserted through the opening at the top of the aerosol container 1, and the mounting cup 2 is placed on the opening of the aerosol

container 1 with the container gasket 3 sandwiched therebetween while filling the inside of the aerosol container 1 with compressed gas. Then, the annular recess on the upper surface of the cup 2 is caulked outward to secure the cup 2 airtightly. The compressed gas filled in the aerosol container 1 constantly compresses the bag 9 from the outside.

[0029] When filling the assembled container with a content, the content is press-fitted through the central hole of the mounting cup 2.

[0030] At this time, the valve seat 6 is moved downward by the pressure of filling the content, and the annular protrusion 6b at its upper end is separated from the stem gasket 7 to open the injection valve. The content passes therebetween and is filled inside the bag 9 from the small-diameter portion 4a of the housing 4. The bag 9 expands as it is filled with the content, and the surrounding compressed gas becomes further compressed.

[0031] When filling of a predetermined amount of content is completed and the pressure is released, the annular protrusion 6b of the valve seat 6 comes into contact with the stem gasket 7 by the biasing force of the spring 8, and the injection valve is closed.

[0032] Thereafter, the sheath-shaped inner circumferential surface 6a of the valve seat 6 is cleaned from the central hole of the mounting cup 2 to remove a residual content.

[0033] After filling the content, the stem 5 is attached to the valve seat 6. At the time of this attachment, the air caught between the bottom surface of the stem 5 and the valve seat 6 is removed through the lower-end-side opening 5d, so that the stem 5 can be attached without pushing down the valve seat 6.

[0034] In addition, the lower-end-side outer circumferential surface 5c is composed of a cylindrical outer circumferential surface and a tapered surface that continuously tapers below the cylindrical outer circumferential surface. Thus, the sliding portion at the time of attachment is shortened while ensuring the close contact length with the sheath-shaped inner circumferential surface 6a, thereby achieving both stability and ease of fixing the stem 5 and the valve seat 6.

[0035] Note that the lower-end-side opening 5d may be omitted when the stem 5 is easily attached to the valve seat 6 without the injection valve being in the open state, for example, when the biasing force of the spring 8 or the pressure of the compressed gas is high and the valve seat 6 is sufficiently biased against the stem gasket 7, or when there is a place for the air between the bottom of the stem 5 and the valve seat 6 to escape.

[0036] FIG 2 shows an injection state (injection mode) in which the stem 5 of the aerosol product shown in FIG 1 is pressed.

[0037] When the stem 5 is pushed down against the spring 8, the annular protrusion 6b separates from the stem gasket 7 to create a gap, the injection valve becomes open, and the inside of the housing 4 and the inside of the stem 5 communicate with each other. The

content stored in the bag 9 is pumped into the housing 4 in the path indicated by the arrow by the pressure of the compressed gas compressing the bag 9, and is injected into an external space area from the side opening 5b of the stem 5 through the passage 5a.

[0038] Since the lower-end-side opening 5d of the stem 5 is blocked by the valve seat 6 and is in a dead-end state, an air pocket is created into which the content does not enter, and the content enters only up to the liquid level A due to its high viscosity. Even if the content is low in viscosity, the inner circumferential surface of the stem 5 and the step portion formed by the inner bottom surface around the lower-end-side opening 5d prevent the content from dripping, preventing the content from entering the lower-end-side opening 5d.

[0039] Moreover, since the lower-end-side outer circumferential surface 5c of the stem 5 and the sheath-shaped inner circumferential surface 6a of the valve seat 6 are in close contact, the content will not enter this gap.

[0040] Furthermore, since the outer circumferential surface of the stem 5 and the upper circumferential surface of the central hole of the stem gasket 7 are in close contact with each other, the content will not leak from these surfaces into the external space area.

[0041] FIG 3 shows a rest state (rest mode) in which the pressed stem 5 of the aerosol product shown in FIG 2 is released and the stem 5 returns to the position shown in FIG 1.

[0042] When the pressure on the stem 5 is released, the stem 5 moves upward due to the biasing force of the spring 8 until the annular protrusion 6b comes into contact with the stem gasket 7, and the content stops flowing into the stem 5 from the side opening 5b. The content remains in the stem 5 with an air pocket bordering the liquid level A in substantially the same manner as in the state shown in FIG 2.

[0043] Note that, since the side opening 5b is sealed by the inner circumferential surface of the stem gasket 7, the content will not leak from there into the external space area.

[0044] FIG 4 shows the state in which the aerosol product of FIG 3 is removed with the stem 5.

[0045] First, when the stem 5 is pulled upward from the valve seat 6, a negative pressure space area is created between the bottom surface of the stem 5 and the valve seat 6, and the air in the air pocket flows out from the lower-end-side opening 5d. When the stem 5 is further pulled, the content flows out up to the liquid level B following the air as the negative pressure space area expands.

[0046] The lower-end-side outer circumferential surface 5c is composed of a cylindrical outer circumferential surface and a tapered surface that continuously tapers below the cylindrical outer circumferential surface, and when the cylindrical outer circumferential surface comes off the sheath-shaped inner circumferential surface 6a, the tapered surface separates and the negative pressure space area and the external space area communicate

with each other to release the negative pressure. Thus, the outflow of the content from the lower-end-side opening 5d is immediately stopped.

[0047] By reducing the passage cross-sectional area by the lower-end-side opening 5d, the passage resistance of the air and content can be increased and the outflow of the content can be reduced.

[0048] Since there is a time difference between when the bottom surface of the stem 5 separates from the valve seat 6 and when the content flows out from the lower-end-side opening 5d, the content does not adhere to the inner bottom surface of the valve seat 6.

[0049] At this time, since the entire content remaining inside the stem 5 will be drawn downward, the content near the injection valve (inside the annular protrusion 6b) will also be drawn through the side opening 5b, and the content remaining on the valve seat 6 and the stem gasket 7 around the stem 5 can be minimized.

[0050] Even when the valve seat 6 and the stem gasket 7 are to be cleaned as necessary, it can be easily done because the remaining content is minimized and the content does not adhere to the inner bottom surface of the valve seat 6 which is deep and difficult to clean.

[0051] When the stem 5 is cleaned and then attached to the valve seat 6, the state shown in FIG 1 is obtained.

[0052] Naturally, the present invention is not limited to the above-described embodiments,

(21) Instead of providing the lower-end-side opening 5d on the bottom surface of the stem 5, a hole may be provided in the form of an intermediate orifice at a position between the bottom surface and the side opening 5b; and

(22) The stem 5 and various operating parts may be integrated.

[0053] Aerosol products to which the present invention is applied include those for various uses such as detergents, cleaning agents, cooling agents, muscle anti-inflammatory agents, hair growth agents, hair dyes, hair styling agents, hair treatment agents, sunscreens, lotions, cleansing agents, antiperspirants, cosmetics, shaving foam, foods, liquid droplets (vitamins or the like), pharmaceuticals, quasi-drugs, gardening agents, insecticides, pest repellents, animal repellents, deodorants, laundry starch, fire extinguishers, paints, adhesives, lubricants, urethane foam, and the like.

[0054] The content stored in the aerosol container may be in various forms such as liquid, cream, or gel. Components added to the content include, for example, powder, oil components, alcohols, surfactants, polymer compounds, active ingredients depending on the purpose, and water.

[0055] As the powder, metal salt powder, inorganic powder, resin powder, and the like are used. For example, talc, kaolin, aluminum hydroxychloride (aluminum salt), calcium alginate, gold powder, silver powder, mica, carbonate, magnesium chloride, silica, zinc oxide, titani-

um oxide, zeolite, nylon powder, barium sulfate, cellulose, and mixtures thereof are used.

[0056] As oil components, silicone oils such as dimethylpolysiloxane, ester oils such as isopropyl myristate, fats and oils such as palm oil, eucalyptus oil, camellia oil, olive oil, and jojoba oil, hydrocarbon oils such as liquid paraffin, and fatty acids such as myristic acid, palmitic acid, stearic acid, linoleic acid, and linolenic acid are used.

[0057] As alcohols, monohydric lower alcohols such as ethanol, monohydric higher alcohols such as lauryl alcohol and cetanol, and polyhydric alcohols such as ethylene glycol, 1,3-butylene glycol and glycerin are used.

[0058] As surfactants, anionic surfactants such as sodium lauryl sulfate, nonionic surfactants such as polyoxyethylene alkyl ether and polyglycerin fatty acid ester, amphoteric surfactants such as lauryldimethylaminoacetic acid betaine, and cationic surfactants such as alkyltrimethylammonium chloride are used.

[0059] As the polymer compound, hydroxyethylcellulose, methylcellulose, gelatin, starch, casein, xanthan gum, carboxyvinyl polymer, and the like are used.

[0060] As active ingredients depending on each application, dyes such as para-phenylene diamine and aminophenol, oxidizing agents such as hydrogen peroxide, setting agents such as acrylic resin and wax, ultraviolet absorbents such as 2-ethylhexyl para-methoxycinnamate, vitamins such as retinol and dl- α -tocopherol, moisturizers such as hyaluronic acid, anti-inflammatory analgesics such as methyl salicylate and indomethacin, disinfectants such as sodium benzoate and cresol, pest repellents such as pyrethroids and diethyl toluamide, antiperspirants such as zinc parphenolsulfonate, coolants such as camphor and menthol, anti-asthmatic drugs such as ephedrine and adrenaline, sweeteners such as sucralose and aspartame, adhesives and paints such as epoxy resins and urethane, dyes such as paraphenylene diamine and aminophenol, oxidizing agents such as hydrogen peroxide, and fire extinguishing agents such as ammonium dihydrogen phosphate and sodium/potassium hydrogen carbonate are used.

[0061] Furthermore, suspending agents, emulsifying agents, antioxidants, metal ion sequestering agents, and the like other than the above-listed contents can also be used.

[0062] As the injection gas, liquefied gases such as liquefied petroleum gas, dimethyl ether, and hydrofluoroolefins, and compressed gases such as carbon dioxide gas, nitrogen gas, compressed air, nitrous oxide, oxygen gas, rare gases, and mixed gases thereof are used.

REFERENCE SIGNS LIST

[0063]

- 1 Aerosol container
- 2 Mounting cup

- 3 Container gasket
- 4 Housing
- 4a Small-diameter portion
- 4b Rib
- 5 Stem
- 5a Passage
- 5b Side opening
- 5c Lower-end-side outer circumferential surface
- 5d Lower-end-side opening
- 10 5e Rib
- 6 Valve seat
- 6a Sheath-shaped inner circumferential surface
- 6b Annular protrusion
- 7 Stem gasket
- 15 8 Spring
- 9 Bag
- 10 Connection port
- 11 Suction pipe
- A Liquid level
- 20 B Liquid level

Claims

- 25 1. A content injection mechanism comprising:

a detachable cylindrical stem having an inflow hole through which a content stored in a container body flows from a side surface and a passage downstream thereof;
 a bowl-shaped valve seat whose inner surface engages with a lower end of the stem;
 a housing which accommodates the valve seat and into which the content in the container body flows; and
 a stem gasket that has a central opening through which the stem passes and that is held in the housing and exhibits a valve action between the stem gasket and the valve seat, wherein the valve seat includes:

an inner circumferential surface that is formed on the inner surface and is in close contact with an outer circumferential surface of the lower end; and
 an upward annular contact portion formed around a bowl-shaped opening of the valve seat,
 the inflow hole is provided in such a manner that it is exposed inside the annular contact portion from the bowl-shaped opening of the valve seat when the stem and the valve seat are engaged, and
 the stem gasket is held in the housing in such a manner that a bottom surface near an outer side of the central opening is in close contact with the annular contact portion in a rest mode.

2. The content injection mechanism according to claim 1, wherein a hole communicating with the passage is provided in the lower end of the stem. 5
3. The content injection mechanism according to claim 1 or 2, wherein an outer circumferential surface of the lower end includes: 10
a cylindrical outer circumferential surface and a tapered surface that continuously tapers below the cylindrical outer circumferential surface.
4. An aerosol product equipped with the content injection mechanism according to any one of claims 1 to 3, and storing a content including a propellant and an undiluted solution. 15

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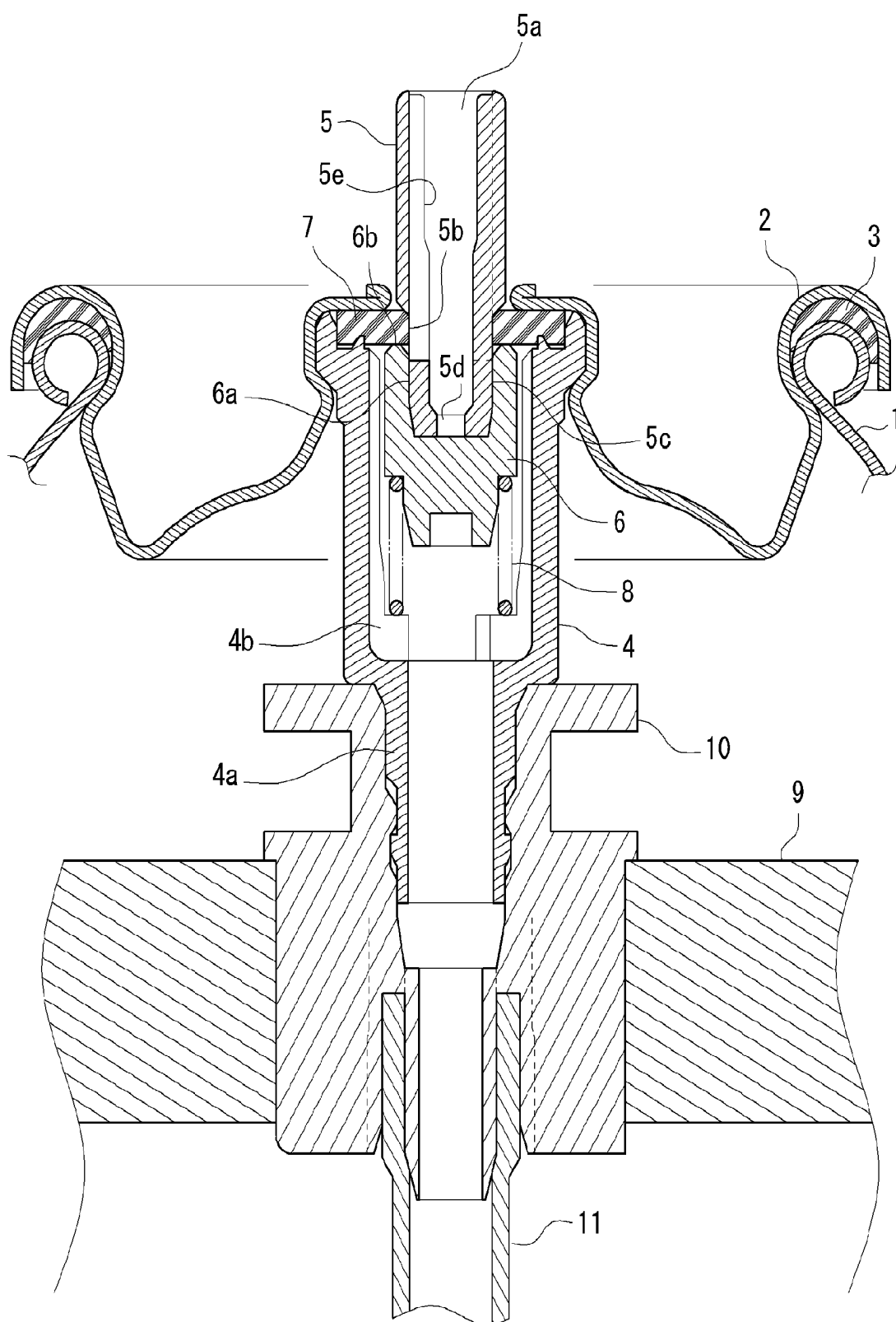
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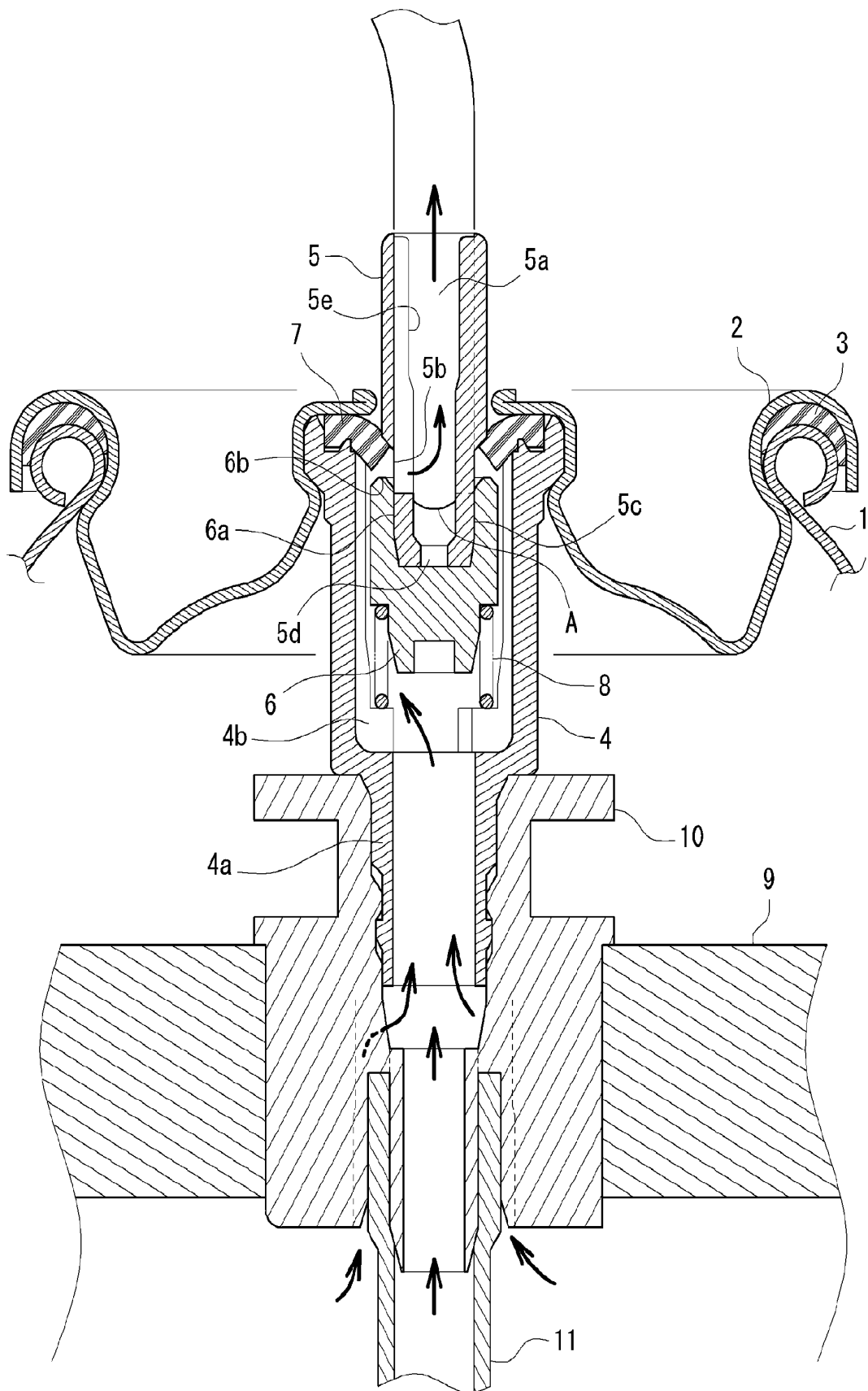
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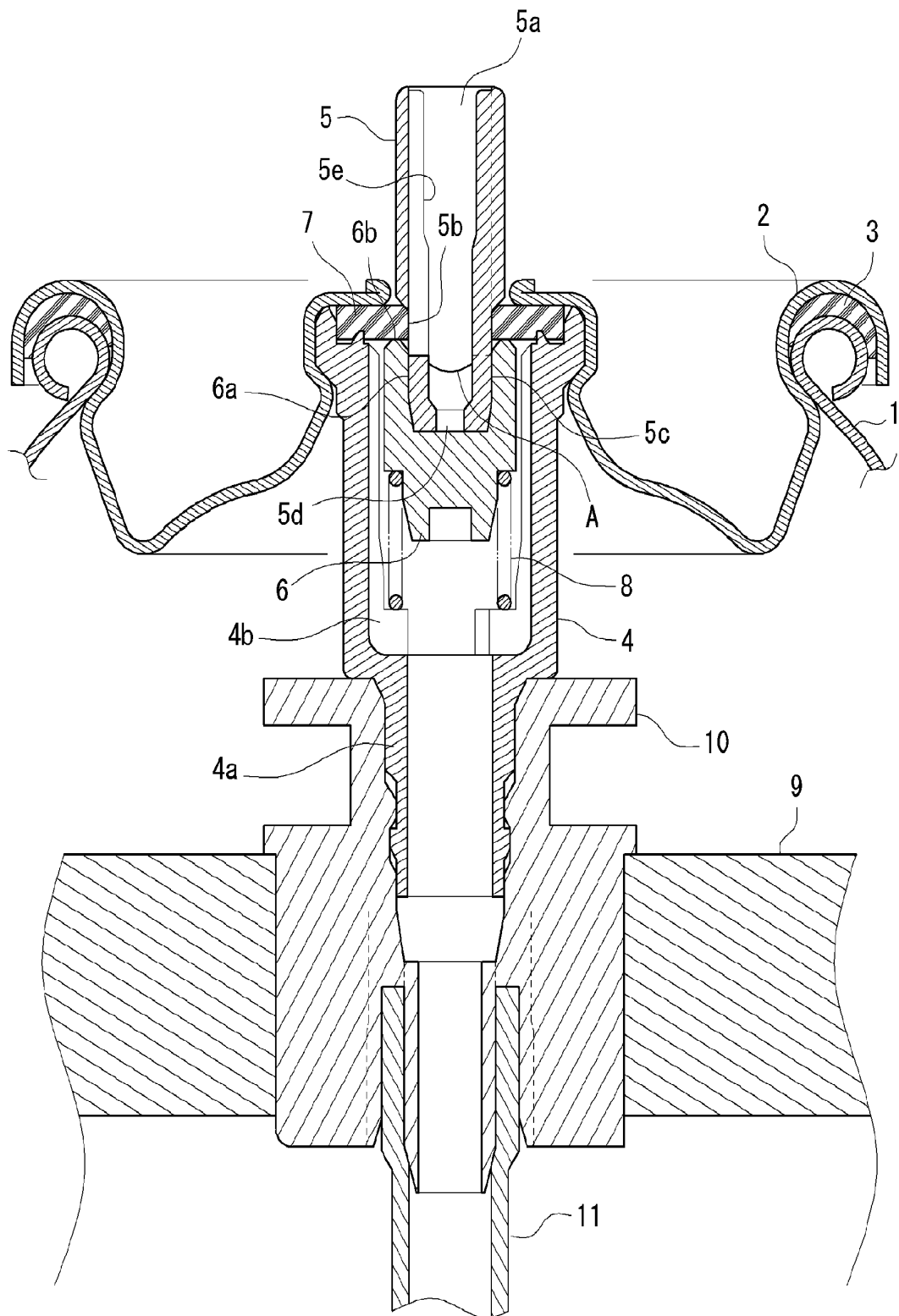
[Fig. 1]



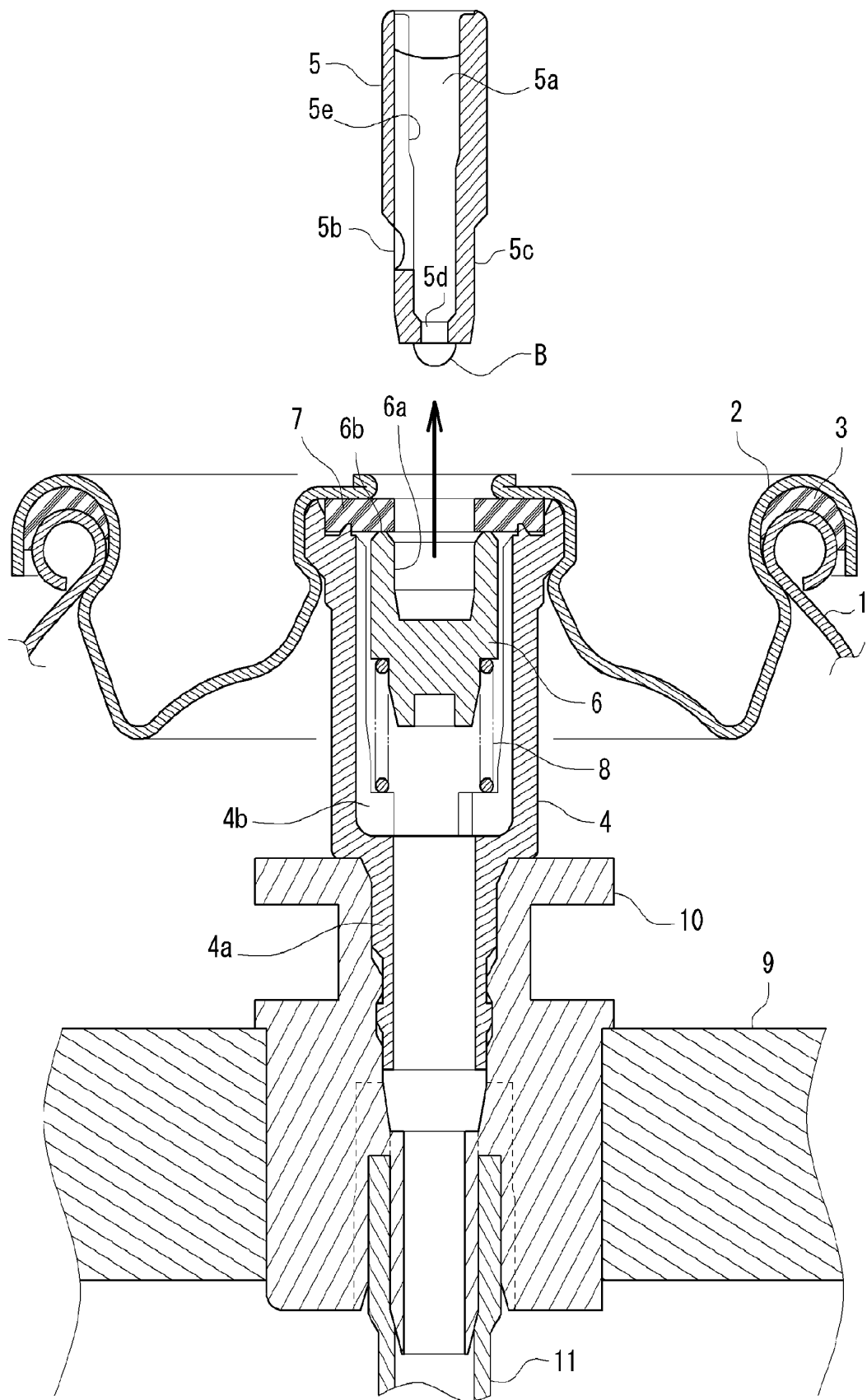
[Fig. 2]



[Fig. 3]



[Fig. 4]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/040530

A. CLASSIFICATION OF SUBJECT MATTER

B05B 9/04(2006.01)i; **B65D 83/48**(2006.01)i
FI: B65D83/48; B05B9/04

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)

B05B9/04; B65D83/48

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 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

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.
X	JP 9-290874 A (OSAKA SHIP BUILDING CO., LTD.) 11 November 1997 (1997-11-11) paragraphs [0012], [0013], fig. 4	1-4
A	WO 2016/056714 A1 (TOLMO ECO GREEN CO., LTD.) 14 April 2016 (2016-04-14)	1-4
A	JP 38-18747 Y1 (AKITA, Masatoshi) 05 September 1963 (1963-09-05)	1-4

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

05 December 2022

Date of mailing of the international search report

20 December 2022

Name and mailing address of the ISA/JP

Japan Patent Office (ISA/JP)
3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915
Japan

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2022/040530

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 9-290874 A	11 November 1997	(Family: none)	
WO 2016/056714 A1	14 April 2016	KR 10-2016-0042219 A	
JP 38-18747 Y1	05 September 1963	(Family: none)	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2005162327 A [0009]