

(19)



(11)

EP 2 474 458 A1

(12)

EUROPEAN PATENT APPLICATION published in accordance with Art. 153(4) EPC

(43) Date of publication:

11.07.2012 Bulletin 2012/28

(51) Int Cl.:

B61B 1/02 (2006.01)(21) Application number: **10813618.5**

(86) International application number:

PCT/JP2010/063837(22) Date of filing: **17.08.2010**

(87) International publication number:

WO 2011/027667 (10.03.2011 Gazette 2011/10)

(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 SE SI SK SM TR**

• **Kabushiki Kaisha Kobe Seiko Sho****Chuo-ku****Kobe-shi****Hyogo 651-8585 (JP)**(30) Priority: **01.09.2009 JP 2009202107**

(72) Inventors:

• **SUDA, Yoshihiro****Tokyo 113-8654 (JP)**• **KOGA, Takaaki****Tokyo 113-8654 (JP)**

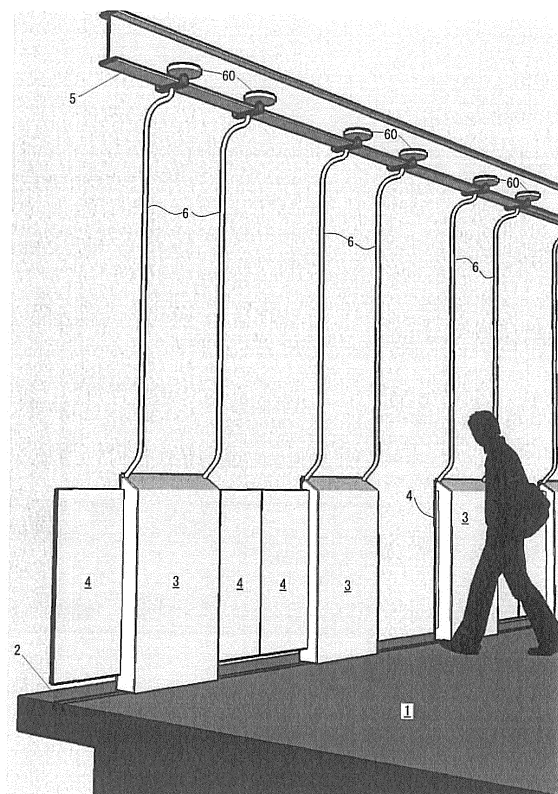
(71) Applicants:

• **The University of Tokyo****Bunkyo-Ku****Tokyo 113-8654 (JP)**(74) Representative: **Gevers France****23bis, rue de Turin****75008 Paris (FR)**

(54) **AUTOMATIC PLATFORM GATES**

(57) A moveable platform barrier with a simple arrangement which enables stable standing/running of a moveable door receiving member is provided. A moveable platform barrier comprising a moveable door receiving member (3) moveable in the lengthwise direction of the platform (1) by a drive means along a guide rail (2) provided on a floor of a platform (1) and a door (4). A structural member positioned above the platform (1) is provided with an upper guide member (5) extending in the lengthwise direction of the platform (1). The moveable door receiving member (4) is supported by a supporting member (6) that is moveable along said upper guide member (5).

Fig.1



Description

Technical Field

[0001] The present invention relates to an automated platform gate provided adjacent to an edge of a platform to screen the platform from a track.

Background of the Invention

[0002] In recent years, as safety measures and such at railway stations, installing of a door apparatus or gate apparatus, referred to as a platform door, an automated platform gate and such, is becoming pervasive, and will become more widespread in the future.

[0003] In practice, existing installed platform doors and automated platform gates have arrangements depending on door arrangements of rolling stock and therefore cannot deal with a platform at which different types of trains having different distances between adjacent doors stop. However, in practice, there are lines on which various types of trains run on the same line and the number of doors, door width, and door position are different depending on the type, purpose, and model of car. There is a need for the platform door or automated platform gate that can deal with the different types of cars having different door arrangements.

[0004] A number of platform doors or automated platform gates have been proposed to deal with the different types of cars having different door arrangements. The proposed devices can roughly be divided into a type employing a plurality of full height screens as disclosed in patent document 1 and a type employing a lower height door receiving member and a door leaf that can retractably project from the door receiving member as disclosed in patent document 2.

[0005] According to the full height screen type door as described in patent document 1, the screen having a height from the floor of the platform higher than those of passengers moves in the lengthwise direction of the platform, which leads to a large-scale structure as a whole including a door frame as well as a cost increase. Further, a conductor's view when passengers getting on an off the train may be deteriorated.

[0006] According to the automated platform door having a lower height door receiving member and a door leaf, a structure is more simple in comparison with the full height screen type, and a conductor's view when passengers getting on an off the train can be maintained. Further, automated platform doors having a lower height door receiving member and a door leaf in which a moveable door receiving member is employed have been proposed (patent documents 3 and 4). To flexibly deal with the different types of cars with different door arrangements, a structure employing the moveable door receiving member would be advantageous.

[0007] To implement the platform barrier employing the moveable door receiving member, the problem is how

stable standing/running of the door receiving member is accomplished where the door receiving member supports the door leaf in a cantilever manner and thus is unstable. Patent document 4 refers to a situation where the door receiving member could overturn when a train passing through exerts a wind pressure on the door receiving member, or a passenger leans against the door receiving member at rush hour. Patent document 4 solves this problem by characterizing the running mechanism at a lower side of the door receiving member, which leads a complicated arrangement of the running mechanism as well as a cost increase.

Patent Document 1 JPA2004-131009
Patent Document 2 JPA2005-145372
Patent Document 3 JPA2005-335451 1
Patent Document 4 JPA2006-8068

Summary of the Invention

[0008] The present invention seeks to provide a moveable platform barrier with a simple arrangement which enables stable standing/running of a moveable door receiving member.

[0009] According to the present invention, there is provided a moveable platform barrier comprising a guide rail provided on a floor of a platform and extended in a lengthwise direction of the platform; a moveable door receiving member comprising a door pocket, a runner, and drive means for causing the runner to travel along the guide rail and being moveable in the lengthwise direction of the platform; and a door slidably received in the door pocket. A structural member positioned above the platform is provided with an upper guide member extending in the lengthwise direction of the platform. The moveable door receiving member is supported by a supporting member that is moveable along said upper guide member.

[0010] According to one aspect, the supporting member comprises one or more elongated members. Each elongated member has a lower portion being connected to the moveable door receiving member and an upper portion being moveable along the upper guide member.

[0011] According to one aspect, the moveable door receiving member has a first surface facing a platform side, a second surface facing a track side and a height lower than those of passengers, and the supporting member extends upwardly at the first surface side to a height covering at least upper parts of the bodies of the passengers. More specifically, the supporting member has a lower end connected to the first surface side (platform side) of the moveable door receiving member and extends upwardly to a predetermined height at the first surface side. Alternatively, the lower end of the supporting member is connected to the second surface side (track side) of the moveable door receiving member and a lower portion of the supporting member is curved toward the first surface side (platform side) and then extended upwardly to a predetermined height.

[0012] According to one aspect, the structural member provided with the upper guide member is a roof or ceiling positioned above the platform. The structural member may be a wall installed on the platform.

[0013] According to one aspect, the structural member provided with the upper guide member is a specific structural member adapted to support the upper guide member. Specifically, if the platform does not have existing roof, ceiling and wall, it is necessary to install the specific structural member. In one aspect, the specific structural member comprises a plurality of posts upstanding on the floor of the platform at an interval in the longitudinal direction of the platform. The upper guide member is supported by a lateral member provided at upper ends of the posts. In one aspect, the lateral member comprises an individual lateral member provided at an upper end of each of the posts in a cantilever manner and the upper guide member is supported by the lateral members. In one aspect, the lateral member extends in the lengthwise direction of the platform connecting the upper ends of the posts. Alternatively, the upper guide member may be directly supported by the upper ends of the posts.

[0014] According to the present invention in which the moveable door receiving member is supported by the supporting member that is moveable along the upper guide member, rolling and movement of an upper side of the door receiving member is eliminated by the supporting member so that overturn of the moveable door receiving member is prevented when the door receiving member remains in a stationary state as well as the door receiving member is running.

[0015] It is not necessary to provide a mechanism preventing overturn of the moveable door receiving member on the moveable door receiving member (specifically, a lower side thereof), which leads to a simple arrangement of the running mechanism at the lower side of the moveable door receiving member.

[0016] The moveable door receiving member runs by itself with the drive means installed in the door receiving member and the weight of the moveable door receiving member is supported by the floor side. Substantial strength is not required for the upper guide member (specifically, in comparison with a case where the moveable door receiving member would be hung from the upper guide rail by the supporting member) as long as the upper guide member can simply guide the supporting member to move without rolling of the door receiving member, which enables the upper guide member to be manufactured less costly.

[0017] The upper guide member does not have to bear the weight of the moveable door receiving member by not hanging the door receiving member and it is therefore not necessary to locate the upper guide member directly above the moveable door receiving member, which leads to flexibility in installing the upper guide member. If an existing platform has the roof or ceiling portion, the upper guide member may be installed using these structural members so that it is relatively easy to retrofit the platform

barrier to the existing platform. If an existing platform does not have adequate structural members, a specific structural member adapted to support the upper guide member may be installed on the floor of the platform. As foregoing, substantial strength is not required for the upper guide member so that weight reduction of the upper guide member is possible. The structural member fitted with the upper guide member does not bear load so that a simple supporting structure may be sufficient if the specific structural member has to be installed.

[0018] According to the case where the supporting member extends upwardly at the first surface side (platform side) to a height covering at least upper parts of the bodies of the passengers, it is possible to maintain a conductor's view when passengers getting on an off the train even with the supporting member extending upwardly from the moveable door receiving member.

Brief Description of the Drawings

[0019]

Fig. 1 is a schematic perspective view of a moveable platform barrier according to the present invention; Fig. 2 is a schematic perspective view of a moveable platform barrier according to the present invention; Fig. 3 is a schematic perspective view of a moveable platform barrier according to the present invention when viewed from the track side;

Fig. 4 is a side view of the moveable platform barrier of the present invention showing an embodiment of the supporting structure for the upper guide member; Fig. 5 is a side view of the moveable platform barrier of the present invention showing another embodiment of the supporting structure for the upper guide member;

Fig. 5A is a side view of the moveable platform barrier of the present invention showing a further embodiment of the supporting structure for the upper guide member;

Fig. 6 is a side view of the moveable platform barrier of the present invention showing a further embodiment of the supporting structure for the upper guide member;

Fig. 6A is a side view of the moveable platform barrier of the present invention showing a further embodiment of the supporting structure for the upper guide member;

Fig. 7 is a plan view showing the positional relationship among the platform and the upper guide rails according to differing aspects;

Fig. 8A is a view explaining relationship between a portion connected by the supporting bar and visibility from a conductor;

Fig. 8B is a schematic view showing a view from a conductor in which a passenger at a far side is left between the closed moveable platform barrier and a car and the upper guide rail is omitted;

Fig. 9 shows a running and drive mechanism of the moveable door receiving member in which (A) relates to a ball screw drive mechanism and (B) relates to a belt drive mechanism;

Fig. 10 shows details of the running and drive mechanism of Fig. 9(A); and

Fig. 11 shows details of the running and drive mechanism of Fig. 9(B).

Detail Description

[0020] Referring to Figs. 1 to 3, an overall arrangement of a moveable platform barrier of the present invention will be described. A guide rail 2 is provided on a surface floor of a platform 1 and extends in a lengthwise direction of the platform 1. In one aspect, the guide rail 2 may extend along substantially the entire length of the platform 1. The guide rail 2 is embedded in the floor of the platform 1 and an upper surface of a portion where the guide rail 2 is embedded is flush with the floor of the platform 1.

[0021] A moveable door receiving member 3 is installed on the surface floor of the platform 1 adjacent to an edge facing a track side and is moveable along the guide rail 2 in the lengthwise direction of the platform 1. The moveable door receiving member 3 has a first surface (a platform side front face) 30 facing a platform-side A, a second surface (a track side front face) 31 facing a track side B, left and right end surface (side faces) 32, an upper surface 33 and a bottom surface 34. The moveable door receiving member 3 has a height lower than those of passengers and a height between about 120 cm and 130 cm according to one embodiment. The shape and size of the moveable door receiving member 3 is not limited to the foregoing description.

[0022] The moveable door receiving member 3 comprises a door pocket for receiving the door 4 and an aperture(s) formed at one or both of the end surface(s) 32 of the door pocket. The moveable platform barrier is in a closed position when the door leaf 4 projects from the aperture of the end surface 32 of the moveable door receiving member 3 and is in an open state when the door leaf 4 is received within the moveable door receiving member 3. The door leaf 4 is slidably fitted in the moveable door receiving member 3 between the state where the door is received in the door pocket and the state where the door is projected from the door pocket. A fore side portion of the door leaf 4 received in the pocket may be projected from the end surface of the moveable door receiving member 3. The moveable door receiving member 3 may move relative to the projected door leaf 4 that has been projected from one end surface 32 of the door receiving member 3 such that an opening is formed at the other end surface 32 side of the moveable door receiving member 3 to obtain an open state.

[0023] A door slidable to the door pocket is well-known as a sliding door by a person having ordinary skilled in the art. An automatic sliding door causing the door to

automatically slide is also well-known by a person having ordinary skilled in the art. According to the basic arrangement, a slide rail is provided in a pocket of a door receiving member such that door is moveable and guided by the slide rail. A drive mechanism is provided to cause the door to slide along the slide rail and typically a motor is used as a drive source for the drive mechanism. It will be appreciated that various features can be contemplated by a person having ordinary skilled in the art for specific arrangement for allowing the door 4 to slide relative to the moveable door receiving member 3. Alternatively, the arrangements of the door pocket and the door regarding the automated platform gate are described in patent documents 2 to 4 for example and the similar arrangements may be employed.

[0024] The illustrated embodiment shows two door leaves 4 which are received in the moveable door receiving member 3 in a double sliding manner (patent document 3 and JPA11-334579 disclose doors projecting from the both sides of the pocket) but the number of doors 4 housed in one moveable door receiving member 3 is not limited. For example, one door leaf 4 may be housed in one moveable door receiving member 3. Alternately, as disclosed in patent document 2, JPA2000-16281, and JPA2008-280034, a door receiving member may employ two doors that project from the same end surface of the door receiving member in which one door functions as an intermediate door receiving member for housing the other door, the other door is housed in the one door and the one door is housed in the pocket of the door receiving member. The shape of the door 4 is not limited to a panel type.

[0025] Referring to Figs. 9 to 11, the moveable door receiving member 3 comprises wheels 35 at its bottom surface 34. The wheels 35 rotate along the guide rail 2 such that the moveable door receiving member 3 moves in the lengthwise direction of the platform 1. As foregoing, in one aspect, the guide rail 2 extends substantially along the entire length of the platform 1. A plurality of guide rails may be provided at an interval corresponding to travel distance of respective moveable door receiving members 3. The moveable door receiving member 3 comprises a drive mechanism enabling self-running of the door receiving member 3 by rotating the wheels 35. The moveable door receiving member 3 travels in the lengthwise direction of the platform 1 while the wheels 35 travel along the guide rail 2 by the drive mechanism. The drive mechanism will be explained later.

[0026] An upper guide rail 5 is provided above the platform 1 and extends in the lengthwise direction of the platform 1. In one aspect, the upper guide rail 5 extends substantially along the entire length of the platform 1. Similar to the guide rail 2 embedded in the floor, a plurality of upper guide rails may be provided at an interval corresponding to the travel distance of respective moveable door receiving members 3. The illustrated embodiment shows the upper guide rail 5 extending straightly. The upper guide rail 5 and the guide rail 2 embedded in the

platform 1 may be a gentle curvilinear form in case of a gently curved platform 1.

[0027] The illustrated embodiment shows two pieces of supporting bars 6 as a supporting member and lower ends of the bars 6 are connected to the upper surface 33 of the moveable door receiving member 3. The two pieces of supporting bars 6 extend upwardly and are parallel to each other. An upper end of the supporting bar 6 is provided with a roller 60 that rotates along the upper guide rail 5 such that the upper end of the supporting bar 6 is moveably supported along the longitudinal direction of the upper guide rail 5.

[0028] According to the illustrated embodiment, the supporting bar 6 is provided with the roller 60 at its upper end but the roller 60 may not be necessary as long as the upper end of the supporting bar 6 can travel along the upper guide rail 5. For example, if the upper end of the supporting bar can slidably contact the upper guide rail so as to smoothly slide following the travel of the moveable door receiving member, the upper end of the supporting member may directly contact the upper guide rail and guided by the upper guide rail. A portion being connected to the lower end of the supporting bar 6 is not limited to the upper surface 33 of the moveable door receiving member 3. For example, the above portion may be an upper portion of the first surface 30, an upper portion of the second surface 31, or an upper portion of the end surface 32. The lower end of the supporting bar 6 may detachably connected to the moveable door receiving member 3. The supporting bar 6 that can be removed from the moveable door receiving member 3 facilitates the good maintenance of the moveable platform barrier.

[0029] The illustrated embodiment shows two pieces of supporting bars 6 as an elongated supporting member but the number of supporting bar 6 is not limited and may be one or three, for example. An overall shape and cross sectional shape of the supporting bar 6 are not limited and the cross section may be circular, rectangular or any other shapes. The supporting bar 6 may be a hollow pipe, a solid rod-like member, or a flat belt-like member. The illustrated embodiment shows a substantially vertically extending supporting bar 6 but an upper portion of the supporting bar 6 may be substantially curved in accordance with an installation position of the upper guide rail 5.

[0030] Using a space between the two pieces of supporting bars 6, an information display plate may be provided between the two pieces of supporting bars 6. Exemplary information displayed on the information display plate may include a route map, a timetable, operation information and advertisement. If the information display plate is provided, the plate may be provided preferably at only a portion of the height of the supporting bar 6 so as not to block a view from a conductor when passengers getting on and off a train.

[0031] Referring to Figs. 4 to 6A, various embodiments of a supporting structure for the upper guide rail 5 will be explained. In Fig. 4 to Fig. 6A, the guide rail embedded in the floor of the platform is omitted.

[0032] Fig. 4 shows a case where the upper guide rail 5 is provided at the platform with a roof and the upper guide rail 5 is supported by the roof. The following is a detailed description. The roof 8 is supported by upper ends of a plurality of posts 7 upstanding on the platform 1. The roof 8 extends to a position above the edge of the platform 1. The upper guide rail 5 is supported by the roof 8 by means of supporting members 9 and 10. A structure where the roof 8 is supported by a wall in place of the posts 7 may be employed.

[0033] The lower end of the supporting member 6 is connected to the sloped upper surface 33 of the moveable door receiving member 3 at a side (platform side A) away from the track. The supporting member 6 extends upwardly from the platform side A (the first surface 30 side) of the upper surface 33 of the moveable door receiving member 3 and an upper portion of the supporting member 6 is curved away from the track (toward platform side A) to form a curved portion 6A, and rollers 60 provided at an upper end of the curved portion 6A is rotatably supported by the upper guide rail 5. It will be appreciated by a person having ordinary skilled in the art that the supporting structure (the supporting member 9 and 10), the shape and size of the supporting bar 6 and so forth may be adequately varied in accordance with the specific structure of the roof 8.

[0034] Fig. 5 shows a case where the upper guide rail 5 is provided at the platform with a ceiling and the upper guide rail 5 is supported by means of the ceiling slab. A typical platform with a ceiling is an underground platform. The following is a detailed description. The ceiling portion 11 that is provided above the platform 1 has an end surface facing the track side which end surface is provided with a support frame 12. The upper guide rail 5' is provided at a lower end of the support frame 12. The supporting bar 6 has a lower end connected to the sloped upper surface 33 of the moveable door receiving member 3 at a side (platform side A) away from the track and extends upwardly from the platform side A of the upper surface 33. An upper portion of the bar is curved toward the track side B to form a curved portion 6B whose upper end is provided with a roller 60' rotatably supported along the upper guide rail 5'. It will be appreciated by a person having ordinary skilled in the art that the supporting structure (the supporting frame 12), the shape and size of the supporting bar 6 and so forth may be adequately varied in accordance with the specific structure of the ceiling portion 11.

[0035] In the embodiments of Figs. 4 and 5, the upper guide rail 5, 5' is supported by the roof 8 and the ceiling portion 11 respectively but the structure for supporting the upper guide rail 5, 5' is not limited to the roof 8 and the ceiling portion 11. The upper guide rail 5, 5' may be supported by the existing wall or the structure at the track side by characterizing the size and shape of the supporting bar 6. Referring to Fig. 5A, an upper portion of the supporting bar 6 is extended in the widthwise direction and a roller 60" at an end of the bar is rotatably supported by

the upper guide rail 5 " mounted in a wall W. A specifically designed supporting structure may be provided as described in the following.

[0036] Fig. 6 shows a case where the upper guide rail 5 is supported by the specific structure installed on the platform 1. The specific structure comprises a plurality of posts 13 upstanding on the surface of the platform 1 at an interval in the longitudinal direction of the platform 1 and lateral members 14 supported at an upper end of the respective posts 13 in a cantilever manner. The illustrated embodiment shows the lateral members 14 extending horizontally in the widthwise direction of the platform 4 toward an edge of the platform 1. The upper guide rail 5 is supported by the undersides of the forward portions of the lateral members 14. The arrangement of the supporting structure is not limited as long as the upper guide rail 5 can be supported. The lateral member may extend in the lengthwise direction of the platform connecting the upper ends of the posts.

[0037] The lower end of the supporting member 6 is connected to the sloped upper surface 33 of the moveable door receiving member 3 at a side (platform side A) away from the track. The supporting member 6 extends upwardly from the platform side A (first surface 30 side) of the upper surface 33 of the moveable door receiving member 3 and an upper portion of the supporting member 6 is curved away from the track (toward platform side A) to form a curved portion 6A, and rollers 60, 60 provided at an upper end of the curved portion 6A are rotatably supported by the upper guide rail 5. It will be appreciated by a person having ordinary skilled in the art that the supporting structure, the shape and size of the supporting bar 6 and so forth may be adequately altered in accordance with different platform conditions.

[0038] Fig. 6A shows a variation of embodiment of Fig. 6. The embodiment of Fig. 6A relates to a platform having no roof or a platform having a high ceiling/roof such as a dome or an atrium as well as an island platform having tracks at both sides in the widthwise direction where double sided moveable platform barriers share the posts 13. Upper portions of the supporting bars 6 of the double sided platform barriers extend toward to each other in the widthwise direction of the platform and rollers 60" of the ends of the supporting bars are rotatably supported by the upper guide rail 5" provided at the upper ends of the posts 13.

[0039] Referring to Figs. 4 to 6A, it is noted that the upper guide rails 5, 5', 5" are not positioned directly above the moveable door receiving member 3. It is not necessary to locate the upper guide directly above the moveable door receiving member 3 because the moveable door receiving member 3 is not hung from the upper guide rails 5, 5', 5" and the upper guide rail does not bear the weight of the door receiving member 3. Accordingly, there is flexibility in arranging the upper guide rail and an arrangement shown Fig. 7 may be possible for example. Fig. 7 shows a positional relationship among the platform 1 and the upper guide rails 5A, 5B and 5C.

On a platform 1, there are provided three guide rails extending in the lengthwise direction X of the platform 1 and positions of guide rails 5A, 5B and 5C are different with one another in the lengthwise direction X and widthwise direction Y of the platform 1. Thus, various embodiments of the supporting structure for the moveable door receiving member 3, an appropriate combination of various embodiments of Figs. 4 to 6A for example, can be employed on a single platform. This may provide benefits to cases where a platform does not have a uniform ceiling or roof structure, or a platform has a roof in part and such.

[0040] As foregoing, according to the embodiments of Figs 4 to 6A, the lower end of the supporting bar 6 is provided at the platform side A (the first surface 30 side), in the depth direction (the thickness direction), of the upper surface 33 of the moveable door receiving member 3 having a height lower than those of passengers. At the platform side of the upper surface 33, the supporting bar 6 extending vertically and upwardly to a height covering the upper parts of the bodies of the passengers (extending along an area between the upper surface 33 of the door receiving member 3 and 200 cm from the floor of the platform 1, for example), and an upper portion is curved toward either the platform side A or the track side B as approaching the upper end. Referring to Figs. 8A and 8B, a view from a conductor (dashed lines shown in Fig. 8A) can be widened by positioning the vertically extending portion of the supporting bar 6 at a side away from the train track. In Figs. 8A and 8B, for the purpose of explaining this view-widening effect, sharper curvilinear figures are shown. Fig. 8B shows a passenger at a far side left between the closed platform barrier and the car and the one can be noticed by the conductor. With the screen type door described in patent document 1, the conductor's view may be blocked by the door.

[0041] If the lower end of the supporting bar 6 is connected to the track side B of the upper surface 33 of the moveable door receiving member 3 as shown in Figs. 1 to 3, an effect similar to the above view-widening effect can be obtained with a curved lower portion 6C of the supporting bar 6 curved toward the platform side A (extending to a position above the first surface 30 for example) and a vertically and upwardly extending portion at the platform side A as shown in a right figure of Fig. 4.

[0042] Referring to Figs. 9 to 11, a running and drive mechanism of the moveable door receiving member 3 will be explained. Fig. 9 shows the running and drive mechanism of the moveable door receiving member 3 in which (A) relates to a drive mechanism using ball screws and (B) relates to a drive mechanism using a belt. Referring to Fig. 9 to 11, two sets of wheels spaced apart in both widthwise direction and depth direction (thickness direction) of the door receiving member 3, four wheels 35 altogether are mounted on the bottom surface 34 of the moveable door receiving member 3. Each wheel 35 is rotatably supported by a vertically extending plate-like bracket 36. A narrow groove 15 is provided on the floor of the platform 1 and the plate-like bracket 36 extends

through the groove. The width of the groove 15 is preferably designed such that insertion of passenger's shoes and any other footwear, a tip of stick, rollers of the bottom of a bag and such into the groove is prevented.

[0043] The bracket 36 is provided with two stopper rings 37 positioned at front and rear sides thereof as well as above the wheel 35. Above the stopper ring 37, a cover 20 is supported by a support 25. An upper surface of the cover 20 is flush with the floor of the platform 1 and a lower surface of the cover 20 functions as a rail guiding the stopper ring 37. The wheels 35, the brackets 36 and the stopper rings 37 together form a wheel assembly. In the wheel assembly, the stopper ring 37 bears an upward load (lifting force by tilting of the door receiving member) and the wheel 35 bears a downward load by the weight of the door receiving member.

[0044] To flexibly deal with different cars with different door arrangements, it is necessary to move the door receiving member 3 individually and each door receiving member 3 has an independent drive source (motor) and a transmission system. According to the illustrated embodiment, it will be readily appreciated by a person having ordinary skilled in the art as to which wheels 35 to be selected as a driving wheel and which wheels 35 to be selected as a driven wheel, among the four wheels 35, alternatively whether all of the wheels 35 are to be assigned as a driving wheel. For example, among the four wheels 35, the front and rear two wheels at one side (for example, track side B) may be selected as the driving wheels and the front and rear two wheels at the other side (for example, platform side A) may be selected as the driven wheel. In this case, one motor is provided to one moveable door receiving member. In order to obtain a larger power of drive system, two motors may be provided to one moveable door receiving member to obtain a simultaneous double drive system. Referring to Figs. 10 and 11, the motor M at one side and drawing lines for the transmission mechanism are shown as dotted lines and it can be understood by a person having ordinary skilled in the art that the following description can be applied to both of cases where one motor is provided at one side and motors are provided at both sides. The moveable door receiving member 3 comprises a controller for controlling opening and closing of the moveable door receiving member 3 and the door in response to an appropriate instruction by a management system installed on the platform 1.

[0045] Referring to Figs 9(A) and 10, in a space below the floor of the platform 1 where the guide rail 2 is embedded, a ball screw 16 extends in the lengthwise direction of the guide rail 2 corresponding to each moveable door receiving member 3. A slider (ball nut) 17 is mounted on an outer surface of the ball screw 16 and is moveable along the longitudinal direction of the ball screw 16. The slider 17 is fixed to the bracket 36 supporting the wheel 35. The ball screw 16 has one end supported by an end bearing 18 and the other end coupled to the motor M via a reducer 19. The motor M is selectively rotated in either

forward or backward direction to cause the slider 17 to move in either left or right direction in response to an instruction by a controller such that the wheels 35 travel along the guide rail 2 and the moveable door receiving member 3 travels in the lengthwise direction of the platform 1. When the door receiving member 3 reaches a predetermined position, the rotation of the motor M stops so that the running door receiving member 3 stops.

[0046] Referring to Figs 9(B) and 11, in a space below the floor of the platform 1 where the guide rail 2 is embedded, a looped belt 21 extends in the lengthwise direction of the guide rail 2 corresponding to each moveable door receiving member 3. The belt 21 is looped over a driven pulley 22 at one side of the guide rail 2 and is looped over a driving pulley 23 at the other side of the guide rail 2. The belt 21 has an upper portion 21A and a lower portion 21B. The bracket 36 supporting the wheel 35 is coupled to the upper portion 21A of the belt 21 via a belt clamp 24. The driving pulley 22 is rotationally driven by the motor M. The motor M is selectively rotated in either forward or backward direction to cause the upper portion 21A of the belt 21 to move in either left or right direction in response to an instruction by a controller such that the wheels 35 travel along the guide rail 2 and the moveable door receiving member 3 travels in the lengthwise direction of the platform 1. When the door receiving member 3 reaches a predetermined position, the rotation of the motor M stops so that the running door receiving member 3 stops.

[0047] A moveable platform barrier with a moveable door receiving member has been proposed (patent documents 3 and 4), and the running and drive mechanism of the moveable door receiving member 3 is not limited to the disclosure of the present specification and can be readily designed by a person having ordinary skilled in the art. For example, a motor for self-running of the moveable door receiving member may be installed on the door receiving member. However, it is noted that the present invention enables to make an arrangement of the running mechanism as simple as possible because according to the present invention rolling of the door receiving member 3 is prevented by supporting the upper end of the door receiving member 3 with the supporting bar 6 and there is no need to provide a mechanism at the running system side for preventing overturn of the door receiving member 3.

[0048] According to the foregoing moveable platform barrier having the moveable door receiving member 3, during the travel of the moveable door receiving member 3, the roller 60 at the upper end of the supporting bar 6 travels along the upper guide rail 5 such that the moveable door receiving member 3 and the supporting member 6 together move along the longitudinal direction of the platform 1. Rolling and movement of the upper side of the moveable door receiving member 3 during the travel of the moveable door receiving member 3 can be absorbed by the supporting bar 6 whose upper end is guided by the upper guide rail 5, which leads to a stable running

of the door receiving member 3.

[0049] In either of the running state and stationary state of the moveable door receiving member 3, if a wind pressure is applied to the door receiving member 3 or a passenger contacts the door receiving member 3, the rolling and movement of the upper side of the door receiving member 3 is eliminated by the supporting bar 6 whose upper end is moveably engaged with the upper guide rail 5 so that overturn of the door receiving member 3 can be prevented.

[0050] By employing the moveable platform barrier with the moveable door receiving member, the moveable platform barrier can be installed on platforms of a line on which trains with different distances between adjacent doors such as a three-door type or four-door type run.

[0051] The present invention can be utilized as a moveable platform barrier installed on a platform.

the upper guide member is a roof (8) or ceiling (11) positioned above the platform (1).

5. The moveable platform barrier of any one of claims 1 to 3 wherein said structural member provided with the upper guide member (5) is a specific structural member adapted to support the upper guide member (5).

Claims

1. A moveable platform barrier comprising:

a guide rail (2) provided on a floor of a platform (1) and extended in a lengthwise direction of the platform (1);

a moveable door receiving member (3) comprising a door pocket, a runner (35), and drive means for causing said runner to travel along the guide rail (2) and being moveable in the lengthwise direction of the platform (1); and

a door (4) slidably received in the door pocket; **characterized in that** a structural member positioned above the platform (1) is provided with an upper guide member (5) extending in the lengthwise direction of the platform (1); and said moveable door receiving member (3) is supported by a supporting member (6) that is moveable along said upper guide member (5).

2. The moveable platform barrier of claim 1 wherein said supporting member comprises one or more elongated members (6) and each elongated member has a lower portion being connected to said moveable door receiving member (3) and an upper portion being moveable along said upper guide member (5).

3. The moveable platform barrier of claim 1 or 2 wherein said moveable door receiving member (3) has a first surface (30) facing a platform side, a second surface (31) facing a track side and a height lower than those of passengers, and said supporting member (6) extends upwardly at the first surface side to a height covering at least upper parts of the bodies of the passengers.

4. The moveable platform barrier of any one of claims 1 to 3 wherein said structural member provided with

Fig.1

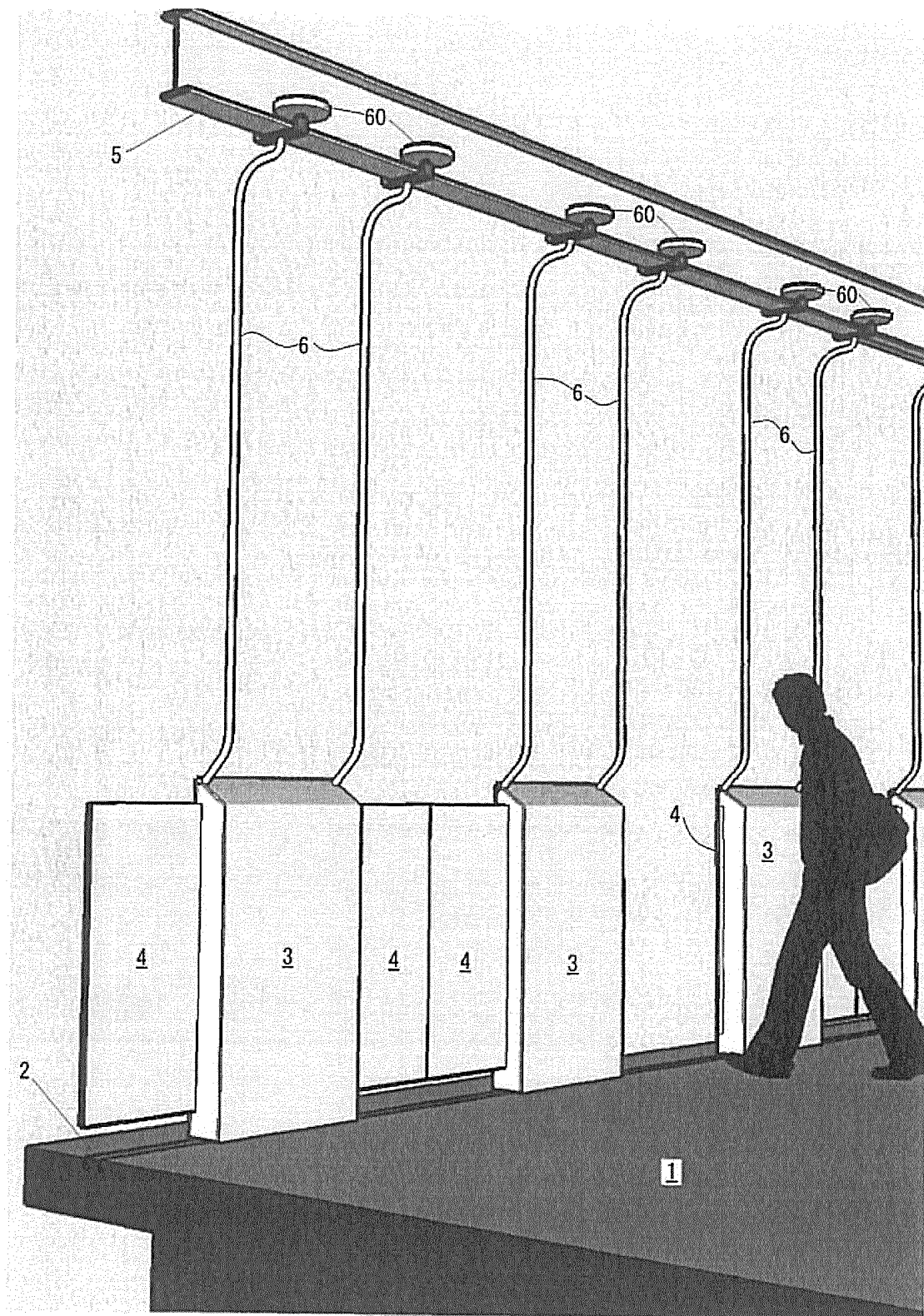


Fig.2

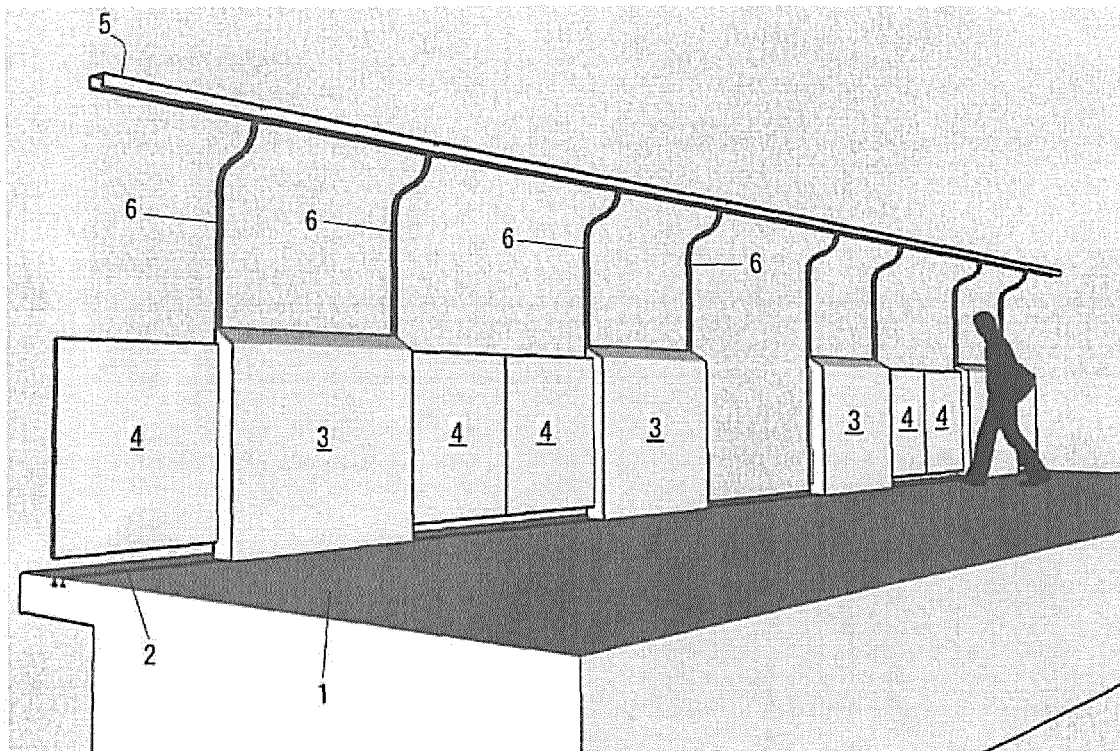


Fig.3

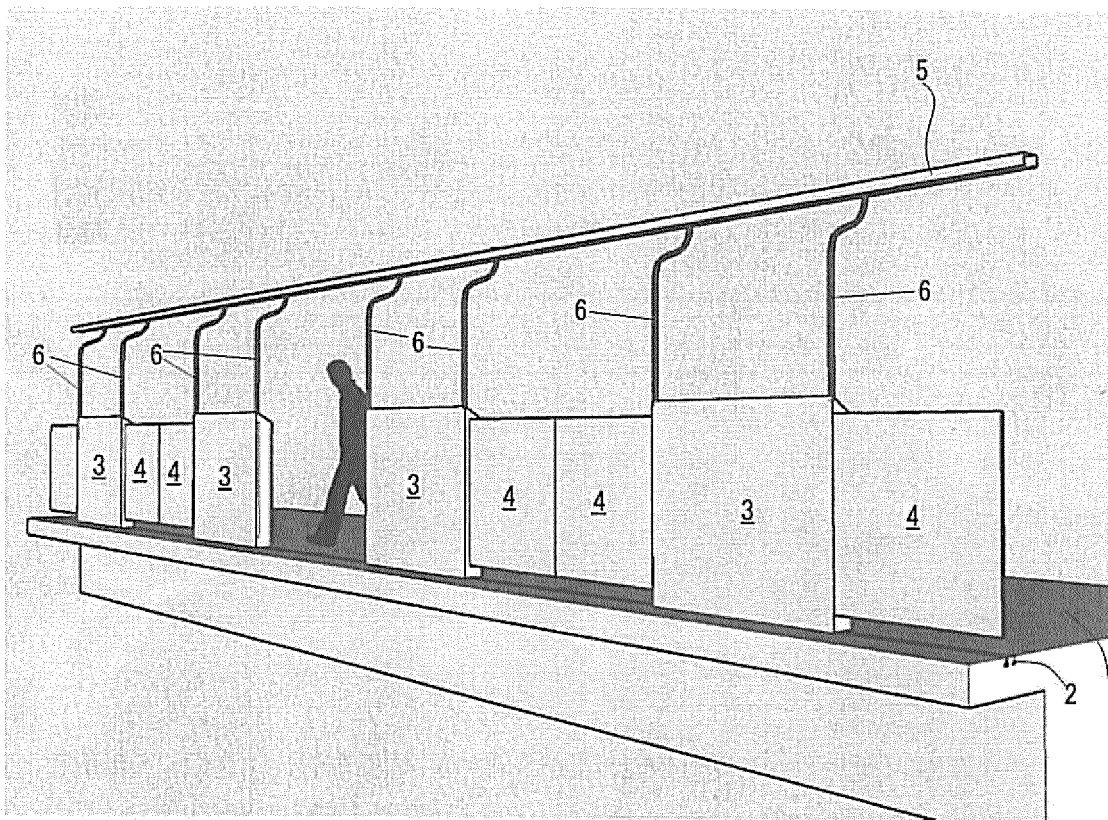


Fig.4

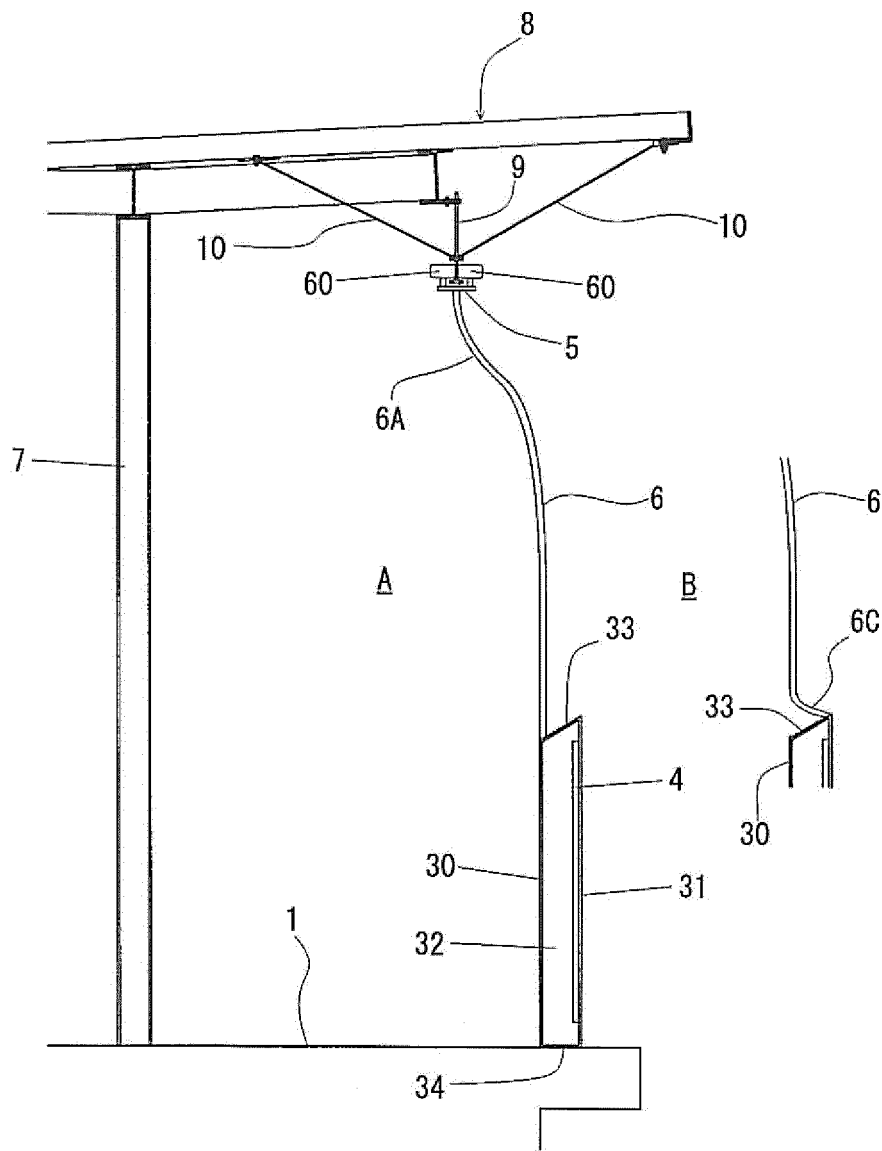


Fig.5

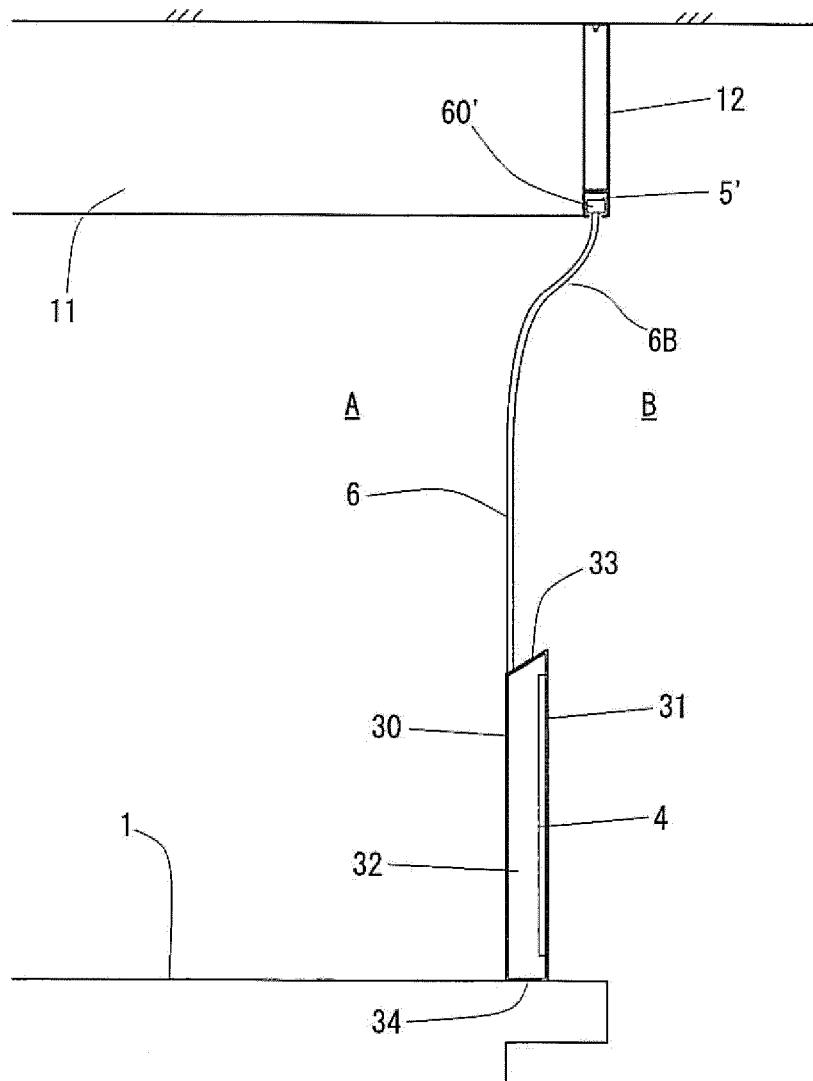


Fig.5A

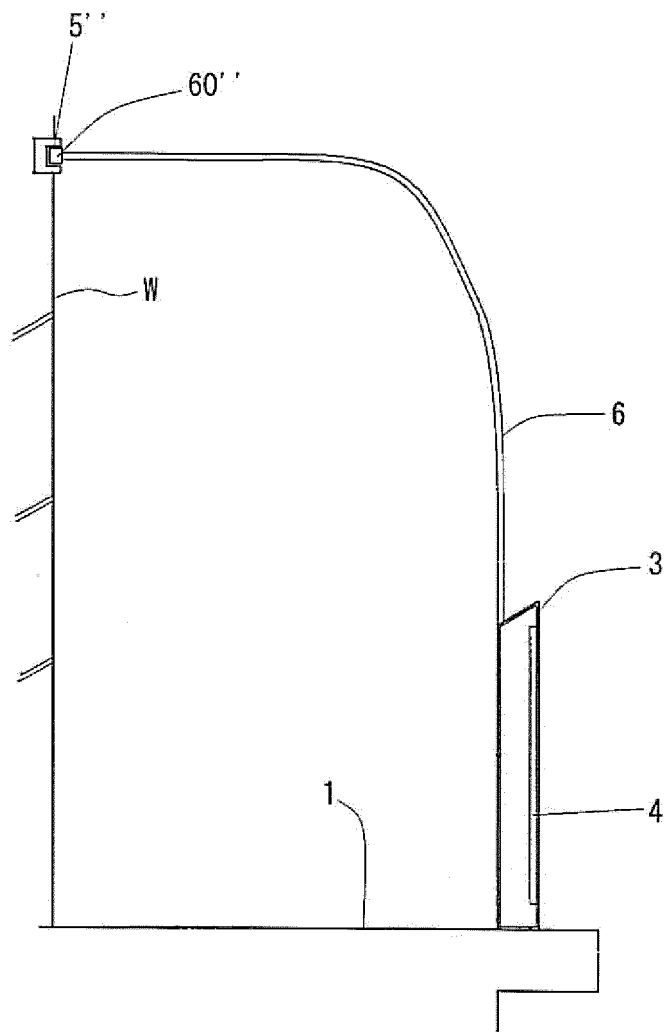


Fig.6

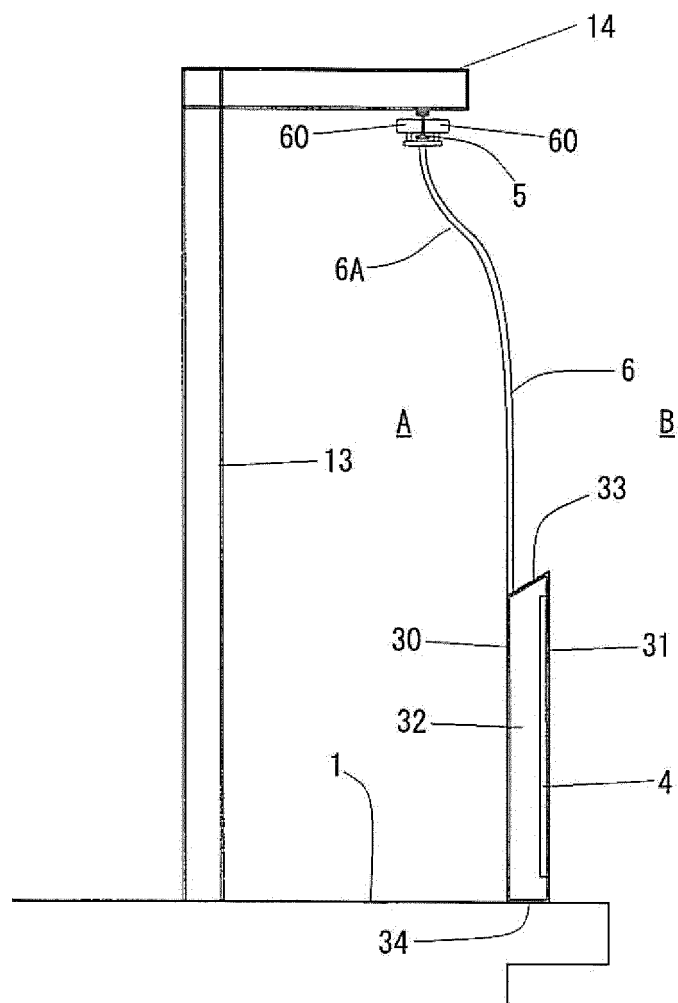


Fig.6A

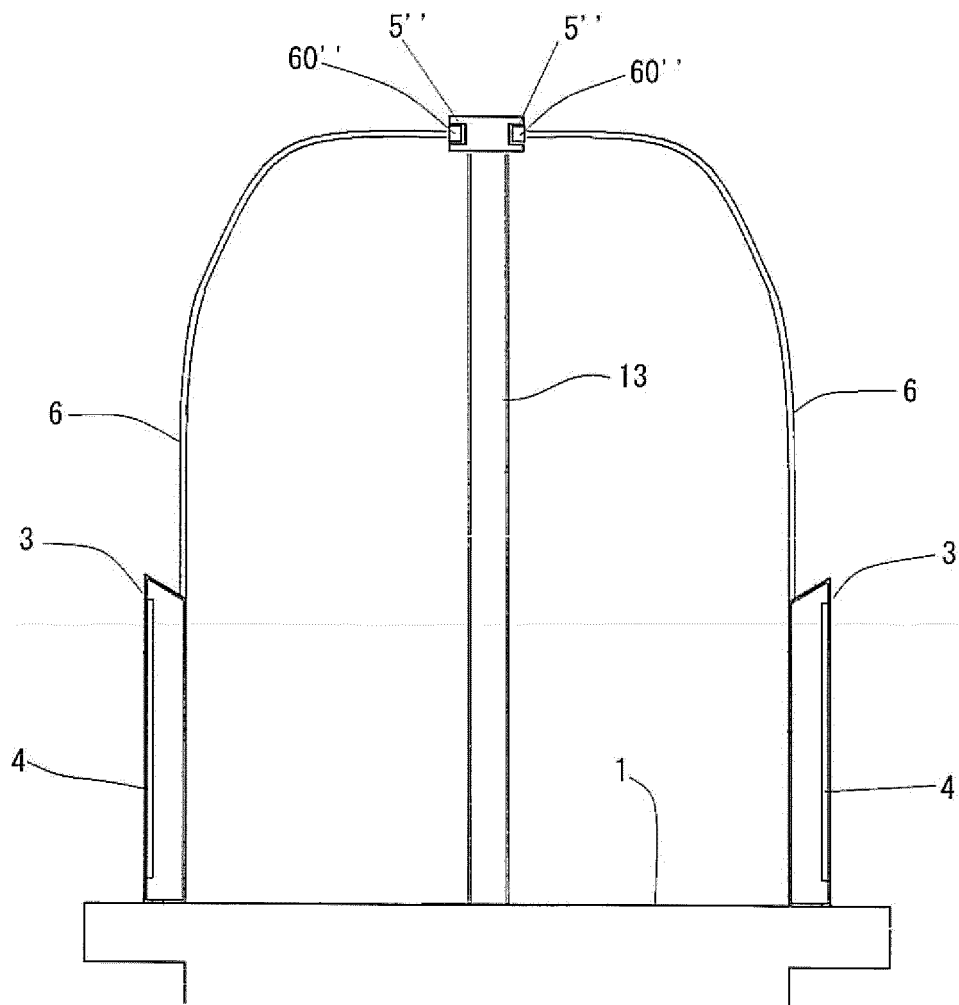


Fig.7

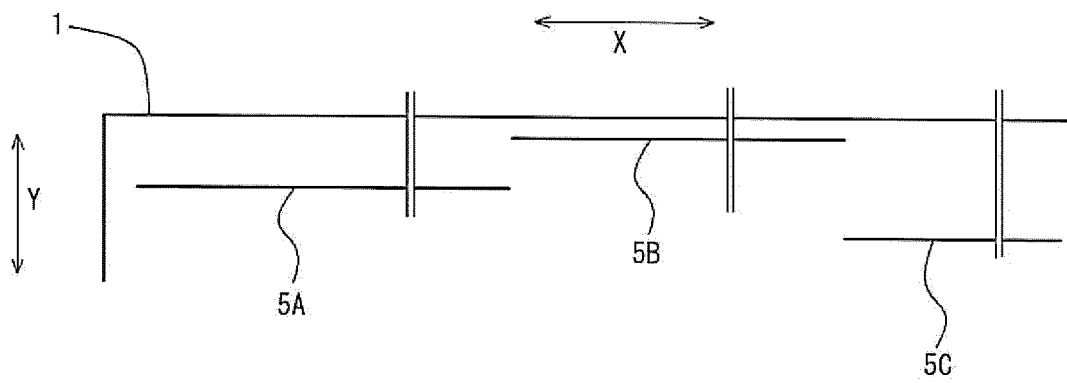


Fig.8A

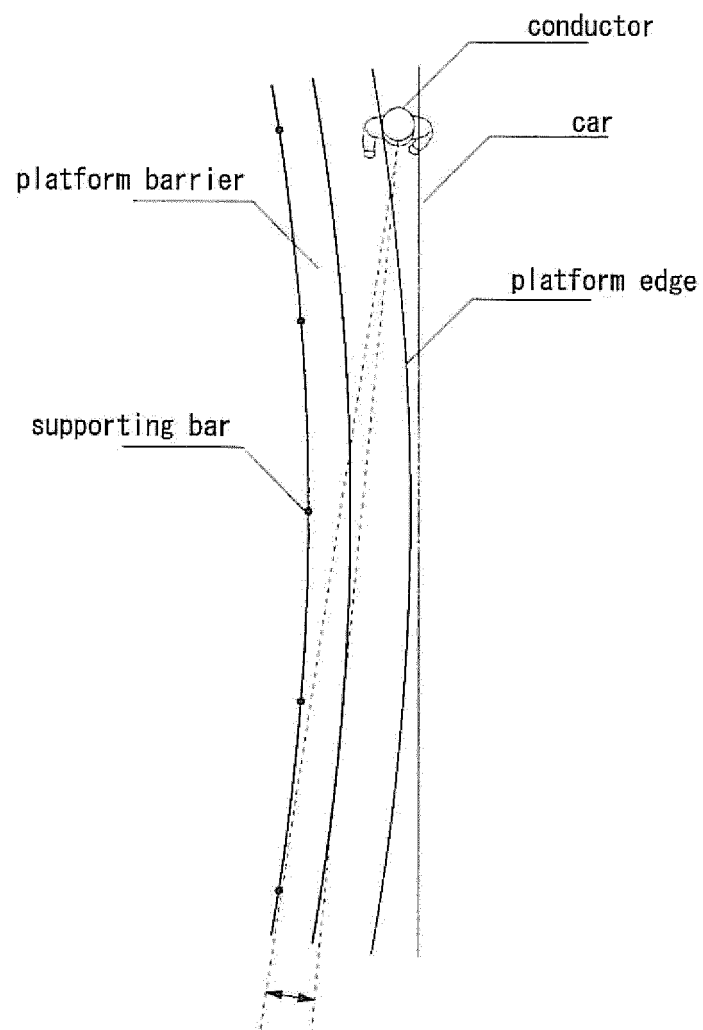


Fig.8B

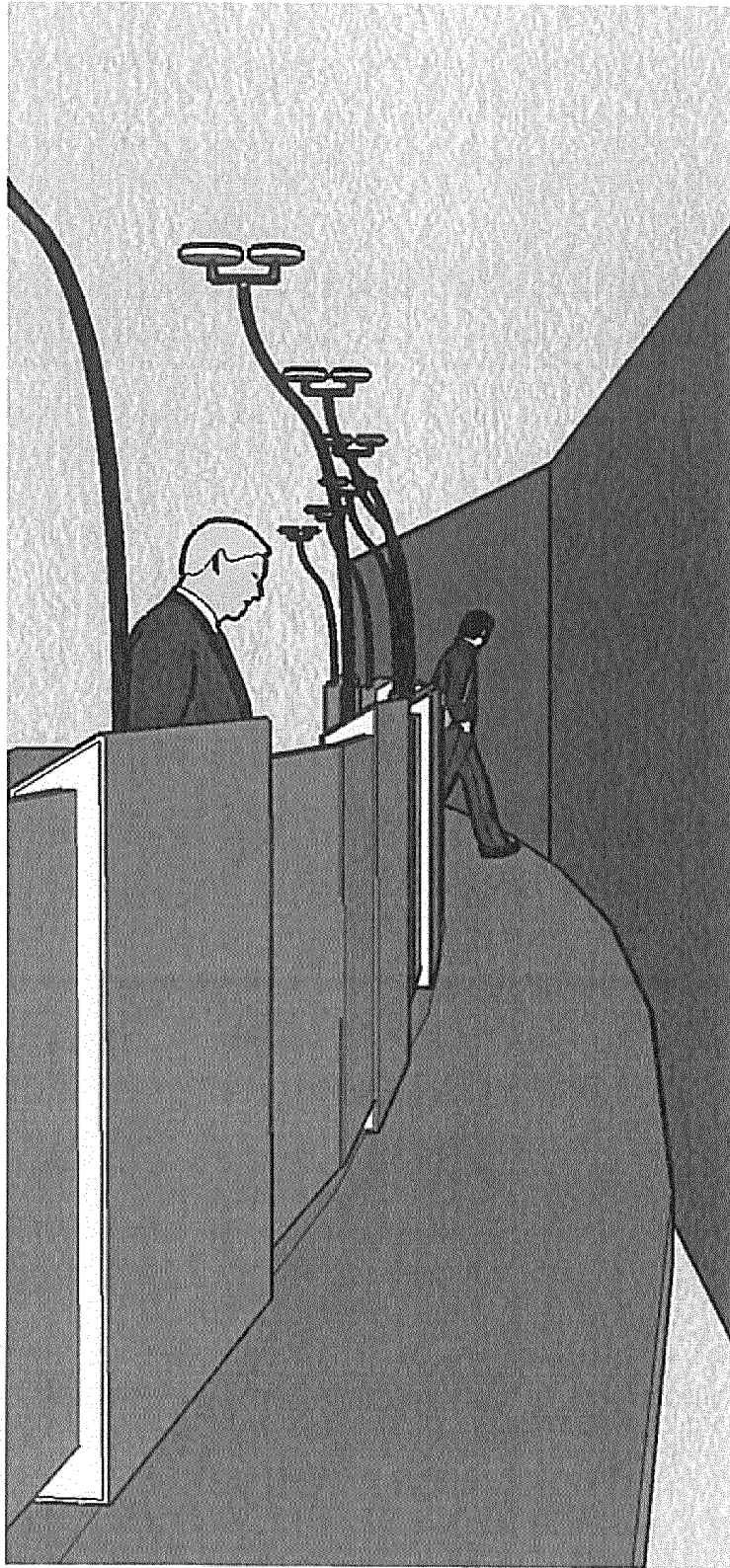


Fig.9

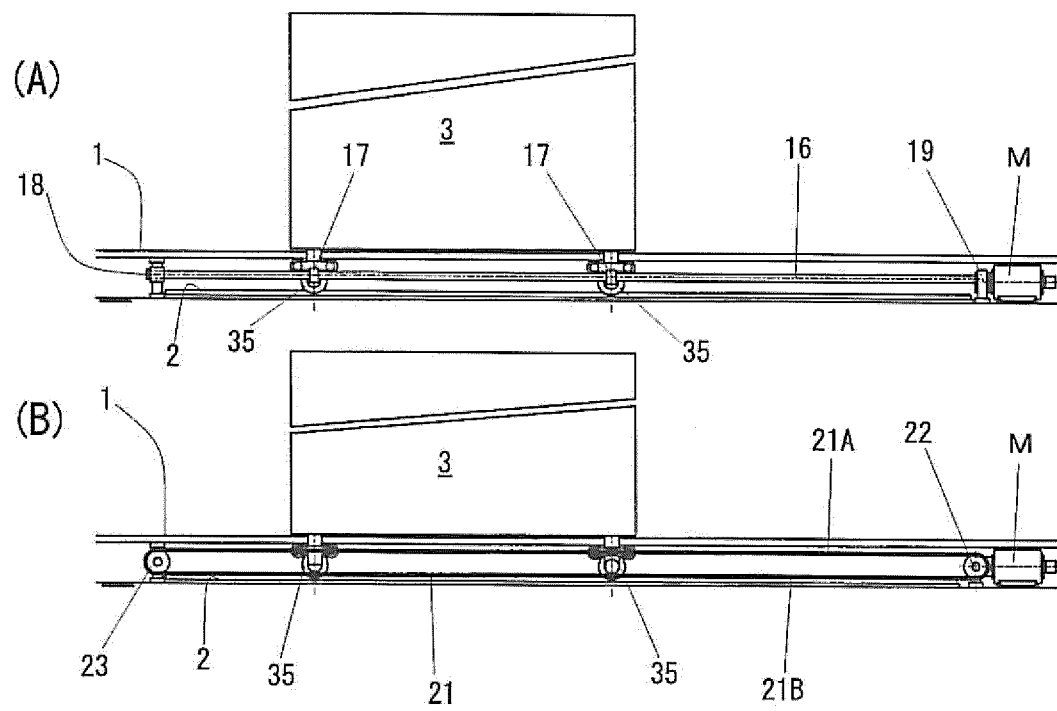


Fig.10

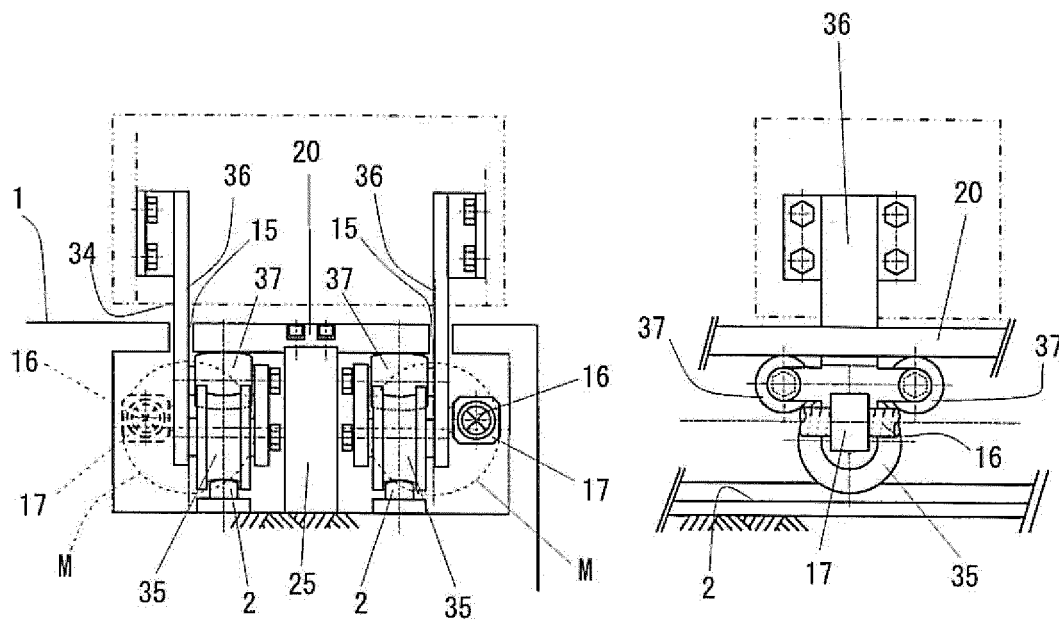
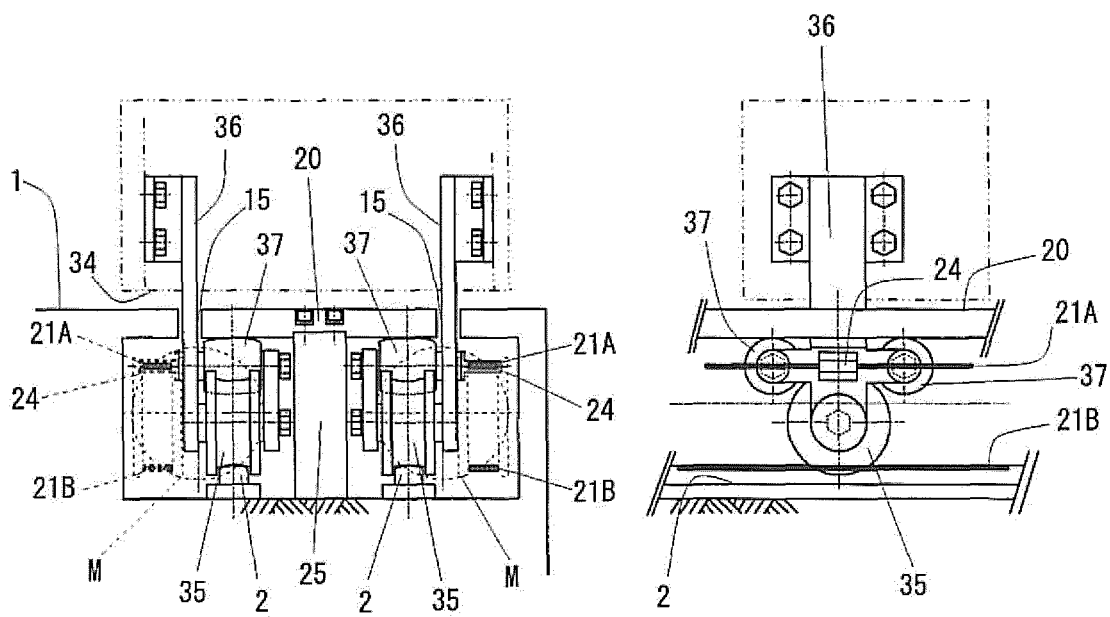


Fig.11



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/063837

A. CLASSIFICATION OF SUBJECT MATTER

B61B1/02 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B61B1/02, E01F1/00, E06B11/02, E05F15/00-15/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2010
Kokai Jitsuyo Shinan Koho	1971-2010	Toroku Jitsuyo Shinan Koho	1994-2010

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2000-142384 A (Kawasaki Heavy Industries, Ltd., Central Japan Railway Co.), 23 May 2000 (23.05.2000), entire text; all drawings (Family: none)	1-5
A	JP 2000-108889 A (Fuji Electric Co., Ltd.), 18 April 2000 (18.04.2000), entire text; all drawings (Family: none)	1-5
A	JP 2005-145372 A (Hitachi, Ltd., East Japan Railway Co.), 09 June 2005 (09.06.2005), entire text; all drawings (Family: none)	1-5

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
05 October, 2010 (05.10.10)Date of mailing of the international search report
19 October, 2010 (19.10.10)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/063837

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2005-335451 A (Mitsubishi Electric Corp.), 08 December 2005 (08.12.2005), entire text; all drawings (Family: none)	1-5
A	JP 2006-8068 A (East Japan Railway Co., Nabtesco Corp.), 12 January 2006 (12.01.2006), entire text; all drawings (Family: none)	1-5
A	JP 2006-8069 A (East Japan Railway Co., Nabtesco Corp.), 12 January 2006 (12.01.2006), entire text; all drawings (Family: none)	1-5
A	JP 2007-30659 A (East Japan Railway Co., Nabtesco Corp.), 08 February 2007 (08.02.2007), entire text; all drawings (Family: none)	1-5

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2004131009 A [0007]
- JP 2005145372 A [0007]
- JP 20053354511 A [0007]
- JP 2006008068 A [0007]