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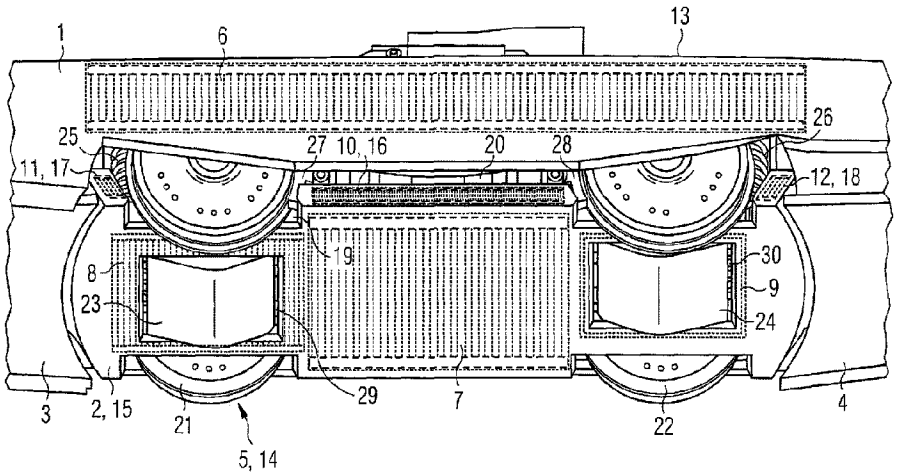
(54) Titre : ENSEMBLE D'HABILLAGE D'UN VEHICULE
(54) Title: CLADDING ARRANGEMENT FOR A VEHICLE



(57) Abrégé/Abstract:
The invention relates to a cladding arrangement having at least one first cladding part (1) for a vehicle, in particular a rail vehicle, which is connectable via at least one connecting means to a running gear (5) of the vehicle, a running gear component, a car body of the vehicle or a car body component.
To provide advantageous structural conditions, it is proposed to connect at least one first heating device (6), which is directed into a hollow formed by at least the first cladding part (1), to the at least first cladding part (1).

Ice deposits on the vehicle may in this way be effectively thawed.

Abstract

Cladding arrangement for a vehicle

The invention relates to a cladding arrangement having at least one first cladding part (1) for a vehicle, in particular a rail vehicle, which is connectable via at least one connecting means to a running gear (5) of the vehicle, a running gear component, a car body of the vehicle or a car body component.
To provide advantageous structural conditions, it is proposed to connect at least one first heating device (6), which is directed into a hollow formed by at least the first cladding part (1), to the at least first cladding part (1).

Ice deposits on the vehicle may in this way be effectively thawed.

Fig. 1

Cladding arrangement for a vehicle

The invention relates to a cladding arrangement having at least one first cladding part for a vehicle, in particular a rail vehicle, which is connectable via at least one connecting means to a running gear of the vehicle, a running gear component, a car body of the vehicle or a car body component.

To achieve low air resistance, vehicles, running gear, roofs or roof structures of vehicles etc. (for example rail vehicles, trucks and roofs of rail vehicles etc.) frequently have aerodynamically shaped cladding. Low air resistance is important for keeping energy requirements or requirements with regard to vehicle drive power and/or fuel consumption as low as possible.

Furthermore, during winter operation of vehicles it frequently occurs that snow and ice build up on bodies and on running gear and/or within running gear (for example on brake cylinders and brake calipers) and such snow and ice have generally to be removed in highly heated de-icing halls provided for the purpose, to ensure functionality of the vehicles and the components thereof. Such de-icing or thawing operations are not only demanding in terms of time, energy and personnel but are also costly. Specific de-icing apparatuses have to be provided, the above-mentioned de-icing halls built and appropriately provided installations operated and maintained.

According to the prior art, WO 2014/206643 A1 for example describes a clad running gear for a rail vehicle. Cladding side parts are arranged to the side of the running gear and/or along the rail vehicle. A base part is provided on a running

gear underside. The side parts are connected to a car body of the rail vehicle, and the base part is connected to the running gear. A gap, which allows the wheels to turn out, is provided between the side elements and the base element.
In its known form, the stated approach has the disadvantage that the cladding encourages snow and ice to become deposited on the running gear and the components thereof.

JP 2018-58434 A, which discloses a running gear of a rail vehicle with a heating device, is furthermore known. The heating device is arranged on an underside of a running gear frame.
No running gear cladding is apparent, meaning high heat losses are probable and an effective heating action is only to be expected in the immediate vicinity of the heating device.

The object of the invention is therefore that of providing a running gear cladding with an effective and efficient de-icing device combined therewith.

This object is achieved according to the invention with a cladding arrangement of the above-stated type, in which at least one first heating device, which is directed into a hollow formed by at least the first cladding part, is connected to the at least first cladding part.
In this way, thawing and de-icing operations can be performed on-vehicle. De-icing halls which need major heating and stationary de-icing installations and/or apparatuses can be dispensed with.
If the cladding arrangement is arranged, for example, on the running gear, said cladding arrangement forms a running gear hollow or running gear cavity. Because the first heating device is directed into this running gear hollow or running

gear cavity, particularly effective and efficient heating of the running gear or of running gear components is achieved. Relatively minor heat losses and thus a moderate heating power requirement are to be expected. Thus, rapid and, in particular in comparison with de-icing using a hot-air stream, energy-efficient de-icing or thawing operations relating to snow and ice deposits are performed on the vehicle.
Damage, as may arise for example in the case of manual thawing operations using hot water from high-pressure cleaners or using tools for breaking off ice deposits on the vehicle, is avoided.
As a result of the cladding arrangement according to the invention, the availability and flexibility of the vehicle is consequently also increased.

It is favorable for the at least first heating device to take the form of a film heater.
This measure results in a particularly compact arrangement and thus low utilization of available structural space.

One advantageous configuration is obtained if the at least first heating device is connectable to a power distribution facility of the running gear.
This measure means that cables do not have to be guided directly from the first heating device to a power supply unit in the vehicle and the cables needed for the first heating device may be short in construction.

A favorable solution is achieved if the at least first heating device is adapted to the at least first cladding part with regard to the geometric shape thereof.
As a result of this measure, the first heating device may on the one hand be positioned as close as possible to a vehicle

component which needs heating, and the number of heating devices needed on the first cladding part may be reduced. If, for example, the first cladding part has a recess, there is no need to arrange a plurality of heating devices around the recess, but rather just the first heating device is required, which may, depending on application, have a recess congruent with the recess in the first cladding part.

It is favorable for the at least first heating device to have a temperature sensor.
In this way, temperature information may be acquired at the first heating device and passed for example to a control unit for temperature adjustment of the first heating device or to a data memory for statistical evaluation etc..

An advantageous solution is achieved if the at least first heating device is connectable to a control unit of the vehicle.
This measure enables flexible setting of first heating device temperatures, which proceeds for example by predetermining a nominal value, which is input by means of an operator control unit with display in the driver's cab of the vehicle.

A favorable configuration is achieved if the at least first heating device is connectable to a data bus of the vehicle. This enables data to be transmitted from and to the first heating device. For example, temperature data produced by the temperature sensor or current data may be transmitted to the control unit, to a data memory or further vehicle system (for example diagnostic systems). Error states of the first heating device may thus be detected, for example, and warnings produced (for example in the driver's cab).

It is favorable for the at least first heating device to be connectable to a radio device.
This measure enables data, by means of which for example an error state of the first heating device may be detected, to be transferred as radio signals to vehicle systems or maintenance stations which have corresponding receive units.

An advantageous configuration is obtained if the at least first heating device is arranged in alignment with a vehicle component to be heated.
This brings about effective heat transfer from the first heating device to the component to be heated.

A favorable solution is achieved if the at least first heating device is arranged integrated into the at least first cladding part.

This measure makes it possible to dispense with heating devices which are arranged on the first cladding part and which may become detached or fall off and are exposed to environmental conditions etc.. Protective jacketing of the first heating device by the first cladding part itself is consequently achieved.

According to one aspect of the present invention, there is provided a cladding arrangement having at least one first cladding part for a vehicle which is connectable via at least one connecting means to a running gear of the vehicle, a running gear component, a car body of the vehicle or a car body component, wherein at least one first heating device, which is directed into a running gear hollow formed by at least the

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first cladding part, is connected to the at least first cladding part, wherein the running gear or the running gear component is heated by heat transfer from the cladding.

The invention is explained in greater detail below with reference to an exemplary embodiment, in which:

Fig. 1: shows an exemplary variant embodiment of a cladding arrangement according to the invention with heating devices in perspective view from below and to the side, the cladding arrangement being connected to a running gear and a car body of a rail vehicle.

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A portion illustrated in Fig. 1 in perspective view from below and to the side of an exemplary variant embodiment of a cladding arrangement according to the invention has a first cladding part 1, a second cladding part 2, a third cladding part 3, a fourth cladding part 4 and a fifth cladding part which is not shown, these being shaped in an aerodynamically favorable way.

The first cladding part 1 is arranged in the region of a first running gear longitudinal side 13 and bolted to a car body, not shown, of a rail vehicle. Bolts are provided as corresponding connecting means.

The fifth cladding part is arranged in the region of a second running gear longitudinal side 14 and likewise bolted to the car body.

It is also feasible, according to the invention, to provide hinges, i.e. articulated joints, as connecting means between the first cladding part 1 and the car body and between the fifth cladding part and the car body, so enabling the first cladding part 1 and the fifth cladding part to fold open and shut. It is moreover conceivable to embody the first cladding part 1 and the fifth cladding part as multipart components.

The second cladding part 2 takes the form of underbody cladding for running gear 5 of the rail vehicle and is coupled to a running gear frame 20, i.e. a running gear component, via wire rope dampers, not shown, which function as connecting means between the second cladding part 2 and the running gear frame 20. The second cladding part 2 is embodied in one piece. According to the invention, it is however also possible to embody the second cladding part 2 as a multipart component and to connect individual parts of the second cladding part 2 together in an articulated manner.

The third cladding part 3 and the fourth cladding part 4 are arranged below non-visible tanks connected to the car body, i.e. car body components, and bolted to these tanks.
Between the second cladding part 2 on the one hand and the third cladding part 3 and the fourth cladding part 4 on the other hand, two curved interspaces or gaps are provided, in order not to impede turning out of the running gear 5 and the second cladding part 2 relative to the car body or relative to the third cladding part 3 and the fourth cladding part 4.

The running gear 5 takes the form of an internally mounted running gear 5 and has a first wheel set 21 and a second wheel set 22, which are coupled to the running gear frame 20 via non-visible wheel set bearing devices. Between the first wheel set 21 and the second wheel set 22 on the one hand and the first cladding part 1, the second cladding part 2 and the fifth cladding part on the other hand, intervals or interspaces are provided so as not to restrict the mobility of the first wheel set 21 and of the second wheel set 22 relative to the cladding arrangement.

Furthermore, the running gear 5 has a first drive unit 23 connected to the first wheel set 21 and a second drive unit 24 connected to the second wheel set 22.
In the region of the first running gear longitudinal side 13, a first primary spring 25 is arranged between the first wheel set 21 and the running gear frame 20 and a second primary spring 26 is provided between the second wheel set 22 and the running gear frame 20. In the region of the second running gear longitudinal side 14 there are provided a third, non-visible, primary spring arranged between the first wheel set 21 and the running gear frame 20 and a fourth, likewise non-

visible, primary spring arranged between the second wheel set 22 and the running gear frame 20.

A first shoe brake 27 and a second shoe brake 28 are connected in the region of the first running gear longitudinal side 13 to the running gear frame 20, a third shoe brake and a fourth shoe brake, which are not visible, being connected in the region of the second running gear longitudinal side 14.

A first heating device 6 is connected to a first inner side of the first cladding part 1, and a second heating device 7, third heating device 8 and fourth heating device 9 are connected to a second inner side of a bottom face 15 of the second cladding part 2.
Furthermore, a fifth heating device 10 is connected to a third inner side of a first side face 16 of the second cladding part 2, a sixth heating device 11 is connected to a fourth inner side of a second side face 17 of the second cladding part 2 and a seventh heating device 12 is connected to a fifth inner side of a third side face 18 of the second cladding part 2. Further heating devices are connected to further inner sides of the fifth cladding part and further side faces of the second cladding part 2.
It is conceivable, according to the invention, also to connect heating devices to inner sides of the third cladding part 3 and of the fourth cladding part 4 and thus to heat the tanks located thereabove.

The first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 are embodied as film heaters known from the prior art, are provided on inner sides of the cladding

arrangement and are directed into a running gear hollow 19 formed by the cladding arrangement, whereby this and chassis components such as the first shoe brake 27, the second shoe brake 28, the third shoe brake and the fourth shoe brake etc. may be effectively heated and snow and ice deposits effectively thawed.
The film heaters are adhesively bonded to the cladding arrangement.
According to the invention, it is however also conceivable to clamp on the film heaters by means of clamping devices provided on the cladding arrangement or this to connect them by means of other force- or form-locking connections and/or material bonds to the cladding arrangement. It is for example conceivable for the film heaters to be arranged on supports or frames which are bolted to the cladding arrangement.

The film heaters used for the cladding arrangement according to the invention are electric resistance heaters. These have a plurality of metallic panel heating elements which are sheathed in plastics films. The panel heating elements are connected via connection elements to terminals (not shown) to which cable lines (likewise not shown) are connected. These cable lines are connected to a non-visible power distribution facility, which is arranged on the running gear frame 20. The power distribution facility is connected, likewise via a cable line, to a power supply facility of the car body, via which the first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 are supplied with electricity.
According to the invention, it is also conceivable to connect the first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth

heating device 10, the sixth heating device 11 and the seventh heating device 12 directly to the power supply facility. According to the invention, it is also conceivable to integrate the first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 into the cladding arrangement. In this case, heating rods coated with electrically insulating layers are incorporated into the first cladding part 1, the second cladding part 2 and the fifth cladding part, i.e. enveloped in a material of the cladding arrangement, only those sides of the heating rods which face the running gear hollow 19 being exposed.

The power distribution facility has a control unit with a computing unit, which is connected via conduction paths for data transmission to the first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 on the one hand and to an operator control unit in a driver's cab of the car body on the other hand. The control unit is supplied with electricity via the power distribution facility.
The first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 each have a temperature sensor, not shown. The temperature sensors are connected to the control unit via stated conduction paths.
By means of the operator control unit in the driver's cab of the rail vehicle, the film heaters may be switched on and off and nominal temperatures set. On the basis of these nominal temperatures and the actual temperatures measured by the

temperature sensors, the control unit generates control signals, via which electrical currents of the film heaters are adjusted in order to achieve and maintain a predetermined actual temperature.
According to the invention, it is also conceivable to operate and control the first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 separately.

The control unit further has an external temperature sensor, not shown. Automatic switching on and off of the film heaters is possible via corresponding external temperature data. If the external temperature falls below a defined first threshold value, the film heaters are thus activated. If a defined second external temperature threshold value, which is greater than the first external temperature threshold value, is exceeded and the film heaters have been continuously activated over a defined period, the film heaters are deactivated.

The first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 are furthermore connected via the control unit to a radio device arranged in the control unit, which radio device has a first antenna with transmit and receive unit. Temperature and diagnostics data etc. of the film heaters are transferred via the radio device to a maintenance station or other recipient for evaluation.
Furthermore, preset nominal temperatures may be transferred from a maintenance station to the radio device and consequently to the control unit and the film heater may thus be remotely controlled.

According to the invention, it is also conceivable for the film heaters in each case to be connected directly to their own radio device. In this case, it also possible to dispense with cable-based conduction paths for data transmission between the film heaters and the control unit and to perform a data exchange between the film heaters and the control unit by means of radio signals, the control unit to this end having its own, second antenna.

Furthermore, the first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 are also connected via the control unit to a data bus, not shown, of the rail vehicle, via which for example temperature data and status data (for example with regard to electrical current or resistance values of the film heaters) etc. may be transferred to a display unit in the driver's cab or to a diagnostics system of the rail vehicle etc.. Furthermore, the control unit may also receive control signals etc. via the data bus. According to the invention, it is also possible for the first heating device 6, the second heating device 7, the third heating device 8, the fourth heating device 9, the fifth heating device 10, the sixth heating device 11 and the seventh heating device 12 to be connected separately via corresponding data lines to the data bus.

The fifth heating device 10 is provided in the immediate vicinity of the first shoe brake 27 and the second shoe brake 28, whereby these are effectively heatable, and ice deposits, which may lead to seizing of brake cylinders or brake levers, may be thawed.

According to the invention, it is also conceivable to configure the fifth heating device 10 in two parts and for both parts to be arranged in alignment in each case with a vehicle component to be heated, i.e. for example with the first shoe brake 27 and the second shoe brake 28.

The sixth heating device 11 is arranged in the immediate vicinity of the first primary spring 25, and the seventh heating device 12 in the immediate vicinity of the second primary spring 26. The first primary spring 25 and the second primary spring 26 may thus be effectively heated and ice deposits stuck thereto, which may immobilize the first primary spring 25 and the second primary spring 26, thawed.

The third heating device 8, the fourth heating device 9, the sixth heating device 11 and the seventh heating device 12 are adapted to the cladding arrangement with regard to their geometric shapes.
The third heating device 8 and the fourth heating device 9 have recesses which are congruent with a first recess 29 of the second cladding part 2, through which the first drive unit 23 projects, and a second recess 30 of the second cladding part 2, through which the second drive unit 24 projects, and thus form a frame around the first drive unit 23 and the second drive unit 24.
The sixth heating device 11 and the seventh heating device 12 are parallelogram-shaped and thus fit geometrically with the second side face 17 and the third side face 18 of the second cladding part 2.

The second heating device 7 and the fifth heating device 10 are separate from one another. However, according to the invention it is also possible to embody the second heating

device 7 and the fifth heating device 10 as a single unit, this single unit having a rebate in a transitional zone between the bottom face 15 and the first side face 16 of the second cladding part 2.

According to the invention, it is moreover conceivable for the cladding arrangement to cover not only underframe components (for example the tanks) and running gear 5, but also vehicle roof structures such as pantographs etc..

According to the invention, it is furthermore also conceivable to provide just the first cladding part 1 as cladding arrangement and to embody this in the shape of a cuboidal envelope and arrange it around the running gear 5 to form the running gear hollow 19.

List of references

1	First cladding part
2	Second cladding part
3	Third cladding part
4	Fourth cladding part
5	Running gear
6	First heating device
7	Second heating device
8	Third heating device
9	Fourth heating device
10	Fifth heating device
11	Sixth heating device
12	Seventh heating device
13	First running gear longitudinal side
14	Second running gear longitudinal side
15	Bottom face
16	First side face
17	Second side face
18	Third side face
19	Running gear hollow
20	Running gear frame
21	First wheel set
22	Second wheel set
23	First drive unit
24	Second drive unit
25	First primary spring
26	Second primary spring
27	First shoe brake
28	Second shoe brake
29	First recess
30	Second recess

Claims

1. A cladding arrangement having at least one first cladding part for a vehicle which is connectable via at least one connecting means to a running gear of the vehicle, a running gear component, a car body of the vehicle or a car body component, wherein at least one first heating device, which is directed into a running gear hollow formed by at least the first cladding part, is connected to the at least first cladding part, wherein the running gear or the running gear component is heated by heat transfer from the cladding.

2. The cladding arrangement as claim in claim 1 wherein the at least one first cladding part for a vehicle is for a rail vehicle.

3. The cladding arrangement as claimed in claim 1 or 2, wherein the at least first heating device takes the form of a film heater.

4. The cladding arrangement as claimed in any one of claims 1 to 3, wherein the at least first heating device is connectable to a power supply facility of the vehicle.

5. The cladding arrangement as claimed in any one of claims 1 to 4, wherein the at least first heating device is connectable to a power distribution facility of the running gear.

6. The cladding arrangement as claimed in any one of claims 1 to 5, wherein the at least first heating device is

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adapted to the at least first cladding part with regard to the geometric shape thereof.

7. The cladding arrangement as claimed in any one of claims 1 to 6, wherein the at least first heating device has a temperature sensor.

8. The cladding arrangement as claimed in any one of claims 1 to 7, wherein the at least first heating device is connectable to a control unit of the vehicle.

9. The cladding arrangement as claimed in any one of claims 1 to 8, wherein the at least first heating device is connectable to a data bus of the vehicle.

10. The cladding arrangement as claimed in any one of claims 1 to 9, wherein the at least first heating device is connectable to a radio device.

11. The cladding arrangement as claimed in any one of claims 1 to 10, wherein the at least first heating device is arranged in alignment with a vehicle component to be heated.

12. The cladding arrangement as claimed in any one of claims 1 to 11, wherein the at least first heating device is arranged integrated into the at least first cladding part.

13. A running gear with a cladding arrangement as claimed in any one of claims 1 to 12.

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14. A car body with a cladding arrangement as claimed in any one of claims 1 to 12.

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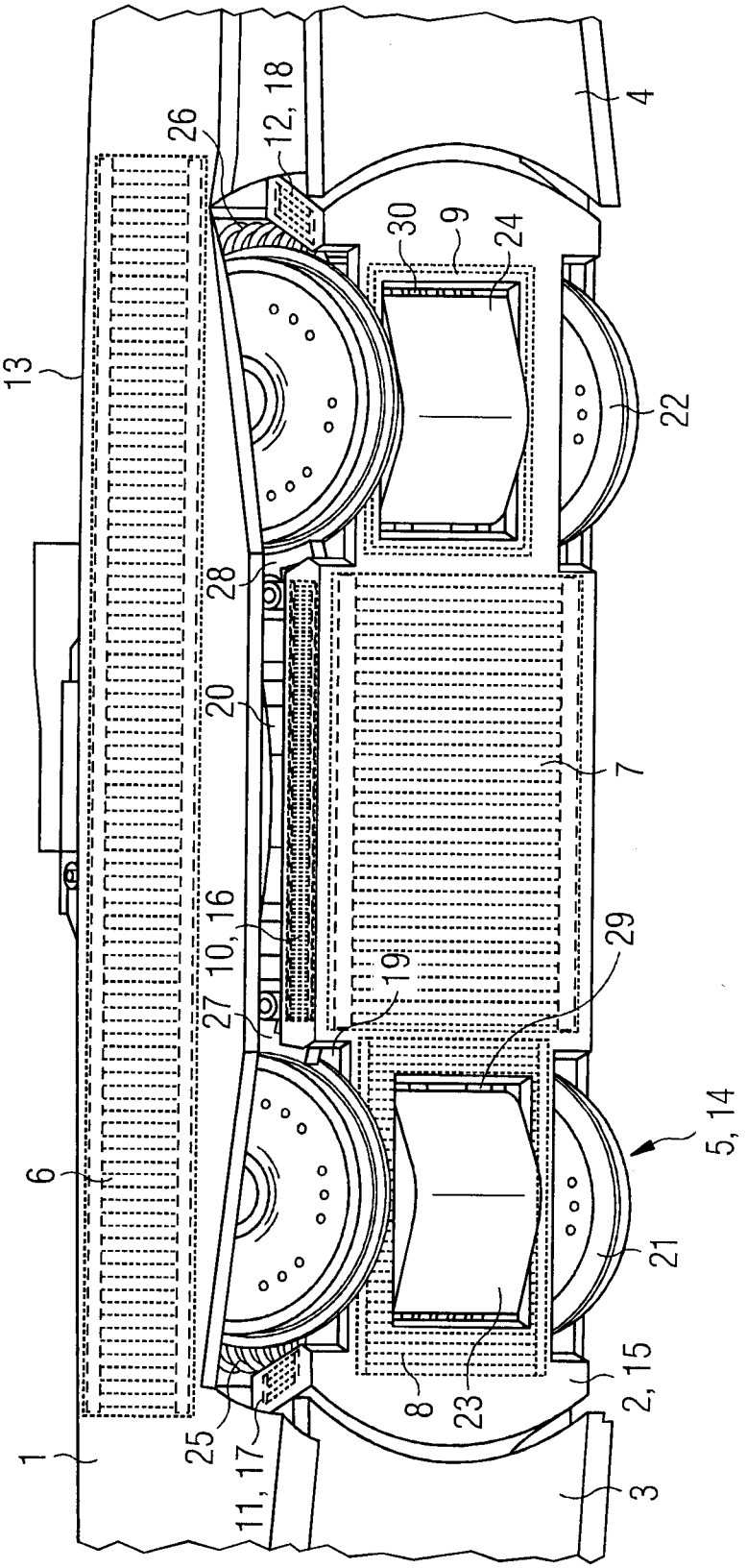
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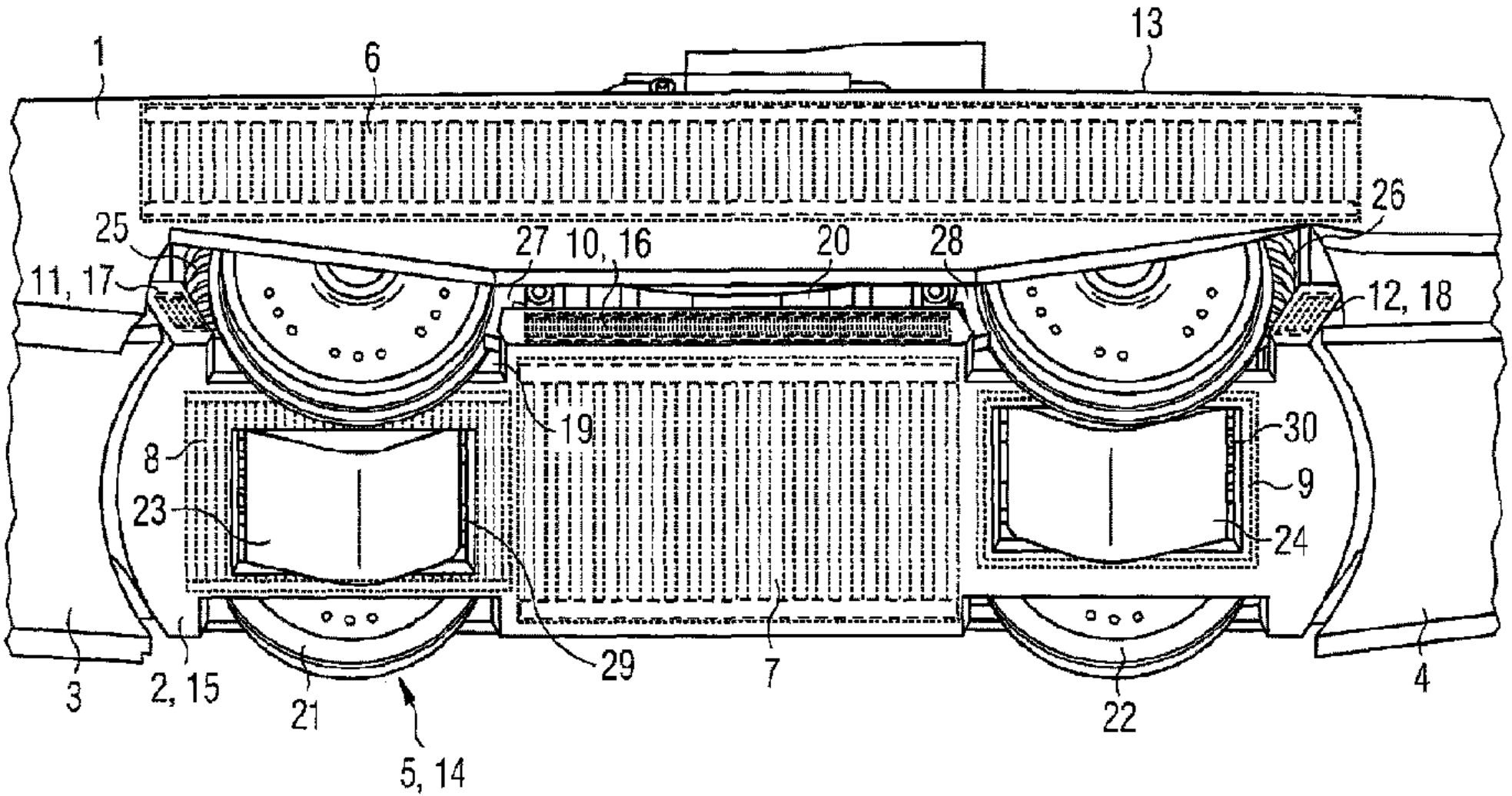
FIG 1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