



US 20050188892A1

(19) **United States**(12) **Patent Application Publication****Ueno et al.**(10) **Pub. No.: US 2005/0188892 A1**(43) **Pub. Date:****Sep. 1, 2005**(54) **TRANSVERSE CAR BODY CONVEYING SYSTEM**(75) Inventors: **Ichiro Ueno**, Osaka (JP); **Manabu Osawa**, Osaka (JP); **Toshihiro Matsushita**, Osaka (JP); **Nobuhiko Yoshimura**, Osaka (JP); **Kazuo Toba**, Osaka (JP)(21) Appl. No.: **11/018,879**(22) Filed: **Dec. 21, 2004**(30) **Foreign Application Priority Data**

Feb. 27, 2004 (JP) 2004-054318

Publication Classification(51) **Int. Cl.⁷** **B61B 9/00**(52) **U.S. Cl.** **104/168**

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SPRING HOUSE, PA 19477 (US)**(73) Assignee: **Tsubakimoto Chain Co.**, Osaka (JP)(57) **ABSTRACT**

A skid-type car body carrier carries a transversely oriented car body along a conveying path. The carrier is driven by a drive roller which frictionally engages a centrally located friction bar mounted underneath the carrier.

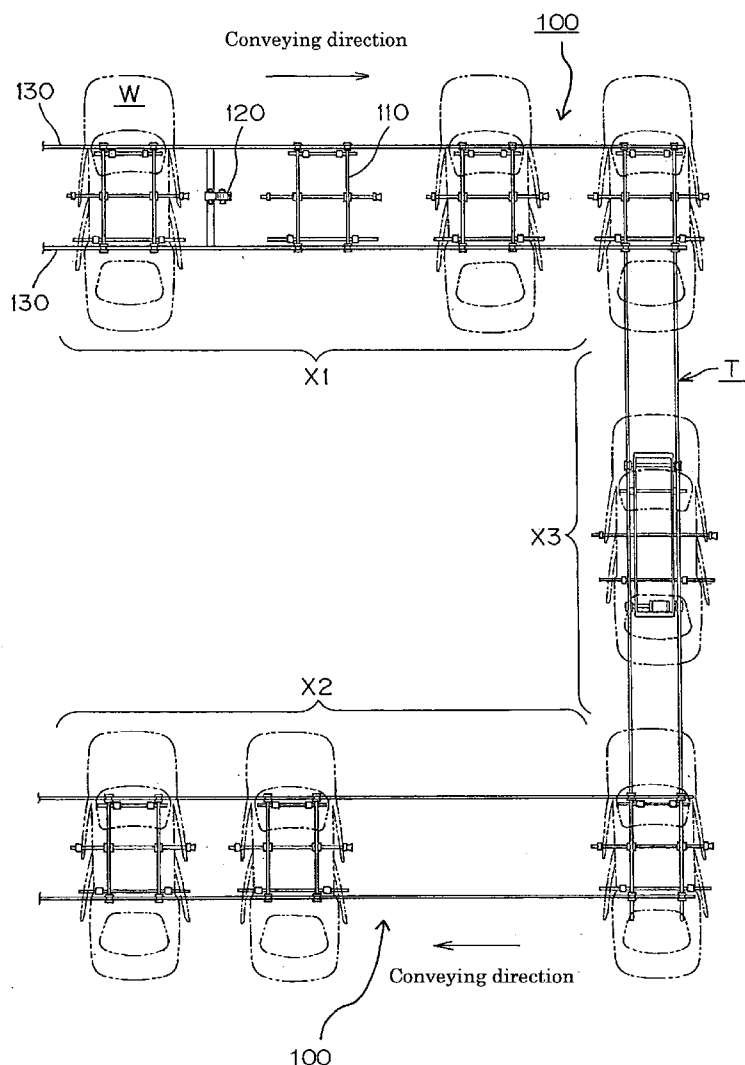


Fig.1

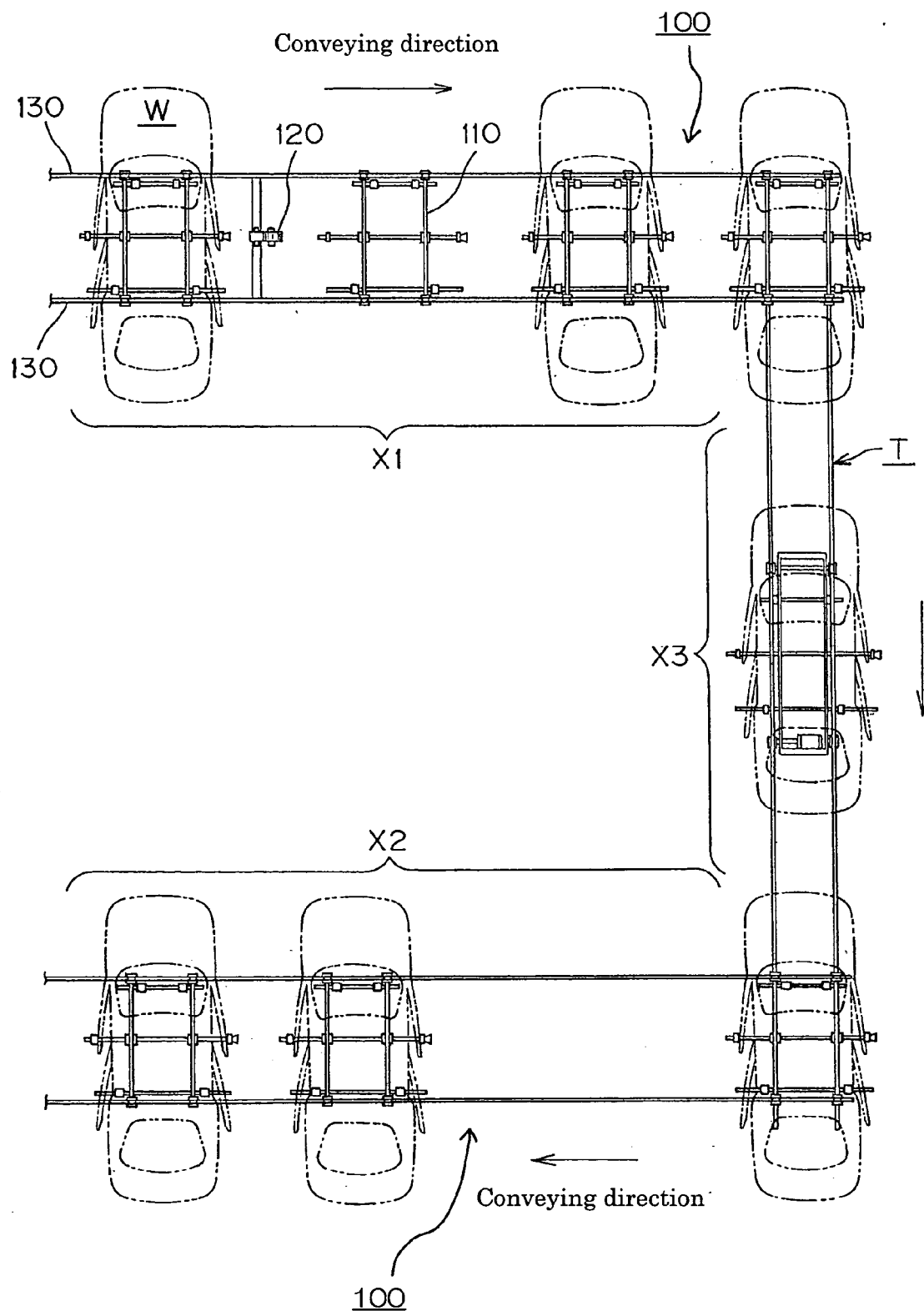


Fig.2

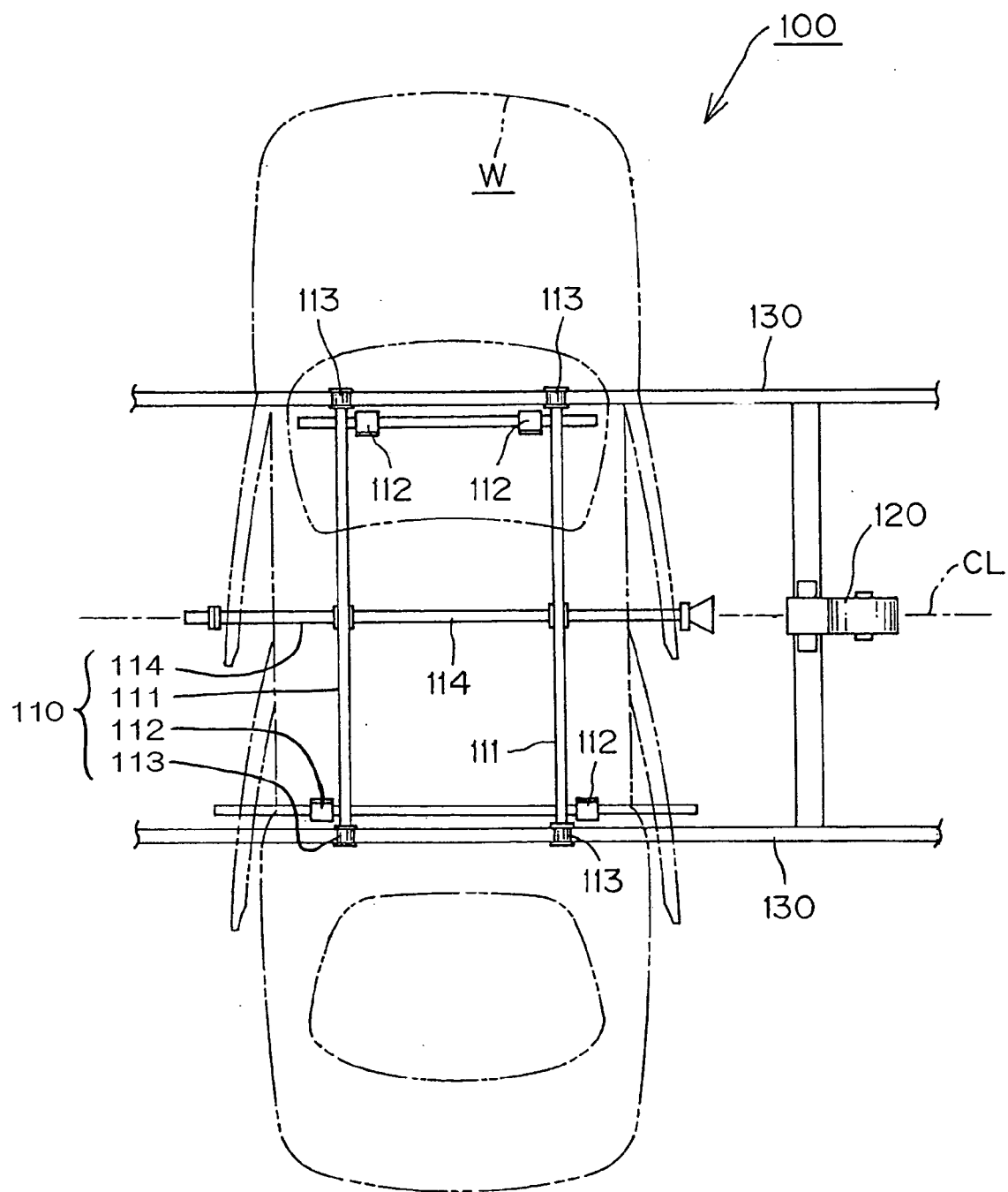


Fig.4

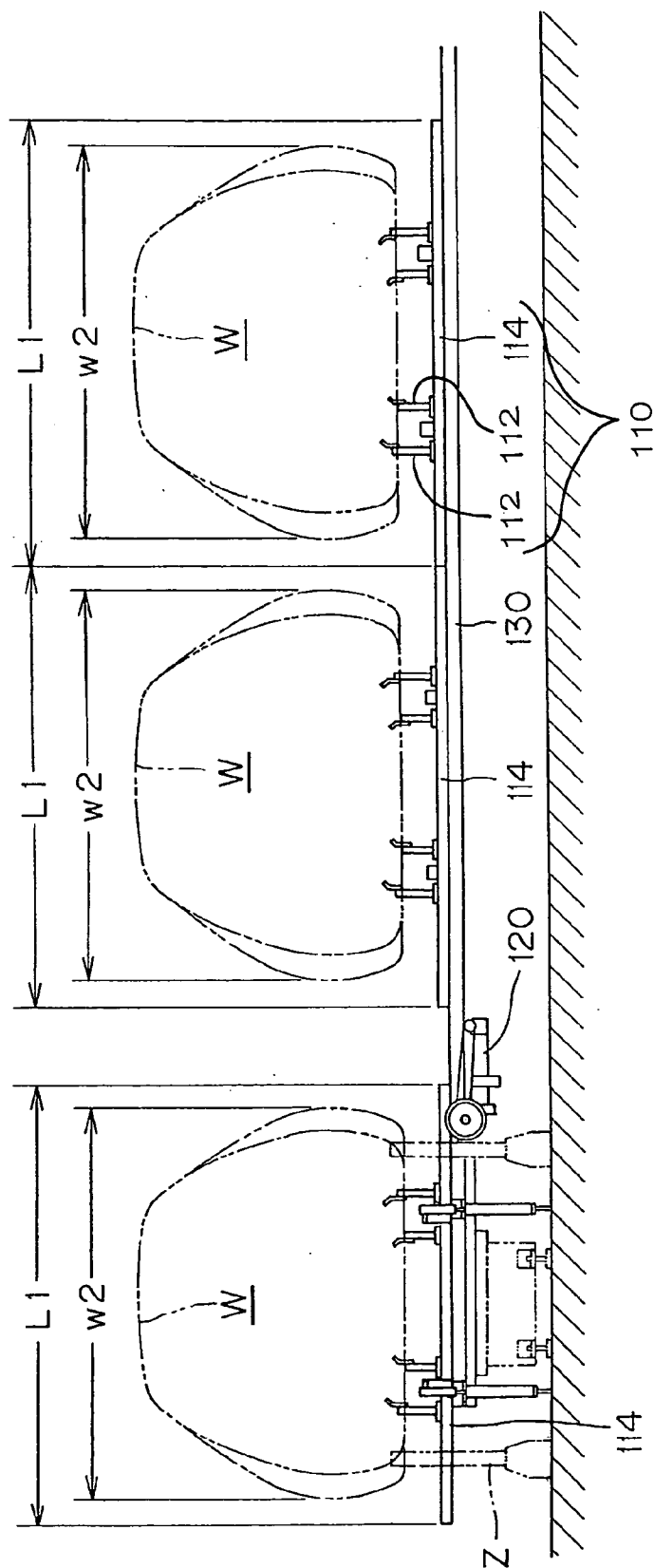


Fig.5

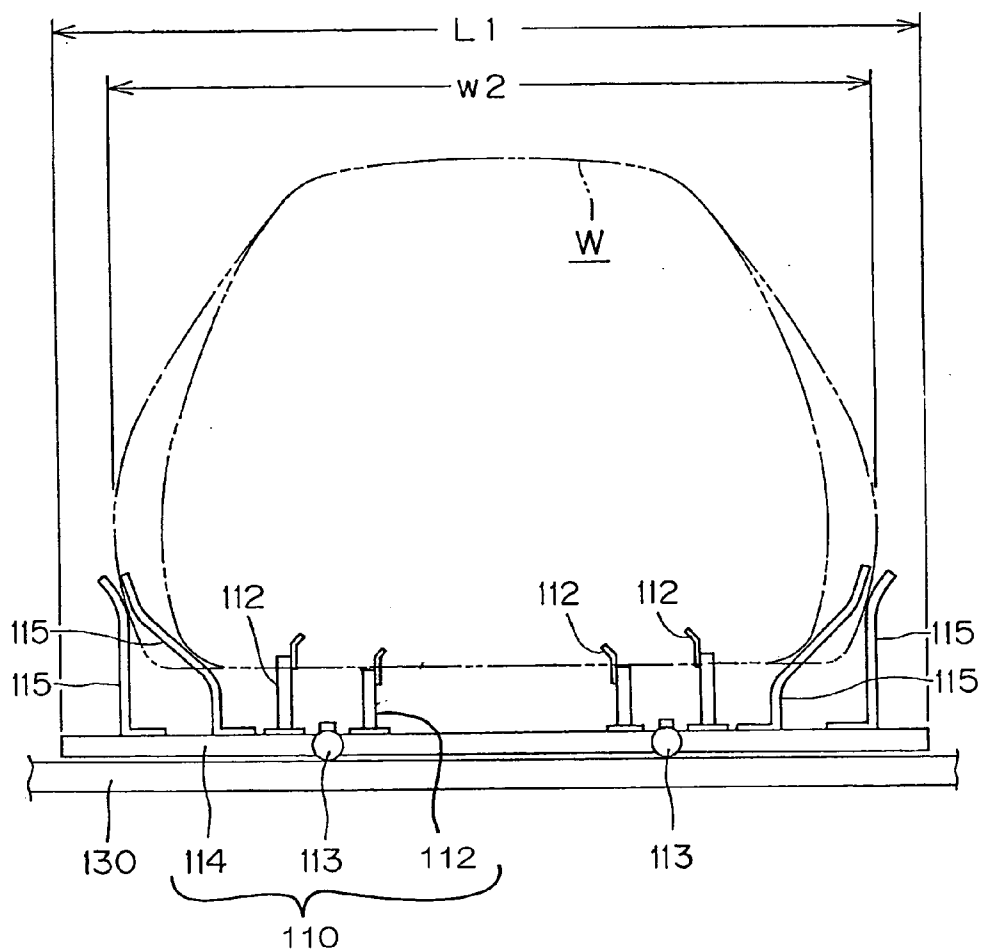


Fig.6

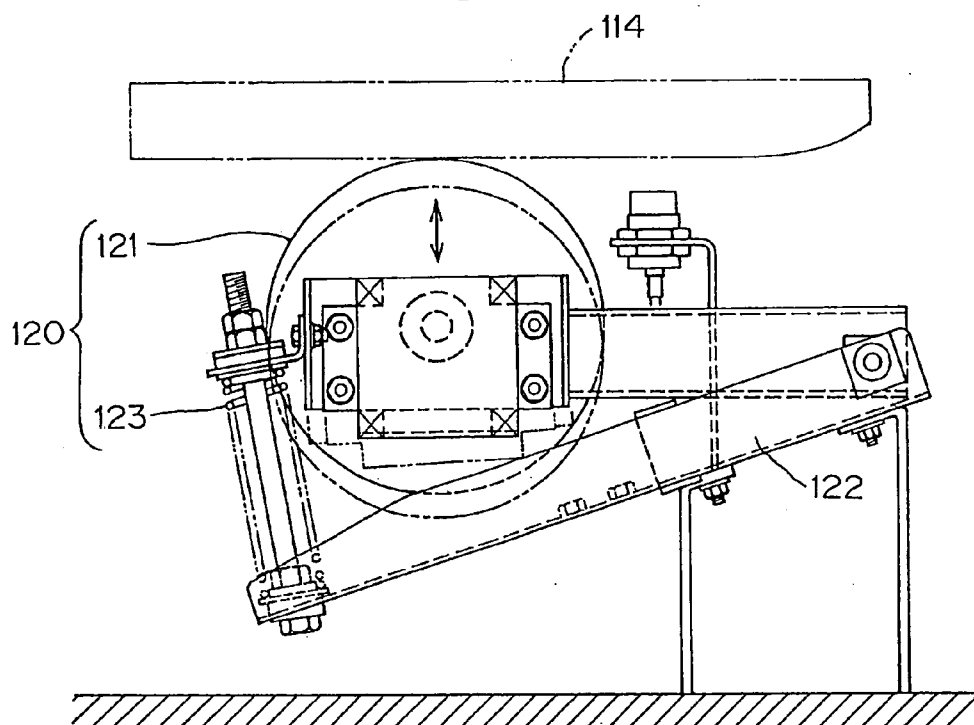


Fig.7

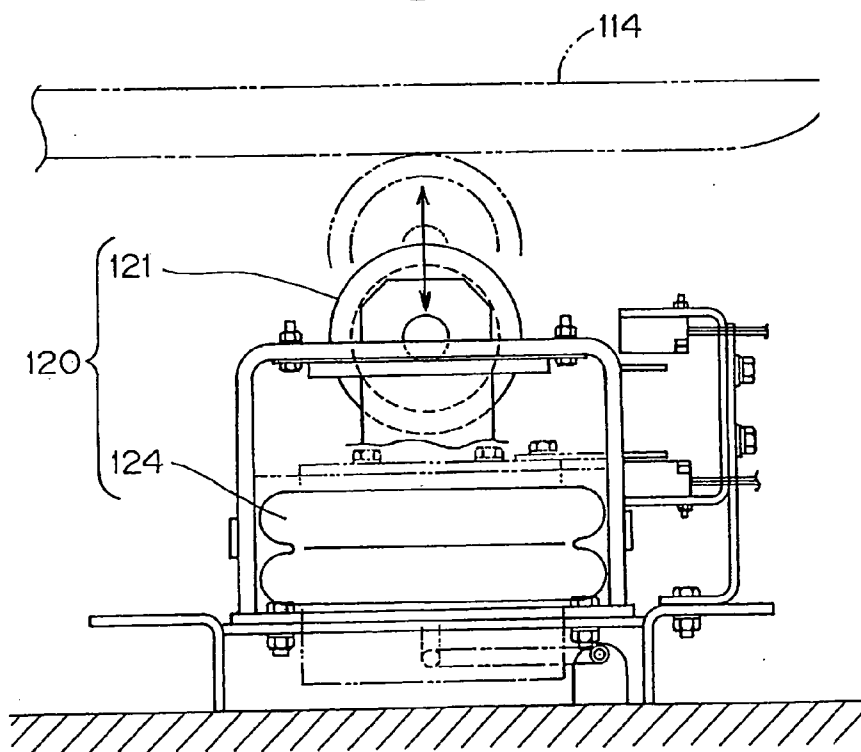
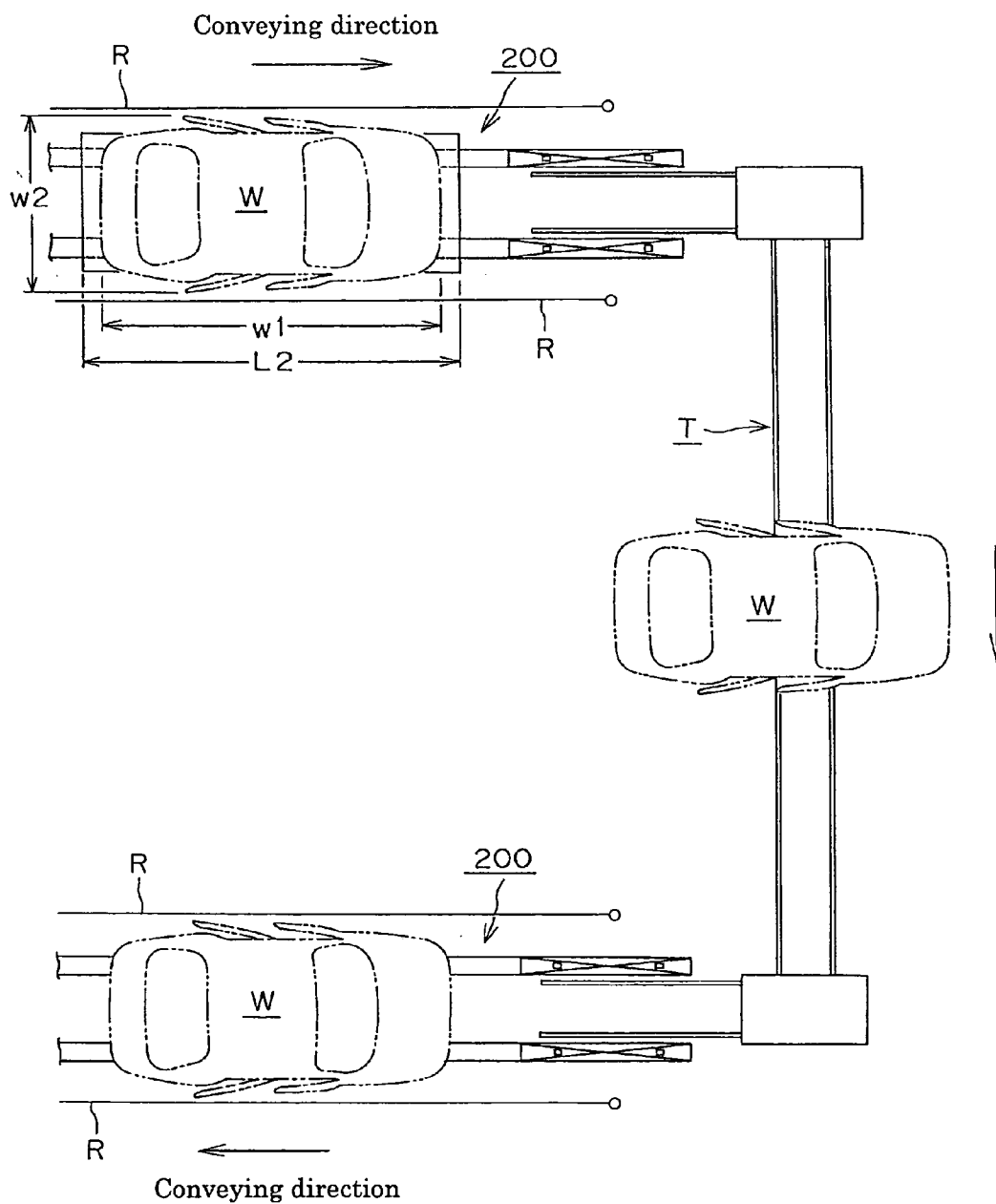


Fig.8
Prior Art



TRANSVERSE CAR BODY CONVEYING SYSTEM

FIELD OF THE INVENTION

[0001] This invention relates to a transfer system for conveying car bodies in a factory, and more specifically to a transverse car body conveying system, in which a skid-type carrier travels passively on rails, and on which a car body mounted on the carrier is oriented in a direction transverse to the direction of carrier movement.

BACKGROUND OF THE INVENTION

[0002] Known car body conveying systems include systems having a number of conveyor units, in which a large number of hybrid conveying carriers travel. Each conveying carrier is provided with left and right conveying skids, left and right front wheels, and left and right rear wheels. The hybrid type carriers are propelled by driving rollers and controlled by a large number of carrier-detecting sensors.

[0003] As shown in **FIG. 8**, a conventional hybrid-type storage conveyor system, disclosed in Japanese Laid-Open Patent Publication 2001-63555, is arranged in a C-shaped configuration, and comprises two conveyor tracks **200** connected by a traverser mechanism **T** for transferring car bodies **W** from one of the two conveyor tracks to the other. On the conveyor tracks, the car bodies are conveyed in the longitudinal direction of the bodies. The lengths of the conveyor tracks **200** need to be sufficiently large to accommodate the car body lengths **w1**, and consequently storage efficiency is low. Moreover, the carrier size is necessarily large, resulting in high carrier weight and a high conveying power requirement.

[0004] In a conveyor system in which all of the carriers are identical, in order to accommodate various car bodies of different lengths, the length **L2** of each of the carriers must correspond to the length of the longest car body with which the conveyor system is to be used. Consequently, the lengths of the carriers impose a limit on the number of carriers that can be provided along each track **200**. Furthermore, in some cases, it has been necessary to replace carriers on the conveyor system with new carriers in order to accommodate different car bodies.

[0005] In the conventional hybrid type storage conveyor of **FIG. 8**, a door of a car body **W** can open unexpectedly as a result of vibration, or impact such as may occur when carriers come into contact with each other. Opening of a car door during operation of the conveyor can cause damage to objects adjacent to the conveying path, as well as injury to personnel. To prevent damage and injury, ropes **R** were provided along both sides of the conveyor to limit opening of the doors. However, these ropes take up space, and become an obstacle to various operations, impairing productivity.

[0006] Accordingly, objects of this invention are to overcome the above-mentioned problems of a conventional conveying system; to reduce the size and weight of a skid-type carrier; to make a skid-type carrier adaptable to various types of car bodies, thereby improving its versatility; and to prevent accidental opening of the doors of the cars being conveyed without requiring additional space, and without impairing productivity.

SUMMARY OF THE INVENTION

[0007] The car body conveying system in accordance with the invention comprises a pair of rails extending in spaced,

parallel relation to each other along a conveying path. A skid-type carrier is supported on the rails for travel along the conveying path. Brackets mounted on the carrier are arranged to support an elongated car body on the carrier, with the direction of elongation of the car body extending transverse to the direction of travel of the carrier along the conveying path. A friction bar, supported by said carrier, extends along the direction of travel of the carrier along the conveying path, and a drive roller disposed on the conveying path is positioned to engage, and impart a frictional driving force to, the friction bar.

[0008] Preferably, the length of the friction bar is greater than the maximum width of the car body mounted on the carrier, but less than the length of the car body, and the friction bar and drive roller are preferably located along a center line midway between the rails. Door opening-prevention barriers, provided at front and rear positions on the carrier, are positioned to engage doors of the car body supported on the carrier in order to limit opening thereof.

[0009] The car body conveying path to which the transverse car body conveying system of the invention is adapted can be a conveying line for conveying car bodies in an assembly step, a painting step, a drying step, or the like in a car factory, for example. The term "car body" should be understood to refer either to a fully assembled car, or a partial assembly comprising at least the car's body shell, or its chassis.

[0010] The skid-type carrier has a car body mounted thereon in transverse orientation with respect to the direction of carrier travel along the conveyor path, and is passively propelled along a pair of rails by a frictional driving force imparted by a drive roller. The friction bar, which extends along the direction of carrier travel, can be much shorter than the front-to-rear dimension of the car being transported. The size of the skid-type carrier can be relatively small compared to the conventional carrier, and consequently a high storage efficiency can be realized. Moreover, the power required to propel the carrier along the conveying path is substantially lower than the power required in a conventional conveyor. Moreover, since different types of car bodies generally do not differ greatly in their widths, the carrier can be compatible with a wide variety of car bodies.

[0011] Because the friction bar and the driving roller are provided on the center line of the car body conveying path, stable travel of the carrier can be attained, and the frame of the skid-type carrier can be structurally very simple.

[0012] Furthermore, because door opening-preventing barriers are provided at front and rear positions along the conveying direction of the carrier frame, it is unnecessary to provide conventional door opening-prevention ropes on both sides of the car body conveying path. Consequently, more spaces are provided along both sides of the conveying path for various operations, such as painting, assembly, etc.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] **FIG. 1** is a schematic layout of a transverse car body conveying system in accordance with a first embodiment of the invention;

[0014] **FIG. 2** is a plan view showing details of the transverse car body conveying system of **FIG. 1**;

[0015] FIG. 3 is an elevational view of the transverse car body conveying system as shown in FIG. 2;

[0016] FIG. 4 is a side view of the transverse car body conveying system of FIG. 1;

[0017] FIG. 5 is an enlarged side view showing a skid-type carrier used in the conveying system of FIG. 1;

[0018] FIG. 6 is a side view of a friction roller type drive used in the conveying system;

[0019] FIG. 7 is a side view of a modified friction roller drive; and

[0020] FIG. 8 is a schematic layout view of a conventional car body conveying system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] In the transverse car body conveying system shown in FIG. 1, car bodies may be transported along conveying path X1 in a painting step, and along conveying path X2 in a drying step. The car bodies are transferred along a conveying path X3 from passage X1 to passage X2 by a traverser mechanism T. Each of the car bodies is arranged so that its direction of elongation, i.e., its long dimension, is in transverse relationship to its direction of travel along passages X1 and X2, and the entire conveying system of FIG. 1 is generally C-shaped in plan view.

[0022] Skid-type carriers 110 for mounting the transversely oriented car bodies W, travel passively on a pair of left and right rails 130 provided along conveying paths X1 and X2. The carriers are propelled by driving forces imparted by friction drive rollers located along each of the car body conveying paths X1 and X2. The drive roller mechanism 120 for conveying path X1 is shown in FIG. 1.

[0023] The skid-type carrier 110 as shown in FIGS. 2 to 5 includes a rectangular carrier frame 111 for mounting the car body in a transversely oriented condition relative to the rails 130, and support brackets 112, which are located on the top of the carrier frame 111 adjacent the left front, right front, left rear and right rear corners of the frame, and which secure and support the car body W on the frame. Wheels 113 which are also mounted rotatably on the frame adjacent the corners of the frame, travel on rails 130 and support the frame and the car body mounted thereon. A transfer lifter Z, shown in FIG. 4 is used to transfer the skid-type carrier 110.

[0024] A friction bar 114, which comes into contact with the drive roller, is also mounted on the underside of the frame. The friction bar 114 is positioned on the center lines CL of the car body conveying paths X1 and X2. Consequently it can come into contact with the drive roller mechanism 120. The skid-type carriers 110 can travel in a stable manner, the structure of the carrier 110 is simple, and the number of drive roller mechanisms 120 required along conveying paths X1 and X2 is comparatively small.

[0025] The length of the friction bar need only be slightly greater than the width w2 of the car body, and can be much shorter than the car body length w1. Because the widths of the carriers is reduced, more of them can fit along a conveyor passage of a given length. Consequently, improved storage efficiency can be realized. Additionally, even in the case of car bodies W having differing widths w2, the differences

between the body widths is generally very small. Therefore, a given skid-type carrier 110 configured to carry a car body in transverse orientation, can be easily adapted to a variety of car bodies, and consequently a high degree of compatibility and versatility in the skid-type carrier 110 can be realized.

[0026] As shown in FIG. 5, door opening-prevention barriers 115 are respectively provided on the skid-type carrier 110 at positions near the front and rear doors on both sides of the car body W mounted on the carrier frame 111. It not necessary to provide a door opening-prevention rope on both sides of the conveying paths as in the conventional conveyor system depicted in FIG. 8. The absence of ropes provides interference with operating space on both sides of the conveying paths X1 and X2.

[0027] As shown in FIG. 6, the friction roller drive mechanism 120, includes a polyurethane friction roller 121, which contacts the friction bar 114 of the skid-type carrier 110, and a support frame 122 attached to a frame of a car body conveying path X1 or X2. A biasing device 123 presses the roller 121 upward against the bar 114. In a modified drive mechanism as shown in FIG. 7, a friction roller drive 120 includes a polyurethane roller 121, which is pressed upwardly by an air bellows 124 into abutting relationship with bar 114 on a carrier 110.

[0028] In summary, because the skid-type carrier 110 is arranged to carry car bodies oriented in a direction transverse to their direction of travel on the conveyor path, the size of the carrier can be reduced, and less power is required to move the carriers. The lengths of the friction bars 114 can be reduced to a length which corresponds to the car body width w2, and which is shorter than the car body length w1, and consequently a larger number of car bodies can be accommodated in a conveyor of a given length. Additionally, different types of car bodies can be accommodated by a given skid-type carrier 110, and therefore the conveyor has a greater versatility than that of a conventional car body conveyor. Furthermore the centrally located friction bars 114 and roller drive ensure stable travel of the carrier frames 111 and enable the construction of the skid-type carrier 110 to be simplified. Thus, it is not necessary to provide door opening-prevention ropes on the sides of the car body conveying paths X1 and X2, and therefore operating space is provided on both sides of the conveying paths X1 and X2.

We claim:

1. A transverse car body conveying system comprising:
 - a pair of rails extending in spaced, parallel relation to each other along a conveying path;
 - a skid-type carrier supported on said rails for travel along said conveying path;
 - brackets on said skid-type carrier arranged to support an elongated car body on said carrier, with the direction of elongation of said car body extending transverse to the direction of travel of the carrier along said conveying path;
 - a friction bar supported by said carrier and extending along the direction of travel of the carrier along said conveying path; and

a drive roller disposed on said conveying path and positioned to engage, and impart a frictional driving force to, said friction bar.

2. A transverse car body conveying system according to claim 1, including an elongated car body supported on said brackets with the direction of elongation of the car body extending transverse to the direction of travel of the carrier along said conveying path.

3. A transverse car body conveying system according to claim 2, in which the length of said friction bar is greater than the maximum width of the car body but less than the length of said car body.

4. A transverse car body conveying system according to claim 1, in which said friction bar and said drive roller are located along a center line midway between said rails.

5. A transverse car body conveying system according to claim 1, in which said car body has doors, including door opening-prevention barriers at front and rear positions on said skid-type carrier, said barriers being positioned to

engage doors of a car body supported on said carrier to limit opening thereof.

6. A transverse car body conveying system according to claim 2, in which said car body has doors, and including door opening-prevention barriers at front and rear positions on said skid-type carrier, said barriers being positioned to engage said doors of the car body to limit opening thereof.

7. A transverse car body conveying system according to claim 3, in which said car body has doors, and including door opening-prevention barriers at front and rear positions on said skid-type carrier, said barriers being positioned to engage said doors of the car body to limit opening thereof.

8. A transverse car body conveying system according to claim 4, including door opening-prevention barriers at front and rear positions on said skid-type carrier, said barriers being positioned to engage doors of a car body supported on said carrier to limit opening thereof.

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