(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 263 793**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87830327.0**

(22) Date of filing: **09.09.87**

(51) Int. Cl.[4]: **B 61 F 3/04**
B 61 F 3/12, B 61 F 5/52,
B 61 F 3/16, B 61 D 13/00,
B 61 C 9/52

(30) Priority: **06.10.86 IT 6775686**

(43) Date of publication of application:
13.04.88 Bulletin 88/15

(84) Designated Contracting States:
AT BE CH DE ES FR GB IT LI LU NL SE

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(54) Twin-engined central bogie for low-floored rall vehicles with two or more articulated bodies.

(57) A twin-engined two-axled central bogie for railway and for tramway vehicles with two or more articulated bodies, including two cross members (1, 2) carrying the wheels (9) and pivotably interconnected by means of two side members (3), and a central longitudinal structure (4) whose ends (4c) rest on two pneumatic springs (12, 13) carried by respective central platforms (5, 6) formed by the cross members. The central structure carries means for the articulated connection of the articulating ends (E_1, E_2) of the bodies of the vehicle, and there are provided tie means (20) for connecting the two cross members to this structure in order to prevent longitudinal movement, as well as lateral restraining means (23, 24) for limiting transverse movement.

Two drive motors (50, 51), situated at the sides of the bogie and resiliently connected to the side members, drive the wheels (9) of the respective sides through longitudinal drive-shafts (55, 56) and geared reduction units (57).

A differential (58) may be coupled to each motor to divide the drive between the wheels on the respective side.

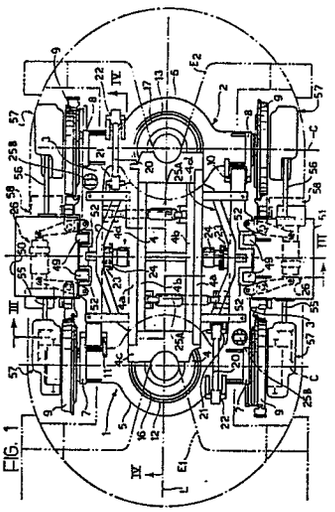

FIG. 1

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Description

Twin-engined central bogie for low-floored rail vehicles with two or more articulated bodies

The present invention relates in general to railway and tramway vehicles with two or more articulated bodies, and particularly concerns a bogie intended to be fitted to the central part of such a vehicle, that is, beneath the articulation between the inner ends of its bodies.

The object of the invention is to produce a driving bogie which is appreciably reduced in height so as to enable the vehicle to which it is fitted to be provided, even the central bogie, with a lower footplate and which at the same time has a relatively simple and light conformation so as to permit ample relative vertical movement of the wheels to ensure that crooked and irregular track is passed over correctly.

According to the invention, this object is achieved by virtue of the fact that a two-axled central bogie for low-floored rail vehicles with two or more articulated bodies is characterised in that it comprises:

two cross members with upwardly-projecting ends carrying respective pairs of idle wheels, the cross members forming respective central platforms each carrying a vertical and transverse suspension spring of the pneumatic flexible-bellows type,

two side members, each of which is rigidly connected at one end to the end of a respective cross member and articulated at the other end to the corresponding end of the other cross member,

two drive motors situated at the sides of the bogie between the corresponding wheels and resiliently connected to the sides of the two side members, each of the motors having its respective shaft parallel to the longitudinal axis of the bogie and driving the two wheels of the respective side through two longitudinal jointed drive shafts and two geared reduction units,

a central longitudinal structure whose ends rest on the two pneumatic springs and carry means for the articulated connection of the articulating ends of the two bodies of the vehicle, the connection means being contained, at least for the greater part, between the pneumatic springs,

tie means interconnecting the central longitudinal structure and the cross members to prevent longitudinal movement of the structure,

lateral restraining means for limiting transverse movement of the central longitudinal structure,

vertical and lateral shock-absorber means interposed between the central structure and the two side members, and

braking means for the wheels.

A differential unit may conveniently be associated with each motor for dividing the drive between the respective wheels of the side.

To advantage, the braking means for the wheels comprise pneumatically-operated braking members with blocks and electromagnetically-operated braking members with shoes.

Further characteristics of the invention will become clear from the detailed description which follows with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a schematic plan view of a twin-engined central bogie according to the invention,

Figure 2 is a schematic side elevational view of the bogie,

Figure 3 is a cross-section taken on the line III-III of Figure 1, and

Figure 4 is a longitudinal section taken on the line IV-IV of Figure 1.

The driving bogie illustrated in the drawings is intended to be fitted to the central zone of a railway or tramway vehicle with two articulated bodies, that is, below the articulation and intercommunication part between the two bodies. This part is schematically indicated P in Figure 3, while the inner articulation ends of the floors of the two bodies are indicated E_1, E_2 in Figure 1. These inner articulation ends E_1, E_2 are provided with respective downwardly-projecting vertical pins A, one of which is visible in Figure 4, for articulated connection to the bogie according to the invention in the manner described below.

The bogie is composed of two cross members, generally indicated 1, 2, two side members 3 which interconnect the cross members 1 and 2, and a central longitudinal structure 4 which extends above the central regions of the cross members 1 and 2.

Each cross member 1, 2, as better seen in Figures 3 and 4, is generally U-shaped with a widened and lowered central part forming a support platform 5, 6 and upwardly-bent ends 7, 8 carrying idle wheels 9. The configuration is such that the support platforms 5, 6 lie well below the axles C of the wheels 9, which enables the floor of the vehicle in the central intercommunication part P to be made with a lowered middle part, as indicated M in Figure 3.

The two side members 3 consist of tubular members of quadrangular cross-section and interconnect the two cross members 1 and 2 at the bases of their respective raised ends 7 and 8, so as to permit relative rotation of the cross members 1 and 2 about the longitudinal axis L of the bogie.

In particular, one of the side members 3 is fixed rigidly at one end to one of the ends 7 of the cross member 1, while at its other end it is connected to the corresponding end 8 of the other cross member 2 by means of a ball joint articulation, generally indicated 10. The other side member 3 is fixed rigidly at one end to the other end 8 of the cross member 2, while it is connected at its opposite end to the other end 7 of the cross member 1 by means of a similar ball joint articulation, generally indicated 11.

The two support platforms 5 and 6 of the cross members 1 and 2 receive two air springs 12, 13 of known flexible-bellows type, which constitute the secondary vertical and transverse suspension of the bogie.

The central longitudinal structure 4 consists of a

frame including two pairs of spaced longitudinal members 4a, 4b having a quadrangular-sectioned tubular structure and interconnected at the ends by transverse members 4c. These transverse members 4c rest on the tops of the air springs 12 and 13, and are connected to two housings 16, 17 which project downwardly and are open at their upper ends.

The two housings 16, 17, which are generally cylindrical in shape, are arranged coaxially with the springs 12 and 13 and extend sealingly within the cavities of the latter. Vertical resilient buffer members 18 (one of which is illustrated in Figure 4) are applied to the external faces of the base walls of the two housings 16 and 17 and are intended to cooperate with the facing surfaces of the support platforms 5 and 6.

Each of the housings 16 and 17 houses a ball joint coupling unit, generally indicated 19, (one of which is visible in Figure 4) through which the articulation pin A of the corresponding end E_1, E_2 of the corresponding body of the vehicle is engaged.

Two lateral structures 4d extend from the longitudinal members 4a of the central structure 4 and serve to connect the lowered middle part M of the articulation and intercommunication part P, in the manner illustrated schematically in the right-hand part of Figure 3.

The longitudinal structure 4 is connected to the cross members 1 and 2 by means of a pair of longitudinal connecting rods 20 situated on opposite sides and articulated at one end to the attachment structure 4d and at the opposite end to the corresponding cross member 1, 2. These articulations, indicated 21 and 22 respectively, are of the ball-joint type.

The connecting rods 20 have the function of preventing longitudinal movement of the central structure 4 relative to the cross members 1 and 2 and of keeping them in equilibrium even in the presence of non-barycentric loads.

Lateral restraining members, constituted by two lateral appendages 23 projecting from the inner sides of the side members 3 and by two resilient rebound buffers 24 projecting from the middles of the longitudinal members 4a of the structure 4 for cooperation with the appendages 23, are provided for limiting transverse movement of the central structure 4.

Two hydraulic shock-absorbers, indicated 25A, are arranged transversely and obliquely beneath the central longitudinal structure 4 and pivotably connect the longitudinal members 4b to the side members 3 on the sides opposite the lateral restraining members 23, 24.

Two hydraulic shock-absorbers for vertical movement, indicated 25B, are arranged substantially vertically between the body and the frame of the bogie and are pivotably connected thereto.

The two side members 3 also support devices for braking the wheels 9: these braking devices include two pneumatically-operated braking units with blocks, generally indicated 26, and two electromagnetically-operated braking units with shoes, generally indicated 27.

Two drive motors, indicated 50, 51, are arranged on the sides of the bogie between the two pairs of wheels 9 on these sides. The motors 50 and 51 are resiliently connected by means of resilient supports 49 to lateral attachment parts 52 projecting upwardly from the side members 3.

Each of the motors 50, 51 has a driving shaft 54 which is parallel to the longitudinal axis L of the bogie and drives two jointed drive-shafts 55,56 to transmit the drive to the respective wheels 9. This transmission is carried out by each motor 50, 51 through a pair of double-reduction geared reduction units 57 including a first pair of bevelled gears and a second pair of cylindrical gears.

In order to divide the drive between the two wheels 9 on each side, so as to prevent the wheels of the side from slipping on the rails as a result of any geometric rolling irregularities, a differential unit, schematically indicated 58 in Figures 1 and 2, can conveniently be associated with each motor 50, 51. In this case, each differential unit 58 is frontally flanged directly onto the respective motor 50, 51 on the side of the drive-shaft 56, and the driving shafts 54 are hollow to allow the respective drive-shafts 55 and 56 to pass therethrough.

The bogie according to the invention is suitable for mounting under a compartment with a low floor M, as indicated schematically in Figure 3, so as to maintain a uniform corridor throughout the vehicle, even over the twin-engined central bogie.

Furthermore, the wheel-housings of the body at the side of the lowered central region M, indicated schematically R in Figure 3, may be used advantageously as seats for the passengers.

Claims

1. A two-axled central driving bogie for low-floored rail vehicles, characterised in that it comprises:

- two cross members (1, 2) with upwardly-projecting ends (7, 8) carrying respective pairs of idle wheels (9), the cross members (1, 2) forming respective central platforms (5, 6) each carrying a vertical and transverse suspension spring (12, 13) of the pneumatic flexible-bellows type,
- two side members (3), each of which is connected rigidly at one end to an end (7, 8) of a respective cross member (1, 2) and articulated at the other end to the corresponding end (8, 7) of the other cross member (2, 1),
- two drive motors (50, 51) situated at the sides of the bogie between the corresponding wheels (9) and connected resiliently to the sides of the two side members (3), each of the motors (50, 51) having a respective driving shaft (54) parallel to the longitudinal axis (L) of the bogie and driving the two wheels (9) of the respective sides through two jointed longitudinal drive-shafts (55, 56) and two geared reduction units (57),
- a central longitudinal structure (4) whose ends (4c) rest on the pneumatic springs (12, 13)

and carry means (16, 17, 19) for the articulated connection of the articulating ends (E_1, E_2) of the two bodies of the vehicle, the jointed connection means being contained, at least for the greater part, between the pneumatic springs (12, 13),

- tie means (20) interconnecting the longitudinal structure (4) and the cross members (1, 2) to prevent longitudinal movement of the central structure (4),

- lateral restraining means (23, 24) for limiting transverse movement of the central longitudinal structure (4),

- braking means (26, 27) for the wheels (9), and

- vertical, lateral shock-absorber means (25) interposed between the central longitudinal structure (4) and the two side members (3).

2. A bogie according to Claim 1, characterised in that a differential unit (58) is coupled to each motor (50, 51) for dividing the drive between the drive-shafts (55, 56) of the two wheels (10, 12) of the respective side.

3. A bogie according to Claim 1 or Claim 2, characterised in that the means for braking the wheels (9) comprise pneumatically-operated braking members (26) with blocks and electromagnetically-operated braking members (27) with shoes.

4. A bogie according to Claim 1, characterised in that the central longitudinal structure (4) has at its ends (4c) downwardly-projecting parts shaped as upwardly-open housings (16, 17), each housing containing a ball joint coupling (19) in which is engaged a downwardly-projecting articulation pin (A) carried by the articulation end (E_1, E_2) of the corresponding body of the vehicle.

5. A bogie according to Claim 4, characterised in that a resilient vertical buffer member (18) is applied to the base of each housing (16, 17).

6. A bogie according to Claim 1, characterised in that the lateral restraining means comprise two lateral appendages (23) which project from the inner sides of the two side members (3) and are intended to cooperate with respective resilient rebound buffers (24) carried by the sides (4a) of the central longitudinal structure (4).

7. A bogie according to Claim 1, characterised in that it includes a pair of fluid shock-absorbers (25A) interposed transversely and obliquely between the central longitudinal structure (4) and the two side members (3), and a pair of fluid shock-absorbers (25B) interposed vertically between the bogie and the body of the rail vehicle.

8. A bogie according to Claim 1, characterised in that the tie means include two longitudinal connecting rods (20) which connect opposite sides of the central longitudinal structure (4) to the two cross members (1, 2).

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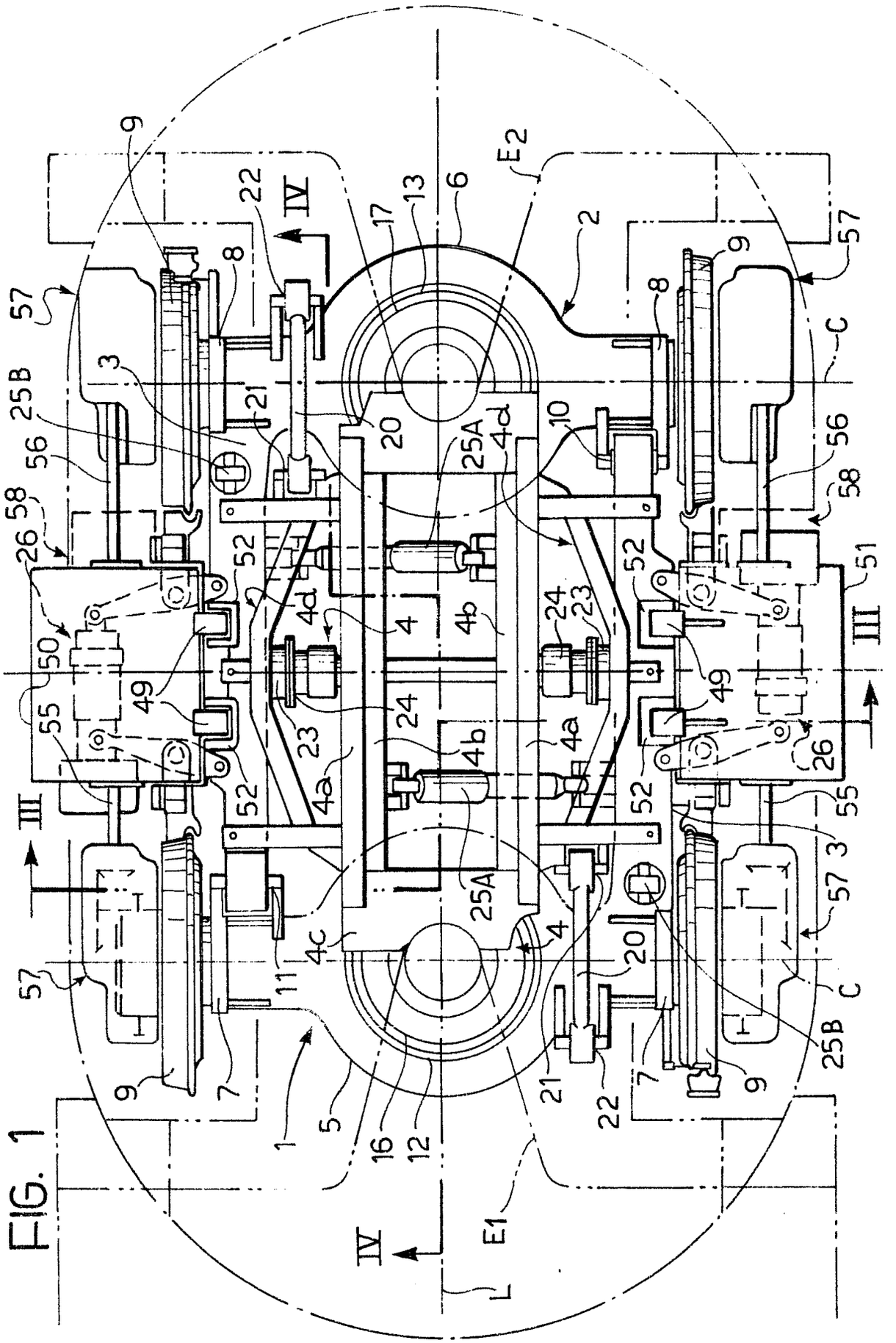

FIG. 1

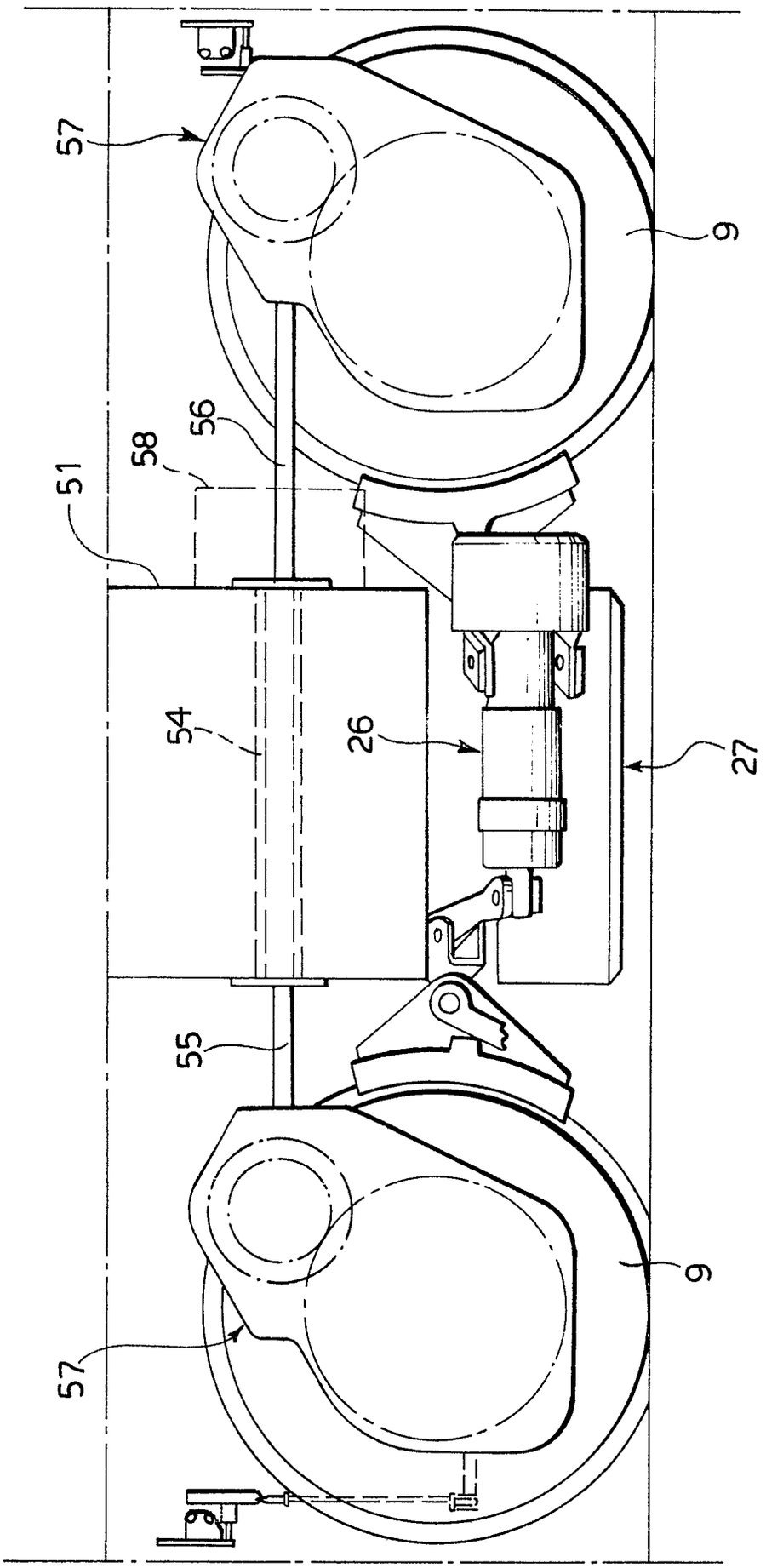

FIG. 2

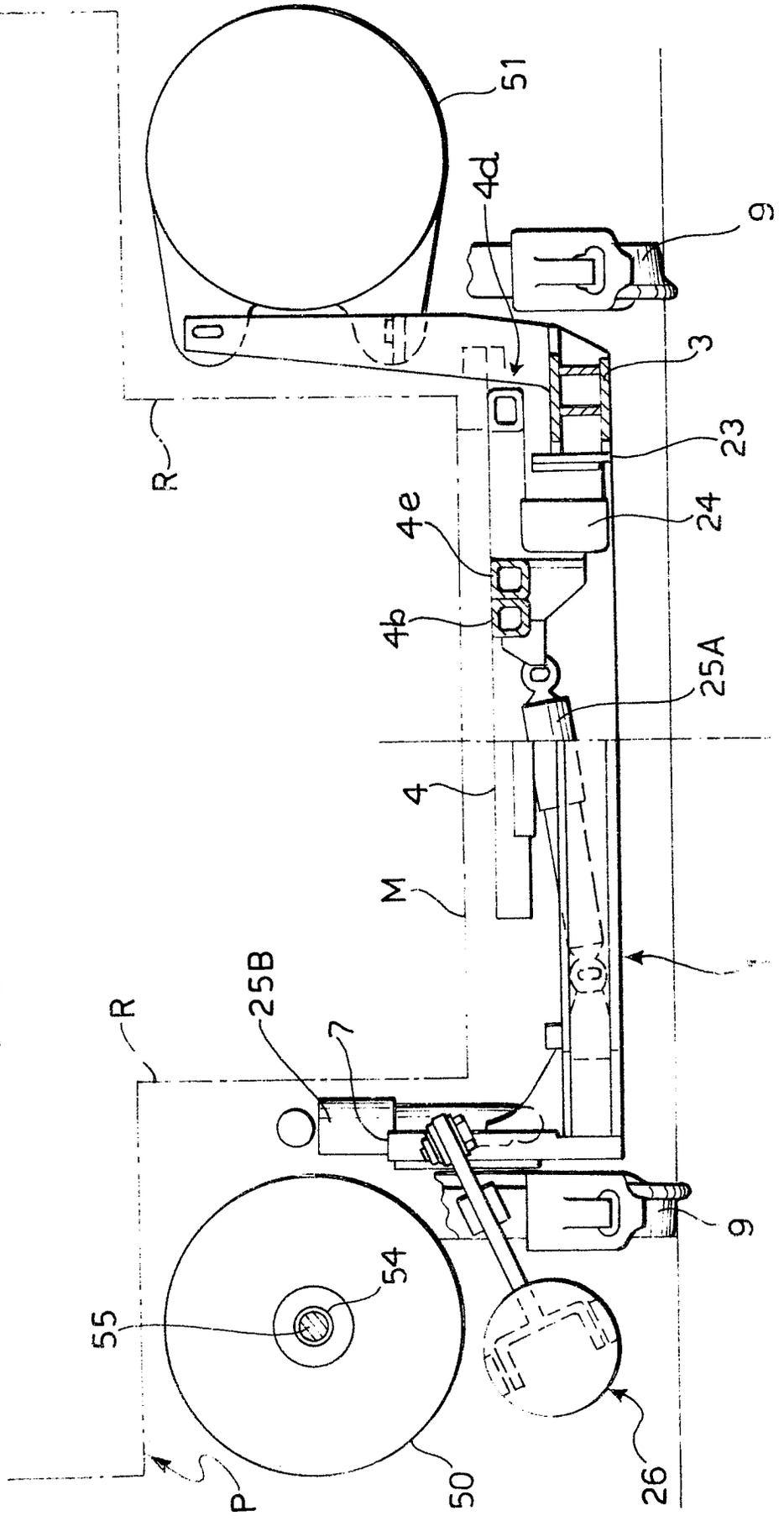

FIG. 3

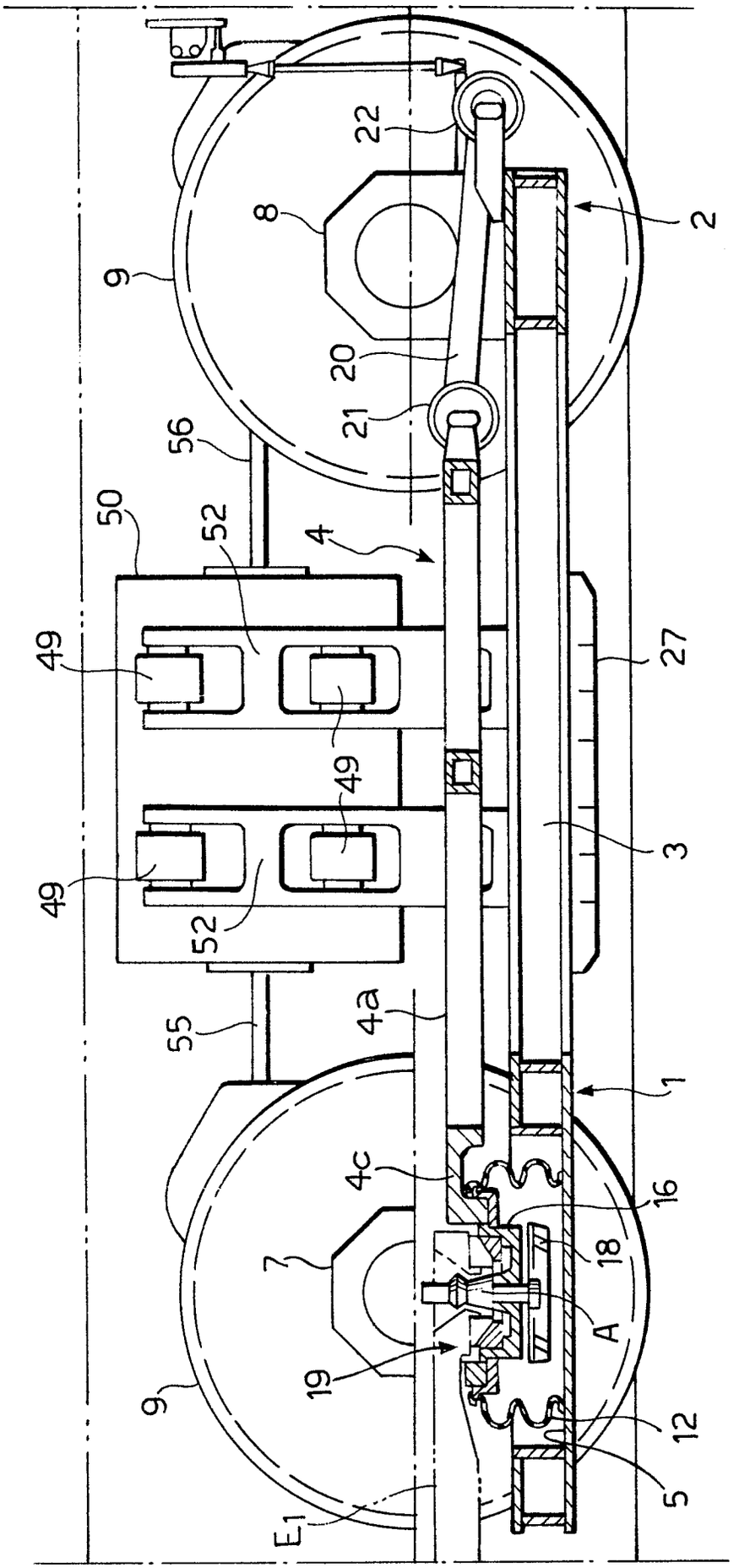

FIG. 4