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(54) MODEL RAILROAD CAR FOR CLEANING RAILS

(57) Provided is a rail cleaning device for model railroads operated at small torque while not requiring a complicated manual cleaning operation and a light and self-propelled model railroad car for cleaning rails. A model car 1 includes an attachment member 8 that holds a polishing film 8d, a holding member 7 that rotatably holds the attachment member 8, and an eccentric mechanism 9 which is able to eccentrically move the attachment member 8. When the eccentric mechanism 9 penetrates a floor plate 10 of the model car 1 and is held on the floor plate 10 to be movable up and down, the model car 1 is able to be self-propelled while not bearing any weight of the attachment member 8, the holding member 7, and the eccentric mechanism 9 in a state in which the polishing film 8d contacts the surface of the model rail 2.

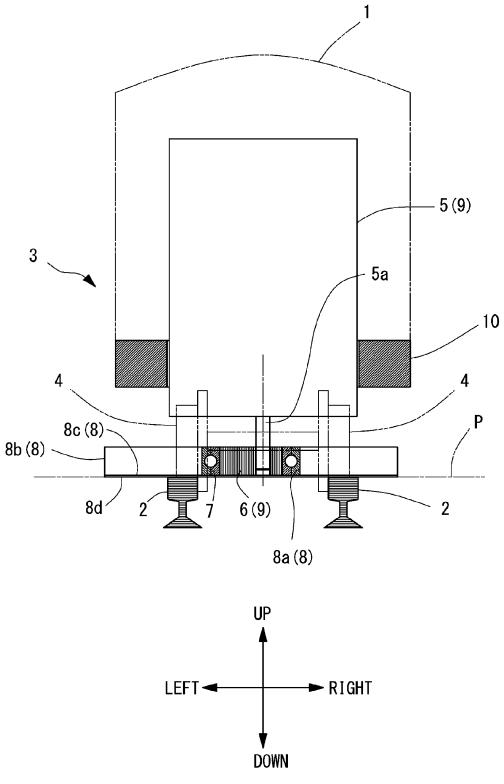

Figure 2

EP 3 539 631 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a rail cleaning device for model railroad and a model railroad car for cleaning rails.

BACKGROUND ART

[0002] Conventionally, model railroad has been enjoyed as a hobby or the like. In a model railroad, a vehicle modeled exactly at a certain scale imitating an actual rail car (referred to as model car for convenience of description) travels along a rail for model car (referred to as model rail for convenience of description). The model cars run substantially on electric power. The electric power is supplied from an external power supply via the model rail.

[0003] When dust or dirt adheres to the surface of the model rail, there is a possibility that various problems may occur. For example, when a friction resistance between the model car and the model rail changes, there is a case in which the model car does not travel as expected. Further, when an electric resistance between the model rail and a wheel changes due to dust on the model rail or dirt caused by spark or the like, there is a case in which sufficient electric power may not be supplied.

[0004] For example, Patent Documents 1 and 2 disclose measures for cleaning the model rail. Patent Document 1 discloses a device in which a cleaning pad is separably attached to a base attached to a handle. Patent Document 2 discloses a cleaning car equipped with a dust collection fan or a polishing head.

CITATION LIST

PATENT DOCUMENT

[0005]

Patent Document 1: JP 2013-075161 A
Patent Document 2: JP 2000-325673 A

SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0006] In the disclosure of Patent Document 1, there is a need to perform a cleaning operation by purposely gripping the device. When the extension path of the model rail is long, it is troublesome to perform a cleaning operation over the entire path. In addition, it is difficult to clean a part such as a tunnel into which hands do not enter.

[0007] In the disclosure of Patent Document 2, horizontal torque is generated in order to rotate a polishing head directly coupled to a motor. Since a relatively large weight is mounted in order to prevent deviation (derailment) from the rail due to this torque, the weight increases and a strong power car pulling or propelling a cleaning car needs to be connected. Furthermore, since the power car is connected, it is necessary to change the direction of the train to clean the rail at the vicinity of its terminal end.

[0008] The invention has been made in view of the above-described circumstances and an exemplary object of the invention is to provide a rail cleaning device for model railroads operated at small torque without requiring a complicated manual cleaning operation and a light and self-propelled model railroad car for cleaning rails.

MEANS FOR SOLVING THE PROBLEM

[0009] In order to solve the above-described problems, a rail cleaning device for model railroads of an exemplary aspect of the invention is a rail cleaning device for model railroads provided in a model railroad car, including: an attachment member that holds a polishing film contacting surfaces of rails of a model railroad to clean the surfaces thereof; a holding member that holds the attachment member to be rotatable about an orthogonal shaft orthogonal to a plane including the surface of the rail; and an eccentric mechanism which is able to eccentrically move the attachment member within a plane including the surface of the rail.

[0010] A model railroad car for cleaning rails of another exemplary aspect of the invention is a model railroad car for cleaning surfaces of rails of a model railroad, including: an attachment member that holds a polishing film contacting the surfaces of the rails of the model railroad to clean the surfaces thereof; a holding member that holds the attachment member to be rotatable about an orthogonal shaft orthogonal to a plane including the surface of the rail; and an eccentric mechanism which is able to eccentrically move the attachment member within a plane including the surface of the rail, in which the eccentric mechanism penetrates a floor plate of the model railroad car for cleaning rails and is held on the floor plate to be movable up and down, thereby the model railroad car for cleaning rails is able to be self-propelled while not bearing any weight of the attachment member, the holding member, and the eccentric mechanism in a state in which the polishing film contacts the surface of the rail.

[0011] Further objects and other features of present invention should be apparent from the following description of preferred embodiments with reference to the accompanying drawings.

ADVANTAGEOUS EFFECTS OF THE INVENTION

[0012] According to the invention, it is possible to provide a rail cleaning device for model railroads operated at small torque while not requiring a complicated manual cleaning operation and a light and self-propelled model railroad car for cleaning rails.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 is an overall view of a model railroad of an embodiment;
Fig. 2 is a schematic configuration diagram of a cleaning device of the embodiment;
Fig. 3 is an enlarged view in which a bottom portion of a model car is viewed from below; and
Fig. 4 is an overall perspective view of the cleaning device illustrating an appearance of an attachment member.

DESCRIPTION OF THE EMBODIMENTS

<Configuration of Cleaning Device>

[0014] Hereinafter, an embodiment of the invention will be described with reference to the drawings. Fig. 1 is an overall view of a model railroad S according to the embodiment. In the embodiment, a model car 1 will be described as a typical example. A rail for a model railroad along which the model car 1 travels (rail for model railroad) will be referred to as model rail 2.

[0015] The model car 1 which includes a cleaning device 3 (see Fig. 2) of the rail for the model railroad of the embodiment will be described. In the embodiment, as illustrated in Fig. 1, the traveling direction of the model car 1 is the front and back direction, the direction in which the model car 1 is viewed from the model rail 2 is the up direction, and the opposite direction thereof is the down direction. The left and right direction is defined when the model car 1 is viewed from the front side and the left and right direction may be referred to as the width direction.

[0016] The model car (the model railroad car for cleaning rails) 1 includes a plurality of wheels 4. The wheels 4 are used to roll on the surface of the model rail 2. The cleaning device 3 is provided inside the model car 1. Fig. 2 is a schematic configuration diagram of the cleaning device 3. Fig. 2 illustrates the model car 1 when viewed from the front side and illustrates the interior of the model car 1 for ease of explanation. Fig. 3 is an enlarged view in which the bottom portion of the model car 1 is viewed from below.

[0017] The cleaning device 3 includes a motor 5, an eccentric member 6, a bearing (a holding member) 7, and an attachment member 8. The motor 5 is able to rotate a motor shaft (an orthogonal shaft) 5a by electric power supplied thereto and the motor shaft 5a is disposed to extend downward in the up and down direction. That is, the motor shaft 5a extends in a direction orthogonal to a plane P including the surfaces of the two model rails 2. The motor 5 is disposed so that a cleaning surface 8c contacts the surface of the model rail 2 by its own weight inside the model car 1. For example, as illustrated in Fig. 2, the motor 5 may be held to be movable up and down on a floor plate 10 while the motor 5 penetrates the floor plate 10.

[0018] The eccentric member 6 is attached to the motor shaft 5a. The eccentric member 6 may be attached by various fixing measures such as press-insertion, adhesion, and thermal caulking. The eccentric member 6 has a substantially donut shape including an outer periphery and a center hole, and the center hole is deviated (eccentric) with respect to the center of the outer periphery to a certain degree. When the motor shaft 5a rotates, the outer periphery of the eccentric member 6 rotates eccentrically so that the eccentric operation provides the power of the eccentric movement of the attachment member 8 which is described later. Incidentally, the motor 5 and the eccentric member 6 constitute an eccentric mechanism 9. That is, the eccentric mechanism 9 eccentrically moves the attachment member 8 circumferentially in all directions including the width direction and the front and back direction of the model rail 2 in the plane P.

[0019] A bearing 7 is used to rotatably hold the attachment member 8 about the motor shaft 5a orthogonal to the plane P. The eccentric member 6 is fitted into an inner race of the bearing 7 and an outer race of the bearing 7 is fitted into a through-hole 8a of the attachment member 8. When the motor shaft 5a rotates, the attachment member 8 is eccentrically vibrated by the action of the eccentric member 6. At this time, since the attachment member 8 is freely rotatable with respect to the motor shaft 5a by the bearing 7, the attachment member 8 itself does not rotate in synchronization with the motor shaft 5a.

[0020] The attachment member 8 includes, as illustrated in Fig. 4, the through-hole 8a and a disc portion 8b. The through-hole 8a is formed in the vicinity of the center of the circular shape and the bearing 7 is fitted into the through-hole 8a. The bearing 7 is fixed into the through-hole 8a by press-insertion, adhesion, or thermal caulking.

[0021] The through-hole 8a and the disc portion 8b are concentrically formed. The lower surface (the bottom surface) of the disc portion 8b is formed as a cleaning surface 8c. The cleaning surface 8c has a function of holding the polishing film 8d and cleaning the surface of the model rail 2 in such a manner that a polishing film 8d contacts the surface of the model rail 2.

[0022] The polishing film 8d is preferably finely grained with a grain size of 1 μm or less. The cleaning surface 8c moves while drawing an irregular trajectory. A small motor having small torque can be applied as the motor 5. An increase in traveling resistance of the model car 1 due to the polishing may be small. The risk of derailment of the model car 1 due to the cleaning decreases, and the model car 1 can be decreased in weight. There is no need to mount a weight for increasing the weight to the model car 1.

<Operation of Cleaning Device>

[0023] When the motor shaft 5a starts to rotate at the time of cleaning the model rail 2 by using the model car 1, the attachment member 8 is irregularly vibrated by the

action of the eccentric member 6 and the friction resistance between the polishing film 8d and the model rail 2. The attachment member 8 slowly rotates about the motor shaft 5a in a non-synchronized manner. A synthetic trajectory T obtained by the combination of the eccentric movement and the rotational movement of the eccentric member 6 is illustrated in Fig. 3. The synthetic trajectory T illustrated in Fig. 3 indicates the movement trajectory of an arbitrary one point on the polishing film 8d in accordance with the rotation of the motor 5. Since the attachment member 8 moves like the synthetic trajectory T, most of the polishing film 8d is evenly used for cleaning and there is no specific portion which is locally used.

[0024] The model car 1 travels on the model rail 2. The model car 1 travels while the polishing film 8d contacts the surface of the model rail 2 at a constant contact pressure due to the own weight of the motor 5. By using a small and light motor 5, a contact pressure between the polishing film 8d and the surface of the model rail 2 can be made to a small contact pressure and the cleaning operation can be performed at a light contact pressure.

[0025] Since the model car 1 cleans the surfaces of the model rail 2 during the travel, the cleaning operation can be performed simply in not only the long-distance model rail 2 but also the model rail 2 inside a tunnel without performing a complicated manual cleaning operation.

[0026] By the rotation of the motor shaft 5a, the polishing film 8d eccentrically moves (vibrates) in not only the width direction (the left and right direction) but also the front and back direction (that is, in the plane P). Then, the polishing film 8d rotates about the motor shaft 5a in a vibrating manner due to the influence of a change in friction resistance between the surface of the model rail 2 and the polishing film 8d and moves in the same trajectory as that of the synthetic trajectory T. Accordingly, it is possible to clean the model rail 2 while using most of the polishing film 8d thoroughly and efficiently.

[0027] Although the preferred embodiment of the invention has been described above, the invention is not limited thereto, and various modifications and changes can be made within the scope of the gist thereof. For example, the invention includes the following points.

(Point 1) A rail cleaning device for model railroads provided in a model railroad car includes: an attachment member that holds a polishing film contacting surfaces of rails of a model railroad; a holding member that holds the attachment member to be rotatable about an orthogonal shaft orthogonal to a plane including the surface of the rail; and an eccentric mechanism which is able to eccentrically move the attachment member within a plane including the surface of the rail.
Accordingly, it is possible to provide a cleaning device of a rail for a model railroad operated at small torque while not requiring a complicated manual cleaning operation and a light and self-propelling model railroad car for cleaning rails.

(Point 2) The cleaning surface may be a polishing surface. By using the polishing surface containing a polishing agent (so-called dry type), the cleaning operation is simpler as compared with a wet type using a cleaning liquid. Furthermore, the particle size of the polishing agent is preferably 1 μm or less.
(Point 3) The holding member may be a bearing and the eccentric mechanism may include a motor and an eccentric member attached to a motor shaft of the motor. Accordingly, it is possible to configure the cleaning device of the rail for the model railroad without requiring a complicated mechanism part.
(Point 4) A model railroad car for cleaning rails includes the cleaning device of the rail for the model railroad. Accordingly, since it is possible to perform a cleaning operation using the rail cleaning device for model railroads according to Point 1 only by allowing to travel the model railroad car for cleaning rails, an effect according thereto can be obtained.

REFERENCE SIGNS LIST

[0028]

S: model railroad
1: model car (model railroad car for cleaning rails)
2: model rail (rail for model railroad)
3: cleaning device (cleaning device of rail for model railroad)
4: wheel
5: motor (part of eccentric mechanism)
5a: motor shaft (orthogonal shaft)
6: eccentric member (part of eccentric mechanism)
7: bearing (holding member)
8: attachment member
8a: through-hole
8b: disc portion
8c: cleaning surface
8d: polishing film
9: eccentric mechanism
10: floor plate
P: plane
T: synthetic trajectory

Claims

1. A model railroad car for cleaning surfaces of rails of a model railroad, comprising:

an attachment member that holds a polishing film contacting the surfaces of the rails of the model railroad to clean the surfaces thereof;
a holding member that holds the attachment member to be rotatable about an orthogonal shaft orthogonal to a plane including the surface of the rail; and
an eccentric mechanism which is able to eccen-

trically move the attachment member within a plane including the surface of the rail,
wherein the eccentric mechanism penetrates a floor plate of the model railroad car for cleaning rails and is held on the floor plate to be movable up and down, thereby the model railroad car for cleaning rails is able to be self-propelling while not bearing any weight of the attachment member, the holding member, and the eccentric mechanism in a state in which the polishing film contacts the surface of the rail.

2. The model railroad car for cleaning rails according to claim 1,
wherein the holding member is a bearing, and
wherein the eccentric mechanism includes a motor and an eccentric member attached to a motor shaft of the motor.

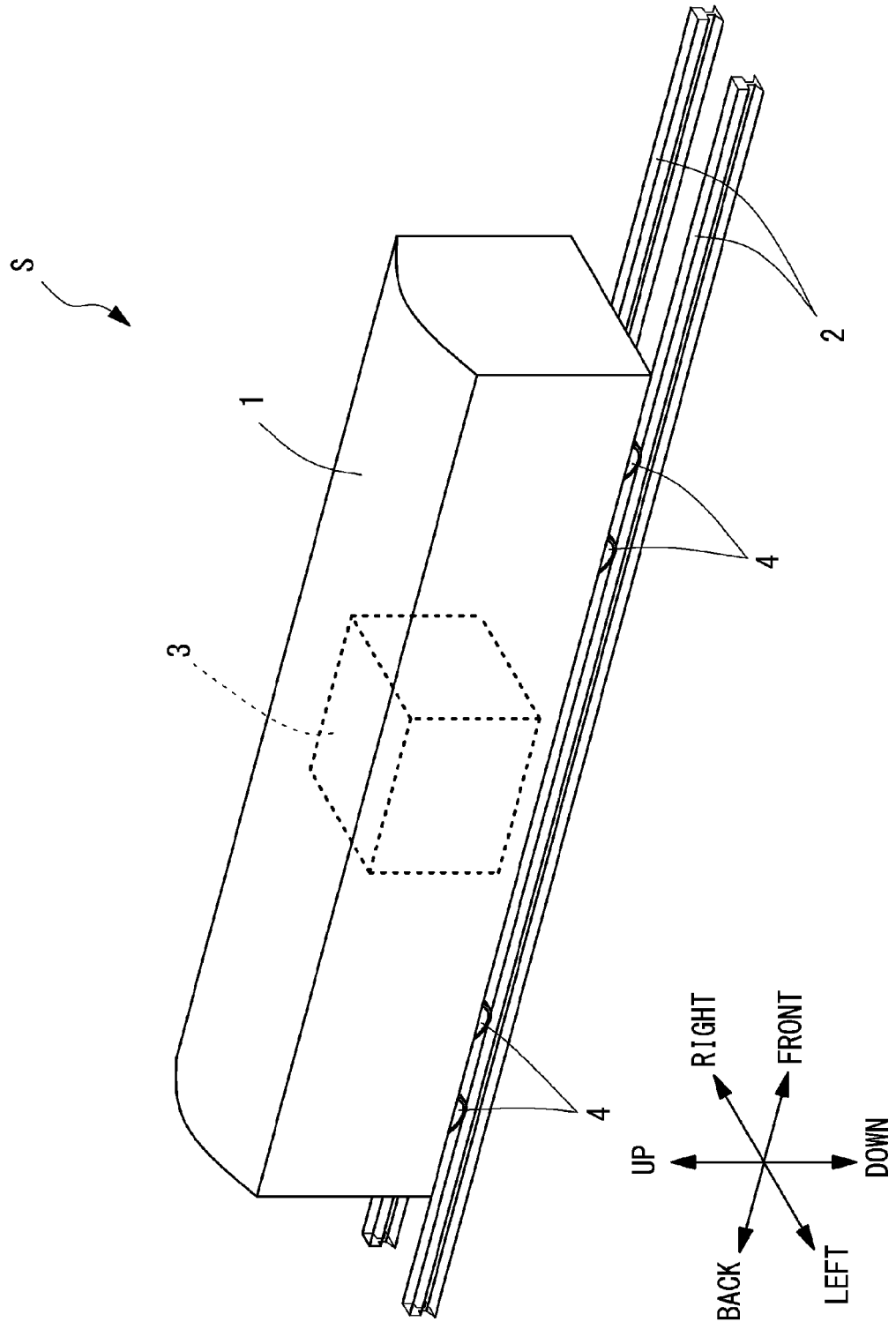

Figure 1

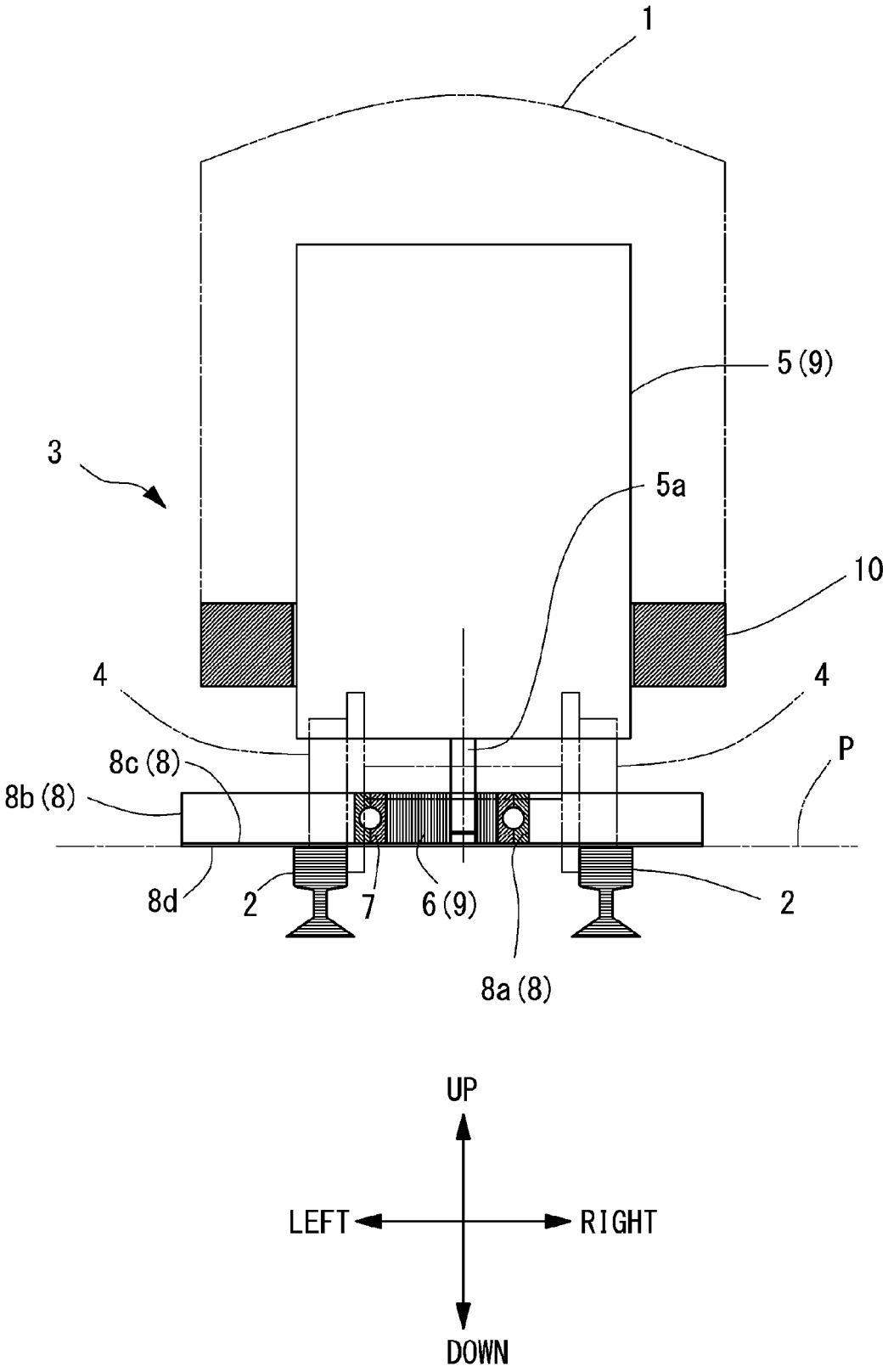

Figure 2

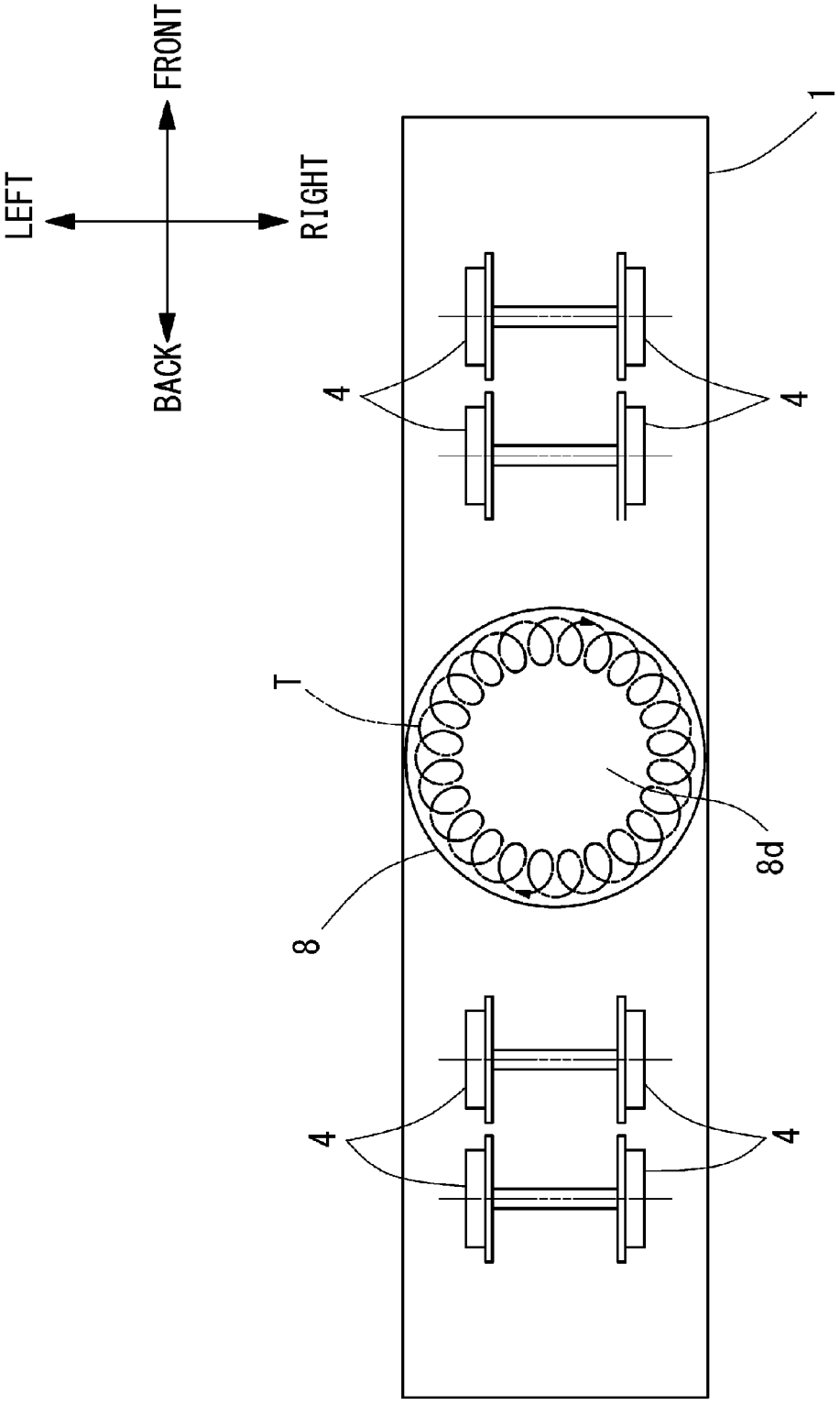

Figure 3

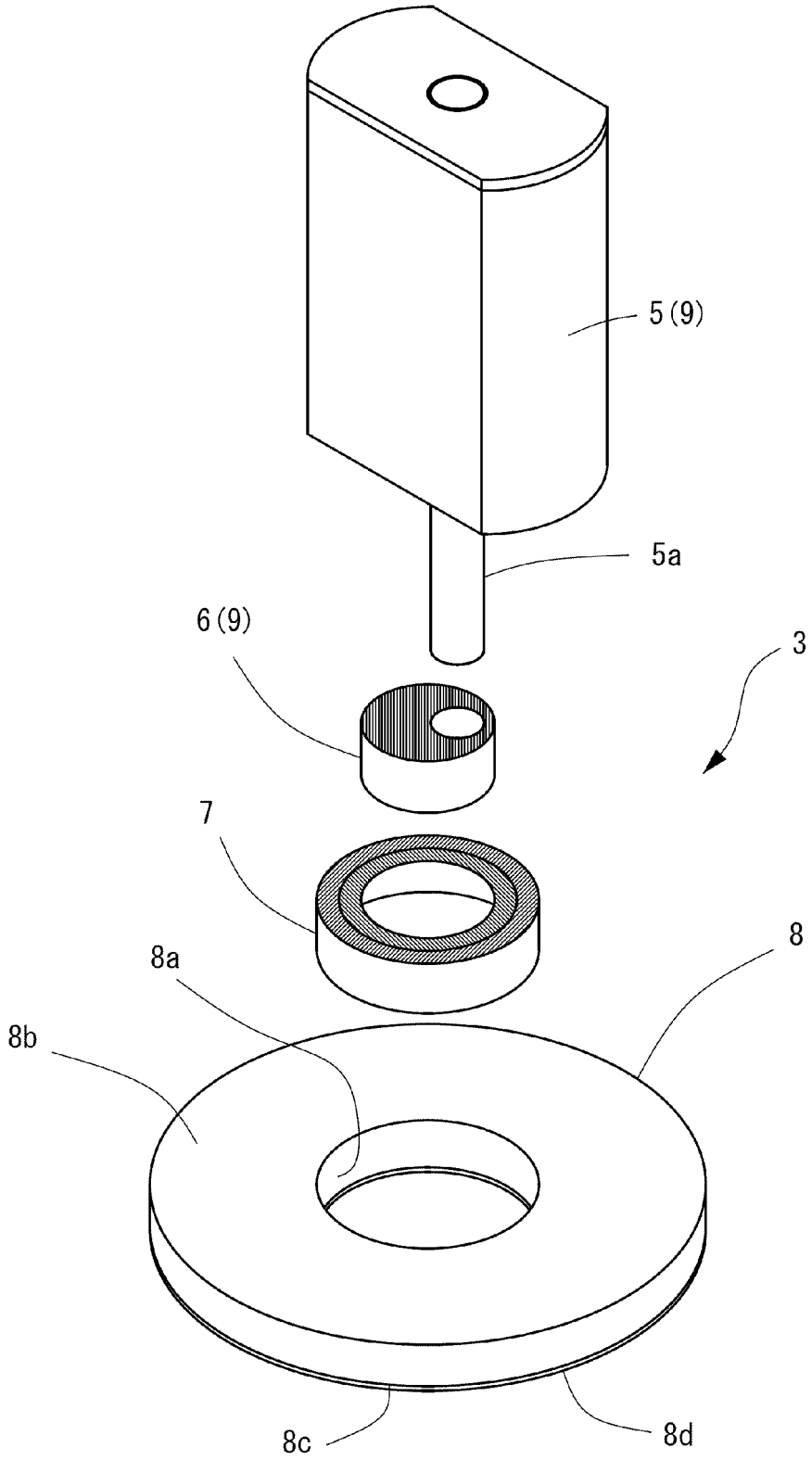

Figure 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/033648

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. A63H19/15(2006.01)i, A63H19/10(2006.01)i, A63H19/14(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. A63H1/00-37/00, B61F1/00-99/00

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	1971-2017
Registered utility model specifications of Japan	1996-2017
Published registered utility model applications of Japan	1994-2017

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.
A	US 8371229 B1 (SAILOR, Michael A.) 12 February 2013, entire text, all drawings (Family: none)	1-2
A	US 2006/0196386 A1 (MULL, James Anthony) 07 September 2006, entire text, all drawings (Family: none)	1-2

☒ 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
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"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	Date of mailing of the international search report
08 December 2017 (08.12.2017)	19 December 2017 (19.12.2017)

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

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2017/033648

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5816168 A (POISSANT, Matthew N.) 06 October 1998, entire text, all drawings (Family: none)	1-2
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 179681/1979 (Laid-open No. 95291/1981) (HAYASHI, Masao) 28 July 1981, entire text, all drawings (Family: none)	1-2

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2013075161 A **[0005]**
- JP 2000325673 A **[0005]**