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(54) **Intercommunication passage between the bodies of two carriages of a rail or tramway vehicle, and a rail or tramway vehicle using such an intercommunication passage.**

(57) Intercommunication passage between the bodies (B_1, B_2) of two carriages (C_1, C_2) of a rail or tramway vehicle (V), in which each of the carriages has a respective bogie (P_1, P_2) close to the zone of intercommunication, which is connected to the body by means of a centre plate (22). The intercommunication passage (10) comprises a rigid tubular element (25) below which is fixed a connecting bar (44) with an articulated attachment end (48) fixed to the bogies through the centre plates. The tubular element has a base wall (30) with semi-circular guide ends (34) which bear slidably on complementary parts (20) projecting from the floor (16) of the two bodies, two side walls (32) and an upper wall (26, 28) to the centre of which is articulated a rocker arm (50) the ends of which are connected by respective connecting rods (56) to the upper walls (12) of the two bodies.

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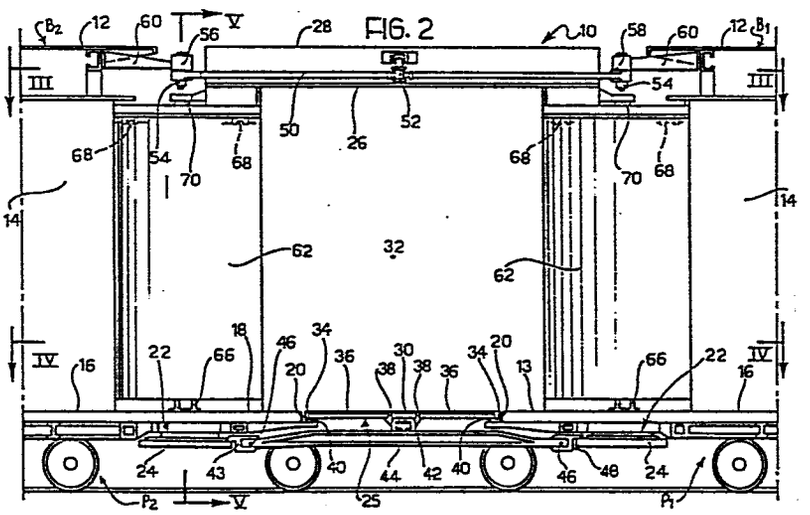
B2
12
60
V
56
28
10
58
60
12
B1
III
III
54
50
26
52
68
54
70
68
68
70
68
14
14
62
32
62
IV
IV
16
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16
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43
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44
42
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48
24
P2
V
25
P1

FIG. 2

Intercommunication passage between the bodies of two carriages of a rail or tramway vehicle and a rail or tramway vehicle using such an intercommunication passage

The present invention relates to tramway and railway vehicles in general comprising two carriages the bodies of which communicate with each other through an intercommunication passage, in which each of the carriages has a respective bogie close to the zone of intercommunication connected to the body by means of a centre plate.

The object of the present invention is to provide an intercommunication passage having a shape such as to allow better use to be made of the space available for passengers in the passageway between the bodies of the two carriages so as considerably to increase the passenger-carrying capacity of the vehicle, while at the same time ensuring convenient and easy movement of passengers between the two bodies.

In order to achieve this object, the present invention provides an intercommunication passage for a tramway railway vehicle of the type defined above, characterised in that it comprises a rigid tubular element beneath which is fixed a connecting bar carrying articulated attachment parts at its ends which are fixed to the bogies through the said centre plates, the tubular element having a base wall with substantially semi-circular guide ends which bear slidably on complementary parts projecting from the floors of two bodies two side walls and an upper wall to the centre of which is articulated a rocker support arm the ends of which are con-

nected by respective connecting rods to the roofs of the two bodies.

According to the invention, between each side wall of the tubular element and the corresponding side wall of each body, there is interposed an intermediate cover carried by the projecting floor and by the roof of the respective body and pivotally connected at its upper end to the upper wall of the tubular element.

According to a further aspect of the invention, the said guide ends of the floor of the tubular element are defined by sector plates articulated to the remaining part of the floor of the tubular element.

The shape of the intercommunication passage according to the invention, by virtue of a rigid connection between the two bodies, forms a wide and spacious passage for passengers without any discontinuity in the level of the floor, while at the same time allowing the necessary relative movements between the two bodies, that is, rotation relative to the vertical axis of each bogie (movement of the vehicle around bends), rotation about a transverse horizontal axis (movement of the vehicle through vertical curves) and rotation about a longitudinal axis (passage of the vehicle over rails which are askew), by virtue of the fact that the rolling movements of the two bodies are independent of each other.

The invention will now be described in detail with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a schematic side elevational view

of a rail of tramway vehicle provided with an intercommunication passage according to the invention,

Figure 2 is a schematic partially sectioned view of the central part of the vehicle on an enlarged scale,

Figure 3 is a schematic view taken on line III-III of Figure 2,

Figure 4 is a schematic view taken on line IV-IV of Figure 2, and

Figure 5 is a schematic view taken on line V-V of Figure 2.

In the drawings, reference V generally indicates a tramway vehicle formed by a pair of carriages C_1, C_2 articulated together through a central intercommunication passage 10 between the bodies B_1, B_2 of the carriages.

As is seen in Figure 1, the vehicle V has a pair of conventional drive bogies M_1, M_2 with wheels of conventional diameter close to the front end of the body B_1 and close to the rear end of the body B_2 respectively.

The adjoining ends of the two bodies B_1, B_2 have respective support bogies P_1, P_2 with smaller diameter wheels. The support bogies P_1, P_2 are preferably of the type forming the subject of Italian Patent Application No. 68510-A/82 in the name of the same Applicants and will thus not be described below for brevity. For the purposes of the present invention it suffices to say that the wheels of the two support bogies P_1, P_2 have a diameter equal to about half (35 cm) that of the wheels of the drive bogies M_1, M_2 allowing the vehicle V to be provided with a floor, generally indicated F

in Figure 1, which is completely lowered along its whole length between the two drive bogies M_1, M_2 at a height normally of the order of 45 cm from the plane of the track, consequently ensuring easier and more convenient access for passengers through the doors D of the vehicle.

As is more clearly shown in Figure 2, each of the bodies B_1, B_2 includes a roof 12, side walls 14 and a base wall or floor 16 having a part 18 projecting beyond the end of the roof 12 towards the intercommunication passage 10. As is best seen in Figure 4, the free end of each projecting part 18 has a semicircular shape with a radius of curvature directed towards the interior of the respective body B_1, B_2 and defining a bearing and sliding guide 20 the function of which will be clarified below.

Returning again to Figure 2, each of the bogies P_1, P_2 is connected to the projecting base part 18 of the respective body B_1, B_2 through a respective centre plate generally indicated 22 the outer ring of which, indicated 24, is fixed to the bogie.

The intercommunication passage 10 comprises a rigid tubular element 25 comprising an upper wall 26 surmounted by a roof 28, a base wall 30 and two side walls 32. As is best seen in Figures 2 and 4, the base wall 30 has semicircular guide parts 34 at its two ends which are defined, except in their zones adjacent the side walls 32, by sector plates 36 articulated to the remaining part of the base wall 30 about respective hinge pins 38. The semicircular guide parts 34 slidably

bear on the semicircular parts 20 of the projections 18 of the floors 16 of the two bodies B_1, B_2 with the interposition of sliding blocks 40.

Beneath the base wall 30 is fixed a reinforcing cross member 42 to which is rigidly connected a longitudinal connecting bar 44 connected to two attachment parts 48 at its ends through articulated couplings 46, the parts 48 being rigidly connected to the rings 24 of the two centre plates 22.

Reference 50 indicates a rocker support arm articulated at its centre to the roof 28 about a vertical pivot pin 52. The ends of the rocker arm 50 are in their turn articulated by respective vertical pins 54 to two connecting rods 56 pivotally connected by pins 58 parallel to the pins 54 to two attachment structures 60 fixed to the ends of the roofs 12 of the two bodies B_1, B_2.

As is clearly seen in Figures 2 and 4, between the side walls 32 of the tubular element 25 and the side walls 14 of the two bodies B_1, B_2 there is a certain space which is clearly necessary to allow relative angular movements between the two carriages B_1, B_2 and the intercommunication passage 10. In order to close these spaces there are provided within the intercommunication passage 10 four vertical covers 62 each having a box structure with an outer wall 63 curved like the guide part 20 and 34 and containing vertical rainwater drainpipes 64. Each cover 62 is connected to the projecting part 18 of the floor 16 and to the roof 12 of the respective body B_1, B_2 by means of respective hinges 66,

68 and its upper part is connected to the upper wall 26 of the tubular element 25 so as to be rotatable about a respective vertical pin 70. The bases of the curved walls 63 of the covers 62 are in sliding contact, by means of brushes or flexible seals, not shown, with the guide parts 20 and 34 while the sides of the covers 62 facing inwardly of the bodies B_1, B_2 are connected to the corresponding side walls 14 thereof by means of flexible closure elements 72 normally of elastomeric material.

The shape of the intercommunication passage 10 described above clearly allows the necessary relative movements between the carriages C_1, C_2 and the rigid tubular element 25 during movement of the vehicle V, that is:

- rotation of each bogie P_1, P_2 about a vertical axis during movement of the vehicle V around a bend;
- rotation about a transverse horizontal axis during movement of the vehicle V along vertical curves;
- rotation about a longitudinal axis during passage of the vehicle V over tracks which are askew, by virtue of the fact that the rolling movements of the two bodies B_1, B_2 are independent of each other.

It is clear from the above that the intercommunication passage 10 according to the invention allows the maximum use to be made of the space between the two bodies (B_1, B_2) which is all to the advantage of the carrying capacity of the vehicle, at the same time ensuring convenient and safe movement of passengers between the bodies themselves.

CLAIMS:

1. Passage for intercommunication between the bodies of two carriages of a rail or tramway vehicle in which each of the carriages has a respective bogie close to the intercommunication zone which is connected to the body by means of a centre plate, characterised in that it comprises a rigid tubular element (25) beneath which is fixed a connecting bar (44) carrying articulated attachment parts (48) at its ends which are fixed to the bogies (P_1, P_2) through the said centre plates (22), the tubular element (25) having a base wall or floor (30) with substantially semicircular guide ends (34) which bear slidably on complementary parts (20) projecting from the floors (16) of the two bodies (B_1, B_2), two side walls (32) and an upper wall (26, 28) to the centre of which is articulated a rocker support arm (50) the ends of which are connected by respective connecting rods (56) to the roofs (12) of the two bodies (B_1, B_2).

2. Intercommunication passage according to Claim 1, characterised in that between each side wall (32) of the tubular element (25) and the corresponding side wall (14) of each body (B_1, B_2), there is interposed an intermediate cover (62) carried by the projecting parts (18) of the bottom (16) and by the roofs (12) of the respective body (B_1, B_2) and pivotally connected at its upper end to the upper wall (26) of the tubular element (25).

3. Intercommunication passage according to Claim 2, characterised in that the intermediate covers (62)

each have an outer wall (63) curved like the said guide ends (34) of the base wall (30) of the tubular element (25) and in sliding contact therewith, the cover (62) being connected laterally to the corresponding side walls (14) of the bodies (B_1, B_2) by flexible closure elements (72).

4. Intercommunication passage according to Claim 2 or Claim 3, characterised in that the intermediate covers (62) are connected to the floor (16) and to the roof (12) of the bodies (B_1, B_2) by means of respective hinges (66, 68).

5. Intercommunication passage according to any one of Claims 2 to 4, characterised in that the intermediate covers (62) have a box structure containing rainwater drainpipes (64).

6. Intercommunication passage according to any one of Claims 1 to 4, characterised in that the said guide ends (34) of the floor (30) of the tubular element (25) are defined at least for the greater part by sector plates (36) articulated to the remaining part of the floor (30) of the tubular element (25).

7. Railway or tramway vehicle including two articulated carriages the bodies of which communicate with each other through an intercommunication passage, and in which each carriage has close to the zone of intercommunication a respective bogie connected to the body by means of a centre plate, characterised in that the floors (16) of the two bodies (B_1, B_2) have respective parts (18) with substantially semicircular ends (20) projecting into the intercommunication passage (10) and

in that the said intercommunication passage (10) includes a rigid tubular element (25) beneath which is fixed a connecting bar (44) carrying articulated attachment parts (48) at its ends fixed to the bogies (P_1, P_2) through the said centre plates (22), the tubular element (25) having a base wall (30), with substantially semicircular guide ends (34) which bear slidingly on the said substantially semicircular ends (20) of the projecting parts (18) of the floors (16) of the two bodies (B_1, B_2), two side walls (32) and an upper wall (26, 28) to the centre of which is articulated a rocker support arm (50) the ends of which are connected through respective connecting rods (56) to the upper walls (12) of the two bodies (B_1, B_2).

8. Rail or tramway vehicle according to Claim 7, characterised in that between each side wall (32) of the tubular element (25) and the corresponding side wall (14) of each body (B_1, B_2), there is interposed an intermediate cover (62) carried by the projecting part (18) of the floor (16) and by the roof (12) of the respective body (B_1, B_2) and pivotally connected at its upper end to the upper wall (26) of the tubular element (25).

9. Rail or tramway vehicle according to Claim 8, characterised in that the intermediate covers (62) have an outer wall (63) curved like the said guide ends (34) of the floor (30) of the tubular element (25) and in sliding contact therewith, the covers (62) being connected laterally to the corresponding side walls (14) of the bodies (B_1, B_2) by flexible closure elements

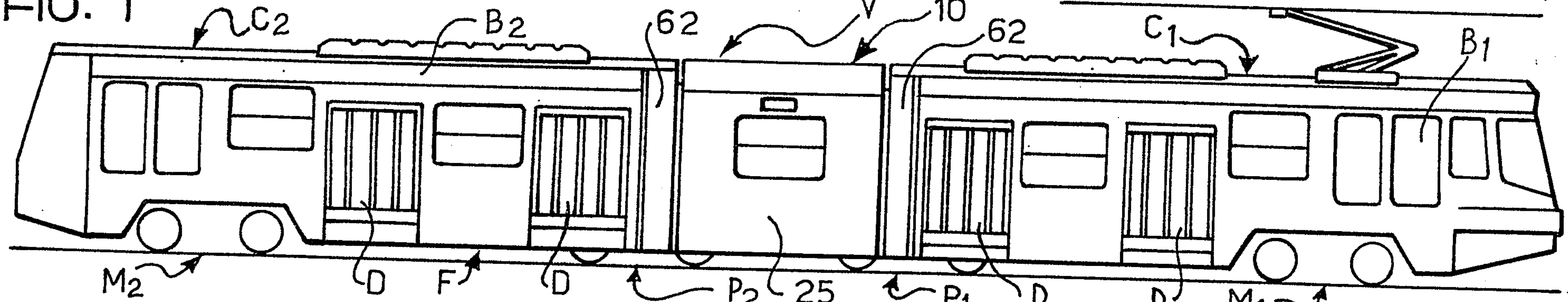
(72).

10. Rail or tramway vehicle according to Claim 8 or Claim 9, characterised in that the intermediate covers (62) are connected to the floors (16) and to the roofs (12) of the bodies (B_1, B_2) by means of respective hinges (66, 68).

11. Rail or tramway vehicle according to any one of Claims 8 to 10, characterised in that the intermediate covers (62) have a box structure containing rainwater drainpipes (64).

12. Rail or tramway vehicle according to any one of Claims 7 to 11, characterised in that the said guide ends (34) of the floor (30) of the tubular element (25) are defined at least for the greater part by sector plates (36) articulated to the remaining part of the floor (30) of the tubular element (25).

FIG. 1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B2
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V
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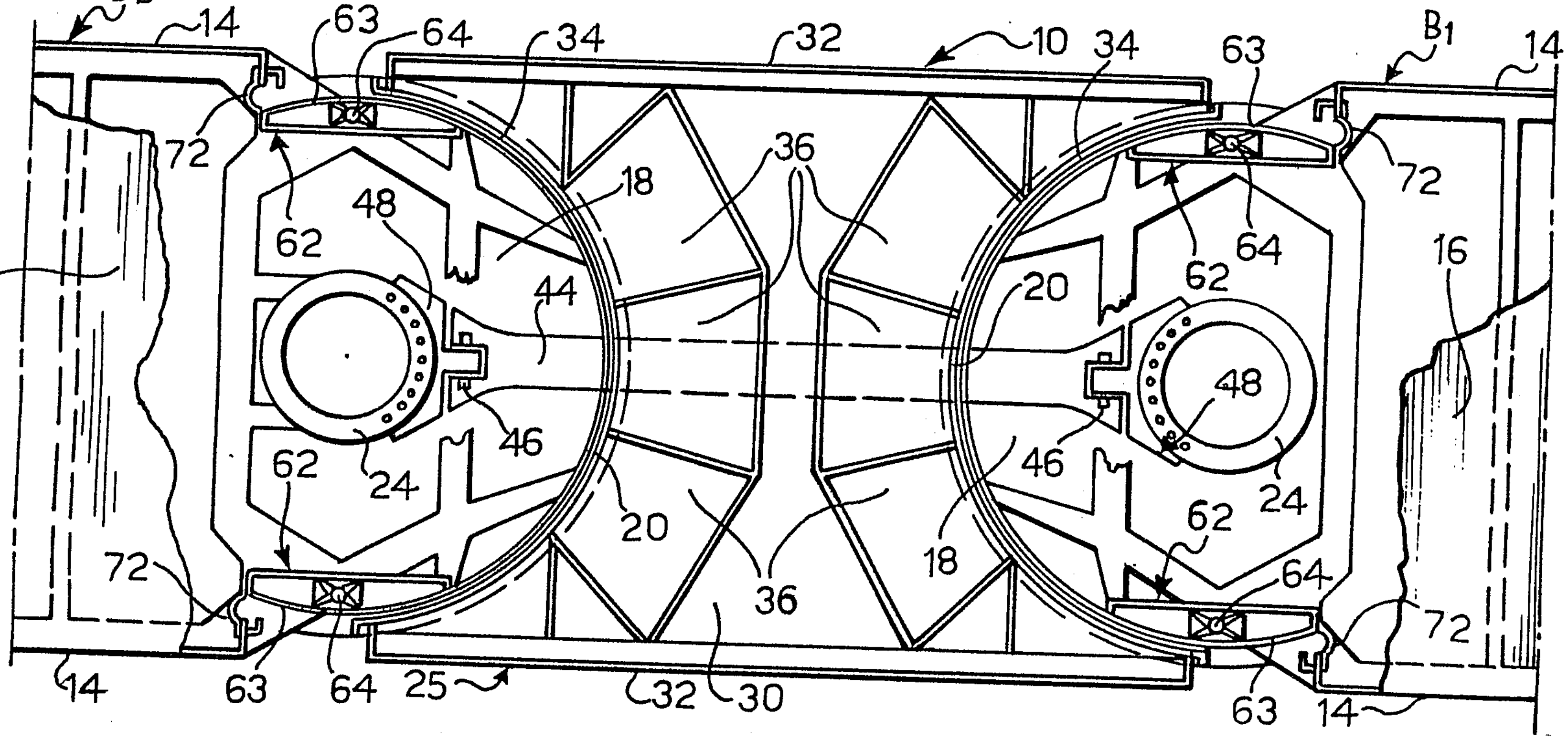
62
C1
B1
M2
D
F
D
P2
25
P1
D
D
M1

FIG. 4


B2
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B1
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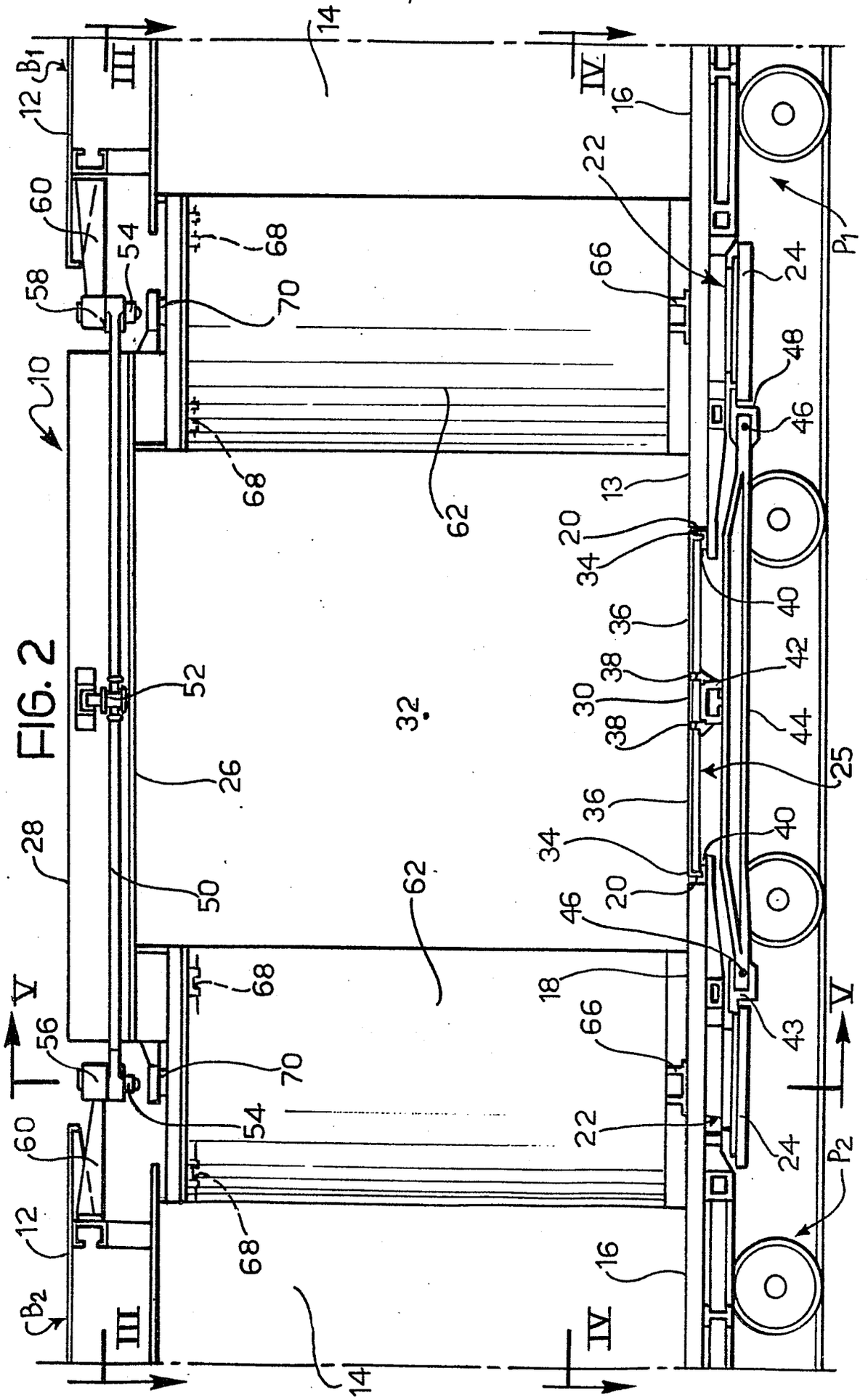
III
IV
V
V
III
IV
B1
B2
P1
P2
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12
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16
18
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22
24
25
26
28
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32
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70
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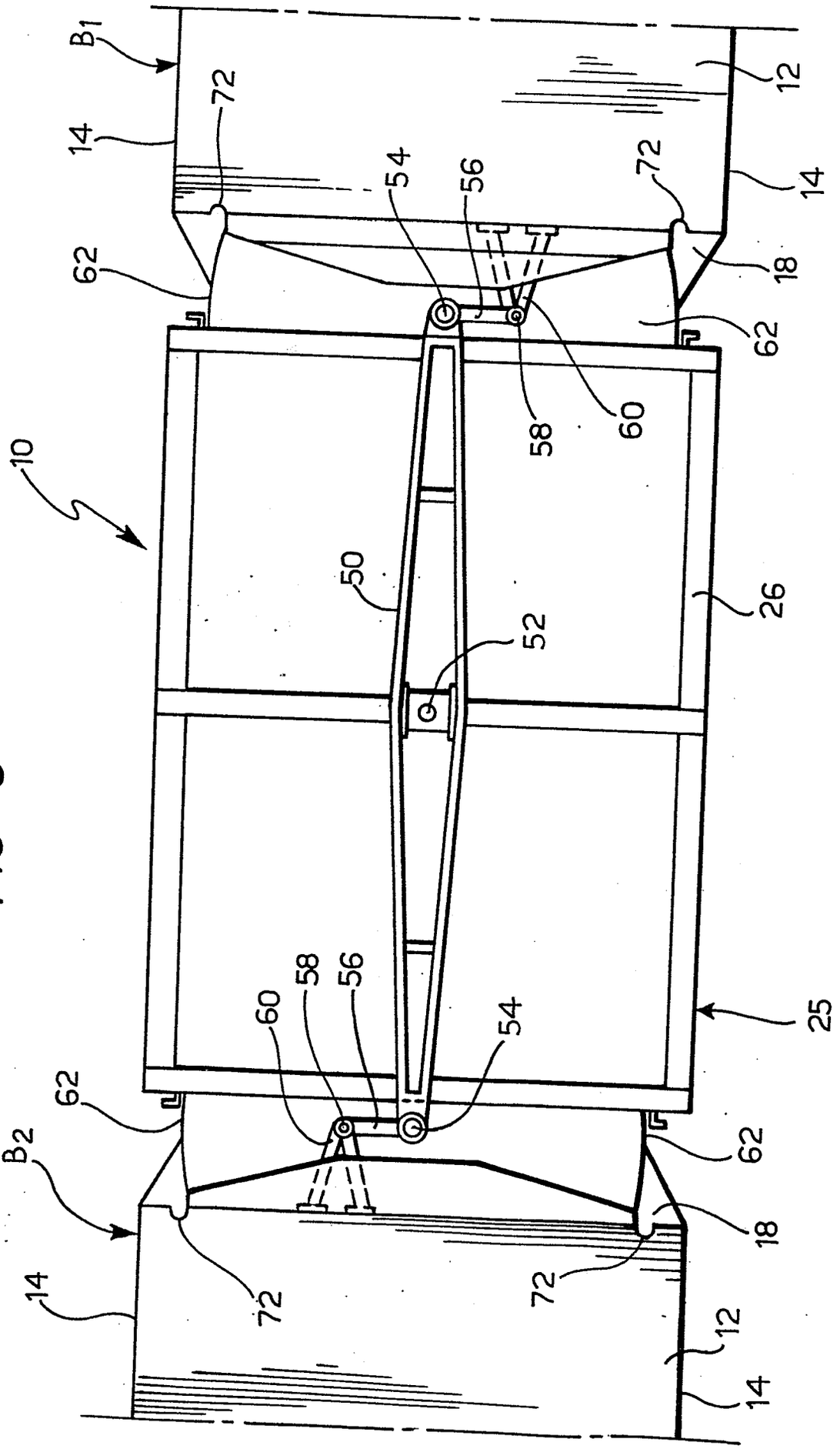
FIG. 2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56
72
14
62
18
62
58
60
10
50
26
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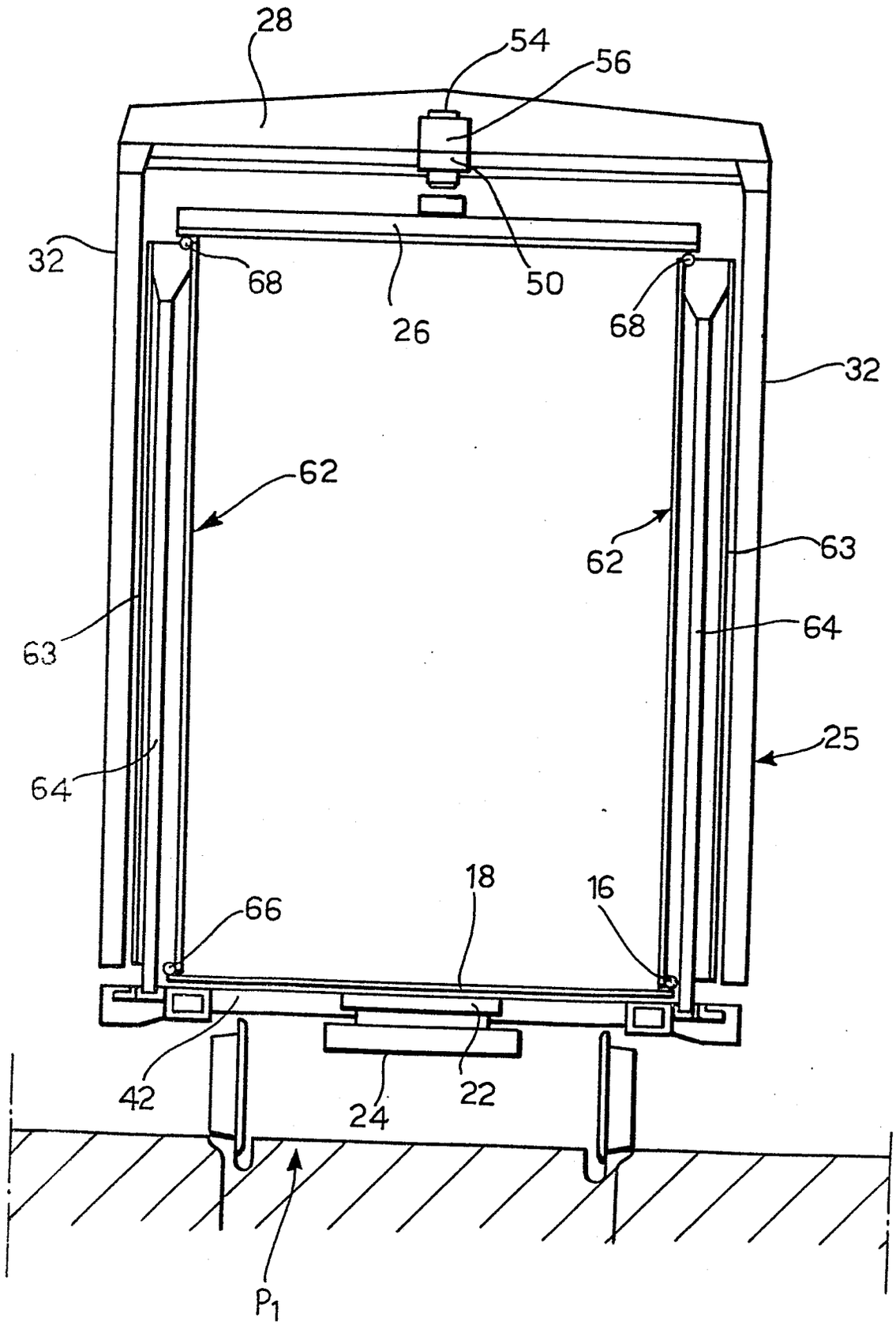
60
58
56
54
62
62
B2
18
72
72
14
12
14

FIG. 3

FIG. 5



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EUROPEAN SEARCH REPORT

0121503
Application number

EP 84 83 0034

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	DE-C- 528 157 (CARL BUDERUS) * Figure 2 *	1,7	B 61 D 17/20
A	US-A-3 922 971 (MAROSHICK) * Figure 4 *	1,2,7, 8	
A	BE-A- 552 998 (DÜSSELDORFER WAGONFABRIK) * Figure 4; claim 1 *	1,7	
A	GB-A-2 009 691 (S.I.G.) * Figure 8; page 6, lines 62-64 *	6,12	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 61 D 17/20
B 60 D 5/00
B 62 D 47/02

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15-06-1984	MARTINOZZI G.M.E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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