

VEHICLE TRANSFERRING SYSTEM

Technical field of the invention

The present invention relates to a vehicle transferring system which is disposed in a parking building and is used for carrying in and out vehicles.

Background of the invention

Generally in a parking building, vehicle carry-in and -out are performed by causing a vehicle to be placed on a carriage and moving the carriage on which a vehicle is placed, in a parking building. Since a vehicle is moved together with a carriage in a parking building, a large amount of power is needed for the movement and the moving system thereof is made large-sized. On the contrary, the present applicant developed a transferring system which is able to be moved with only a little power and which is able to simplify the moving system, and applied for a patent (Japanese laid-open patent No. Hei-6-288113).

Said vehicle transferring system is provided with parking platforms at each floor layer thereof, wherein an elevating apparatus is elevated and lowered to confront the platform of the respective floor layers, and said transfer carrier is disposed on said elevating apparatus.

The transfer carrier is constructed so as to reciprocate between the elevating apparatus and parking platform in a state where a vehicle is placed on the transfer carrier. By movements of the transfer carrier, vehicles are transferred onto and carried on a parking platform, and they are carried out from the parking platform to the elevating apparatus. In order to perform such vehicle transfer, the transfer carrier is provided with wheel supporting members by which a vehicle is lifted up.

Fig.21 and Fig.22 show a conventional transfer system, wherein wheel supporting members 110, 120 are disposed on a transfer carrier 100. The wheel supporting member 110 corresponds to the front wheels 210 of a vehicle, and the wheel supporting member 120 corresponds to the rear wheels 220 thereof. The respective wheel supporting members 110, 120 are composed of a single rod member. Furthermore, the respective wheel supporting members 110, 120 are made rotatable, centering around the end part of the opposite side which constitutes a pair, are provided with lifting cylinders 130, and are able to vertically move on the transfer carrier 100 by elongation and contraction of said lifting cylinders 130.

Since said wheel supporting members 110, 120 are rotatably driven orthogonally to the advancement direction of a vehicle 200, they are brought into contact with the front wheels 210 and rear wheels 220 of a vehicle from both sides as shown in Fig.22 and said wheels 210,220 are put between said wheel supporting members 110,120. In this state, said vehicle 200 is lifted by elongation of said lifting cylinders 130.

Subsequently, the transfer carrier 100 is caused to move toward a parking platform (not illustrated) in this state, wherein said vehicle 200 is placed on the platform by contraction of the lifting cylinders 130. With such a structure, since it is not necessary to carry in and out a vehicle together with a carriage, it is possible to drive the entire system with only a little power.

Summary of the invention

With a conventional transfer system, it was necessary to cause the wheel supporting member to be provided with a large holding force for vehicle wheels, whereby a large force of contacting with the vehicle wheels was needed. Therefore, there was a problem that with such a large force vehicle wheels were damaged. Furthermore, in a case

where the vehicle wheels were of a large diameter, the wheel supporting member could not be brought into contact with the wheels, whereby a sufficient holding was impossible.

The present invention has been developed in view of such problems, and it is therefore an object of the invention to provide a vehicle transferring system which has no possibility for vehicle wheels to be damaged and vehicles are held without fail.

Another object of the invention is to provide a vehicle transferring system constructed so that a wheel supporting member which is brought into contact with the wheels of a vehicle and restricts the wheels is rotatable by the contacting with the wheels of a vehicle, it is possible for the wheel supporting members to get in under the wheels of a vehicle with only a little holding power, the contacting therebetween is made reliable, and the wheels are made free from any damage.

Still another object of the invention is to provide a vehicle transferring system which is equipped with a movable table which is able to move forward and backward, wherein since the front or rear wheel supporting member in the vehicle incoming direction is attached on the movable

table, it is possible to match vehicles whose wheel base is different from each other.

A further object of the invention is to provide a vehicle transferring system which is provided with two movable tables which are able to move forward and backward, wherein since the front and rear wheel supporting members in the vehicle incoming direction are respectively attached on the movable tables, it is possible to match a wide range of vehicles, regardless of the size of wheel bases and wheel arrangements.

Another object of the invention is to provide a vehicle transferring system in which since the transfer carrier is provided with a sensor to detect the wheels positioned at the front and rear side wheel supporting member position in the vehicle incoming direction, a sensor to detect that a vehicle has passed through the vehicle incoming inlet, the vehicle transferring system is able to be utilized up to the range of length of its transfer carrier regardless of the size of wheel bases and wheel arrangements, and furthermore is able to match a wide range of vehicles.

A vehicle transferring system according to the invention was given more improvements on the basis of the technology disclosed in the preceding Japanese laid-open

patent No. Hei-6-288113 which the present applicant filed. Said vehicle transferring system comprises a plurality of wheel supporting members which are in contact with the respective wheels of a vehicle and holds and restricts the wheels; a reciprocable transfer carrier in which wheel supporting members are vertically movably provided; a lifting means for lifting a vehicle from the transfer carrier by moving upward the wheel supporting members which are in contact with the vehicle wheels; and a contacting and separating means by which the wheel supporting members are brought into contact with the vehicle wheels and are separated therefrom, and is characterized in that at least the parts, which are in contact with the vehicle wheels, of the wheel supporting members are rotatable.

With the structure, the wheel supporting members are brought into contact with vehicle wheels by driving of the contacting and separating means, wherein in this state the lifting means means is driven to cause a vehicle to be lifted from the transfer carrier. Furthermore, in this state, the transfer carrier is caused to move in order to transfer the vehicle. Since in this construction the wheel supporting members are made rotatable at at least the part

thereof in contact with the wheels, the wheel supporting members are able to get in under the wheels, whereby a reliable contacting therebetween is made possible with only a small holding force. Thereby, it is possible to sufficiently hold a vehicle and there is no fear of the wheels being damaged.

A double tubular structure, the outer tubular member of which is rotatable, a structure in which the contacting rod to be brought into contact with the vehicle wheels is rotatably disposed, or other structures may be employed as the wheel supporting members.

A transfer carrier of the vehicle transferring system is provided with a movable table which is able to move forward and backward. In a case where the front wheel supporting members or rear wheel supporting members are attached onto the movable table in the vehicle incoming direction, the transfer carrier is able to deal with vehicles, the wheel bases of which are different from each other, and furthermore, in a case where the transfer carrier is provided with a sensor for detecting a wheel which is at the front and rear wheel supporting member positions in the vehicle incoming direction and a sensor for detecting that a vehicle has passed the vehicle

incoming inlet part, the transfer carrier is able to deal with wide types of vehicles, regardless of the size of wheel bases and wheel arrangement, since the lengthwise area of the transfer carrier can be utilized up to the maximum.

The wheel supporting members are able to respectively stop each of wheels at the front or rear positions thereof, the frontmost wheel supporting member is able to be retained at the wheel stopping position when carrying in a vehicle, and the rearmost wheel supporting member is also able to be retained at the wheel stopping position when carrying out a vehicle, whereby if the vehicle incoming side is different from the outgoing side in the wheel supporting members, for example, if the system is provided with a vehicle swivel apparatus, a vehicle which comes in at an excessive speed is suppressed at a prescribed position, and the erroneous start of an outgoing vehicle is prevented. Therefore, it is possible to smoothen the incoming and outgoing operations of vehicles.

Brief description of the drawings

Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig.1 is a front elevational view of a preferred embodiment of vehicle transferring system according to the invention.

Fig.2 is a perspective view of a parking platform.

Fig.3 is a front elevational view of a transfer carrier.

Fig.4 is a plan view of the transfer carrier.

Fig.5 is a plan view of the front wheel supporting member.

Fig.6 is a plan view of a vehicle path.

Fig.7 is a partially broken plan view of a wheel supporting member.

Fig.8 is a side elevational view of the wheel supporting member.

Fig.9 is a plan view for explaining the operations of the wheel supporting member.

Fig.10 is a side elevational view for explaining the operations of the wheel supporting member.

Fig.11 is a plan view for explaining the operations of the entire system.

Fig.12 is a plan view for explaining the operations of the entire system.

Fig.13 is a plan view for explaining the operations of the entire system.

Fig.14 is a plan view for explaining the operations of the entire system.

Fig.15 is a side elevational view for explaining the state where a vehicle is lifted.

Fig.16 is a side elevational view for explaining the operations of the entire system.

Fig.17 is a side elevational view of another preferred embodiment of the system.

Fig.18 is a plan view showing still another preferred embodiment of the system.

Fig.19 is a plan view of a vehicle path showing another preferred embodiment thereof.

Fig.20 is a side elevational view for explaining the transfer carrier, which shows the application range of wheel bases.

Fig.21 is a plan view of a conventional vehicle transferring system.

Fig.22 is a side elevational view of a conventional vehicle transferring system.

Description of preferred embodiments of the invention

Fig.1 shows a preferred embodiment of the invention. By an elevating apparatus 22 being elevated and lowered in said preferred embodiment, a transfer carrier is moved to a parking platform 20 at a prescribed floor layer shown in Fig.2, wherein the elevating apparatus 20 is linked with a winch (not illustrated) via wires 16. A U-shaped vehicle path 1 is rotatably placed on the elevating apparatus 22, and a slider 2 having a transfer carrier 5 is attached to said vehicle path 1.

Said slider 2 is reciprocatably mounted in said vehicle path 1 via rollers 3 provided inside the vehicle path 1. The reciprocating movements of said slider 2 are driven by a transfer motor 6 attached on said vehicle path 1. Therefore, said slider 2 has a rack 8 formed at the underside thereof, and the rack 8 is engaged with a gear 7 at the rotating shaft side of the motor 6.

Said transfer carrier 5 loads a vehicle and is provided at both sides thereof with rollers 4 rolling on and being brought into contact with the inside of the slider 2,

whereby said transfer carrier 5 is able to reciprocate for the slider 2 by the rolling movements of these rollers 4.

Fig.3 and Fig.4 show said transfer carrier 5, where a chain 10 is connected to the underside thereof. Said chain 10 is endlessly suspended with the vehicle path 1 and at the same time is wound in a sprocket 9 (see Fig.1) rotatably attached to the underside of the slider 2. Therefore, since the slider 2 is caused to move by driving of the transfer motor 6 and the movement thereof is transmitted to the transfer carrier 5 via the sprocket 9 and chain 10, whereby said transfer carrier 5 is able to reciprocate.

By this movement, the transfer carrier 5 comes on the parking platform 20 (see Fig.2) along with the slider 2. In Fig.1, 17 is a slider roller attached to the underside of the slider 2, and 24 is a transfer roller attached to the underside of the transfer carrier 5. Either of them rolls and moves on the bottom plate of the parking platform 20 when the transfer carrier 5 comes thereon.

Two pairs of front wheel supporting members 40,41 which correspond to the left and right front wheels 31 of a vehicle 30, and two pair of rear wheel supporting members 42,43 which correspond to the left and right rear wheels

32 of said vehicle 30 are attached to the transfer carrier 5. These wheel supporting members 40,41,42,43 which constitute pairs are vertically movable by wheel supporting member lifting cylinders 14 secured at the underside thereof, and all the wheel supporting members are constructed so as to be simultaneously elevated and lowered in the vertical direction. Furthermore, they are rotatably linked with each other by wheel supporting member cylinders 13. The respective wheel supporting members 40,41,42,43 are able to be set at a position orthogonal to or parallel with the vehicle incoming direction.

As shown in Fig.5 and Fig.6, the front wheel supporting members 40,41 are installed on a movable table 21 which supports the same. The movable table 21 is screwed with a spiral rotating shaft 12 which is driven and rotated by an adjusting motor 11 secured to the transfer carrier 5 and is able to move on slide rails 23 of the transfer carrier 5 by driving of the adjusting motor 11. With this construction, since the front wheel supporting members 40,41 are able to move in the range of distance D, they are able to match the wheel intervals of various kinds of vehicles.

The front wheel supporting members 40,41 and rear wheel supporting members 42,43 rotate by driving of the wheel supporting member cylinders 13, and by the rotation of the wheel supporting members, the wheel supporting members are brought into contact with the front wheels 31 and rear wheels 32 in order to hold and restrict the front wheels 31 and rear wheels 32. Therefore, the wheel supporting member cylinders 13 constitutes a contacting means by which the wheel supporting members 40,41,42,43 are brought into contact with the front wheels 31 and rear wheels 32 of a vehicle 30, and the wheel supporting members 40,42 are provided with a sensor (not illustrated) which detects a contacting of wheels with each of the wheel supporting members.

Fig.7 and Fig.8 show one of the wheel supporting members 40,41,42,43 which are identical to each other. Therefore, in Fig.7 and Fig.8, a wheel supporting member of the preferred embodiment is given 50 as a reference number, which is substituted for the wheel supporting members 40,41,42,43 in the description herein. The wheel supporting member 50 is provided with a shaft 51 linked with a piston of one of the wheel supporting member

cylinders 13, and a tubular member 52 which is rotatably mounted outside the shaft 51.

The tubular member 52 is brought into contact with the wheels 31,32 of a vehicle 30 and is rotatable on the shaft 51 via bearings 53,54. When the wheel supporting member 50 having such a structure is brought into contact with the wheels 31,32 of a vehicle 30, it is possible to perform a contacting with the wheels 31,32 without fail because the outer tubular member 52 is rotated.

Fig.9 and Fig.10 shows actions of the wheel supporting member 50, wherein when the wheel supporting member 50 is rotated by driving of the wheel supporting member cylinder 13 and is brought into contact with the front wheels 31 (as with the rear wheels 32), the tubular member 15 is rotated. For this reason, as shown with dashed lines in the drawings, the wheel supporting member 50 gets in under the wheels 31 and is reliably brought into contact with the wheels 31. Therefore, since the wheel supporting member 50 is brought into contact with the wheels 31 without fail, it is possible to secure a sufficient holding force when lifting the vehicle 30, as described later. Furthermore, the wheels are made free from any damage.

Still furthermore, in a case where the wheel supporting member 50 is used as wheel stoppers when the vehicle 30 is caused to ride on the vehicle path 1 described later (in the preferred embodiment, the front wheel supporting member 40 and rear wheel supporting member 42 correspond to the wheel stoppers), since the tubular member 52 is rotated in line with rotations of the wheels 31 of vehicle 30, the wheels 31 rotate idly. Therefore, the vehicle 30 will never go beyond the wheel supporting member 50, and the safety is secured.

Fig.11 through Fig.16 show operations of the preferred embodiment. When a vehicle comes in, the front wheel supporting member 40 placed forward of the vehicle is positioned orthogonally to the incoming direction of vehicle 30 as shown in Fig.11, and the other wheel supporting members 41,42,43 are located at positions parallel to the vehicle incoming direction, whereby the vehicle incoming is made easier. A vehicle which comes in at an excessive speed is suppressed at a prescribed position by the wheel supporting member 40.

In this state, a vehicle 30 comes in, and the rear wheel supporting member 42 is driven and rotated to be located at a position orthogonal to the vehicle incoming

direction, as shown in Fig.12, at the moment when the front wheels 31 passed the rear wheel supporting member 42. Thereby, the front wheels 31 are brought into contact with the front wheel supporting member 40 as shown in Fig.13, and the movable table 21 is moved in this state by the sensor signals in order to cause the wheel supporting members 40,41 to be moved integrally therewith. And the wheel supporting members 40,41 are caused to stop by the sensor signals at the moment when the rear wheels 32 are brought into contact with the rear wheel supporting member 42. By movement of the front wheel supporting members 40,41, the wheel supporting members are able to match the wheel intervals of various kinds of vehicles.

As shown in Fig.14, in this state, the front wheel supporting member 41 and rear wheel supporting member 43 are driven and rotated by wheel supporting member operating cylinders 13 and are located orthogonally to the vehicle incoming direction and are brought into contact with the rear parts of the front and rear wheels 31,32, whereby the vehicle is stopped and fixed by the wheel supporting members 40,41,42,43. While fixing the vehicle, the wheel supporting members 40,41,42,43 are securely in

contact with the wheels 31,32 and hold and restrict the wheels.

Next, the vehicle is moved to an appointed floor layer, where the vehicle is parked, by moving an elevating apparatus 22. As shown in Fig.15, the wheel supporting member lifting cylinders 14 of the wheel supporting members 40,41,42,43 are driven in order to simultaneously lift the wheel supporting members 40,41,42,43, whereby the vehicle 30 is lifted together with the front and rear wheels 31,32.

Fig.16 is a view showing the states where the transfer motor 6 is driven. The slider 2 is caused to move toward the parking platform 20 via a gear 7 and rack 8. When said slider 2 is guided and moved by the rollers 3, the transfer carrier 5 moves in the right direction on the slider 2 via a chain 10 by rotations of a sprocket 2 of said slider 2.

By the movement, the transfer carrier 5 comes on the parking platform 20 together with the slider 2, and the slider rollers 17 and transfer rollers 24 move on the bottom of the parking platform 20 and reach an appointed parking position. Where the vehicle is caused to arrive at the appointed parking position, the wheel supporting

members 40,41,42,43 are lowered by driving the wheel supporting member cylinders 14 to cause the vehicle 30 to be parked at the appointed position.

Thereafter, the other wheel supporting members 41,42,43 are located at positions parallel to the vehicle incoming direction of the vehicle 30 in such a state where the front wheel supporting member 40 is located orthogonally to the vehicle incoming direction, whereby the fixing state of the wheels is released (as in Fig.11). Then, the slider 2 is moved via the gear 7 and rack 8 by driving the transfer motor 6. At this time, the transfer carrier 5 is moved in the left direction via a chain 10 by rotations of the sprocket 9 of the slider 2. Thus, the respective wheel supporting members 40,41,42,43 and transfer carrier 5 return to the original position in the elevating apparatus 22 together with the slider 22, and at the same time the position of the movable table 21 corresponding to the wheel base of the vehicle which is now caused to come in and to be parked is stored in a memory means.

Furthermore, the elevating apparatus 22 is returned to the vehicle incoming position and the adjusting motor 11 is driven in order to cause both the movable table 21 and the front wheel supporting members 40,41 to retreat to an

appointed position, whereby the standby for subsequent vehicle incoming is enabled.

When carrying out a vehicle, the elevating apparatus 22 is moved to the parking floor of a vehicle 30 to be taken out, and the slider 2 is moved to the parking platform 20 via the gear 7 and rack 8 by driving of the transfer motor 6 and at the same time the wheel supporting members 40,41,42,43 are also moved to the parking platform 20 together with the transfer carrier 5 by a sprocket 9 and chain 10. At this time, the front wheel supporting member 40 is located orthogonally to the vehicle incoming direction by driving the wheel supporting member cylinders 13 while the other wheel supporting members 41,42,43 are located parallel to the incoming direction of vehicle 30 (See Fig.11).

The transfer carrier 5 is moved in the right direction, and the rear wheel supporting member 42 is located orthogonally to the vehicle incoming direction by driving of the wheel supporting member cylinder 13 at the moment when the transfer carrier 5 passes the front wheels 31 (See Fig.12). As the transfer carrier 5 further moves, the front wheel supporting member 40 is brought into contact with the front wheels 31, and the front wheel supporting

members 40,41 are moved in the left direction along with the movable table 21 (See Fig.13). Then, the transfer carrier 5 stops moving at the moment when the rear wheel supporting member 42 is brought into contact with the rear wheels 32. Thereafter, the wheel supporting members 41,43 are rotated and moved to the position orthogonal to the vehicle incoming direction in order to fix the front and rear wheels 31, 32 (See Fig.14).

In this case, such a method may be also available where the movable table 21 is moved to the position of the front and rear wheels 31,32 of the vehicle, which is stored in memory when causing the vehicle to come in, and the wheel supporting members 40,41,42,43 are rotated and moved to the position orthogonal to the vehicle incoming direction at the moment when the movement of the transfer carrier 5 onto the parking platform is completed, whereby the front and rear wheels 31,32 are fixed.

The respective wheel supporting members 40,41,42,43 are simultaneously lifted by driving the wheel supporting member lifting cylinders 14 in this state, and the vehicle 30 is lifted. Under this condition, the slider 2 is moved to the elevating apparatus 22 by driving the transfer motor 6 and the transfer wheel supporting member 5 is also

moved to the elevating apparatus 22 by a sprocket and chain, and simultaneously the vehicle 30 which is lifted by the wheel supporting members 40,41,42,43 is caused to move onto the vehicle path 1. Thereafter, the wheel supporting members 40,41,42,43 are lowered at an appointed position, thereby causing the vehicle 30 to be placed on the vehicle path 1.

Next, the elevating apparatus 22 is moved to the vehicle incoming inlet, wherein the vehicle path 1 on the elevating apparatus 22 is rotated to cause the front side of the vehicle 30 to be turned to the inlet side. The respective wheel supporting members 40,41,42,43 are rotated and located at a position parallel to the vehicle incoming direction, whereby the fixing state of the front and rear wheels 31,32 is released to carry out the vehicle 30. Thereafter, the movable table 21 of the front wheel supporting members 40,41 is moved to the original position via a spiral swivel shaft 12 by driving of the adjusting motor 11. The vehicle path 1 on the elevating apparatus 22 is rotated to stand by for the incoming of subsequent vehicles. Thus, a vehicle is carried in and out.

In the above description, if the wheel supporting member 43 is held at the wheel stopping position when

carrying out the vehicle, it is possible to prevent the vehicle from an erroneous starting toward the back.

Fig.17 shows another preferred embodiment of a wheel supporting member according to the invention. In this preferred embodiment, a wheel supporting member 60 is provided with a linkage rod 61 connected to the wheel supporting member cylinder 13 and a contacting rod 62 attached to the linkage rod 61.

The linkage rod 61 is moved on the transfer carrier 5 in the vehicle incoming direction and in a direction orthogonal thereto by driving of the wheel supporting member cylinder 13, but the linkage rod 61 itself does not rotate. The contacting rod 62 is rotatably mounted along the lengthwise direction of said linkage rod 61. This contacting rod 62 is disposed at a corner at the wheel 31 side at the linkage rod 61, wherein the contacting 61 confronts the wheels 31 of a vehicle.

In such a construction, since the contacting rod 62 confronts the wheels 31, it is able to turn by the contact with the wheels 31. Therefore, the entire wheel supporting member 60 is able to get in under the wheels 31, whereby the contacting with the wheels 31 is very secure and reliable, and the wheels are made free from any damage.

Fig.18 is a still another preferred embodiment regarding the operation of a wheel supporting member 70. The structure of a wheel supporting member 50 shown in Fig.17 and that of a wheel supporting member 60 shown in Fig.18 may be used as the structure of the wheel supporting member 70. Such a wheel supporting member 70 is horizontally movably attached in the X-Y direction on the transfer carrier 5, and the wheel supporting member 70 may be brought into contact with the wheels 31 of a vehicle and may be released therefrom by the movement thereof.

That is, as for the wheel supporting member 70, the position A is the retreating position from a vehicle 31, and the position B is where the wheel supporting member moves in the Y direction, wherein the wheel supporting member 70 is brought into contact with the wheels 31 by further moving thereof from the position B in the X direction. Namely, with such a horizontal movement, it is possible to bring the wheel supporting members into contact with the wheels 31.

Fig.19 is a plan view of a vehicle path in another preferred embodiment thereof, two movable tables 21a, 21b which are movable in the forward and rearward direction of the transfer carrier 5 of the vehicle path 81. The front

side wheel supporting members 40,41 and the rear side wheel supporting members 42,43 in the vehicle incoming direction are respectively provided on the movable tables 21a,21b. Each of the movable tables is driven and is caused to advance and retreat in the range of the moving strokes D and E by separate movable table motors 11.

The movable tables 21a, 21b are provided with a front wheel sensor 82 to detect the wheels positioned at the front wheel supporting member position in the vehicle incoming direction and a rear wheel sensor 83 to detect the wheels positioned at the rear wheel supporting member position, and is further provided with a pass sensor 83 to detect that a vehicle has passed, at the vehicle incoming inlet of the transfer carrier 5. These sensors may be provided in plurality at both the left and right sides to increase their reliability. Furthermore, even though the pass sensor 84 is secured at the fixing side of the vehicle incoming inlet, the effect thereof is identical.

As in Fig.11 through Fig.16, the vehicle transferring system firstly causes the wheel supporting member 40 to move to the wheel stopping position when causing a vehicle to come in. When the front wheels 31 of the incoming vehicle passes through the rear wheel sensor 83, said

vehicle transferring system causes the wheel supporting member 42 to be operated to fix the wheels, and further causes the front side movable table 21a to advance so as to escape therefrom, in response to a signal of the front wheel sensor 82 when the front wheels 31 reach the frontmost wheel supporting member 40. Still furthermore, when the rear wheel sensor 83 detects the rear wheels 32, said system causes the rear side movable table 21b to advance so as to escape from the rear wheels.

When the pass sensor 84 detects a passing of a vehicle and the front side movable table 21a advances to an appointed position, the front and rear movable tables 21a, 21b are stopped, and at the same time the rear side wheel supporting members 41,43 are caused to perform a vehicle stopping action, whereby the front and rear wheels are held and restricted. Furthermore, when carrying out a vehicle, the carry-out action is able to be similarly performed.

In this state, a vehicle is housed in the range of length of the transfer carrier 5. Since the front and rear wheels 31,32 are restricted, an appointed parking action is able to be performed as in the above description at appointed floor layers.

The front and rear movable tables 21a, 21b are drawn near each other in advance, and a stoppage is indicated to the vehicle side when the pass sensor 84 detects a passing of a vehicle when carrying in a vehicle, or the transfer carrier 5 is caused to advance to the extreme position of the parking platform, and the front and rear movable tables 21a, 21b are caused to retreat until the front wheel sensor 82 and rear wheel sensor 83 detect the wheels 31,32, whereby it is possible to securely restrict the front and rear wheels 31,32 without fail.

Fig.20 is a side view for explanation of a vehicle transferring system, which shows the application range of a wheel base. Thus, since the front and rear movable tables 21a,21b respectively have the movement strokes D and E, in the vehicle transferring system according to the invention, it is possible to utilize the range of length of the transfer carrier to the maximum in vehicles in which the wheel arrangement is different from each other, regardless of the size of the wheel base of vehicle, and to match a wide range of vehicles. In this example where the front movement stroke D of the movable tables 21a, 21b is 645mm and the rear movement stroke E is 450mm, the vehicle transferring system is applicable to vehicles

having its wheel base of 1,920mm at the minimum W1 and 3,015mm at the maximum W2.



What is claimed is

1. A vehicle transferring system comprising:

a plurality of wheel supporting members which are in contact with the respective wheels of a vehicle and hold and restrict the wheels;

a reciprocable transfer carrier in which the wheel supporting members are vertically movably provided;

a lifting means for lifting a vehicle from the transfer carrier by moving upward the wheel supporting members which are in contact with the vehicle wheels; and

a contacting and separating means by which the wheel supporting members are brought into contact with the vehicle wheels and are separated therefrom,

and being characterized in that at least the parts, which are in contact with the vehicle wheels, of the wheel supporting members are rotatable.

2. A vehicle transferring system set forth in claim 1, wherein the wheel supporting members are of double tubular structure in which the outer tubular member is rotatably attached to the inner shaft.



3. A vehicle transferring system set forth in claim 1, wherein a rotatable contacting rod of the wheel supporting member is disposed at the portion which confronts a vehicle wheel.

4. A vehicle transferring system set forth in claims 1 through 3, wherein the transfer carrier is provided with a movable table which is able to move forward and backward, and the front wheel supporting members or rear wheel supporting members are attached onto the movable table in the vehicle incoming direction.

5. A vehicle transferring system set forth in claims 1 through 3, wherein the transfer carrier is provided with two movable tables which are movable in the forward and backward direction, and the front wheel supporting members and rear wheel supporting members are respectively attached onto said movable tables in the vehicle incoming direction.

6. A vehicle transferring system set forth in claim 4 or 5, wherein the transfer carrier is provided with a sensor for detecting a wheel which is at the front and rear wheel supporting member positions in the vehicle incoming direction and a sensor for detecting that a vehicle has passed the vehicle incoming inlet part.



7.A vehicle transferring system set forth in claim 1, wherein the wheel supporting members are able to respectively stop each of the wheels at the front or rear positions thereof, the frontmost wheel supporting member is able to be retained at the wheel stopping position when carrying in a vehicle and the rearmost wheel supporting member is also able to be retained at the wheel stopping position when carrying out a vehicle.