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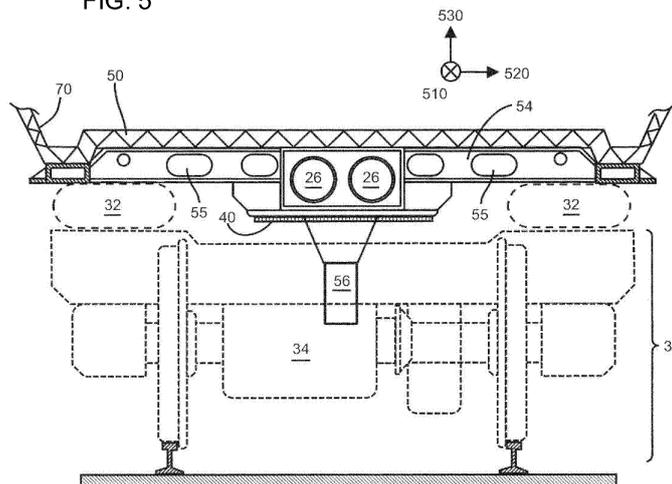
(54) **RAILWAY VEHICLE**

(57) There is provided a railway vehicle which has a common compartment layout for a railway vehicle having an internal-combustion engine mounted under a floor and a railway vehicle which does not have the internal-combustion engine and has a compartment space which is not narrowed.

frame (50), and an exhaust pipe (26) for discharging exhaust gas of the internal-combustion engine (24). The underframe (50) includes a body bolster (54) to which a truck (30) is attached, and the exhaust pipe (26) is laid as passing through a center part of the body bolster (54) included in the underframe (50) in the width direction and extending to the vicinity of an end of the underframe (50) in the longitudinal direction.

The railway vehicle includes an underframe (50) forming a surface of a floor, an internal-combustion engine (24) provided under the lower surface of the under-

FIG. 5



Description

Technical Field

[0001] The present invention relates to a railway vehicle including an internal-combustion engine under a floor, and more particularly, to a laying structure of exhaust pipes for guiding exhaust gas discharged from the internal-combustion engine.

Background Art

[0002] An example of a railway vehicle including an internal-combustion engine is an electric diesel vehicle. The electric diesel vehicle includes the internal-combustion engine (engine), a generator which is connected to an output shaft of the internal-combustion engine, a main converter which controls a frequency and a voltage of power generated by the generator, and a main motor which is driven by the power supplied from the main converter (refer to PTL 1).

Citation List

Patent Literature

[0003] PTL 1: Japanese Unexamined Patent Application Publication 2014-217190

Summary of Invention

Technical Problem

[0004] Generally, the internal-combustion engine of the electric diesel vehicle is mounted on a vehicle where a passenger and a crew get on. However, to secure a wide compartment space, the internal-combustion engine is arranged under a floor to be separated from the compartment since the internal-combustion engine easily causes noise and vibration. Traditionally, an exhaust pipe, extending from the internal-combustion engine, which is provided under the floor has a structure that passes through the floor of the compartment and is erected along an inner side of a side surface of the vehicle to a roof.

[0005] In a case where the exhaust pipe is provided in the compartment in the traditional structure, it is necessary to separately design compartment layouts of a vehicle on which the internal-combustion engine is mounted and a vehicle on which the internal-combustion engine is not mounted. In addition, since an exhaust pipe cover which includes a heat insulating layer for insulating heat of the exhaust pipe is provided to be projected from the side surface in the vehicle to the inner side of the vehicle. Therefore, there has been a case where the compartment space becomes narrower and the degree of freedom of compartment design is reduced.

[0006] An object of the present invention is to provide

a railway vehicle which has a common compartment layout for a vehicle on which an internal-combustion engine is mounted and a vehicle on which the internal-combustion engine is not provided and has a compartment space which is not narrowed.

Solution to Problem

[0007] The present invention is a railway vehicle including an underframe forming a surface of a floor, an internal-combustion engine provided under a lower surface of the underframe, and an exhaust pipe for discharging exhaust gas of the internal-combustion engine. The underframe includes a body bolster to which a truck is attached, and the exhaust pipe is laid as passing through a center part of the body bolster included in the underframe in the width direction and extending to the vicinity of an end of the underframe in the longitudinal direction.

Advantageous Effects of Invention

[0008] According to the present invention, it is possible to provide a railway vehicle which has a common compartment layout for a vehicle on which an internal-combustion engine is mounted and a vehicle on which the internal-combustion engine is not provided and has a compartment space which is not narrowed.

Brief Description of Drawings

[0009]

[FIG. 1] FIG. 1 is a side view of a multiple unit train composed of railway vehicles including internal-combustion engines.

[FIG. 2] FIG. 2 is an enlarged view of a vicinity of a truck for supporting the railway vehicle and the internal-combustion engine provided under a floor (part A in FIG. 1).

[FIG. 3] FIG. 3 is a cross-sectional view in a longitudinal direction (cross-sectional view taken along line B-B in FIG. 2) of a part where the internal-combustion engine is mounted.

[FIG. 4] FIG. 4 is a cross-sectional view in a horizontal direction (cross-sectional view taken along line C-C in FIG. 2) of the truck and the internal-combustion engine.

[FIG. 5] FIG. 5 is a cross-sectional view in the longitudinal direction (cross-sectional view taken along line D-D in FIG. 4) of the truck and a vehicle body.

[Fig. 6] FIG. 6 is a cross-sectional view in the longitudinal direction (cross-sectional view taken along line E-E in FIG. 4) of a vehicle end part.

Description of Embodiments

[0010] An embodiment as a mode for carrying out the present invention is described with reference to the draw-

ings.

[0011] First, before the description starts, directions to be used are defined. The directions include a longitudinal (rail) direction 510 of a railway vehicle or a truck, a width (railroad tie) direction 520 of the railway vehicle or the truck, and a height direction 530. The respective directions are simply described as the longitudinal direction 510, the width direction 520, and the height direction 530.

Embodiment

[0012] FIG. 1 is a side view of a multiple unit train composed of railway vehicles including internal-combustion engines. A multiple unit train 1 travels by using power collected from an overhead line 2 in an electrified section and travels by using power obtained by driving a generator 25 driven by a driving force of an internal-combustion engine 24 mounted on the railway vehicle in a section where the overhead line 2 is not provided (non-electrified section).

[0013] On a roof of each leading vehicle (No. 1 and No. 5 in FIG. 1), a collector (pantograph) 16 is mounted. Power collected by the collector 16 is transformed by a main transformer 12, and then supplied to a main converter 14. The power supplied from the main converter 14 drives a main motor (refer to main motor 34 in FIGS. 4 and 5) mounted on the truck to obtain the driving force.

[0014] All the vehicles have air conditioners 17 mounted at the center side in the longitudinal direction on roofs of the vehicles, and each of the air conditioners 17 ventilates air in the vehicle and supplies conditioned air, of which temperature and humidity have been adjusted, in the vehicle. Furthermore, an auxiliary power supply 10 mounted under the floor generates power to be supplied to the air conditioners 17, a broadcasting device (not shown), and the like.

[0015] As illustrated in FIG. 1, a ceiling positioned directly under a portion of the roof where the collector 16 is mounted is formed to be lower than a ceiling of a portion of the roof where the collector 16 is not mounted. When the railway vehicle passes through the non-electrified section where the overhead line 2 (or dual gauge which is not shown) is not provided, the collector 16 is folded, and the railway vehicle travels by using power obtained by operating the generator 25 by the internal-combustion engine 24 mounted on each of middle vehicles (No. 2 to No. 4 in FIG. 1). Each of the middle vehicles has the main converter 14 mounted thereon and controls a voltage and a frequency of power which is collected from the overhead line 2 and of which a pressure is regulated or power generated by the generator 25 to drive the main motor mounted on the truck.

[0016] Since the internal-combustion engine 24 is provided under a floor (high floor) 7 of the middle vehicle, the height of the floor 7 is higher than that of a floor (low floor) 8 of the leading vehicle. Therefore, for a smooth movement between the low floor 8 and the high floor 7, slopes are provided on the vehicles adjacent to the lead-

ing vehicles of the middle vehicles (No. 2 and No. 4 in FIG. 1).

[0017] FIG. 2 is an enlarged view of the vicinity of a truck 30 for supporting the railway vehicle and the internal-combustion engine 24 provided under the floor (part A in FIG. 1). FIG. 3 is a cross-sectional view in the longitudinal direction (cross-sectional view taken along line B-B in FIG. 2) of a part where the internal-combustion engine 24 in FIG. 2 is mounted.

[0018] The vehicle body of the railway vehicle includes an underframe 50 forming the surface of the floor (FIGS. 3 and 4), side structures 70 which are erected at both ends of the underframe 50 in the width direction 520 (FIG. 3), end body structures which are erected at both ends of the underframe 50 in the longitudinal direction 510 (not shown), and a roof structure which is provided at upper ends of the side structure 70 and the end body structure (not shown).

[0019] In addition, the railway vehicle is elastically supported by the trucks 30 disposed at both ends in the longitudinal direction 510 via air springs 32. Under the floor in the vicinity of the truck 30 (on the side of longitudinal direction 510 of railway vehicle), a power generation unit 11, an air tank 19 in which pressurized air for controlling a brake is accumulated, and the like are provided (FIG. 2).

[0020] The power generation unit 11 mainly includes the internal-combustion engine 24 and the generator 25. In the vicinity of the internal-combustion engine 24, mufflers 27, a cooler 28, and the like are provided (FIG. 2). The muffler 27 functions to muffle exhaust sounds of the internal-combustion engine 24, and the cooler 28 functions to facilitate heat dissipation from cooling water.

[0021] Since the internal-combustion engine 24 generates noise and vibration, the internal-combustion engine 24 is mounted under the lower surface of the underframe 50 between both trucks supporting the both ends of the railway vehicle in the longitudinal direction without via a vibration isolating support (which is not shown). In addition, by providing side skirts 42 having a sound insulation function, the internal-combustion engine 24 is surrounded (FIG. 3), and the noise caused by the internal-combustion engine 24 is prevented from propagating around the railway vehicle.

[0022] A heat insulating plate 40 is provided under the lower surface of the underframe 50 between the underframe 50 and the internal-combustion engine 24 (FIG. 3), and heat radiation from the upper part of the internal-combustion engine 24 is prevented from being transmitted to the lower surface of the underframe 50.

[0023] The mufflers 27 are provided, as a pair of the right and left mufflers, below the both ends of the internal-combustion engine 24 in the width direction 520. As illustrated in FIGS. 2 and 3, each of two exhaust pipes 26, extended from each of the pair of mufflers 27, has a structure which extends toward an end of the underframe 50 in the longitudinal direction 510 immediately below the underframe 50 in the width direction 520 after rising upward at the center part of the internal-combustion engine

24 in the width direction. A heat insulating material is wound around the outer peripheral surface of the exhaust pipe 26 to prevent heat of the exhaust pipe 26 from being radiated to the surroundings.

[0024] FIG. 4 is a cross-sectional view in the horizontal direction (cross-sectional view taken along line C-C in FIG. 2) of the truck 30 and the internal-combustion engine 24. FIG. 5 is a cross-sectional view in the longitudinal direction (cross-sectional view taken along line D-D in FIG. 4) of the truck 30 and the vehicle body. FIG. 6 is a cross-sectional view in the longitudinal direction (cross-sectional view taken along line E-E in FIG. 4) of a vehicle end part.

[0025] As illustrated in FIG. 4, the underframe 50 includes side beams 52 and end beams 51 as a framework. The side beams 52 are disposed at both ends of the railway vehicle in the width direction 520 along the longitudinal direction 510, and the end beams 51 are disposed at both ends of the railway vehicle in the longitudinal direction 510 along the width direction 520. A body bolster 54 is disposed as a part of the underframe 50 used to attach the truck 30 below the vehicle body and formed of a high-rigidity strength member. As illustrated in FIGS. 4 and 5, a center pin 56 is disposed under the lower surface of the center part of the body bolster positioned at the center part of the body bolster 54 in the width direction 520 and is an axis when the truck 30 turns in the horizontal plane. A pair of middle beams 53 is laid along the longitudinal direction 510 between the end beams 51 at both ends of the underframe 50 in the longitudinal direction 510 and the body bolster 54 and connects the end beams 51 to the body bolster 54.

[0026] The two exhaust pipes 26 extend from the internal-combustion engine 24 via the muffler 27, are raised upward to the lower surface of the center part of the underframe 50 in the width direction 520 near the internal-combustion engine 24, and the two exhaust pipes 26 are arranged side by side in the width direction 520 (horizontal plane) (FIG. 3). Next, the two exhaust pipes 26 arranged on the horizontal plane side by side pass through the body bolster 54 along the longitudinal direction 510 (FIG. 5) and are laid between the pair of middle beams 53 forming a part of the underframe 50 (FIG. 4).

[0027] The two exhaust pipes 26 join together and are integrated as a single exhaust pipe 26 after extending to the vicinity of the end beam 51 (FIG. 4). As illustrated in FIG. 6, the single integrated exhaust pipe 26 is laid between the pair of middle beams 53 and is positioned below a coupler 58. Concurrently, the exhaust pipe 26 is fixed to an exhaust pipe holder 46 provided under the lower surface of the middle beam 53 via a vibration isolating support 47. In addition, the exhaust pipe 26 which extends to the vicinity of the end beam 51 is bent toward the end in the width direction 520 (FIG. 4), and then, extends in the height direction 530 along a surface of an end body structure (which is not shown) on the inner side of the vehicle and is erected so as to pass through a roof

structure (which is not shown). Normally, on the vehicle's inner side of the end body structure, a portion is provided in which a deck portion used by a passenger and the like to get on and get off from the railway vehicle, a device room where devices are placed, or a luggage storage space is provided and in which a compartment space where the passenger and the like is seated is not provided.

[0028] As illustrated in FIG. 5, the body bolster 54 includes end body bolsters positioned at both ends in the width direction 520 and a center part body bolster which is positioned at the center in the width direction 520 and through which the exhaust pipes 26 pass. The end body bolster is formed of a hollow extruded shape material which is extruded along the width direction 520. The center part body bolster is formed by assembling thick plate materials by welding.

[0029] In addition, the air spring 32 has contact with the lower surface of the end body bolster, and the end body bolster includes a plurality of conduits 55 along the longitudinal direction 510. Electric wires and pipes intersecting with the body bolster 54 are laid through the conduits 55.

[0030] Next, countermeasures regarding the heat of the exhaust pipe 26 are described. In a portion where the exhaust pipes 26 are positioned above the main motor 34 of the truck 30, the heat insulating plate 40 is provided under the lower surfaces of the exhaust pipes 26 and prevents the heat of the exhaust pipes 26 from being transmitted to the main motor 34 (FIG. 5). Although not shown, the heat insulating material is provided in a portion where the exhaust pipes 26 have contact with the center part body bolster, and this prevents the heat of the exhaust pipe 26 to be transmitted to the body bolster and the like.

[0031] As described above, the exhaust pipe 26 has a structure laid in a form which is raised from the internal-combustion engine 24 to the lower surface of the center part of the underframe 50 in the width direction 520 via the muffler 27, passes through the center part of the body bolster 54, included in the underframe 50, in the width direction 520, and extends to the end of the railway vehicle in the longitudinal direction 510, and then, is raised in the height direction 530 and passes through the roof structure. That is, since the exhaust pipes 26 are not laid in the compartment, a larger compartment space can be secured. In addition, interference between the exhaust pipes 26 provided under the lower surface of the underframe 50 and the air spring 32 can be suppressed. Furthermore, in addition, after the exhaust pipe 26 is extended to the end of the railway vehicle in the longitudinal direction 510, the exhaust pipe 26 is raised in the deck portion which is used by a passenger and the like to get on and get off from the railway vehicle or the device room. Therefore, a common compartment layout can be used for the railway vehicle having the internal-combustion engine 24 mounted therein and the railway vehicle which does not have the internal-combustion engine 24 mount-

ed therein.

[0032] The two exhaust pipes 26 are arranged in parallel in the horizontal plane under the lower surface of the center part of the underframe 50 in the width direction 520 and pass through the center part body bolster provided at the center part of the body bolster 54. Accordingly, it is possible to suppress an increase in the height of the center part body bolster and to obtain a compartment space that is wide in the height direction.

[0033] Furthermore, an outlet of the exhaust pipe 26 is provided on the roof at the end of the railway vehicle in the longitudinal direction, and the position of the outlet is separated from the air conditioner 17 provided on the center part of the roof in the longitudinal direction. Accordingly, it is possible to prevent that the exhaust gas discharged from the exhaust pipe 26 is taken in the air conditioner 17 and contaminates and damages the air conditioner 17.

[0034] In the above embodiment, the multiple unit train has been described which includes various devices for the travel in the electrified section, the internal-combustion engine for the travel in the non-electrified section, and the generator connected to the internal-combustion engine. However, the present invention is not necessarily limited to the multiple unit vehicle (railway vehicle) to travel in both of the electrified section and the non-electrified section.

[0035] Although the railway vehicle having an electric diesel engine including the generator connected to the internal-combustion engine mounted thereon has been exemplified as the embodiment, the present invention can be applied to a railway vehicle having a hydraulic diesel engine, which includes only an internal-combustion engine, mounted thereon.

Reference Signs List

[0036]

1	multiple unit train
2	overhead line
10	auxiliary power supply
11	power generation unit
12	main transformer
14	main converter
16	collector (pantograph)
17	air conditioner
19	air tank
24	internal-combustion engine
25	generator
26	exhaust pipe
27	muffler
28	cooler
30	truck
32	air spring
34	main motor
40	heat insulating plate
42	side skirt

46	exhaust pipe holder
47	vibration isolating support
50	underframe
51	end beam
5	52 side beam
	53 middle beam
	54 body bolster
	55 conduit
	56 center pin
10	58 coupler
	70 side structure
	510 longitudinal (rail) direction
	520 width (railroad tie) direction
	530 height direction

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Claims

1. A railway vehicle comprising:
 - 20 an underframe configured to form a surface of a floor;
 - an internal-combustion engine provided under a lower surface of the underframe; and
 - 25 an exhaust pipe configured to discharge exhaust gas of the internal-combustion engine, wherein the underframe includes a body bolster to which a truck is attached, and the exhaust pipe is laid as passing through a center part of the body bolster in a width direction and extending to the vicinity of an end of the underframe in a longitudinal direction.
- 35 2. The railway vehicle according to claim 1, wherein the two exhaust pipes are arranged in parallel in a horizontal direction.
- 40 3. The railway vehicle according to claim 2, comprising: a pair of mufflers provided between the internal-combustion engine and the exhaust pipes, and the exhaust pipes which extend from the respective mufflers are raised to a lower surface of a center part of the underframe in the width direction and are arranged in parallel in the horizontal direction.
- 45 4. The railway vehicle according to claim 2, comprising: a pair of middle beams provided between end beams at both ends of the underframe in the longitudinal direction and the body bolster, wherein the two exhaust pipes are laid between the pair of middle beams.
- 50 5. The railway vehicle according to claim 4, wherein the two exhaust pipes are integrated as a single exhaust pipe in the vicinity of the end beam, and the single exhaust pipe is provided below a coupler provided between the middle beams as facing to-

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ward the end beam, is bent from the vicinity of the end beam toward an end of the underframe in the width direction, and is erected so as to pass through a roof structure of the railway vehicle in a vertical direction along a surface on a vehicle's inner side of an end body structure of the railway vehicle. 5

6. The railway vehicle according to claim 5, wherein the single exhaust pipe is fixed to an exhaust pipe holder provided under lower surfaces of the middle beams via a vibration isolating support. 10
7. The railway vehicle according to claim 1, wherein an outer peripheral surface of the exhaust pipe is wound with a heat insulating material. 15
8. The railway vehicle according to claim 1, wherein the railway vehicle is a vehicle which has an electric diesel engine, including a generator connected to the internal-combustion engine, mounted on the vehicle. 20
9. The railway vehicle according to claim 1, wherein the railway vehicle is a vehicle which has a hydraulic diesel engine, including only the internal-combustion engine, mounted on the vehicle. 25
10. The railway vehicle according to claim 8, wherein a heat insulating plate is provided on a part above a motor where the two exhaust pipes are mounted on the truck. 30

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FIG. 1

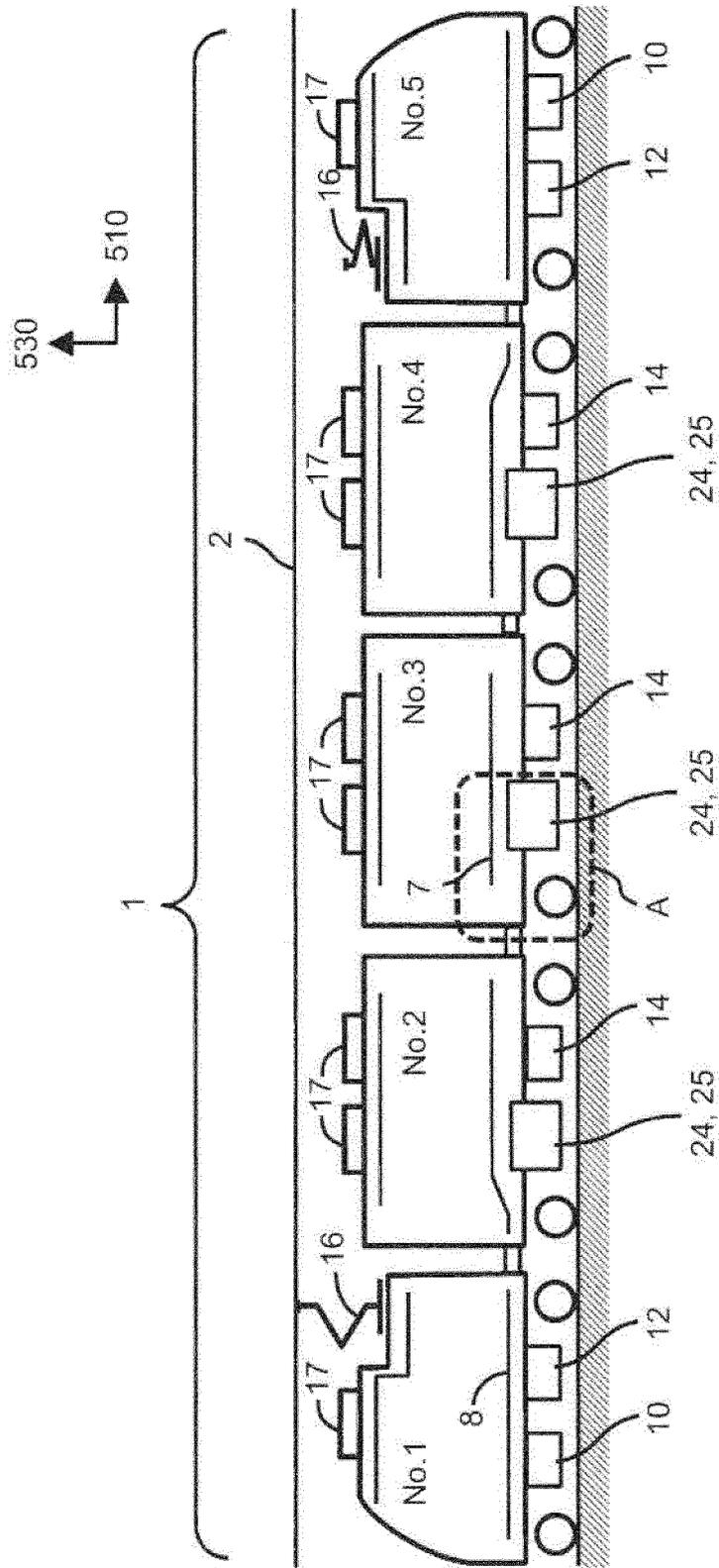
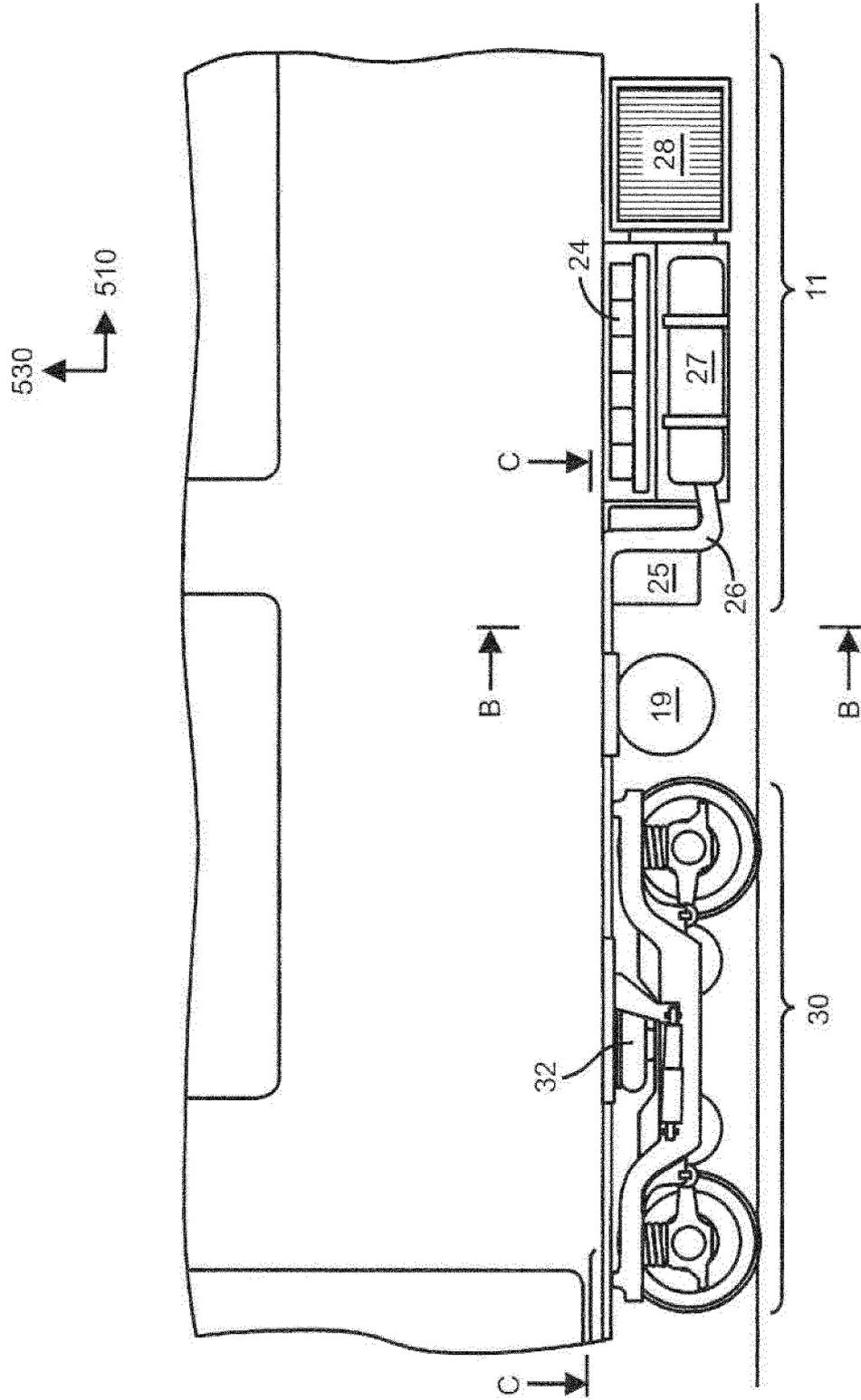


FIG. 2



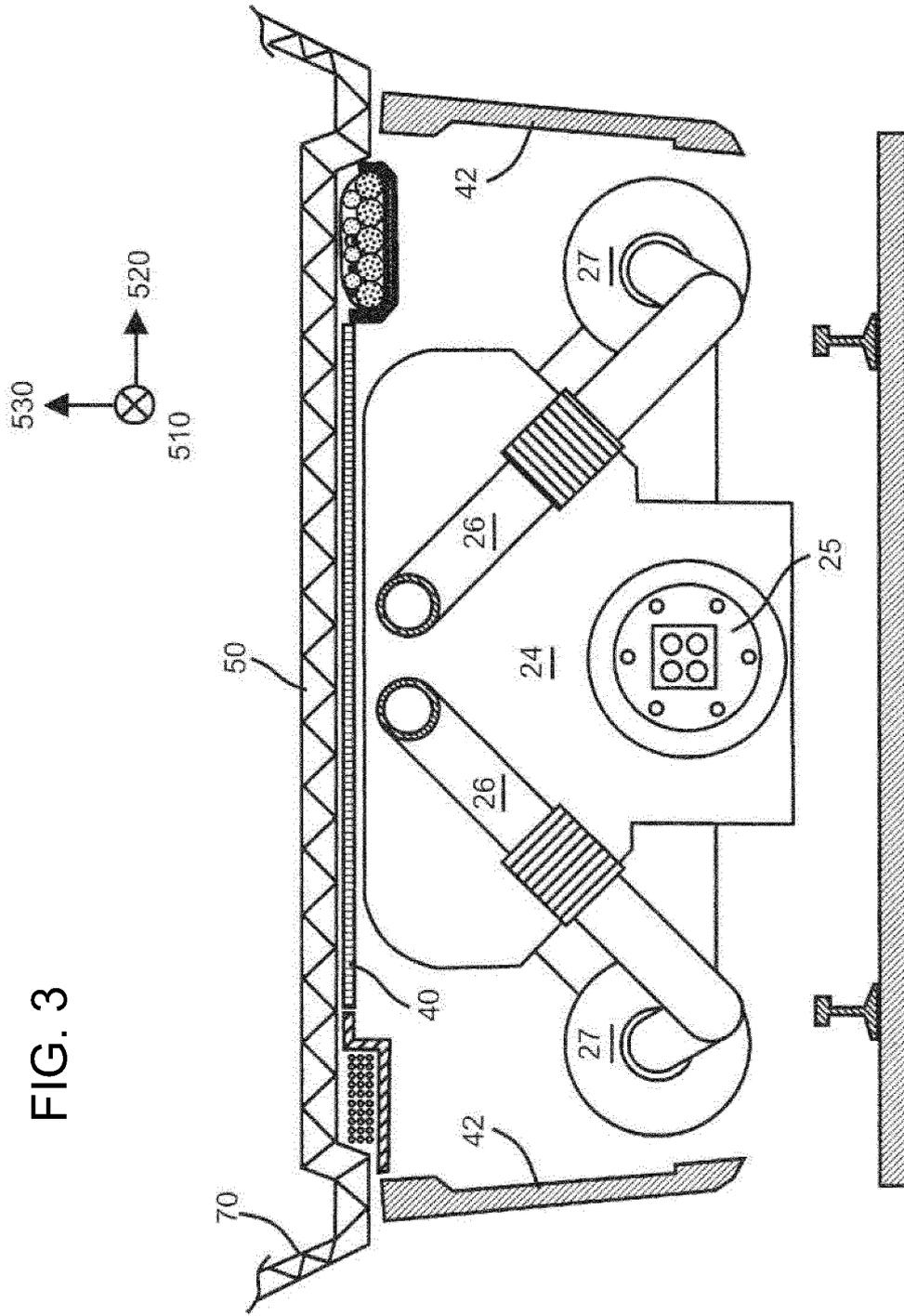


FIG. 3

FIG. 4

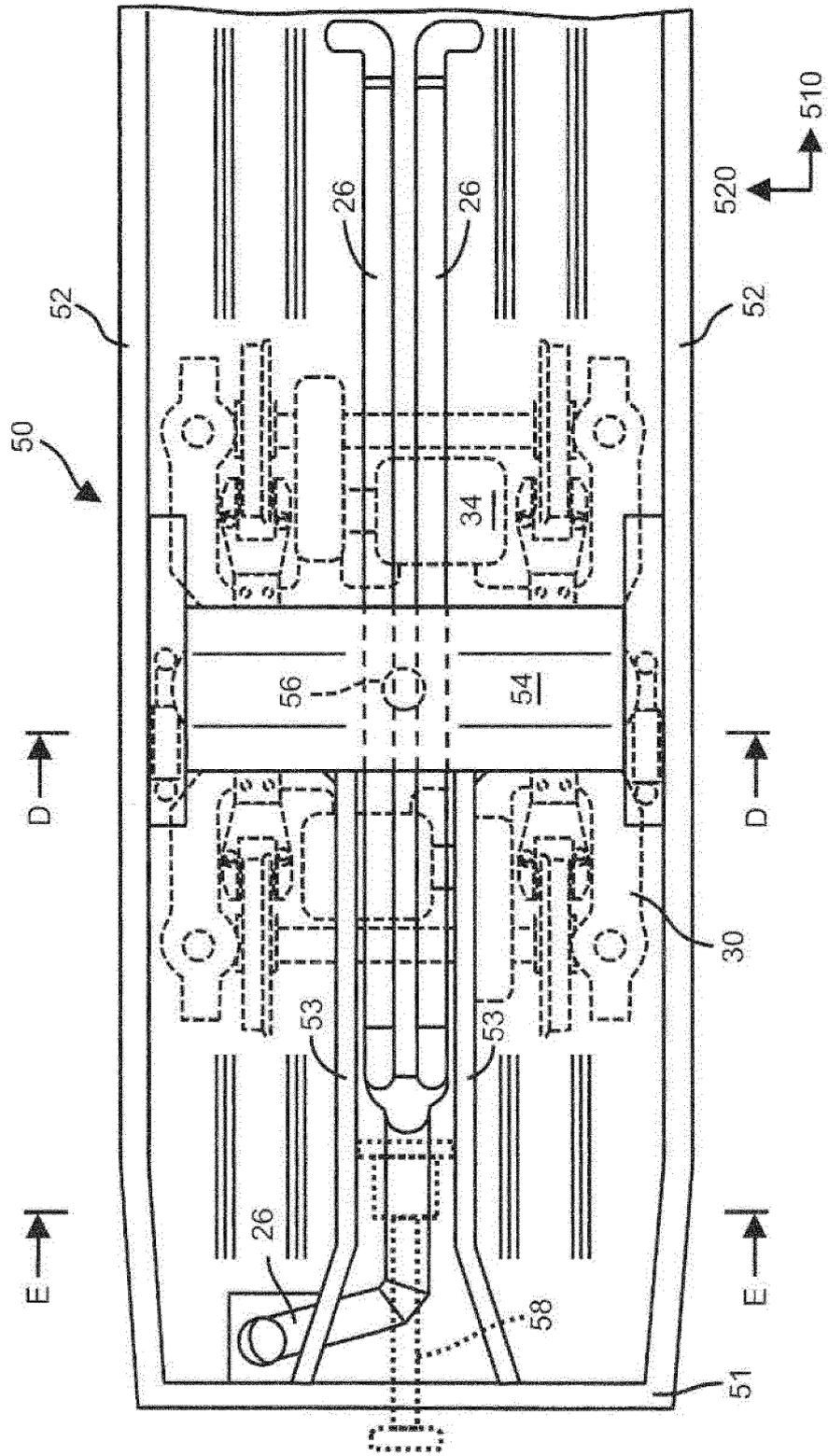


FIG. 5

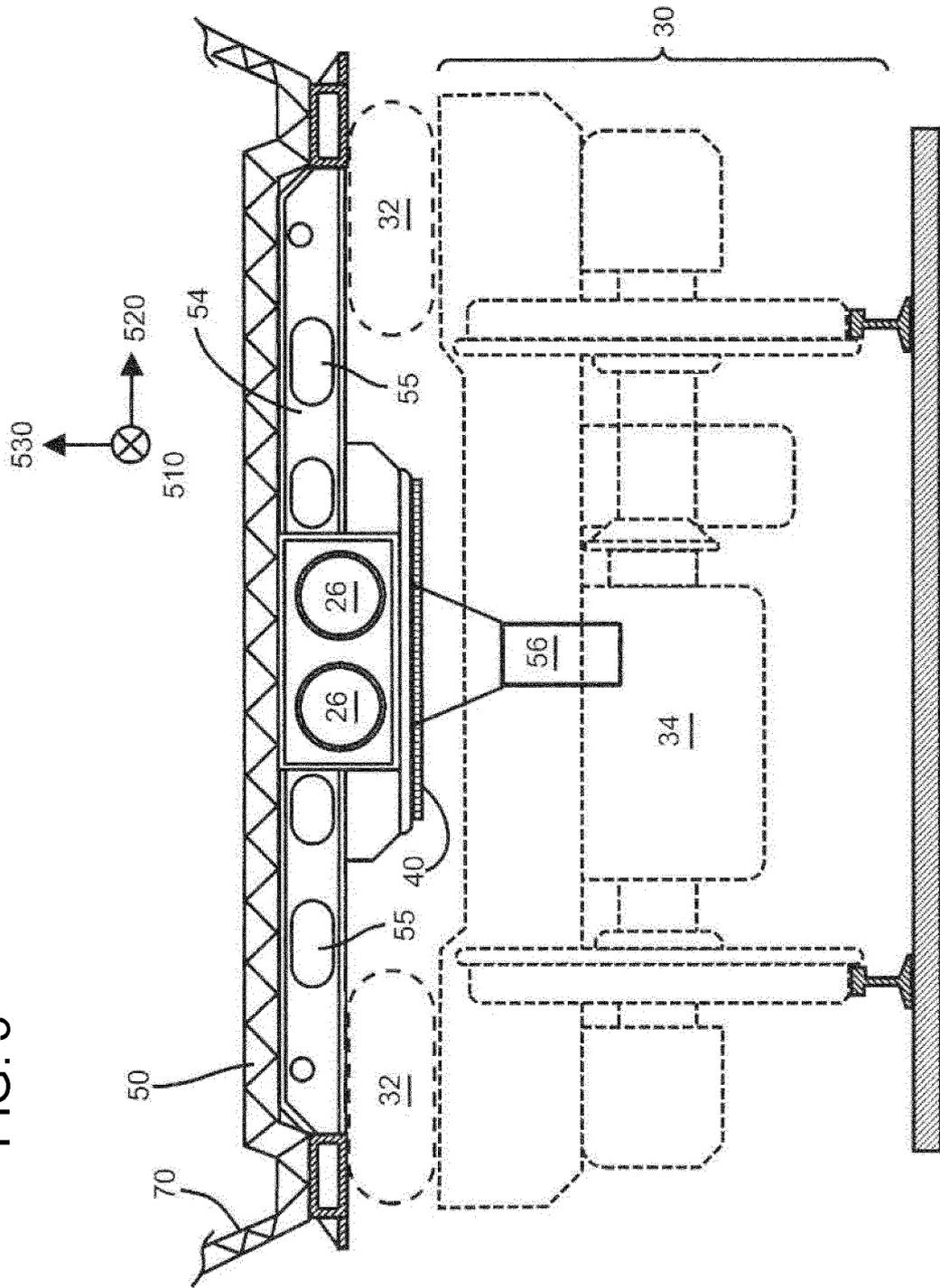
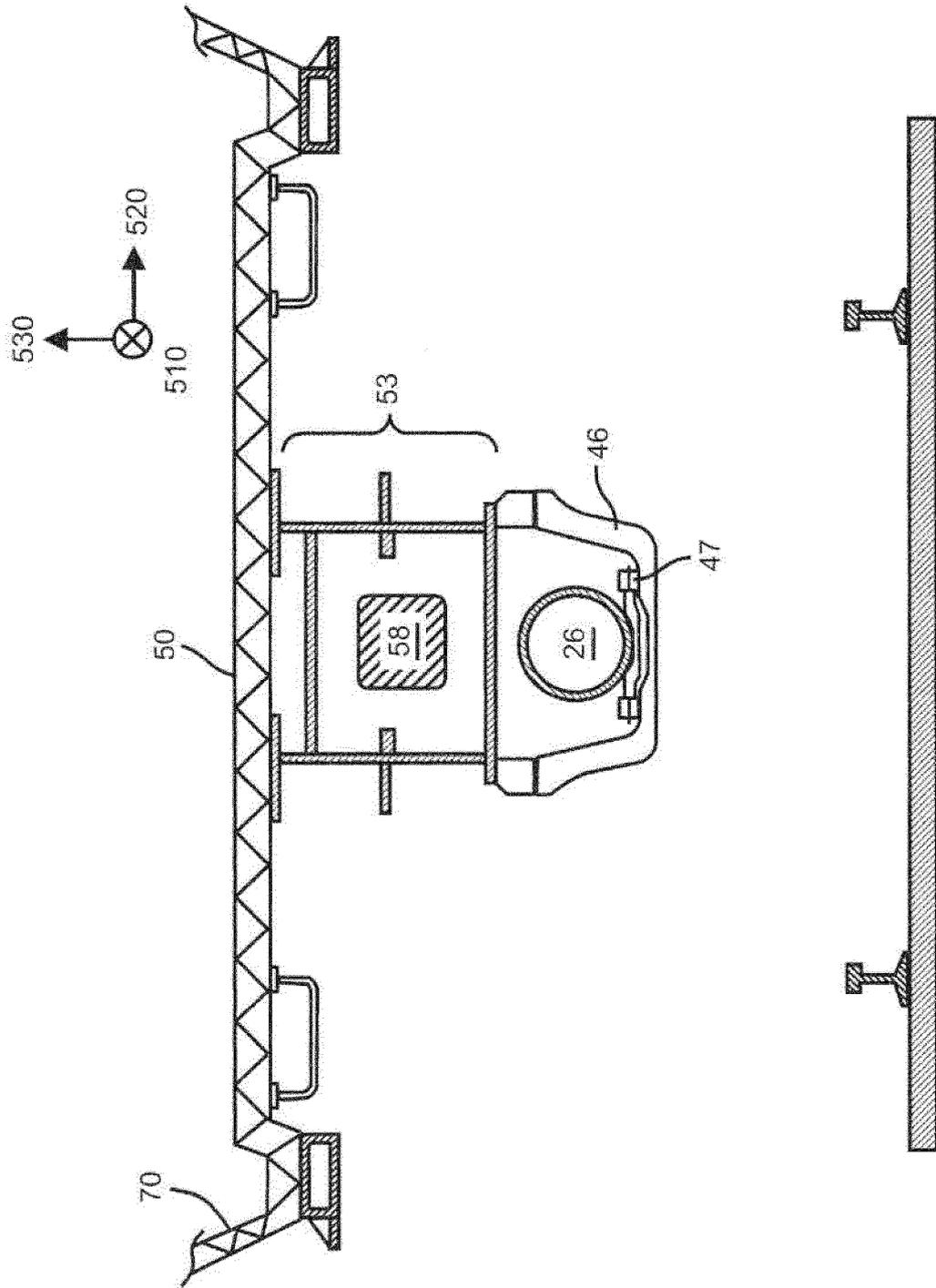


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2015/070913

5	<p>A. CLASSIFICATION OF SUBJECT MATTER B61C5/04(2006.01) i</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>													
10	<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) B61C5/04</p>													
15	<p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <table border="0"> <tr> <td>Jitsuyo Shinan Koho</td> <td>1922-1996</td> <td>Jitsuyo Shinan Toroku Koho</td> <td>1996-2015</td> </tr> <tr> <td>Kokai Jitsuyo Shinan Koho</td> <td>1971-2015</td> <td>Toroku Jitsuyo Shinan Koho</td> <td>1994-2015</td> </tr> </table>		Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2015	Kokai Jitsuyo Shinan Koho	1971-2015	Toroku Jitsuyo Shinan Koho	1994-2015				
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20	<p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>													
25	<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">30</td> <td> <p>A US 2011/0088587 A1 (BOMBARDIER TRANSPORTATION GMBH), 21 April 2011 (21.04.2011), entire text; fig. 1 to 4 & WO 2009/106544 A1 & EP 2255078 A1 & DE 102008011329 A1 & DE 202008017331 U1 & AT 10738 U3 & CN 102016249 A & ES 2453381 T3</p> </td> <td style="vertical-align: top;">1-10</td> </tr> <tr> <td style="vertical-align: top;">35</td> <td> <p>A JP 58-101866 A (Hitachi, Ltd.), 17 June 1983 (17.06.1983), entire text; fig. 1 to 9 (Family: none)</p> </td> <td style="vertical-align: top;">1-10</td> </tr> </tbody> </table>		Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	30	<p>A US 2011/0088587 A1 (BOMBARDIER TRANSPORTATION GMBH), 21 April 2011 (21.04.2011), entire text; fig. 1 to 4 & WO 2009/106544 A1 & EP 2255078 A1 & DE 102008011329 A1 & DE 202008017331 U1 & AT 10738 U3 & CN 102016249 A & ES 2453381 T3</p>	1-10	35	<p>A JP 58-101866 A (Hitachi, Ltd.), 17 June 1983 (17.06.1983), entire text; fig. 1 to 9 (Family: none)</p>	1-10			
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40	<p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.</p>													
45	<table border="0"> <tr> <td>* Special categories of cited documents:</td> <td>"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</td> </tr> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"&" document member of the same patent family</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td></td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>		* 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	"E" earlier application or patent but published on or after the international filing date	"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	"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)	"&" document member of the same patent family	"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	
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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														
50	<p>Date of the actual completion of the international search 05 October 2015 (05.10.15)</p>	<p>Date of mailing of the international search report 13 October 2015 (13.10.15)</p>												
55	<p>Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan</p>	<p>Authorized officer Telephone No.</p>												

INTERNATIONAL SEARCH REPORT

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

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2667843 A (DEAN, Walter B.), 02 February 1954 (02.02.1954), entire text; fig. 1 to 22 & ES 197183 A1	1-10

REFERENCES CITED IN THE DESCRIPTION

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