



(11)

EP 3 296 179 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
19.08.2020 Bulletin 2020/34

(51) Int Cl.:
B61D 27/00 (2006.01) B60H 1/00 (2006.01)

(21) Application number: **15891823.5**

(86) International application number:
PCT/JP2015/063630

(22) Date of filing: **12.05.2015**

(87) International publication number:
WO 2016/181498 (17.11.2016 Gazette 2016/46)

(54) RAILWAY VEHICLE PROVIDED WITH CEILING MODULE

SCHIENENFAHRZEUG MIT DECKENMODUL

VÉHICULE FERROVIAIRE COMPRENANT UN MODULE DE PLAFOND

(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**

(43) Date of publication of application:
21.03.2018 Bulletin 2018/12

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Description

Technical Field

5 **[0001]** The present invention relates to a railway vehicle in which a duct for supplying conditioned air whose temperature and humidity are conditioned by an air conditioner is disposed on a ceiling and particularly relates to a railway vehicle having a low roof portion or a railway vehicle that cannot secure a satisfactory ceiling height due to a loading gauge or increase in speed.

10 Background Art

[0002] Generally, a duct serving as a channel of supply of conditioned air conditioned by an air conditioner, a lighting device, a support portion supporting straps, a luggage rack, broadcast equipment, and the like are disposed on a ceiling portion of a railroad car representing the railway vehicle.

15 **[0003]** PTL 1 discloses a ceiling structure with which a manufacturing time of a ceiling portion can be reduced and appearance of a ceiling can be improved. In this ceiling structure, air conditioning ducts, ceiling lamps, speakers, and the like are provided as a plurality of units, and those units are attached to a support portion provided on a lower surface of a roof structure body. In addition, lower surfaces of the respective units are flush with each other so that a flat ceiling surface is obtained.

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Citation List

Patent Literature(s)

25 **[0004]** PTL 1: JP-UM-B-60-9096; PTL2: US 2,134,588

Summary of Invention

Technical Problem(s)

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[0005] Among railway vehicles represented by railroad cars, there is a vehicle in which a floor surface height of a railway vehicle is set to be substantially the same as an upper surface height of a platform and a power collection device for obtaining electric power from an overhead line is disposed on a roof structure body of the railway vehicle. Such a vehicle has a low ceiling portion in which the power collection device is disposed in a recessed portion provided in the roof structure body so as to obtain a maximum ceiling height within a low vehicle height in view of a loading gauge, reduction in air resistance at the time of running at a high speed, and reduction in a vehicle weight and a ceiling portion is lowered in accordance with this recessed portion.

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[0006] In a case where a configuration disclosed in PTL 1 is applied to the low ceiling portion, a protruding portion is further provided on the low ceiling portion due to attachment of each unit, and therefore a height of the ceiling is further lowered. Therefore, a passenger who sits in a seat under the low ceiling portion may feel uncomfortable, e.g., may feel a sense of being oppressed due to the height of the ceiling.

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[0007] Further, in a case where a conditioned air duct for supplying conditioned air from an air conditioner to a passenger room is disposed on the low ceiling portion, a passenger may feel uncomfortable because conditioned air ejected from the conditioned air duct toward the passenger room may be directly ejected toward a body of the passenger.

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[0008] PTL2 discloses a railway vehicle with an air conditioner, a duct for supplying the conditioned air to the inside of the vehicle, the duct being made up of channel element having an opening facing toward a ceiling panel arranged below a roof structure body of the railway vehicle and the ceiling panel provided to cover the opening, air being ejected transversely to the flow of the duct in a substantially horizontal direction.

[0009] Furthermore, in the low ceiling portion, the conditioned air duct, a lighting device, and broadcast equipment are attached in a limited space between a lower surface of the roof structure body in which the recessed portion is provided and a low ceiling panel, and therefore it is problematic in that a manufacturing cost is increased and assembly work becomes complicated.

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[0010] In view of this, an object of the invention is to provide a railway vehicle that does not make passengers uncomfortable, can be produced at a low manufacturing cost, can be assembled by simple work, and, in addition, has a low ceiling portion offering excellent comfort and having excellent appearance. Solution to Problem(s)

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[0011] In order to solve the above problems, a railway vehicle according to claim 1 is provided. Advantageous Effects of Invention

[0012] According to the invention, it is possible to provide a railway vehicle that does not make passengers uncom-

fortable, can be assembled by simple work at a low cost, and has a ceiling portion having excellent appearance.

Brief Description of Drawings

[0013]

[Fig. 1] Fig. 1 is a conceptual diagram of a multiple-car train including railroad cars having a low roof portion.

[Fig. 2] Fig. 2 is a cross-sectional view (C-C cross-section in Fig. 1) of a low roof portion, which crosses a longitudinal direction of a railroad car in Example 1 of the invention.

[Fig. 3] Fig. 3 is a horizontal sectional view (D-D cross-section in Fig. 2) of a high ceiling portion and a low ceiling portion of a railroad car.

[Fig. 4] Fig. 4 is a cross-sectional view (E-E cross-section in Fig. 2) of a connecting portion of a high roof portion and a low roof portion, which crosses a width direction of a railroad car.

[Fig. 5] Fig. 5 is an enlarged cross-sectional view (F portion in Fig. 4) of a connecting portion of a high roof portion and a low roof portion.

[Fig. 6] Fig. 6 is a cross-sectional view (G-G cross-section in Fig. 4) of an end portion in a width direction of a low roof portion, which crosses a longitudinal direction of a railroad car.

[Fig. 7] Fig. 7 is a horizontal sectional view (corresponding to Fig. 3) of a high ceiling portion and a low ceiling portion in Example 2.

[Fig. 8] Fig. 8 is a cross-sectional view (H-H cross-section in Fig. 7) of an end portion in a width direction of the low ceiling portion in Example 2, which crosses a longitudinal direction of a railroad car.

Description of Embodiments

[0014] A form for implementing the invention will be described with reference to the drawings.

[0015] Note that a railway vehicle is a general term for vehicles operated along laid railways and includes a railroad car, a monorail car, a streetcar, a vehicle for a new transportation system, and the like, and, hereinafter, examples of the invention will be described by exemplifying a railroad car as such a railway vehicle.

[Examples]

[Example 1]

[0016] Fig. 1 is a conceptual diagram of a multiple-car train including railroad cars having a low ceiling portion. A multiple-car train 1 is made up of first cars 1a and intermediate cars 1b, and a power collection device 16 for obtaining electric power from an overhead line 2 is mounted on a roof structure body of the first car 1a near the intermediate car 1b. Further, an air conditioner 17 for supplying conditioned air obtained by conditioning a temperature and humidity of air to a passenger room is mounted on a roof structure body of each vehicle.

[0017] The first car 1a includes an auxiliary power supply device 10 for outputting electric power to be supplied to an air conditioner, broadcast equipment, lighting equipment, and the like, a main transformer 12 for adjusting a voltage of electric power obtained from the overhead line 2, and the like under a floor thereof. In the intermediate car 1b, a generator unit 15 that is made up of an internal-combustion engine and a generator and outputs satisfactory electric power to allow a multiple-car vehicle to autonomously run, a main converter device 14 for controlling a main motor included in a bogie, and the like are disposed under a floor thereof.

[0018] The roof structure body of the first car 1a has, within a range from a part including a driver's seat to a part before the power collection device 16, a high roof portion (general portion) A having the same height as that of the intermediate car 1b and, within a range in which the power collection device 16 is mounted, a low roof portion B having a recessed portion for disposing the power collection device 16.

[0019] Fig. 2 is a cross-sectional view (C-C cross-section in Fig. 1) of the low roof portion, which crosses a longitudinal direction of the railroad car.

[0020] The first car 1a is a hexahedron including an underframe serving as a floor surface 7, side structure bodies 32 erected in both end portions in a width direction (railroad tie direction) of the underframe, end structure bodies or head structure bodies (not illustrated) erected in end portions in a longitudinal direction (rail direction) of the underframe, and a low-roof structure body 34 connected to upper end portions 35 of the side structure bodies 32 and the end structure bodies or head structure bodies. The end portions 35 in a height direction of the roof structure body have substantially triangular spaces in both side portions in a width direction of the low-roof structure body 34.

[0021] Further, the first car 1a has a high-roof structure body 36 within a range of the high roof portion A and the low-roof structure body 34 within a range of the low roof portion B, and the intermediate car 1b only has the high-roof structure

body 36. Note that the high-roof structure body 36 and the low-roof structure body 34 are connected by a connecting plate 37 (see Fig. 5).

[0022] Various kinds of devices (see Fig. 1) attached under the floor are disposed on a lower surface of an underframe 6, and those devices are covered by side skirts 25 hanging from end portions in the width direction of the underframe 6.

[0023] A height H4 of the floor surface 7 from a track 4 is set on the basis of a height of a representative platform of a route on which the multiple-car vehicle 1 is operated, and seats 40 and tables (not illustrated) are arranged on an upper surface of the floor surface 7 in a passenger room space having a height H1 from the floor surface 7 to a ceiling panel 83b of the low roof portion B and a height H3 therefrom to a ceiling panel 83a of the high roof portion A (see Fig. 1).

[0024] Fig. 3 is a horizontal sectional view (D-D cross-section in Fig. 2) of the high ceiling portion and the low ceiling portion of the railroad car. The first car 1a has a vestibule 75 through which passengers and the like get on/get off the railroad car on a side adjacent to the intermediate car 1b, and a toilet unit 26, side sliding doors 71 to be used to get on/get off the railroad car, a gangway serving as a passage to an adjacent vehicle, and the like are disposed in this vestibule 75.

[0025] The air conditioner 17 is placed on an upper surface of the high-roof structure body 36 (see Fig. 1), and a conditioned air duct 94 for supplying conditioned air from the air conditioner 17 is provided in a middle portion in a width direction (railroad tie direction) inside (below) the high-roof structure body 36. A conditioned air duct 80 that is connected to the conditioned air duct 94 via a connecting duct 93 and supplies conditioned air to the passenger room and a conditioned air duct 89 that is directly connected to the conditioned air duct 94 and supplies conditioned air to an upper space of the vestibule 75 are provided inside the low roof portion B. Both the conditioned air ducts 94 and 89 are provided in a plane along the longitudinal direction of the first car 1a.

[0026] Exhaust air to be discharged from the passenger room having the high roof portion A and the low roof portion B of the first car 1a to the outside of the vehicle is discharged by an exhaust air blower of the air conditioner 17 via an exhaust air intake port provided in the ceiling panel below the air conditioner 17. Further, exhaust air from the vestibule 75 and the toilet unit 26 having the low roof portion B is sent to the exhaust air intake port through an exhaust air duct 86 provided from the ceiling portion of the toilet unit 26 to the ceiling portion of the high roof portion A and is then emitted to the outside of the vehicle by the exhaust air blower of the air conditioner 17.

[0027] Fig. 4 is a cross-sectional view (E-E cross-section in Fig. 2) of a connecting portion of the high roof portion A and the low roof portion B, which crosses the width direction of the railroad car, and Fig. 5 is an enlarged cross-sectional view (F portion in Fig. 4) of the connecting portion of the high roof portion A and the low roof portion B.

[0028] As illustrated in Fig. 5, conditioned air to be sent to the passenger room having the low roof portion B is supplied through the conditioned air duct 94 provided between the high-roof structure body 36 on which the air conditioner 17 is placed and the ceiling panel 83a, the connecting duct 93 having one end portion connected to this conditioned air duct 94, and the conditioned air duct 80 connected to the other end portion of the connecting duct 93.

[0029] The connecting duct 93 is a flow channel (duct) smoothly bending in the height direction at a connecting portion of the high-roof structure body 36 and the low-roof structure body 34, and the conditioned air duct 80 forms a flow channel having a circular shape including a substantially rectangular shape by using the ceiling panel 83b positioned below the low-roof structure body 34.

[0030] Note that the ceiling panel 83b is extended on the high roof portion A side toward a part in the vicinity of a connecting portion of the connecting duct 93 and the conditioned air duct 94. Further, a heat insulating material 85 for preventing entering/exiting of heat between inside of the vehicle and outside of the vehicle is attached to the whole surfaces of the low-roof structure body 34 and the high-roof structure body 36, the surfaces being positioned on the vehicle interior side.

[0031] The conditioned air duct 80 is made up of a channel material having a vertical piece 80a, a horizontal piece 80b, and an inclined piece 80c and having an opening surface toward the ceiling panel 83b (for example, a channel-shaped material having a C cross-sectional shape) and the ceiling panel 83b. The opening surface (opening portion) of a flow channel thereof is formed to have a C-channel shape by the vertical piece 80a, the horizontal piece 80b, and the ceiling panel 83b that is substantially in parallel to the horizontal piece 80b.

[0032] A horizontal end portion 80ce is extended in parallel to the ceiling panel 83b in a lower end portion of the inclined piece 80c, and an ejection port 87 of conditioned air for ejecting conditioned air in a horizontal direction toward a center portion of the circular conditioned air duct 80 is provided between the horizontal end portion 80ce and the opening portion provided in the ceiling panel 83b.

[0033] The ejection port 87 is provided along an edge on the inner side (center portion side) of the flow channel (duct) formed by the circular conditioned air duct 80. As indicated by an arrow 99, conditioned air diverges in a direction crossing a flow direction of conditioned air flowing through the connecting duct 93 and flows into the conditioned air duct 80. The conditioned air is ejected in a substantially horizontal direction toward the center portion of the conditioned air duct 80 while flowing along the circular conditioned air duct 80.

[0034] A lighting device 81 (See Fig. 3) is provided in a circular shape to be adjacent to the ejection port 87 of the conditioned air duct 80 along an inner circumferential side thereof, and an outer circumferential edge of the lighting

device 81 is close to an inner circumferential edge of the horizontal end portion 80ce.

[0035] The lighting device 81 includes, in a horizontal direction, a light source such as an LED and a diffusion plate 88 for diffusing light emitted from the light source. Further, broadcast equipment (speaker) 82 (see Fig. 4) is attached in a center portion of the lighting device 81.

[0036] The diffusion plate 88 is arranged substantially in parallel to the horizontal end portion 80ec forming the ejection port 87 and guides conditioned air ejected from the ejection port 87 in a substantially horizontal direction.

[0037] A procedure for assembling a ceiling of the low roof portion B will be described with reference to Fig. 5.

[0038] First, the channel material made up of the vertical piece 80a, the horizontal piece 80b, and the inclined piece 80c and the ceiling panel 83b are connected by outwork, and therefore a ceiling module 92 including the conditioned air duct 80 is fabricated.

[0039] Next, one end portion of the connecting duct 93 is connected to the conditioned air duct 94 fixed to the high-roof structure body 36 in advance. Note that a packing 90a for preventing air leakage is attached to a circumferential edge of the other end portion of the connecting duct 93.

[0040] Further, the lighting device 81, the broadcast equipment 82, and the like are fixed to a lower surface of the low-roof structure body 34, and a packing 90b is attached to a lower surface of the diffusion plate 88.

[0041] The ceiling module 92 is positioned, and the ceiling module 92 (ceiling panel 83b) is fixed to a support portion 95 extending below the low-roof structure body 34 while an upper surface thereof is being pushed against the packing 90a and the packing 90b from below.

[0042] Note that, in a case of fabricating the ceiling module 92, the broadcast equipment 82, the lighting device 81, and the like may be attached in advance to be integrally provided.

[0043] Fig. 6 is a cross-sectional view (G-G cross-section in Fig. 4) of an end portion in a width direction of the low roof portion, which crosses the longitudinal direction. The low-roof structure body 34 of the low roof portion B is made up of an end-portion inclined surface 34a that is inclined downward from the upper end portion 35 of the side structure body 32 and a horizontal portion 34b connected to the end-portion inclined surface 34a. The power collection device 16 and the like are provided on the horizontal portion 34b.

[0044] A space 91 surrounded by the upper end portion 35 of the side structure body 32 and the end-portion inclined surface 34a has the same height as that of the high roof portion A even within the range of the low roof portion B and is therefore comparatively high. By using this, it is possible to provide the exhaust air duct 86 and the conditioned air duct 89 (See Fig. 3) communicating with the conditioned air duct 94 arranged in the high roof portion A.

[0045] Further, a slit 96 may be provided in a part of the ceiling panel 83b forming the circular conditioned air duct 80, and therefore part of conditioned air to be supplied from the conditioned air duct 80 to the inside of the passenger room may be supplied to the inside of the passenger room via the slit 96, and the other part of the conditioned air may be supplied to the inside of the passenger room via the discharging port 87.

[0046] With the above-mentioned configuration, conditioned air flowed into the conditioned air duct 80 is ejected in the substantially horizontal direction from a gap between the horizontal end portion 80ce and the ceiling panel 83b toward the center portion of the conditioned air duct 80 so as to cross a longitudinal direction of the conditioned air duct 80 (flow direction of conditioned air) while flowing through the circular conditioned air duct 80 in the longitudinal direction thereof, flows along a lower surface of the diffusion plate 88 forming the lighting device 81, and thereafter flows downward.

[0047] Therefore, conditioned air ejected from the ejection port 87 does not directly blow against a passenger who sits in a seat in the passenger room belonging to the low roof portion B, and therefore the passenger is not made uncomfortable.

[0048] Furthermore, the conditioned air duct 80 is fabricated by combining a C-channel shape opening flow channel and the ceiling panel 83b, and therefore it is possible to minimize a clearance H2 (see Fig. 4) in the height direction between the low-roof structure body 34 and the ceiling panel 83b provided therebelow and secure a large ceiling height dimension H1 of the low roof portion. Thus, a distance between the ejection port 87 of conditioned air and a passenger is increased, and therefore a ceiling height is secured and feeling of spaciousness is obtained. In addition, ejected wind is ejected along the horizontal direction and thereafter moves downward, and therefore it is possible to reduce discomfort caused by directly sending ejected wind to a passenger and improve comfort.

[0049] Further, the duct is formed by covering one surface of the channel material with the ceiling panel 83b, and therefore it is possible to fabricate the light-weight ceiling module 92 with a small manufacturing man-hour by using a small number of components, as compared to a case where an independent duct is arranged separately from the ceiling panel 83b. Furthermore, the ceiling module 92 including the conditioned air duct only needs to be fixed to the low roof portion B, and therefore it is possible to construct a ceiling with a small manufacturing man-hour.

[0050] Meanwhile, the exhaust air duct 86 and the conditioned air duct 89 having a large cross-sectional area can be housed in the spaces 91 between the upper end portions 35 of the side structure bodies 32 and the end-portion inclined surfaces 34a, and therefore it is possible to reduce flow rates of exhaust air and conditioned air flowing through those ducts. As a result, it is possible to reduce pressure loss and fluid sound of the ducts and power consumption of the air blower and prevent noise generated inside the ducts.

[0051] Note that the invention is not only applied to a single railroad car having both sections, i.e., the high roof portion (general portion) A and the low roof portion B as in this example, but the above-mentioned effect exhibits also in a case where the invention is applied to, for example, a railroad car (railway vehicle) only having a roof portion that cannot secure a satisfactory ceiling height in a relationship with a loading gauge.

[Example 2]

[0052] Fig. 7 is a horizontal sectional view (corresponding to Fig. 3) of a high ceiling portion and a low ceiling portion in Example 2, and Fig. 8 is a cross-sectional view (H-H cross-section in Fig. 7) of an end portion in a width direction of the low ceiling portion in this example, which crosses a longitudinal direction.

[0053] Description of matters common to Examples 1 and 2 is omitted, and a different configuration will be mainly described.

[0054] In this example, a conditioned air duct 90 has one end connected to the connecting duct 93 and has the other closed end 90a and forms sides of a substantially rectangular shape in a planar view.

[0055] A shape of the conditioned air duct 90 in a planar view is different from the shape thereof in Example 1. However, the conditioned air duct 90 is the same as the conditioned air duct in Example 1 in that, for example, the conditioned air duct 90 is formed by combining a C-channel member having an opening portion and the ceiling panel 83b and the conditioned air duct 90 has the ejection port 87 for ejecting conditioned air in the horizontal direction to supply the conditioned air to the inside of the passenger room.

[0056] Further, in this example, as illustrated in Fig. 7, two lines of lighting devices 81a are provided on the ceiling panel 83b along a longitudinal direction of the conditioned air duct 90 the first car 1a on the outside of the conditioned air duct 90 in the width direction.

[0057] A diffusion plate is not arranged on the ejection port 87 side from the conditioned air duct 90 toward the inside, and therefore a straightening plate 97 for guiding the flow 99 of conditioned air is arranged downstream of the ejection port 87 of the conditioned air duct 80.

[0058] As in Example 1 described above, the ceiling module 92 (see Fig. 5) is fabricated by fixing a C-channel opening flow channel to the ceiling panel 83b to form the conditioned air duct 80 and fixing the lighting devices 81a to the ceiling panel 83b. This ceiling module 92 is lifted upward from the lower surface of the low-roof structure body 34, is positioned, and is thereafter fixed to the low-roof structure body 34 via the support portion 95.

[0059] With the above-mentioned configuration, conditioned air that has flowed into the conditioned air duct 80 is ejected in the substantially horizontal direction from the gap between the horizontal end portion 80ce and the ceiling panel 83b while flowing through the circular conditioned air duct 80, flows along the straightening plate 97, and thereafter flows downward. Therefore, conditioned air ejected from the ejection port 87 does not directly blow against a passenger in the passenger room belonging to the low roof portion B, and therefore it is possible to prevent the passenger from being made uncomfortable.

[0060] Furthermore, the conditioned air duct 80 is fabricated by combining the C-channel opening flow channel and the ceiling panel 83b, and therefore it is possible to reduce a dimension H2 (see Fig. 4) in the height direction of the ceiling portion of the low roof portion B and increase the ceiling height dimension H1 of the low roof portion. Thus, a distance between the ejection port 87 of conditioned air and a passenger can be long, and therefore it is possible to reduce discomfort caused by an influence of ejected wind and improve comfort. Further, it is possible to fix the ceiling module including the conditioned air duct to the low roof portion B with a small work man-hour, and therefore a manufacturing cost can be reduced.

[0061] Although not illustrated, a terminal end portion 90b of the conditioned air duct 90 provided in the width direction of the first car 1a may be omitted, and there may be provided the conditioned air duct 90 that is extended in the width direction from the other end portion of the connecting duct 93 and then changes its direction to the longitudinal direction and is extended in the direction. With this configuration, conditioned air to the passenger room having the low roof portion B can be supplied by the ceiling panel 83b including the conditioned air duct 90 having a simpler configuration.

[0062] According to the invention, conditioned air from the air conditioner only needs to be ejected in the horizontal direction to the inside of the passenger room via the ejection port while flowing through the air conditioning duct of the ceiling module in the longitudinal direction thereof, and a shape and the like thereof can be variously selected depending on a specification or form of the railroad car.

Reference Signs List

[0063]

1 ... multiple-car vehicle 1a ... first car

(continued)

	1b ...	intermediate car	2 ...	overhead line
	4 ...	track	7 ...	floor surface
5	8 ...	high floor surface		
	10 ...	auxiliary power supply device		
	12 ...	main transformer	14 ...	main converter
	15 ...	generator unit	16 ...	power collection device
10	17 ...	air conditioner	25 ...	side skirt
	26 ...	toilet unit	32 ...	side structure body
	34 ...	low roof structure body		
	34a ...	end-portion inclined surface		
	34b ...	horizontal portion		
15	35 ...	upper end portion of side structure body (end portion in width direction of roof structure body)		
	36 ...	high roof structure body	37 ...	connecting plate
	40 ...	seat	71 ...	side sliding door
20	75 ...	vestibule	85 ...	heat insulating material
	86 ...	exhaust air duct	89 ...	conditioned air duct
	80, 90	... conditioned air duct (low roof structure body)		
	81 ...	lighting device	82 ...	broadcast equipment
	83 ...	ceiling panel	84 ...	information display device
25	85 ...	heat insulating material	91 ...	space
	92 ...	ceiling module	93 ...	connecting duct
	94 ...	conditioned air duct (high roof structure body)		
	95 ...	support portion		
30	96 ...	slit	97 ...	straightening plate
	99 ...	flow of conditioned air		
	A ...	high roof portion (general portion)		
	B ...	low roof portion		
	H1 ...	low-roof-portion ceiling height		
35	H2 ...	high-roof-portion ceiling height		
	H3 ...	low-roof-portion ceiling space		
	H4 ...	floor surface height		

Claims

1. A railway vehicle (1), comprising:

an air conditioner (17) for generating conditioned air whose temperature and humidity are conditioned; and
a duct (80, 90) for supplying the conditioned air to inside of the vehicle, wherein:

the duct (80, 90) forms a flow channel having a geometrical shape in an overhead view having a center portion and is made up of

a channel element having an opening facing toward a ceiling panel (83) arranged below a roof structure body (34) of the railway vehicle, and
the ceiling panel (83) provided to cover the opening; and

in the duct (80, 90), an ejection port (87) through which conditioned air flowing through the duct is ejected transversely to the direction of flow in the duct in a substantially horizontal direction toward the center portion is provided between the channel element and the ceiling panel (83) .

2. The railway vehicle according to claim 1, wherein

the duct (80, 90) has a circular shape or a substantially rectangular shape in an overhead view.

3. The railway vehicle according to claim 1, wherein
the channel element and the ceiling panel (83) below the roof structure body are integrally provided to serve as a ceiling module (92).
4. The railway vehicle according to claim 1, wherein
a straightening plate (88, 97) for guiding the conditioned air ejected from the ejection port (87) is arranged downstream of the ejection port.
5. The railway vehicle according to claim 4, further comprising:

a lighting device (81) arranged inside the duct (80, 90) and downstream of the ejection port (87); and
a diffusion plate (88) for diffusing light emitted from the lighting device (81), wherein
the diffusion plate (88) serves as the straightening plate.
6. The railway vehicle according to claim 3, wherein
the ceiling module (92) is obtained by integrally providing a lighting device (81) and broadcast equipment (82) .
7. The railway vehicle according to claim 1, wherein
a slit (96) for ejecting part of the conditioned air downward is provided in the ceiling panel forming the duct (80, 90).

Patentansprüche

1. Schienenfahrzeug (1), umfassend:

eine Klimavorrichtung (17) zum Erzeugen klimatisierter Luft, deren Temperatur und Feuchtigkeit konditioniert sind; und

eine Leitung (80, 90) zum Zuführen der klimatisierten Luft in das Fahrzeug, wobei:
die Leitung (80, 90) einen Strömungskanal bildet, der in einer Draufsicht eine geometrische Form aufweist, die einen Mittelabschnitt aufweist und der aus

einem Kanalelement, das eine Öffnung aufweist, die in Richtung einer Deckenplatte (83) ausgerichtet ist, die unter einem Dachstrukturkörper (34) des Schienenfahrzeugs angeordnet ist, und
der Deckenplatte (83) besteht, die zum Abdecken der Öffnung bereitgestellt ist; und

wobei in der Leitung (80, 90) zwischen dem Kanalelement und der Deckenplatte (83) eine Ausstoßöffnung (87) bereitgestellt ist, durch die die durch den Schacht strömende klimatisierte Luft quer zur Strömungsrichtung in dem Schacht in einer im Wesentlichen horizontalen Richtung in Richtung zum Mittelabschnitt ausgestoßen wird.

2. Schienenfahrzeug nach Anspruch 1, wobei die Leitung (80, 90) in einer Draufsicht eine kreisförmige Form oder eine im Wesentlichen rechteckige Form aufweist.
3. Schienenfahrzeug nach Anspruch 1, wobei
das Kanalelement und die Deckenplatte (83) unter dem Dachstrukturkörper einstückig bereitgestellt sind, um als Deckenmodul (92) zu dienen.
4. Schienenfahrzeug nach Anspruch 1, wobei
eine Begradigungsplatte (88, 97) zum Leiten der klimatisierten Luft, die von der Ausstoßöffnung (87) ausgestoßen wird, stromab der Ausstoßöffnung angeordnet ist.
5. Schienenfahrzeug nach Anspruch 4, ferner umfassend:

eine Beleuchtungsvorrichtung (81), die innerhalb der Leitung (80, 90) und stromab der Ausstoßöffnung (87) angeordnet ist; und
eine Streuplatte (88) zum Streuen von Licht, das von der Beleuchtungsvorrichtung (81) emittiert wird, wobei die Streuplatte (88) als Begradigungsplatte dient.

6. Schienenfahrzeug nach Anspruch 3, wobei das Deckenmodul (92) durch einstückiges Bereitstellen einer Beleuchtungsvorrichtung (81) und einer Sendeeinrichtung (82) erhalten wird.
7. Schienenfahrzeug nach Anspruch 1, wobei ein Schlitz (96) zum Ausstoßen eines Teils der klimatisierten Luft nach unten in der Deckenplatte, die die Leitung (80, 90) bildet, bereitgestellt ist.

Revendications

1. Véhicule ferroviaire (1), comprenant :

un climatiseur (17) pour générer de l'air conditionné dont la température et l'humidité sont conditionnées ; et un conduit (80, 90) pour fournir l'air conditionné à l'intérieur du véhicule, dans lequel :

le conduit (80, 90) forme un canal d'écoulement ayant une forme géométrique dans une vue de dessus présentant une partie centrale, et est composé

d'un élément de canal ayant une ouverture tournée vers un panneau de plafond (83) agencé sous un corps de structure de toit (34) du véhicule ferroviaire, et du panneau de plafond (83) prévu pour couvrir l'ouverture ; et

dans le conduit (80, 90), un orifice d'éjection (87) à travers lequel l'air conditionné s'écoulant à travers le conduit est éjecté transversalement à la direction d'écoulement dans le conduit dans une direction sensiblement horizontale vers la partie centrale est prévu entre l'élément de canal et le panneau de plafond (83).

2. Véhicule ferroviaire selon la revendication 1, dans lequel le conduit (80, 90) a une forme circulaire ou une forme sensiblement rectangulaire en vue de dessus.

3. Véhicule ferroviaire selon la revendication 1, dans lequel l'élément de canal et le panneau de plafond (83) en dessous du corps de structure de toit sont intégrés pour servir de module de plafond (92).

4. Véhicule ferroviaire selon la revendication 1, dans lequel une plaque de redressement (88, 97) pour guider l'air conditionné éjecté depuis l'orifice d'éjection (87) est agencée en aval de l'orifice d'éjection.

5. Véhicule ferroviaire selon la revendication 4, comprenant en outre :

un dispositif d'éclairage (81) agencé à l'intérieur du conduit (80, 90) et en aval de l'orifice d'éjection (87) ; et une plaque de diffusion (88) pour diffuser la lumière émise par le dispositif d'éclairage (81), dans lequel la plaque de diffusion (88) sert de plaque de redressement.

6. Véhicule ferroviaire selon la revendication 3, dans lequel le module de plafond (92) est obtenu en prévoyant intégralement un dispositif d'éclairage (81) et un équipement de diffusion (82).

7. Véhicule ferroviaire selon la revendication 1, dans lequel une fente (96) pour éjecter une partie de l'air conditionné vers le bas est prévue dans le panneau de plafond formant le conduit (80, 90).

FIG. 1

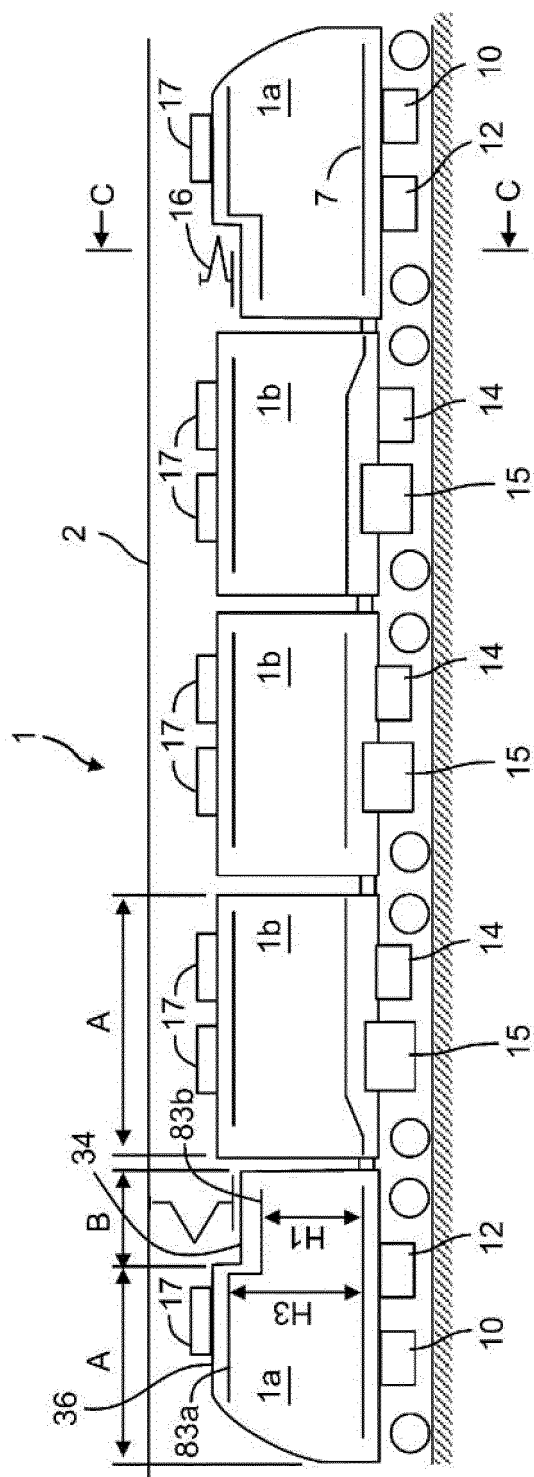


FIG. 2

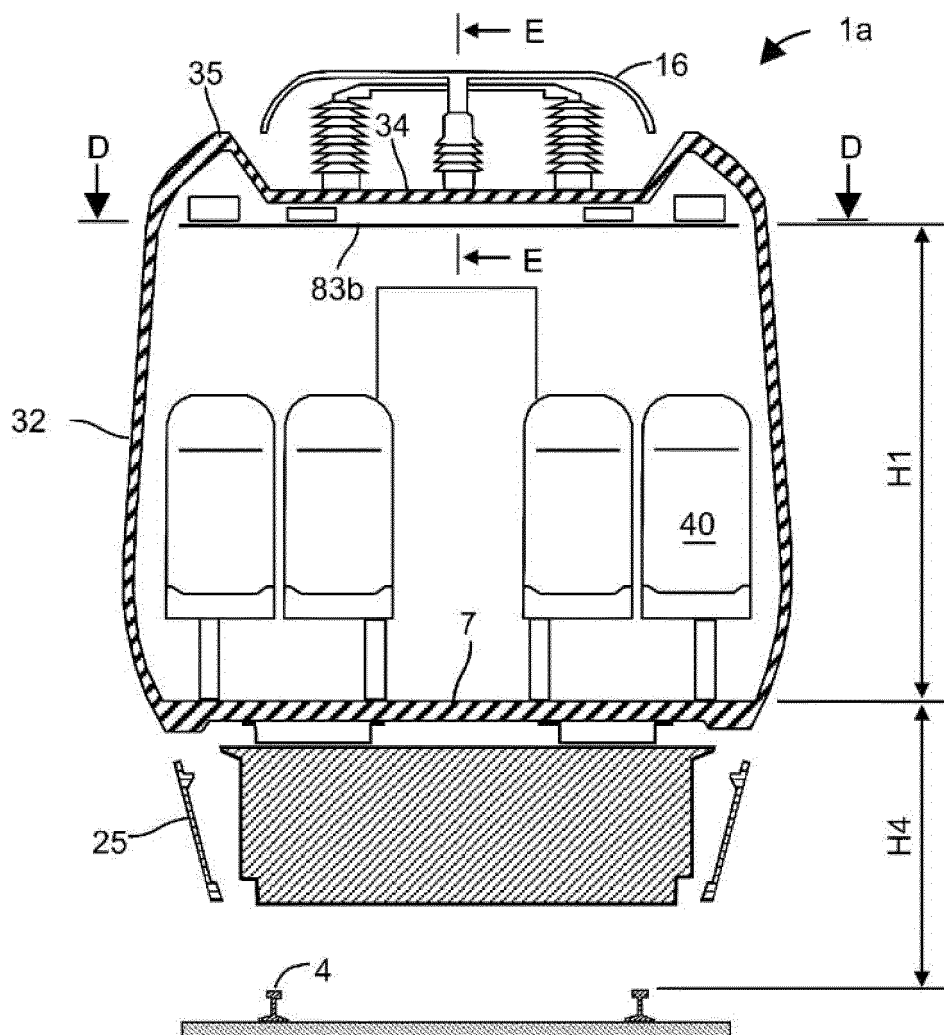


FIG. 3

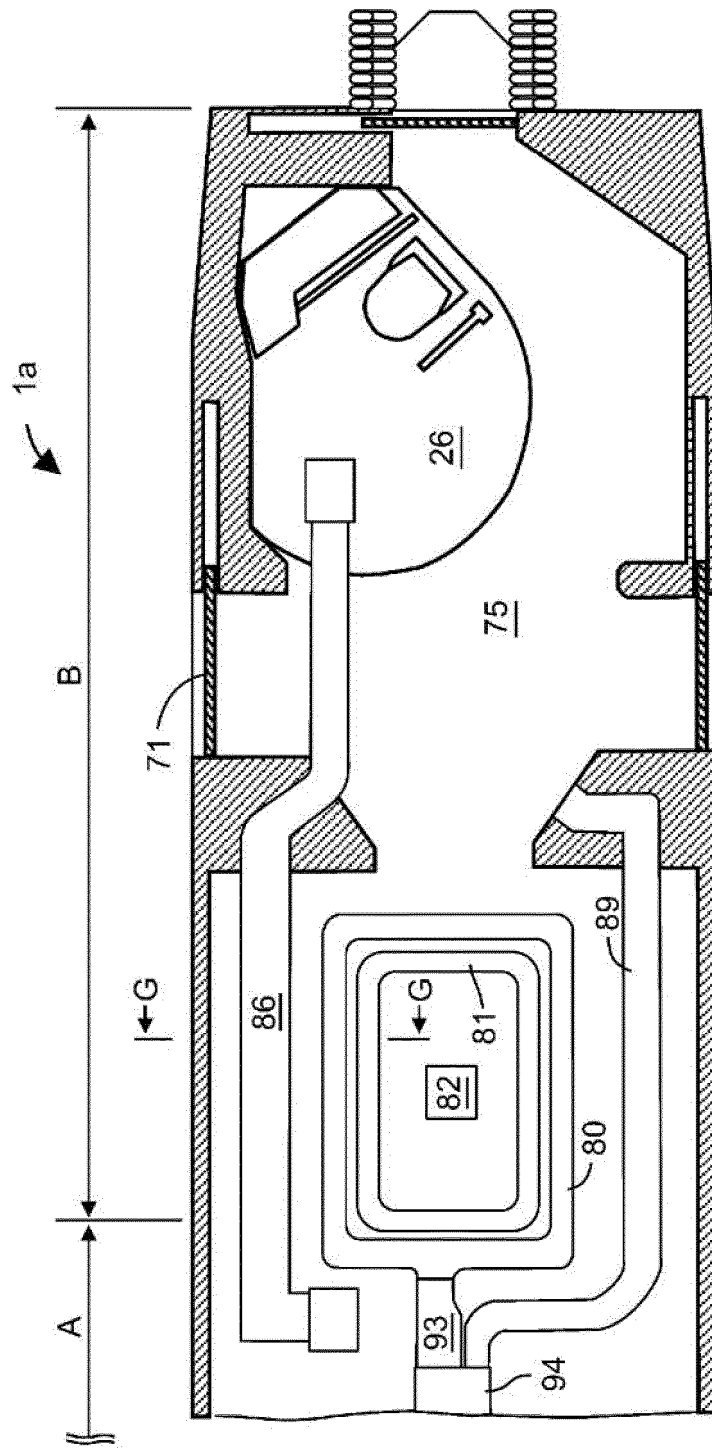


FIG. 4

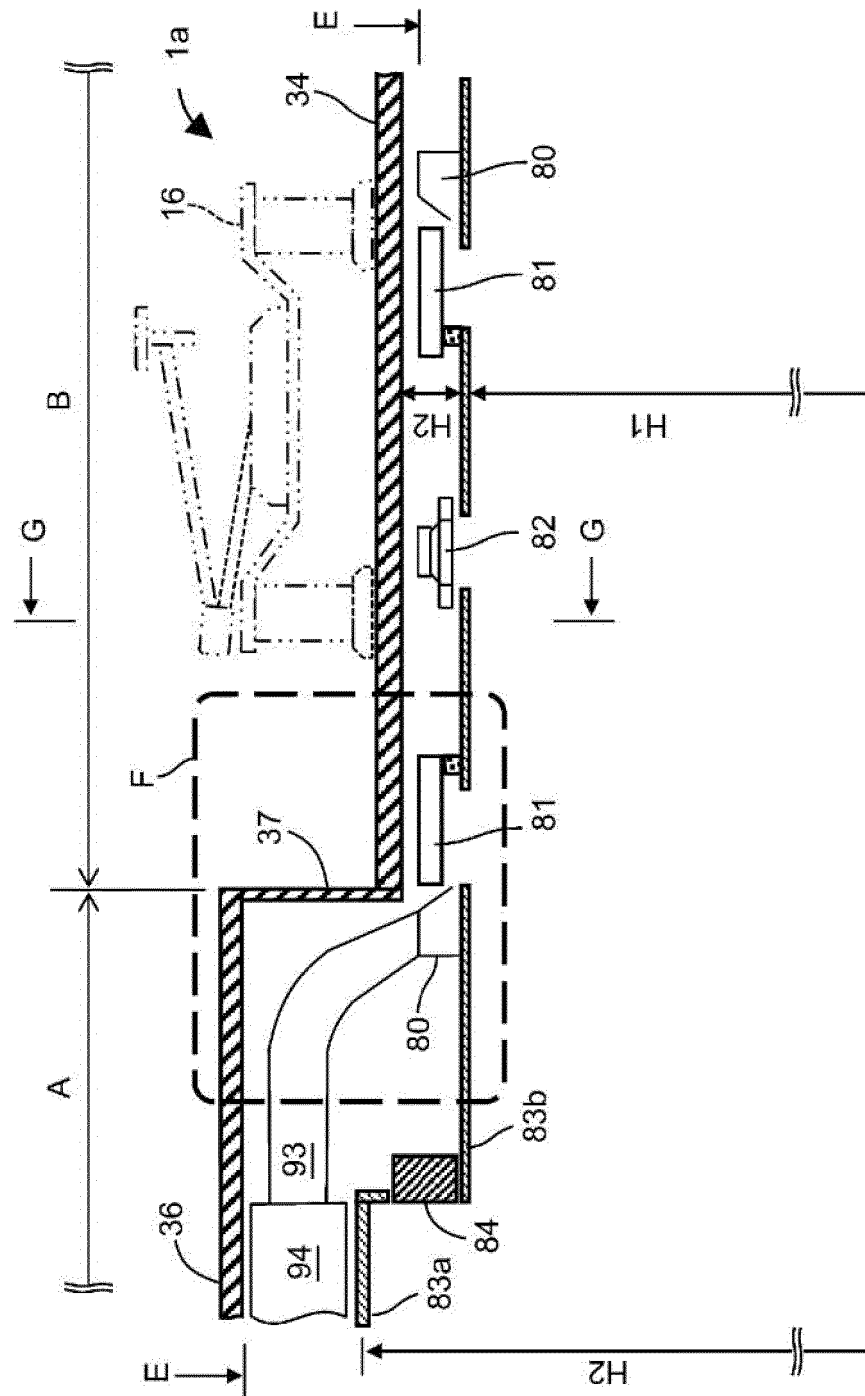


FIG. 5

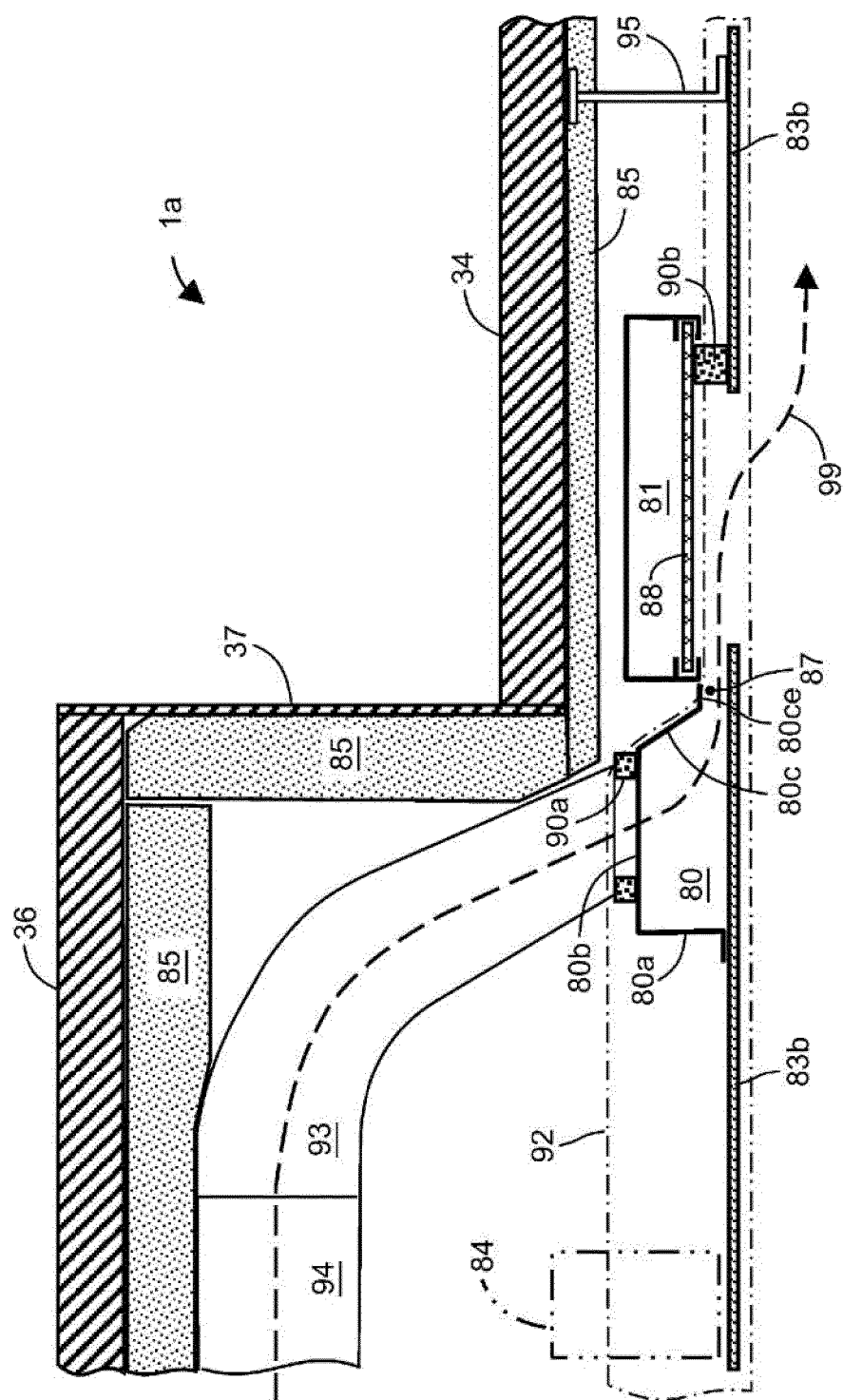


FIG. 6

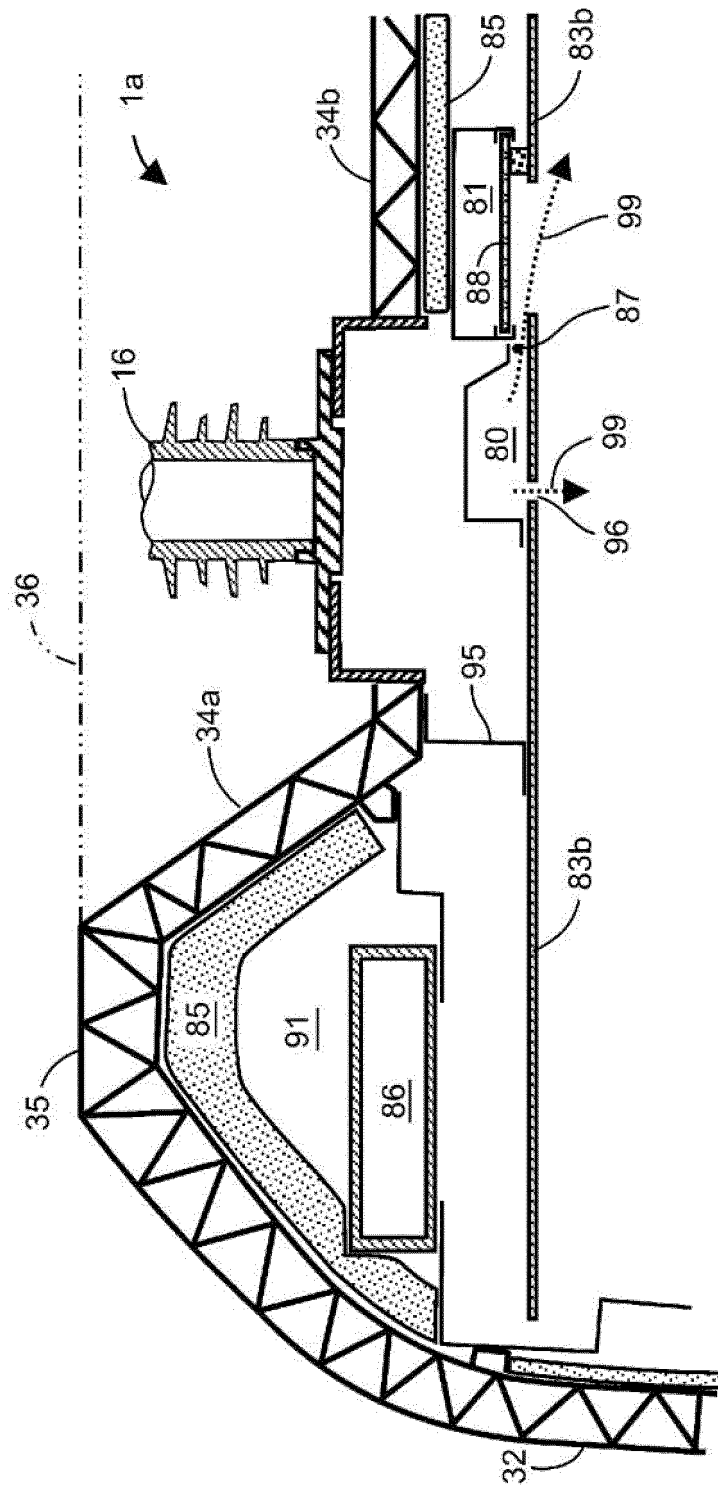


FIG. 7

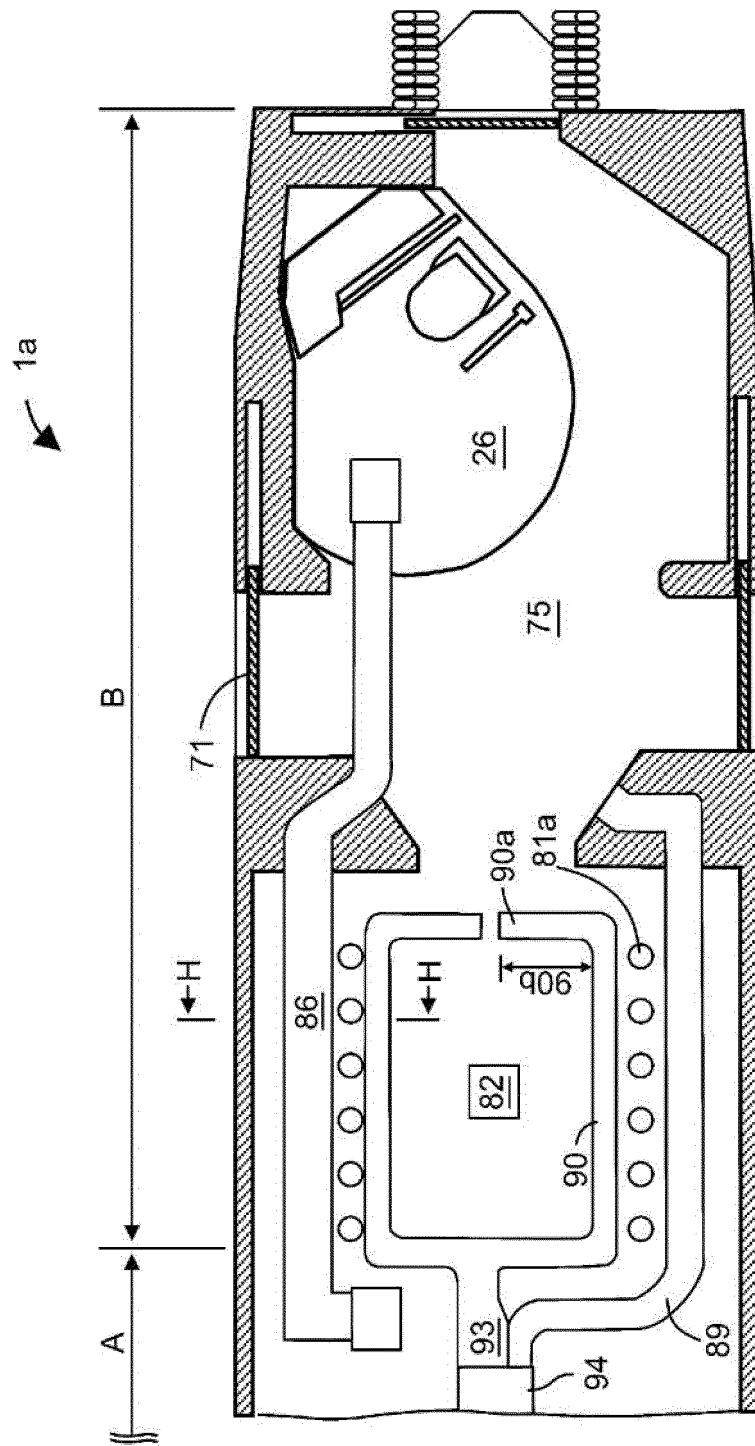
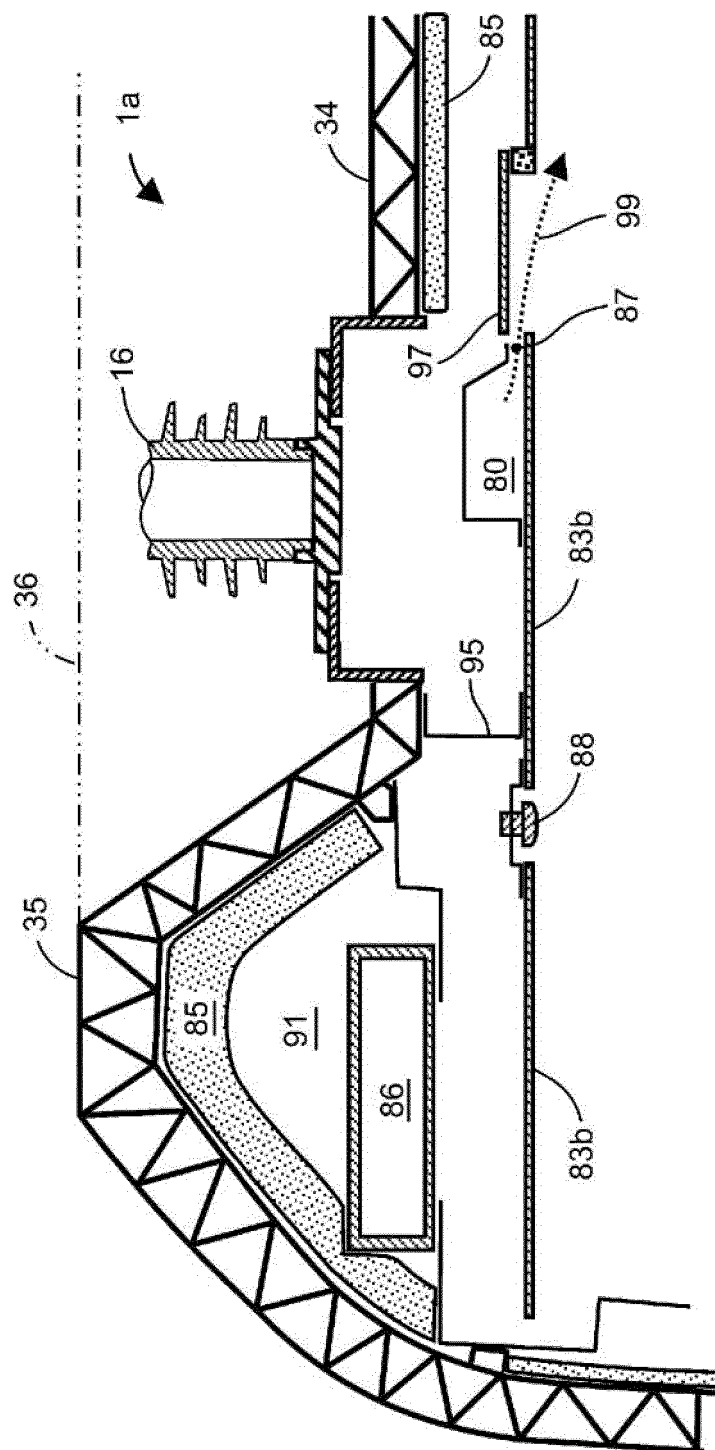


FIG. 8



REFERENCES CITED IN THE DESCRIPTION

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