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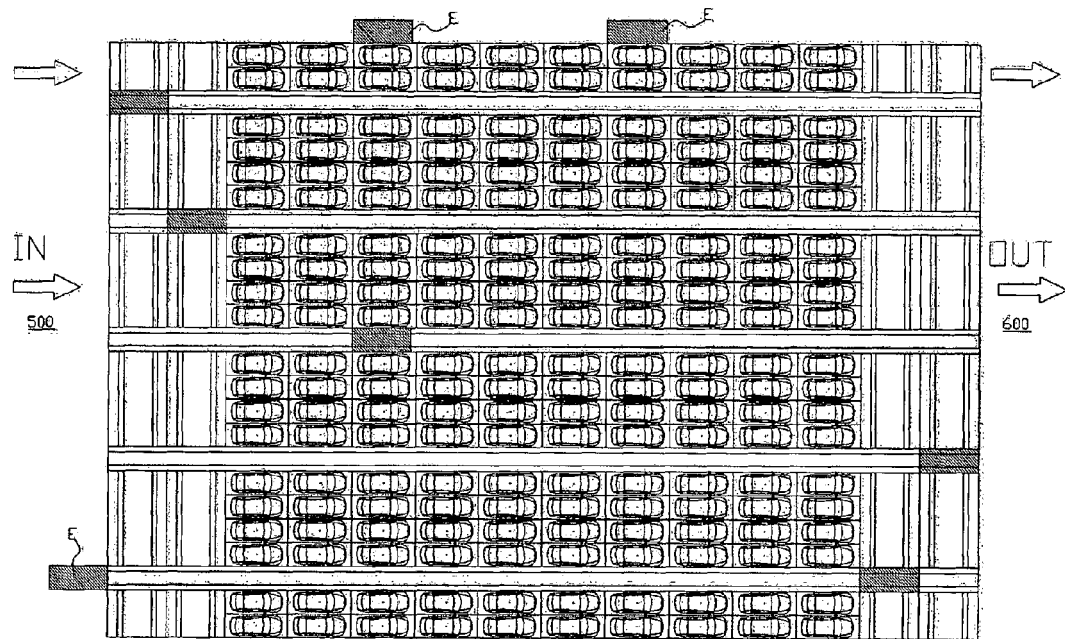
(54) **MULTILAYER MECHANICAL PARKING SYSTEM**

(57) The present invention relates to a multilayer mechanical parking system, and more particularly, to a novel parking system in which a mechanical parking system is unitized to allow for easy installation and maintenance. To this end, the multilayer mechanical parking system of the present invention comprises: a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon; a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked; a control unit which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle; and a collapsible multilayer elevator (5000) including an entry and exit control unit (A) for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit (B) connected to an output shaft of the entry and exit control unit (A) so as to horizontally move the loaded parked vehicle to left and right vehicle loading units (3000), an inter-layer distance adjusting unit (C) which has a vertical distance adjusting bar (805) installed at an

extended portion protruding from the front surface of the entry and exit control unit (A) so as to adjust the distance between the entry and exit control unit (A) and the horizontal movement and loading units (B) arranged in multiple layers during vertical elevation, a vertical elevation adjusting unit (D) linked to the extended portion of the entry and exit control unit (A) located at the top of the inter-layer distance adjusting unit (C) so as to enable the vertical elevation of the collapsible multilayer elevator (5000), and a travel adjusting unit (E) which receives power from the vertical elevation adjusting unit (D) so as to enable the horizontal forward and backward movement of the collapsible multilayer elevator (5000). The vehicle loading units (3000), which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, are symmetrically arranged, and a vertical and horizontal entry and exit unit (1500) is arranged to enable the collapsible multilayer elevator (5000) to move in horizontal and vertical directions between the symmetrically arranged vehicle loading units (3000).

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FIG. 14



Description

Cross-Reference To Related Application

[0001] This application claims the benefit of Korean Patent Application No. 10-2011-0083281, filed on August 22, 2011 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference

Technical Field

[0002] The present invention relates to a multilayer mechanical parking apparatus, and more particularly, to a parking system, which can vertically and horizontally move vehicles that are entered more quickly by separating an entry unit and an exit unit of a vehicle to be parked and independently operating a vertical elevation transfer unit that vertically moves.

Background Art

[0003] As an example of a related-art mechanical parking system, there is Korean Registration Patent No. 10-0403484 filed and owned by the present applicant. The above patent discloses the following configuration as shown in FIGS. 1 to 3.

[0004] A multilayered parking system includes a power generating unit which is installed in an upper end part of a central moving path A formed in the parking system including a multilayered left and right moving path by horizontal and vertical members and is connected to a vehicle transportation device to supply power at all times by transferring the generated power to a main driving shaft extending to the lowest end of the central moving path and a towing driving shaft arranged horizontally in an upper lateral surface of the central moving path; a clutch device which is engaged with the main driving shaft connected to the power generating unit and controls the power supply to left and right conveyor belts by an internal controller; a vehicle transportation device which has a timing device, etc. provided in a lower part thereof and devices provided in an upper surface thereof to elevate and tow vehicles; and a left and right vehicle loading part which has a conveyor belt device installed thereunder receiving power from the main driving shaft by the operation of the clutch device and operating like a caterpillar when the vehicle transportation device arrives at a predetermined floor.

[0005] That is, the foregoing parking system includes the power generating unit, the vehicle transportation device, and the left and right vehicle loading parts.

[0006] In the power generating unit, a first power generating unit 501 and a second power generating unit 502 are installed to face each other in left and right sides of an upper end of a vertical member 500 including the central moving path A to vertically move the vehicle transportation device, and a power transferring means 504 connected to a first output shaft 503 of the first power

generating unit 501 is connected to a gear 505 installed in a top end of the main driving shaft 506 to drive the main driving shaft 506 and concurrently drive a towing pole 509 by the power supplied by the second output shaft 507 through the second power transferring means 508, and the power from the second power generating unit 502 is used to drive a second towing pole 512 facing the towing pole 509 by a third power transferring means 511.

[0007] Also, the vehicle transportation device moves up and down by the power supplied by the power generating unit and has the main driving shaft 506 penetrating a lateral part of the vehicle transportation device and changes its direction by a power transforming means 550 to thereby move the loaded vehicle to the left and right horizontal moving paths B and C, and enables a gear clutch 553 horizontally movably connected to a front end of a control lever 552 operated by a solenoid device 551 to receive the transformed power, and is engaged with and moves together with the left and right transportation of the gear clutch 553 and enables a sleeve yoke 555 to be connected to a sleeve joint 554 formed in a second end thereof. The vehicle transportation device includes a clutch structure in which a conic insertion body 556 has a plurality of tools 557 in a base thereof and an inclusion part 558 is spaced by a certain distance to include the insertion body therein in a front end of the sleeve yoke 555.

[0008] In the left and right vehicle loading part, curves 701 are consecutively arranged in parallel in an upper surface of an upper structure shaped like a rectangular parallelepiped and a lower part thereof has a space. A lower structure which is shaped like a rectangular parallelepiped symmetrical to the upper structure and has an upper part open has a plurality of vertical walls 704 installed alternately in left and right ends thereof and a connection part 703 with a hollow part 707 among the vertical walls 704, and forms a roller retainer 705 in a lower surface of the lower structure to install roller members 706 and forms a filling layer 710 by filling the space formed by the connection of the upper and lower structures with an elastic material.

[0009] The power generating units 501 and 502 that are features of the above system enables both vertical and horizontal transfer of a vehicle. However, since these systems must supply and transform power with a single structure, the system becomes complicated with accompanying elevator, complicated power transformers for left and right transformation and power transferring devices. The complicated system leads to a complicated control system, thereby causing considerable maintenance expenses.

[0010] In order to overcome the foregoing limitations, the present applicant filed a patent application related to a multilayer mechanical parking system. (Korean Patent Application No. 10-2009-66993, filed July 22, 2009)

[0011] The multilayer mechanical parking system disclosed in Korean Patent Application No. 10-2009-66993

include an entry and exit parking units 500 and 600, an entry and exit transfer unit 1500, and an elevator 2000.

[0012] The entry and exit parking units 500 and 600 include left and right guide frames 515 and 615 installed in front/rear of left and right supporting frames 510 and 610 formed by front and rear and left and right members. Left and right sliders 512 and 612 are arranged in the guide frames. Upper ends of the sliders 512 and 612 are arranged to directly contact an external lower surface of a lower unit 551 of the left and right conveyor belts. The left and right conveyor belts 501 and 601 contacting the sliders 512 and 612 include left and right conveyor belts that rotate like a caterpillar by a rotation of left and right driving sprockets 560 and 660.

[0013] Also, the entry and exit transfer unit 1500 includes an entry and exit controller 1000 which is disposed in a central portion of the entry and exit parking units 500 and 600 and controls a power input/output of a power transmission unit to move a vehicle transferred from the entry and exit parking units 500 and 600 to the left and right side and controls a rotation direction, speed and rotation distance of the left and right conveyor belts and conveyor belts 501, 601 and 1501 of the entry and exit transfer unit. The entry and exit transfer unit 1500 receive power through the left and right clutches 301 and 302 by the entry and exit controller 1000 to allow vehicles transferred from the entry and exit parking units 500 and 600 move to the left and right sides.

[0014] Also, the elevator 2000 is an apparatus that moves the entry and exit controller 1000 and the entry and exit transfer unit 1500 in a vertical direction.

[0015] Since the related-art multilayered parking system is configured in a form of building that vertically stands exposing out of the ground, it is a system that can maximally accommodate vehicles to be parked per unit area. However, it is not desirable under recent residential environments in which parked vehicles are not exposed on the ground and the parking space is prepared under the ground, particularly, in which greens of park are pursued instead of a parking lot on the ground. Furthermore, it is possible to make better use of space by adopting a horizontal arrangement and making a system multilayered without a high-rise system with a relatively broad parking space.

Disclosure of the Invention

Technical Problem

[0016] The present invention provides a parking system, which is easy to install and maintain and is also free in structure modification after the installation.

[0017] The present invention also provides a parking system, which enables the installation of a mechanical parking lot according to the amount of vehicles and the conditions of a site only by performing an assembling work in the site after a single unitized system is manufactured, tested, and inspected in a factory.

[0018] The present invention also provides a failure-free parking system, which is quick in entry and exit of vehicles while parking a large amount of vehicles under the ground instead of parking vehicles on the ground.

[0019] The present invention also provides a mechanical parking system, which is possible to promptly repair when a failure occurs.

Technical Solution

[0020] In accordance with an aspect of the present invention, there is provided a multilayer mechanical parking system including a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle, the multilayer mechanical parking system further including: a collapsible multilayer elevator 5000 including an entry and exit controller (A) for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit (B) connected to an output shaft of the entry and exit controller (A) so as to horizontally move the loaded parked vehicle to left and right vehicle loading units (3000), an interlayer distance adjusting unit (C) which has a vertical distance adjusting bar (805) installed at an extended portion protruding from the front surface of the entry and exit controller (A) so as to adjust the distance between the entry and exit controller (A) and the horizontal movement and loading units (B) arranged in multiple layers during vertical elevation, a vertical elevation adjusting unit (D) linked to the extended portion of the entry and exit controller (A) located at the top of the interlayer distance adjusting unit (C) so as to enable the vertical elevation of the collapsible multilayer elevator (5000), and a travel adjusting unit (E) which receives power from the vertical elevation adjusting unit (D) so as to enable the horizontal forward and backward movement of the collapsible multilayer elevator (5000); and a vertical and horizontal entry and exit unit (1500) including the vehicle loading units (3000), which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, symmetrically disposed, and enabling the collapsible multilayer elevator (5000) to move in horizontal and vertical directions between the vehicle loading units (3000) that are symmetrically disposed.

[0021] The entry and exit controller (A) may include: a power generating unit that generates power by a driving motor (M) at the front central portion thereof to output power to an output shaft (11) and includes a rotation sensor (12) disposed at a rear side of the driving motor (M); a power transmission device including a first toothed gear (13) disposed at the output shaft (11) of the power generating device to transform delivered power and then de-

liver power to the conveyor belt for the entry and exit controller and a second toothed gear (14) for delivering power to the left and right conveyor belts, the first toothed gear 13 being power-transmittably connected to the driving shafts (15 and 16) for the entry and exit controller, disposed at left and right sides, by a power transmitting unit (101) and the second toothed gear (14) being power-transmittably connected to the left and right clutches (301 and 302) by a left and right delivering units (102) for delivering power to the left and right conveyor belts; and a control mechanism (1000) including left and right levers (210 and 202) that deliver power delivered from the power transmitting device to left and right driving sprockets (560 and 660) and left and right hydropneumatic cylinders (203 and 204) that enable the operation control of the left and right levers (201 and 202).

[0022] The driving sprockets (560 and 660) that rotate the conveyor belts may be formed of a reinforced plastic.

[0023] The multilayer mechanical parking system may further include a length adjusting unit disposed at one side or the other side opposite thereto of the driving sprockets (560 and 660) rotating the conveyor belts to adjust the length of the left and right conveyor belts. During the operation of the conveyor belts, the tension of the conveyor belts may be appropriately maintained.

[0024] The left and right movement loading unit (B) may include a caterpillar-type transfer belt (401), and the transfer belt (401) may be connected to the driving shafts (15 and 16) of the entry and exit controller A to allow the front and rear transfer belts to rotate at the same time, randomly loading a loaded vehicle onto the left and right conveyor belts (501 and 601) of the vehicle loading unit (3000) adjacent thereto.

[0025] The parking interlayer distance adjusting unit (C) may be connected to the fixing part (801a) of the extended part (801) protruding from the front surface of the uppermost layer entry and exit controller (a1) and the vertical elevation traction link (810) of the vertical elevation adjusting unit (D). The distance adjusting bars (805) disposed in the extended part (801) of the lower layer entry and exit controller A consecutively disposed under the uppermost layer entry and exit controller (a1) may be configured to penetrate a through hole (805a) of the extended part (801) of the uppermost layer entry and exit controller (a1), and may be consecutively and penetrably disposed in the entry and exit controllers (A) consecutively disposed thereunder. Also, a stop bar (805b) may be formed at the top of the distance adjusting bar (805) to be stopped by the extended part (801) at the upper side.

[0026] In the vertical elevation adjusting unit (D), an output shaft (910) of a driving motor (M1) may be connected to a power transmission device (916) for elevation via a clutch (915), and the output shaft (910) may rotate a vertical driving shaft (920) through a first power conversion device (903), a power transmission device (904), and a second power conversion device (905).

[0027] The travel adjusting unit (E) may move back

and forth along a monorail (mo) by converting power in a horizontal direction through a third power conversion device (929) disposed at the lowermost portion of the vertical driving shaft (920) to deliver power to a driving gear (940) engaged with the monorail (mo) through a horizontal movement power transmission device (930), and may be configured to be supported by a guide rail (go) that is horizontally disposed at both sides of the monorail (mo).

[0028] In the control mechanism (100), the left and right levers (201 and 201a) connected to operating rods (203a and 204a) of the left and right hydropneumatic cylinders (203 and 204) may enable the shift forks (205 and 205a) connected to the front ends (202 and 202a) of the operating lever (201 and 201a) to move back and forth toward the driving shaft of the left and right conveyor belt by the forward and backward movement of the operating rods (203a and 204a), centering on pins (206 and 206a).

[0029] In accordance with another aspect of the present invention, there is provided a multilayer mechanical parking system including a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle, the multilayer mechanical parking system further including: a collapsible multilayer elevator (5000) including an entry and exit controller (A) for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit (B) connected to an output shaft of the entry and exit controller (A) so as to horizontally move the loaded parked vehicle to left and right vehicle loading units, an interlayer distance adjusting unit (C) which has a vertical distance adjusting bar (805) installed at an extended portion protruding from the front surface of the entry and exit controller (A) so as to adjust the distance between the entry and exit controller (A) and the horizontal movement and loading units (B) arranged in multiple layers during vertical elevation, and a vertical elevation adjusting unit (D) linked to the extended portion of the entry and exit controller located at the top of the interlayer distance adjusting unit (C) so as to enable the vertical elevation of the collapsible multilayer elevator (5000); and a vertical and horizontal entry and exit unit (1500) including the vehicle loading units (3000), which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, symmetrically disposed, and enabling the collapsible multilayer elevator (5000) to move in horizontal and vertical directions between the vehicle loading units (3000) that are symmetrically disposed, wherein the collapsible multilayer elevator (5000) and the vertical and horizontal entry and exit unit (1500) are continuously and extensively disposed.

[0030] In accordance with still another aspect of the

present invention, there is provided a multilayer mechanical parking system including a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle, the multilayer mechanical parking system further including: a collapsible multilayer elevator (5000) including an entry and exit controller (A) for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit (B) connected to an output shaft of the entry and exit controller (A) so as to horizontally move the loaded parked vehicle to left and right vehicle loading units (3000), an interlayer distance adjusting unit (C) which has a vertical distance adjusting bar (805) installed at an extended portion protruding from the front surface of the entry and exit controller (A) so as to adjust the distance between the entry and exit controller (A) and the horizontal movement and loading units (B) arranged in multiple layers during vertical elevation, and a vertical elevation adjusting unit (D) linked to the extended portion of the entry and exit controller (A) located at the top of the interlayer distance adjusting unit (C) so as to enable the vertical elevation of the collapsible multilayer elevator (5000); and a vertical and horizontal entry and exit unit (1500) including the vehicle loading units (3000), which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, symmetrically disposed, and enabling the collapsible multilayer elevator (5000) to move in horizontal and vertical directions between the vehicle loading units (3000) that are symmetrically disposed, wherein the collapsible multilayer elevator (5000) and the vertical and horizontal entry and exit unit (1500) are continuously and extensively disposed and the multilayer mechanical parking system further includes a collapsible multilayer elevator for emergency at a side surface thereof and the vertical and horizontal entry and exit unit (1500).

Advantageous effects

[0031] The present invention has an effect of providing a unitized parking system by configuring a vehicle loading space and an entry and exit space for parking into a separate unit.

[0032] Also, an optimal system for maintenance can be provided while meeting demands by introducing a separate collapsible multilayered elevator for the vertical entry and exit and the transfer of a vehicle to be parked.

[0033] Furthermore, since the collapsible multilayer elevator can move in vertical and horizontal directions along the vertical and horizontal entry and exit unit, a vehicle to be parked can be randomly loaded at a desired location.

[0034] In addition, the collapsible multilayer elevator can move along a monorail thereunder, and particularly, this movement and the vertical elevation can be performed by a single motor, thereby enabling the reduction of energy consumption and the efficient utilization of an installation space.

[0035] The present invention can fundamentally improve the inconvenience due to a failure because the entry and exit of a vehicle is possible even though a failure that is a fatal defect of a mechanical parking lot occurs.

Brief Description of the Drawings

[0036]

figure 1 to 3 are views illustrating Korean Patent No. 10-0403484 owned by the present applicant as an example of a related-art;

figure 4 to 11 are views illustrating Korean Patent Application No. 10-2009-66993 filed by the present applicant as another example of a related-art;

figure 12 is a side view illustrating an overall configuration for describing the installation state of the present invention;

figure 13 is a plan view illustrating an overall configuration for describing the installation state of the present invention;

figure 14 is a plan view illustrating a continuous arrangement state according to an embodiment of the present invention;

figure 15 is a front view illustrating a continuous arrangement state according to an embodiment of the present invention;

figure 16 is a side view illustrating a collapsible multilayer elevator according to an embodiment of the present invention;

figure 17 is a side view illustrating a vehicle loading state after an extension of a collapsible multilayer elevator according to an embodiment of the present invention;

figure 18 is a side view illustrating a collapsible multilayer elevator separated from a monorail for the movement according to an embodiment of the present invention;

figure 19 is a plan view illustrating a travel adjusting unit for transfer and an entry and exit controller under a collapsible multilayer elevator according to an embodiment of the present invention;

figure 20 is a plan view illustrating a vertical elevation adjusting unit installed at an upper portion of a collapsible multilayer elevator according to an embodiment of the present invention; and

figure 21 is a perspective view illustrating a structure of a collapsible multilayer elevator according to an embodiment of the present invention.

<Description of Reference Numerals Indicating Primary Elements in the Drawings>

[0037]

A: entry and exit controller
 B: horizontal movement and loading unit
 C: parking interlayer distance adjusting unit
 D: vertical elevation adjusting unit
 E: travel adjusting unit
 M: driving motor
 15, 16: driving shaft
 300: vehicle loading unit
 401, 402: transfer belt
 500, 600: entry and exit parking unit
 501, 601: left and right conveyor belts
 560, 660: driving sprocket
 800a, 800b, 800c: vehicle loading plate
 805: vertical distance adjusting bar
 810: vertical elevation traction link
 1000: control mechanism
 1500: vertical and horizontal entry and exit unit
 3000: vehicle loading unit
 5000: collapsible multilayer elevator
 mo: monorail
 go: guide rail

Ways of carrying out the Invention

[0038] The present invention provides a parking system that is easy in in-site assembling and maintenance by unitizing a mechanical parking system of multilayer horizontal and vertical circulation type.

[0039] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0040] The overall configuration of the present invention will be described with reference to FIGS. 12 and 13.

[0041] FIG. 14 is a plan view illustrating a continuous arrangement state according to an embodiment of the present invention, and FIG. 16 is a front view.

[0042] FIG. 16 is a side view illustrating a collapsible multilayer elevator according to an embodiment of the present invention. FIG. 17 is a side view illustrating a vehicle loading state after an extension of a collapsible multilayer elevator according to an embodiment of the present invention. FIG. 18 is a side view illustrating a collapsible multilayer elevator separated from a monorail for the movement according to an embodiment of the present invention.

[0043] For reference, to describe the present invention, components identical to those disclosed in Korean Patent Application No. 10-2009-66993 filed by the present applicant as shown in FIGS. 4 to 11 will be indicated as the same reference numerals.

[0044] The present invention relates to a multilayer mechanical parking system that includes a vehicle loading unit which has, in the lower portion thereof, a conveyor

belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle. The multilayer mechanical parking system may include a collapsible multilayer elevator 5000 and a vertical and horizontal entry and exit unit 1500.

[0045] As shown in FIGS. 15 to 18, the collapsible multilayer elevator 5000 may include an entry and exit controller A for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit B connected to an output shaft of the entry and exit controller A so as to horizontally move the loaded parked vehicle to left and right vehicle loading units 3000, an interlayer distance adjusting unit C which has a vertical distance adjusting bar 805 installed at an extended portion protruding from the front surface of the entry and exit controller A so as to adjust the distance between the entry and exit controller A and the horizontal movement and loading units B arranged in multiple layers during vertical elevation, a vertical elevation adjusting unit D linked to the extended portion of the entry and exit controller A located at the top of the interlayer distance adjusting unit C so as to enable the vertical elevation of the collapsible multilayer elevator 5000, and a travel adjusting unit (E of FIG. 13) which receives power from the vertical elevation adjusting unit D so as to enable the horizontal forward and backward movement of the collapsible multilayer elevator 5000.

[0046] Also, in the vertical and horizontal entry and exit unit (1500 of FIG. 15), the vehicle loading units 3000, which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, may be symmetrically arranged, and a vertical and horizontal entry and exit unit 1500 may be arranged to enable the collapsible multilayer elevator 5000 to move in horizontal and vertical directions between the symmetrically arranged vehicle loading units 3000.

[0047] The entry and exit controller A, as shown in FIGS. 8 to 10, may include a power generating device, a power transmission device, and a control mechanism (1000 of FIG. 11). The power generating device may generate power using a driving motor M, and then output power to the output shaft 11. A rotation sensor 12 may be disposed at the rear side of the driving motor M. The power transmitting device may be connected to the left and right clutches 301 and 302. The power transmission device may include a first toothed gear 13 disposed at the output shaft of the power generating device to transform delivered power and then deliver power to the conveyor belt for the entry and exit controller and a second toothed gear 14 for delivering power to the left and right conveyor belts. The first toothed gear 13 may be power-transmittably connected to the driving shafts 15 and 16 for the entry and exit controller by a power transmitting

unit 101, and the second toothed gear 14 may also be power-transmittably connected to the left and right clutches 301 and 302 by a left and right delivering units 102 for delivering power to the left and right conveyor belts. Also, the control mechanism (1000 of FIG. 11) may include left and right levers 210 and 202 that can deliver power delivered from the power transmitting device to the left and right driving sprockets (560 and 660 of FIG. 6) and left and right hydropneumatic cylinders 203 and 204 that enable the operation control of the levers 201 and 202.

[0048] In the control mechanism (1000 of FIG. 12), as shown in FIG. 8, the left and right levers 201 and 201a connected to operating rods 203a and 204a of the left and right hydropneumatic cylinders 203 and 204 enable the shift forks 205 and 205a connected to the front ends 202 and 202a of the operating lever 201 and 201a to move back and forth toward the driving shaft of the left and right conveyor belt by the forward and backward movement of the operating rods 203a and 204a, centering on pins 206 and 206a.

[0049] In this embodiment, a space is formed between the central loading part and the left and right conveyor belts when a vehicle is transferred to the left or right side or exits. In order to prevent a lower wheel of the vehicle from being stuck in the space, one end of the left and right timing belts 220 and 220a may be connected to a central part of the left and right levers 201 and 201a connected to the operating rods 203a and 204a of the left and right hydropneumatic cylinders 203 and 204, and the other end of the timing belts 220 and 220a is connected to left and right shift levers 224 and 224a of left and right interlocking belts 223 and 223a through left and right idle toothed gears 221 and 221a and 222 and 222a.

[0050] In this embodiment, the left and right clutches 301 and 302, as shown in FIGS. 8 and 11, may deliver power when acceptance toothed gears 303 and 303a and synchronizers 304 and 304a, which have hollow cylindrical shapes, are engaged with each other. External screw threads 306 of the synchronizers 304 and 304a may be engaged with internal screw grooves 305 of the acceptance gears 303 and 303a. A centering shaft 307 may project from a front end of the synchronizers 304 and 304a. The internal rear portion 308 of the acceptance toothed gears 303 and 303a may be elastically supported by a spring 309, and may move back and forth in linkage with the back and forth movement of the shift forks 205 and 205a. Thus, the power transmission to the left and right side may be performed in line with the advancement of the vehicle.

[0051] As shown in FIG. 6, the left and right movement loading unit (B of FIGS. 16 and 18) may include a caterpillar-type transfer belt 401. The transfer belt 401 may be axially connected to the driving shafts 15 and 16 of the entry and exit controller A to allow the front and rear transfer belts 401 and 402 to rotate at the same time, randomly loading a loaded vehicle onto the left and right conveyor belts 501 and 601 of the vehicle loading unit

3000 adjacent thereto.

[0052] In this case, the left and right conveyor belts 501 and 601 may be transferred by the driving sprockets 560 and 660. The driving sprockets 560 and 660 may be formed of a reinforced plastic not to be damaged even by continuous use and exert the same function while being reduced in weight.

[0053] Also, since the left and right conveyor belts 501 and 601 may increase in length after use, the length of the left and right conveyor belts 501 and 601 needs to be adjusted after use for a certain time. For this, a length adjusting means (not shown) may be disposed at one side or the other side opposite thereto of the driving sprockets 560 and 660 to adjust the length of the left and right conveyor belts 501 and 601. Thus, the left and right conveyor belts 501 and 601 may be maintained at an appropriate tension.

[0054] As shown in FIGS. 16 to 18, the parking inter-layer distance adjusting unit C may be connected to the fixing part 801a of the extended part 801 protruding from the front surface of the uppermost entry and exit controller a1 and the vertical elevation traction link 810 of the vertical elevation adjusting unit D. Also, the distance adjusting bar 805 disposed in the extended part 801 of the lower layer entry and exit controller A consecutively disposed under the uppermost layer entry and exit controller a1 is configured to penetrate a through hole 805a of the extended part 801 of the uppermost layer entry and exit controller a1.

[0055] Also, the distance adjusting bars 805 are consecutively and penetrably disposed in the entry and exit controllers A consecutively disposed thereunder.

[0056] A stop bar 805b may be formed at the top of the distance adjusting bar 805 to be stopped by the extended part 801 at the upper side.

[0057] As shown in FIGS. 8 and 11, in the control mechanism 1000, the left and right levers 201 and 201a connected to operating rods 203a and 204a of the left and right hydropneumatic cylinders 203 and 204 enable the shift forks 205 and 205a connected to the front ends 202 and 202a of the operating lever 201 and 201a to move back and forth toward the driving shaft of the left and right conveyor belt by the forward and backward movement of the operating rods 203a and 204a, centering on pins 206 and 206a.

[0058] As shown in FIGS. 16 to 18 and FIGS. 20, in the vertical elevation adjusting unit D, an output shaft 910 of a driving motor M1 may be connected to a power transmission device 916 for elevation via a clutch 915, and the output shaft 910 may rotate a vertical driving shaft 920 through a first power conversion device 903, a power transmission device 904, and a second power conversion device 905.

[0059] As shown in FIGS. 18 and 19, the travel adjusting unit E may move back and forth along a monorail mo by converting power in a horizontal direction through a third power conversion device 929 disposed at the lowermost portion of the vertical driving shaft 920 to deliver

power to a driving gear 940 engaged with the monorail mo through a horizontal movement power transmission device 930.

[0060] In this case, the travel adjusting unit E may be configured to be supported by a guide rail go that is horizontally disposed at both sides of the monorail mo.

[0061] As shown in FIG. 5, the present invention is characterized by an installation of a vehicle entering detection switch 580 between a front conveyor belt r and a rear conveyor belt rr. If a vehicle enters, a vehicle entry detection switch 580 detects the pressure of wheels of the vehicle and transfers a detection signal to a main controller. Such signal is an operating signal with respect to the hydropneumatic cylinder 582 for the stopper 581 installed in the front and rear conveyor belts r and rr to vertically project to operate the operating rod 583 and a link piece 584 connected to the operating rod 583 and to vertically and horizontally move the stopper 581.

[0062] A distance d between the front and rear conveyor belts r and rr is about 10% to about 20% larger than the wheel base of a small car. A distance d1 between the front conveyor belt r and an external end of the rear conveyor belt rr is about 10% to about 20% larger than the wheel base of a large vehicle. Thus, any vehicle can be parked regardless of its size.

[0063] As another feature of the present invention as shown in FIG. 15, the present invention relates to a multilayer mechanical parking system that includes a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle. The multilayer mechanical parking system may include a collapsible multilayer elevator 5000 and a vertical and horizontal entry and exit unit 1500 such that the collapsible multilayer elevator 5000 and the vertical and horizontal entry and exit unit 1500 can be continuously and extensively disposed.

[0064] In this case, the collapsible multilayer elevator 5000 may include an entry and exit controller A for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit B connected to an output shaft of the entry and exit controller A so as to horizontally move the loaded parked vehicle to left and right vehicle loading units 3000, an interlayer distance adjusting unit C which has a vertical distance adjusting bar 805 installed at an extended portion protruding from the front surface of the entry and exit controller A so as to adjust the distance between the entry and exit controller A and the horizontal movement and loading units B arranged in multiple layers during vertical elevation, and a vertical elevation adjusting unit D linked to the extended portion of the entry and exit controller A located at the top of the interlayer distance adjusting unit

C so as to enable the vertical elevation of the collapsible multilayer elevator 5000.

[0065] FIG. 21 is a perspective view illustrating a structure of a collapsible multilayer elevator 5000 according to an embodiment of the present invention.

[0066] For reference, FIG. 21 is a perspective view illustrating a structure in which a vertical elevation movement of vehicle loading plates 800a, 800b and 800c continuously arranged in a vertical direction is performed by the vertical elevation traction link 810.

[0067] As shown in the drawing, the output shaft 910 of the driving motor M1 may drive link driving shaft R1 and R2 by a sprocket that is integrally formed. That is, the rotation of the link driving shaft R1 and R2 may be delivered to other sprockets G1 and G2 of the output shaft 910 by chains C1 and C2 that are power transmission means, and when the link driving shafts R1 and R2 rotate, the vertical elevation traction link 810 coupled to other sprockets S1 and S2 on the link driving shafts R1 and R2 may be allowed to move.

[0068] Particularly, the vertical elevation traction link 810 may be simultaneously coupled to four corners of the vehicle loading plates 800a, 800b and 800c to enable stable elevation without shaking when the vehicle loading plates 800a, 800b and 800c vertically move.

[0069] Referring to FIGS. 15 to 18 and 21, the structure shown in the drawings shows a parking interlayer distance adjusting unit C that adjusts a vertical elevation distance of the left and right horizontal movement loading unit B and the entry and exit controller A that are disposed in a multilayer by a plurality of vertical distance adjusting bars 805.

[0070] That is, the parking interlayer distance adjusting unit C that are disposed in a multilayer may be connected to the fixing part 801a of the extended part 801 protruding from the front surface of the uppermost layer entry and exit controller a1 and the vertical elevation traction link 810 of the vertical elevation adjusting unit D.

[0071] Also, the distance adjusting bar 805 disposed in the extended part 801 of the lower layer entry and exit controller A consecutively disposed under the uppermost layer entry and exit controller a1 may be configured to penetrate a through hole 805a of the extended part 801 of the uppermost layer entry and exit controller a1, and the distance adjusting bars 805 may be consecutively and penetrably disposed in the entry and exit controllers A consecutively disposed thereunder.

[0072] As described above, the stop bar 805b may be formed at the top of the distance adjusting bar 805 to be stopped by the extended part 801 at the upper side.

[0073] Also, front and rear transfer belts 401 and 402 may be disposed on each of the vehicle loading plates 800a, 800b and 800c that are disposed in a multilayer. The vertical elevation traction link 810 may be simultaneously connected to front and rear sides to perform elevation such that stabler movement can be achieved when each of vehicle loading plates 800a, 800b and 800c vertically moves.

[0074] Also, the vehicle loading units 3000, which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, may be symmetrically arranged, and a vertical and horizontal entry and exit unit 1500 may be arranged to enable the collapsible multilayer elevator 5000 to move in horizontal and vertical directions between the symmetrically arranged vehicle loading units 3000. In this case, the collapsible multilayer elevator 5000 and the vertical and horizontal entry and exit unit 1500 may be continuously and extensively disposed.

[0075] The present invention relates to a multilayer mechanical parking system that includes a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle. The multilayer mechanical parking system may include an entry and exit controller A that controls the entry and exit and the horizontal movement of a vehicle to be parked, a collapsible multilayer elevator 5000 and a vertical and horizontal entry and exit unit 1500 such that the collapsible multilayer elevator 5000 and the vertical and horizontal entry and exit unit 1500 can be continuously and extensively disposed, and may further include a collapsible multilayer elevator for emergency disposed at side surface and the vertical and horizontal entry and exit unit 1500.

[0076] In the above configuration, the collapsible multilayer elevator 5000 may be an elevation apparatus that includes a horizontal movement and loading unit B axially connected to an output shaft of the entry and exit controller A so as to horizontally move the loaded parked vehicle to left and right vehicle loading units 3000, an interlayer distance adjusting unit C which has a vertical distance adjusting bar 805 installed at an extended portion protruding from the front surface of the entry and exit controller A so as to adjust the distance between the entry and exit controller A and the horizontal movement and loading units B arranged in multiple layers during vertical elevation, and a vertical elevation adjusting unit D linked to the extended portion of the entry and exit controller A located at the top of the interlayer distance adjusting unit C so as to enable the vertical elevation of the collapsible multilayer elevator 5000.

[0077] Also, in the vertical and horizontal entry and exit unit 1500, the vehicle loading units 3000, which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, may be symmetrically arranged, and the vertical and horizontal entry and exit unit 1500 may be arranged to enable the collapsible multilayer elevator 5000 to move in horizontal and vertical directions between the symmetrically arranged vehicle loading units 3000. Accordingly, the present invention can prevent inconvenience in use by enabling the mechanical parking system to be repaired while maintaining

the entry and exit of a vehicle using the collapsible multilayer elevator for emergency when a failure occurs in the mechanical parking system.

Claims

1. A multilayer mechanical parking system comprising a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle, the multilayer mechanical parking system further comprising:

a collapsible multilayer elevator comprising an entry and exit controller (A) for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit (B) connected to an output shaft of the entry and exit controller (A) so as to horizontally move the loaded parked vehicle to left and right vehicle loading units, an interlayer distance adjusting unit (C) which has a vertical distance adjusting bar installed at an extended portion protruding from the front surface of the entry and exit controller (A) so as to adjust the distance between the entry and exit controller (A) and the horizontal movement and loading units (B) arranged in multiple layers during vertical elevation, a vertical elevation adjusting unit (D) linked to the extended portion of the entry and exit controller (A) located at the top of the interlayer distance adjusting unit (C) so as to enable the vertical elevation of the collapsible multilayer elevator, and a travel adjusting unit (E) which receives power from the vertical elevation adjusting unit (D) so as to enable the horizontal forward and backward movement of the collapsible multilayer elevator (5000); and

a vertical and horizontal entry and exit unit (1500) comprising the vehicle loading units (3000), which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, symmetrically disposed, and enabling the collapsible multilayer elevator (5000) to move in horizontal and vertical directions between the vehicle loading units (3000) that are symmetrically disposed.

2. The multilayer mechanical parking system of claim 1, wherein the entry and exit controller (A) comprises:

- a power generating unit that generates power by a driving motor (M) at the front central portion thereof to output power to an output shaft (11) and comprises a rotation sensor (12) disposed at a rear side of the driving motor (M);
- a power transmission device comprising a first toothed gear (13) disposed at the output shaft (11) of the power generating device to transform delivered power and then deliver power to the conveyor belt for the entry and exit controller and a second toothed gear (14) for delivering power to the left and right conveyor belts, the first toothed gear 13 being power-transmittably connected to the driving shafts (15 and 16) for the entry and exit controller, disposed at left and right sides, by a power transmitting unit (101) and the second toothed gear (14) being power-transmittably connected to the left and right clutches (301 and 302) by a left and right delivering units (102) for delivering power to the left and right conveyor belts; and
- a control mechanism (1000) comprising left and right levers (210 and 202) that deliver power delivered from the power transmitting device to left and right driving sprockets (560 and 660) and left and right hydropneumatic cylinders (203 and 204) that enable the operation control of the left and right levers (201 and 202).
3. The multilayer mechanical parking system of claim 2, wherein the driving sprockets (560 and 660) that rotate the conveyor belts are formed of a reinforced plastic.
 4. The multilayer mechanical parking system of claim 2, further comprising a length adjusting unit disposed at one side or the other side opposite thereto of the driving sprockets (560 and 660) rotating the conveyor belts to adjust the length of the left and right conveyor belts.
 5. The multilayer mechanical parking system of claim 1, wherein the left and right movement loading unit (B) comprises a caterpillar-type transfer belt (401), and the transfer belt (401) is connected to the driving shafts (15 and 16) of the entry and exit controller A to allow the front and rear transfer belts to rotate at the same time, randomly loading a loaded vehicle onto the left and right conveyor belts (501 and 601) of the vehicle loading unit (3000) adjacent thereto.
 6. The multilayer mechanical parking system of claim 1, wherein:

the parking interlayer distance adjusting unit (C) is connected to the fixing part (801a) of the extended part (801) protruding from the front surface of the uppermost layer entry and exit con-

troller (a1) and the vertical elevation traction link (810) of the vertical elevation adjusting unit (D); the distance adjusting bars (805) disposed in the extended part of the lower layer entry and exit controller A consecutively disposed under the uppermost layer entry and exit controller (a1) is configured to penetrate a through hole (805a) of the extended part (801) of the uppermost layer entry and exit controller (a1), and are consecutively and penetrably disposed in the entry and exit controllers (A) consecutively disposed thereunder; and

A stop bar (805b) is formed at the top of the distance adjusting bar (805) to be stopped by the extended part (801) at the upper side.

7. The multilayer mechanical parking system of claim 1, wherein in the vertical elevation adjusting unit (D), an output shaft (910) of a driving motor (M1) is connected to a power transmission device (916) for elevation via a clutch (915), and the output shaft (910) rotates a vertical driving shaft (920) through a first power conversion device (903), a power transmission device (904), and a second power conversion device (905).
8. The multilayer mechanical parking system of claim 1, wherein the travel adjusting unit (E) move back and forth along a monorail (mo) by converting power in a horizontal direction through a third power conversion device (929) disposed at the lowermost portion of the vertical driving shaft (920) to deliver power to a driving gear (940) engaged with the monorail (mo) through a horizontal movement power transmission device (930), and is configured to be supported by a guide rail (go) that is horizontally disposed at both sides of the monorail (mo).
9. The multilayer mechanical parking system of claim 2, wherein in the control mechanism (1000), the left and right levers (201 and 201a) connected to operating rods (203a and 204a) of the left and right hydropneumatic cylinders (203 and 204) enable the shift forks (205 and 205a) connected to the front ends (202 and 202a) of the operating lever (201 and 201a) to move back and forth toward the driving shaft of the left and right conveyor belt by the forward and backward movement of the operating rods (203a and 204a), centering on pins (206 and 206a).
10. A multilayer mechanical parking system comprising a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle

loading unit and the vehicle transfer unit, and an entry and exit of the vehicle, the multilayer mechanical parking system further comprising:

a collapsible multilayer elevator (5000) comprising an entry and exit controller (A) for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit (B) connected to an output shaft of the entry and exit controller (A) so as to horizontally move the loaded parked vehicle to left and right vehicle loading units (3000), an interlayer distance adjusting unit (C) which has a vertical distance adjusting bar (805) installed at an extended portion protruding from the front surface of the entry and exit controller (A) so as to adjust the distance between the entry and exit controller (A) and the horizontal movement and loading units (B) arranged in multiple layers during vertical elevation, and a vertical elevation adjusting unit (D) linked to the extended portion of the entry and exit controller (A) located at the top of the interlayer distance adjusting unit (C) so as to enable the vertical elevation of the collapsible multilayer elevator (5000); and a vertical and horizontal entry and exit unit (1500) comprising the vehicle loading units (3000), which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, symmetrically disposed, and enabling the collapsible multilayer elevator (5000) to move in horizontal and vertical directions between the vehicle loading units (3000) that are symmetrically disposed, wherein the collapsible multilayer elevator (5000) and the vertical and horizontal entry and exit unit (1500) are continuously and extensively disposed.

11. A multilayer mechanical parking system comprising a vehicle loading unit which has, in the lower portion thereof, a conveyor belt-type transfer structure capable of conveying, in left and right directions, a vehicle loaded thereon, a vehicle transfer unit which elevates, in the vertical direction, a vehicle loaded thereon to be parked, and a controller which controls the horizontal and vertical movements of the vehicle loading unit and the vehicle transfer unit, and an entry and exit of the vehicle, the multilayer mechanical parking system further comprising:

a collapsible multilayer elevator (5000) comprising an entry and exit controller (A) for controlling the entry and exit and a horizontal movement operation of the vehicle, a horizontal movement and loading unit (B) connected to an output shaft of the entry and exit controller (A) so as to horizontally move the loaded parked vehicle to left

and right vehicle loading units (3000), an interlayer distance adjusting unit (C) which has a vertical distance adjusting bar (805) installed at an extended portion protruding from the front surface of the entry and exit controller (A) so as to adjust the distance between the entry and exit controller (A) and the horizontal movement and loading units (B) arranged in multiple layers during vertical elevation, and a vertical elevation adjusting unit (D) linked to the extended portion of the entry and exit controller (A) located at the top of the interlayer distance adjusting unit (C) so as to enable the vertical elevation of the collapsible multilayer elevator (5000); and a vertical and horizontal entry and exit unit (1500) comprising the vehicle loading units (3000), which have bottom surfaces provided with horizontally movable conveyor belt-type transfer devices, symmetrically disposed, and enabling the collapsible multilayer elevator (5000) to move in horizontal and vertical directions between the vehicle loading units (3000) that are symmetrically disposed, wherein the collapsible multilayer elevator (5000) and the vertical and horizontal entry and exit unit (1500) are continuously and extensively disposed and the multilayer mechanical parking system further comprises a collapsible multilayer elevator for emergency at a side surface thereof and the vertical and horizontal entry and exit unit (1500).

FIG. 1

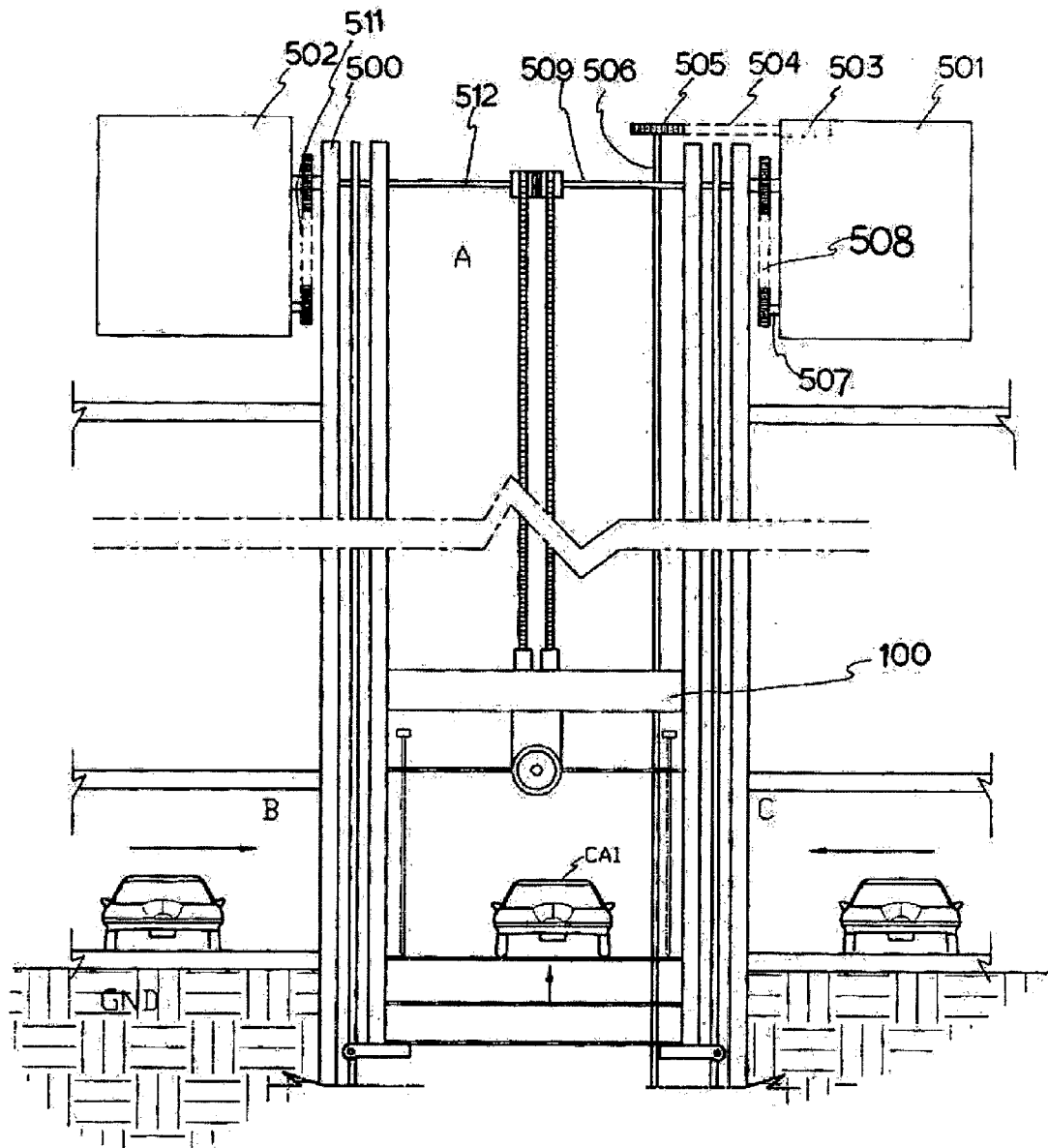


FIG. 2

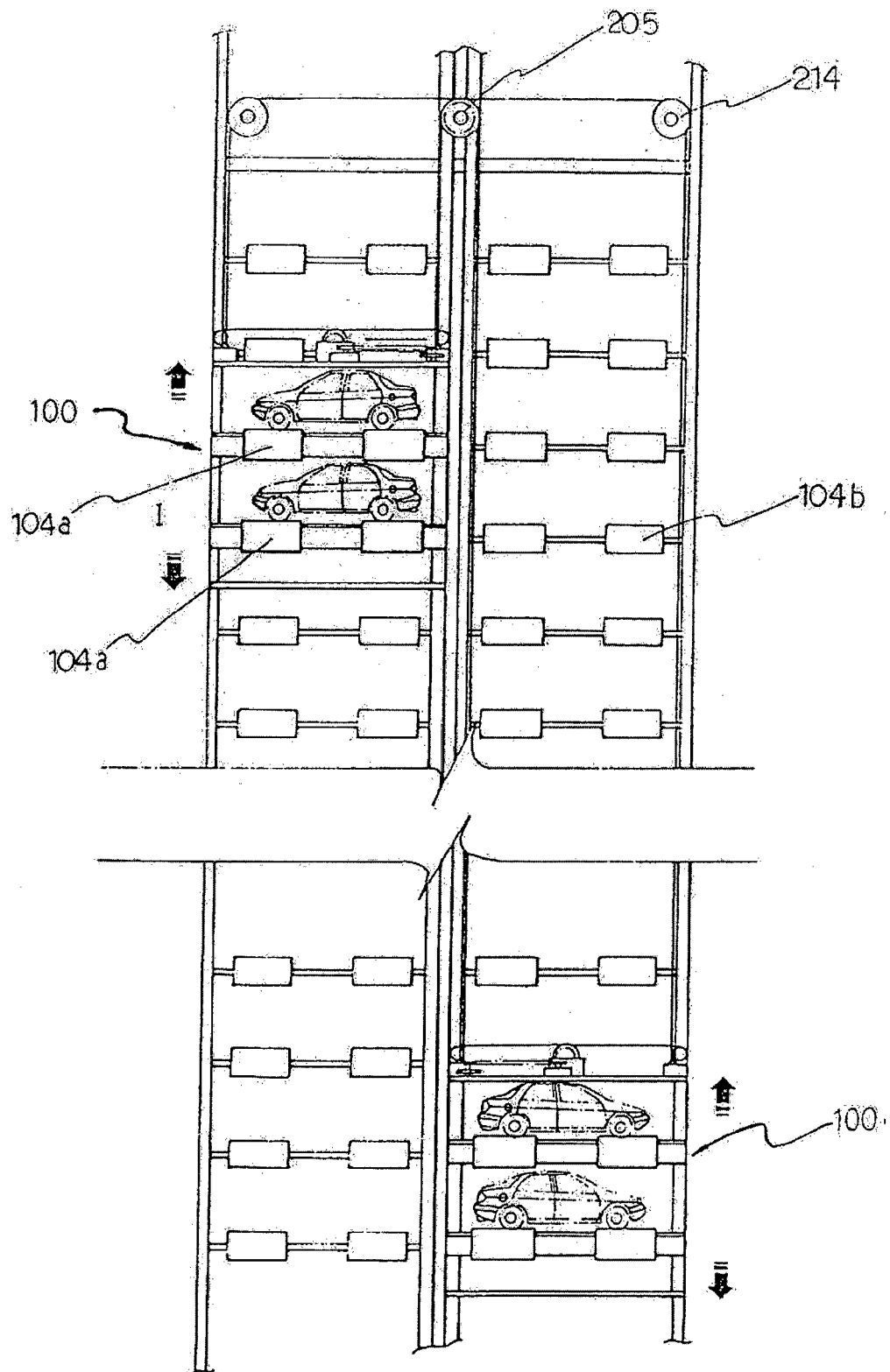


FIG. 3

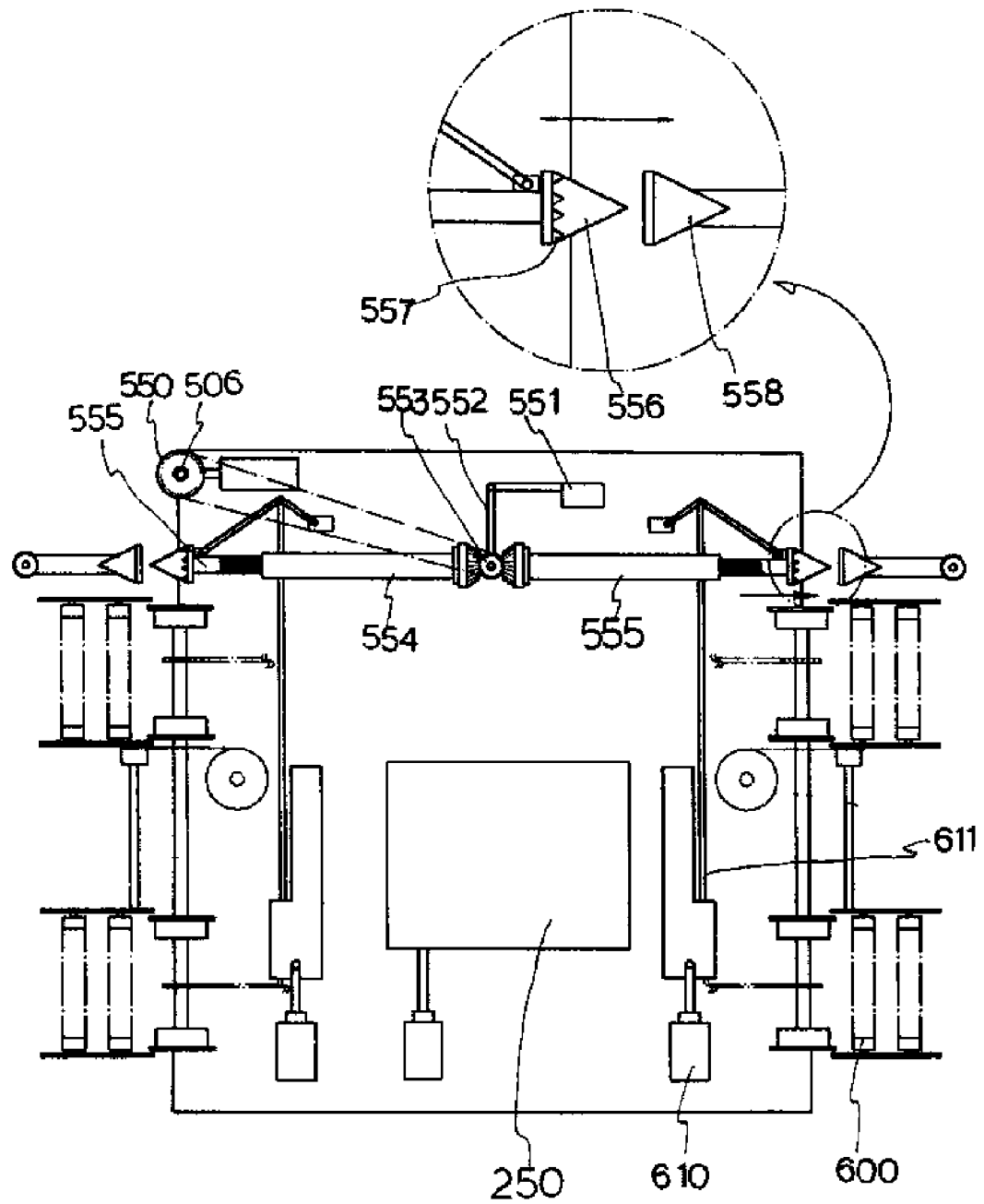


FIG. 4

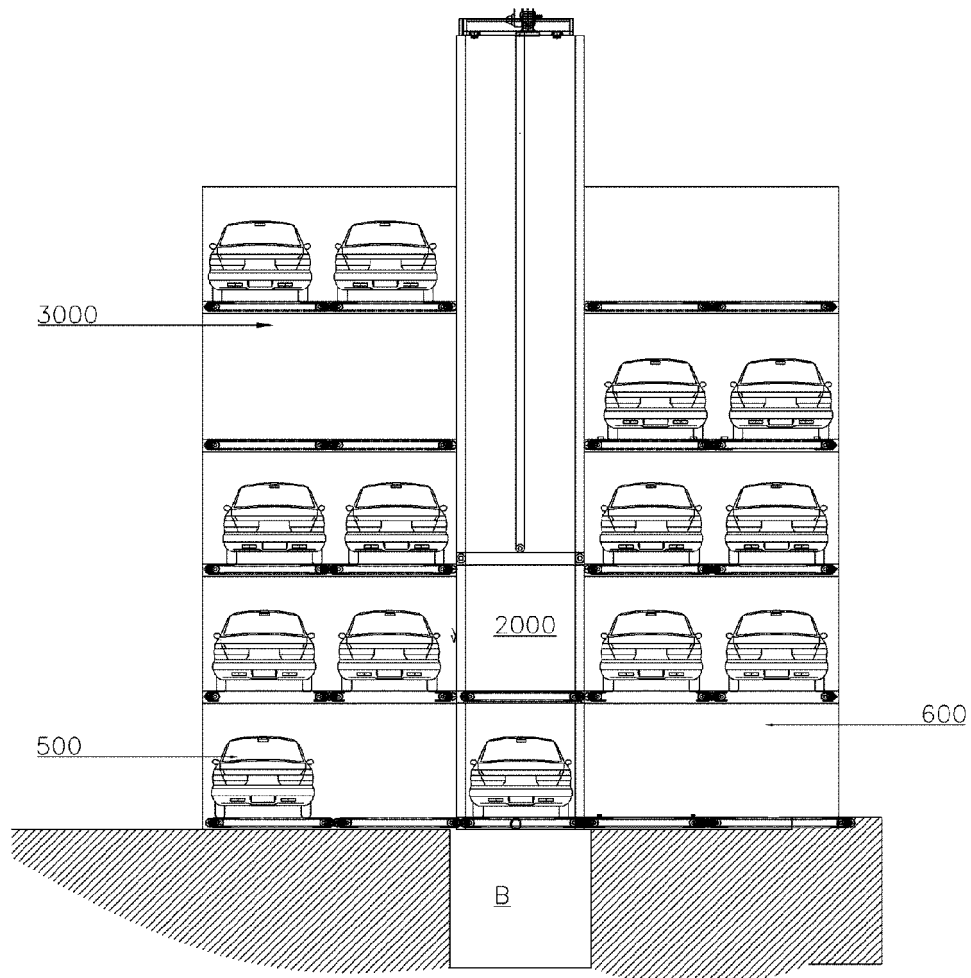


FIG. 5

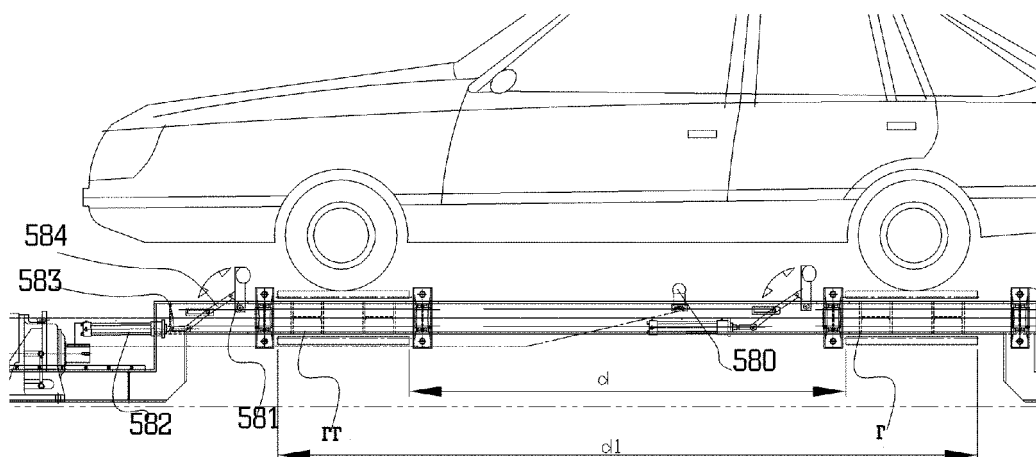


FIG. 6

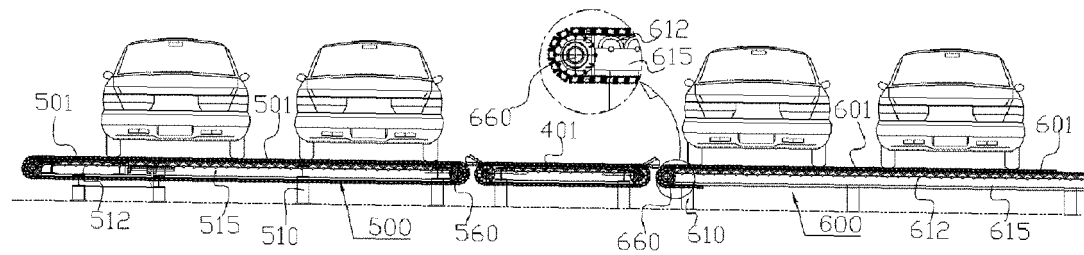


FIG. 7

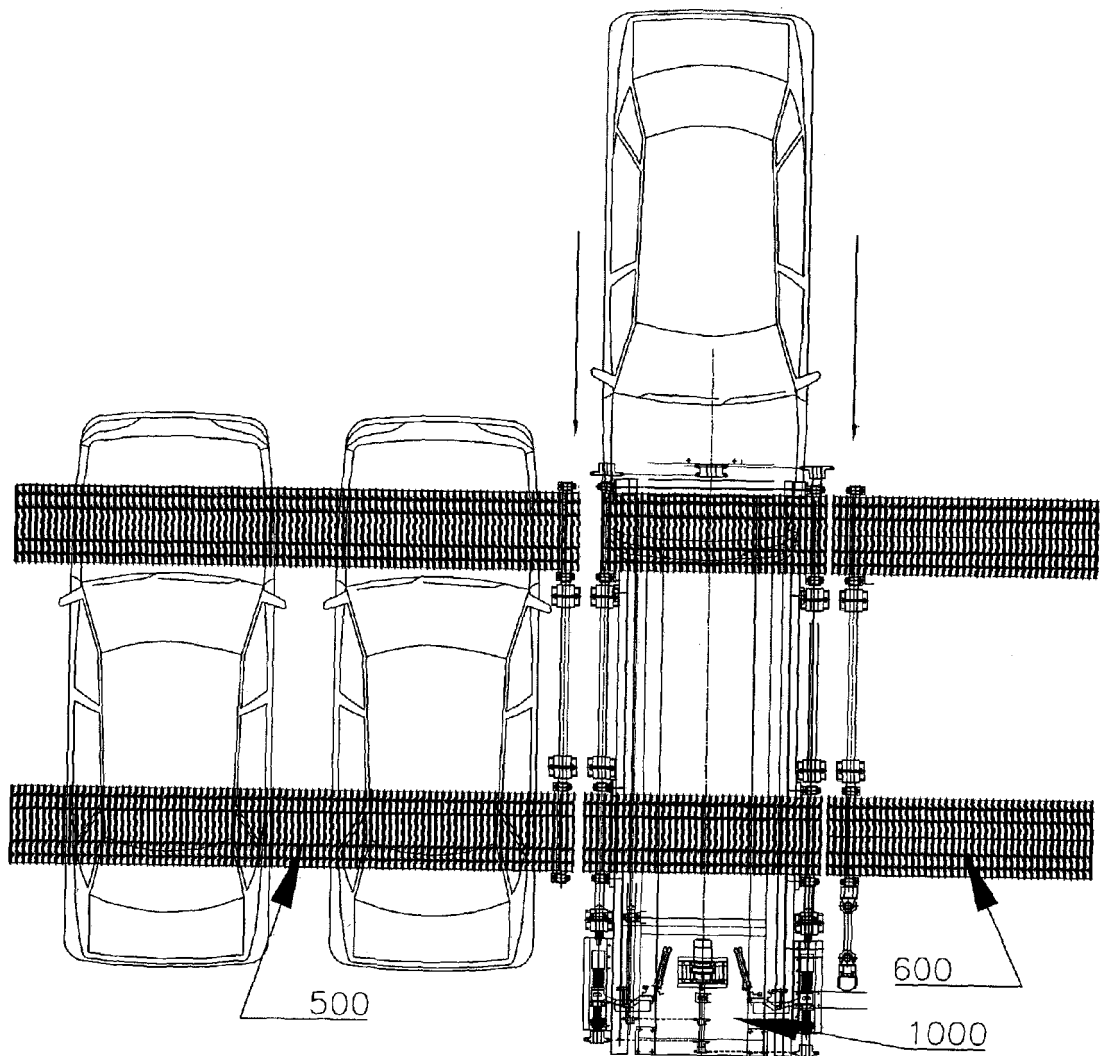


FIG. 8

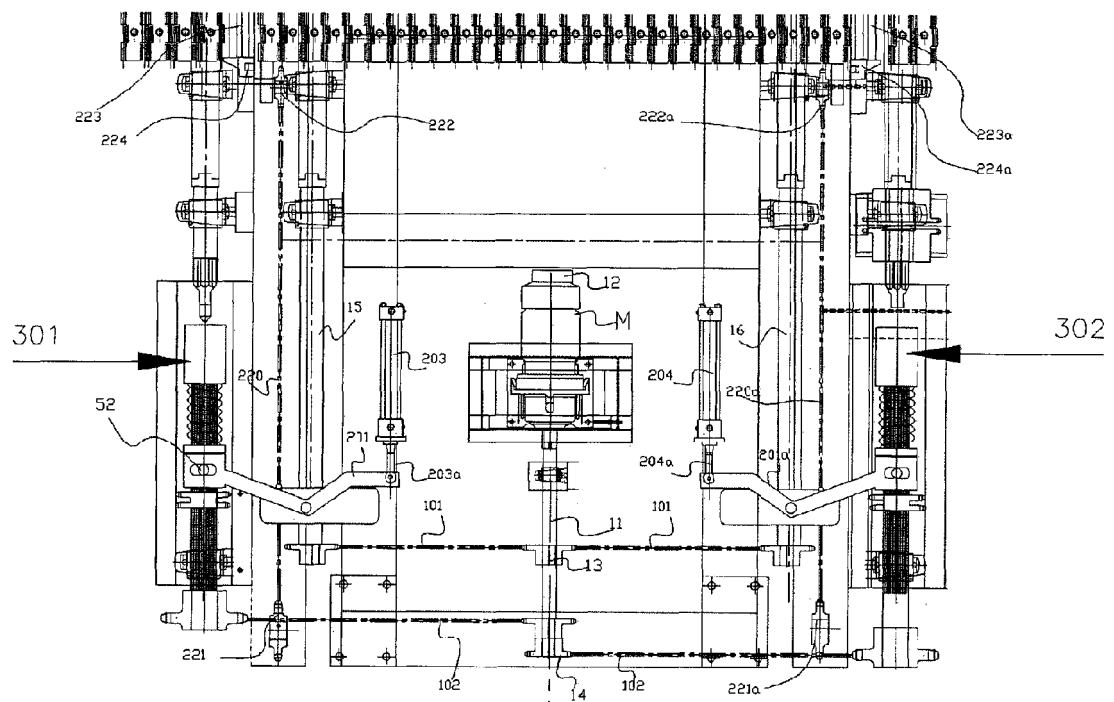


FIG. 9

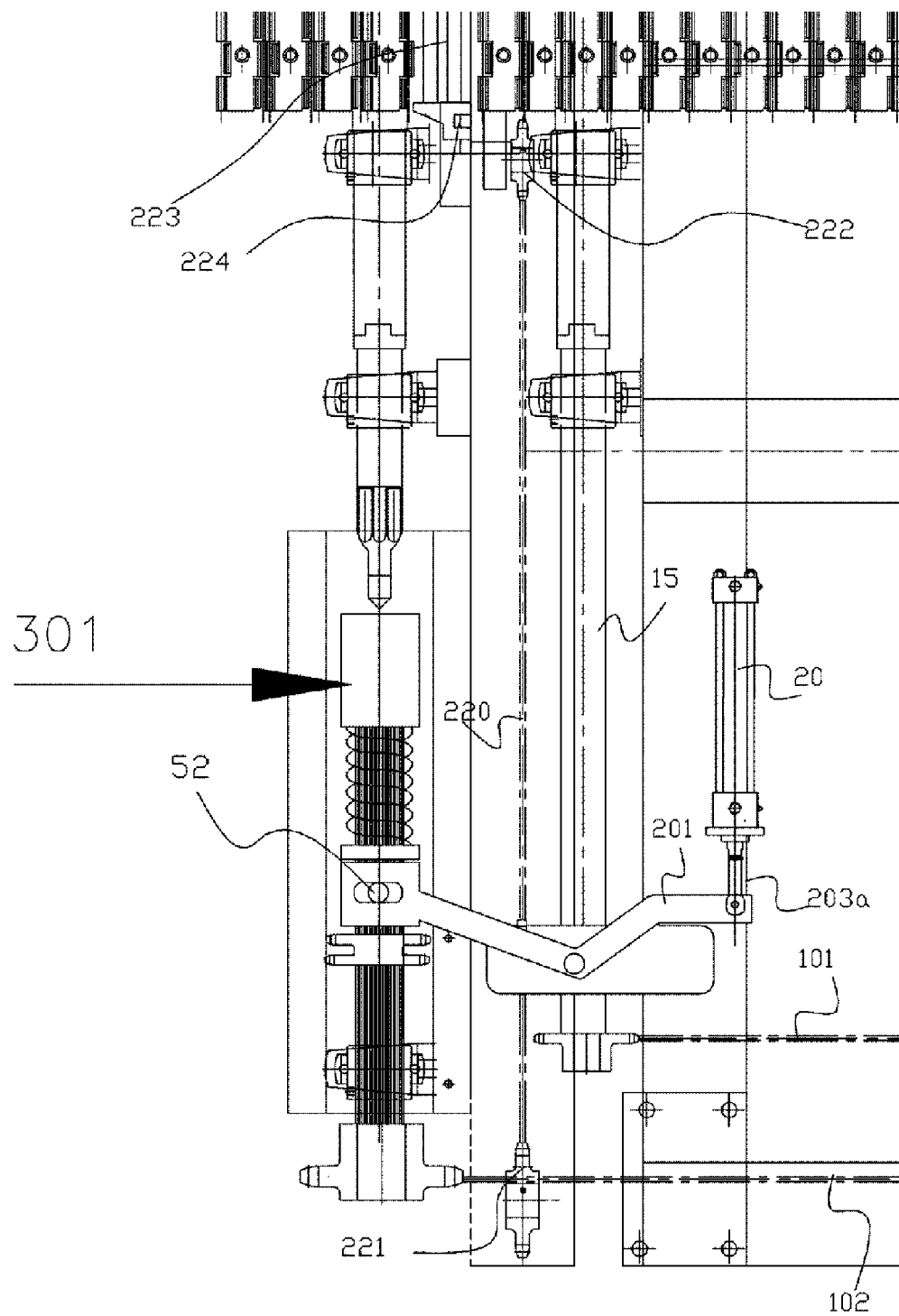


FIG. 10

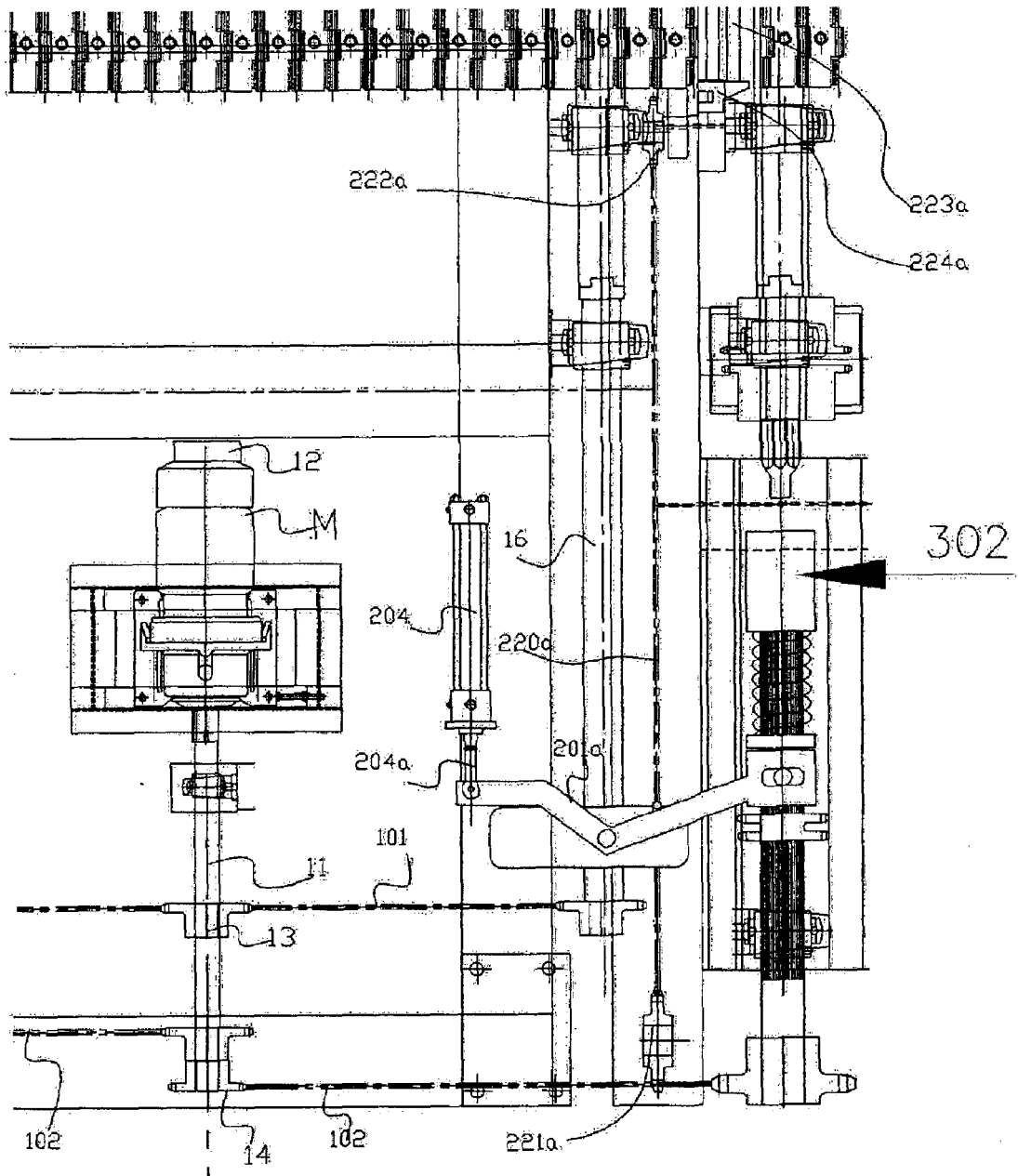


FIG. 11

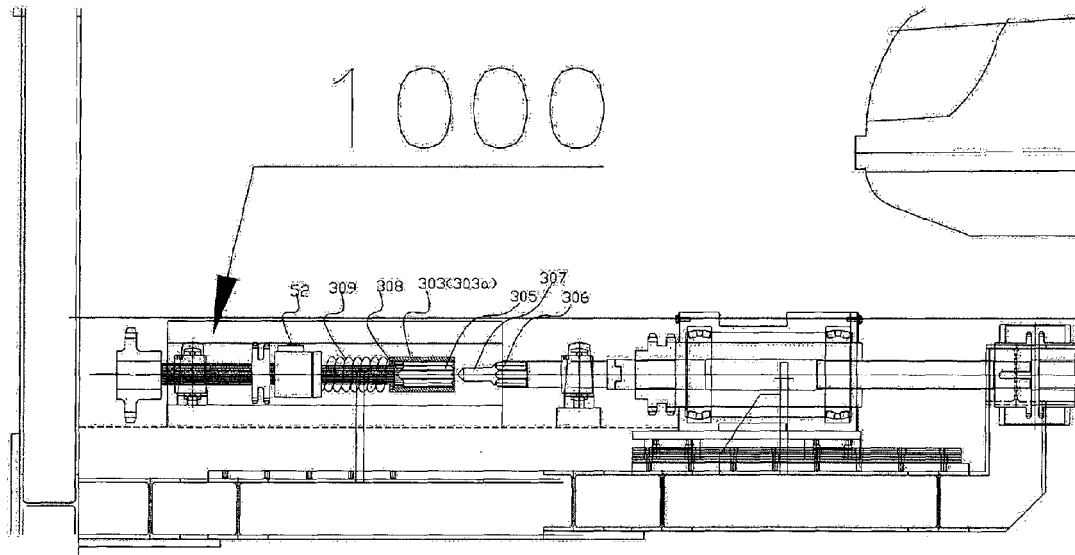


FIG. 12

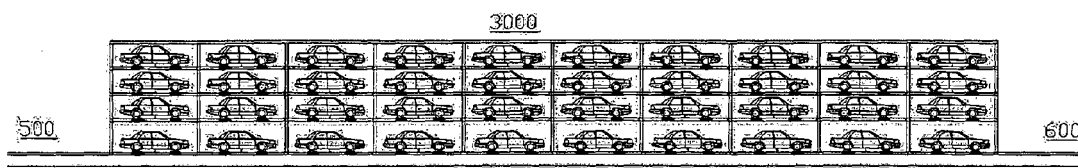


FIG. 13

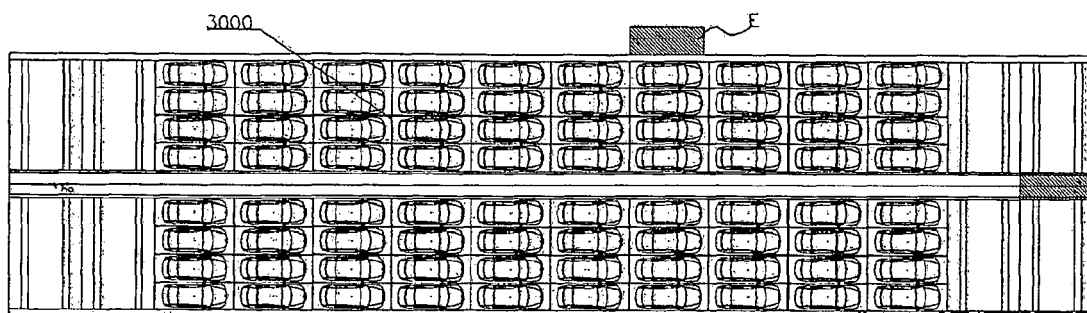


FIG. 14

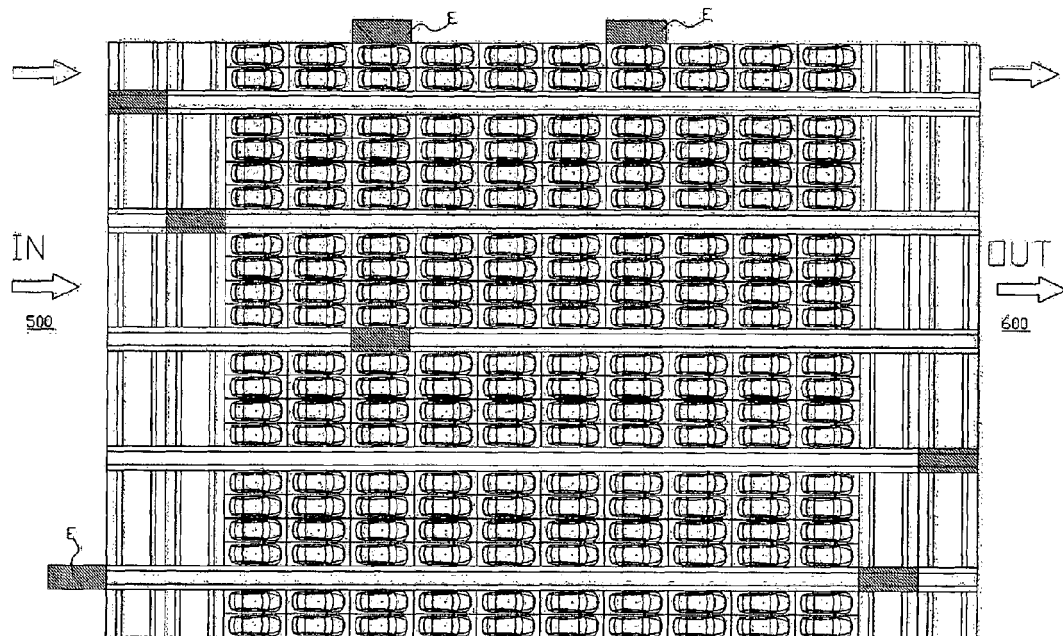


FIG. 15

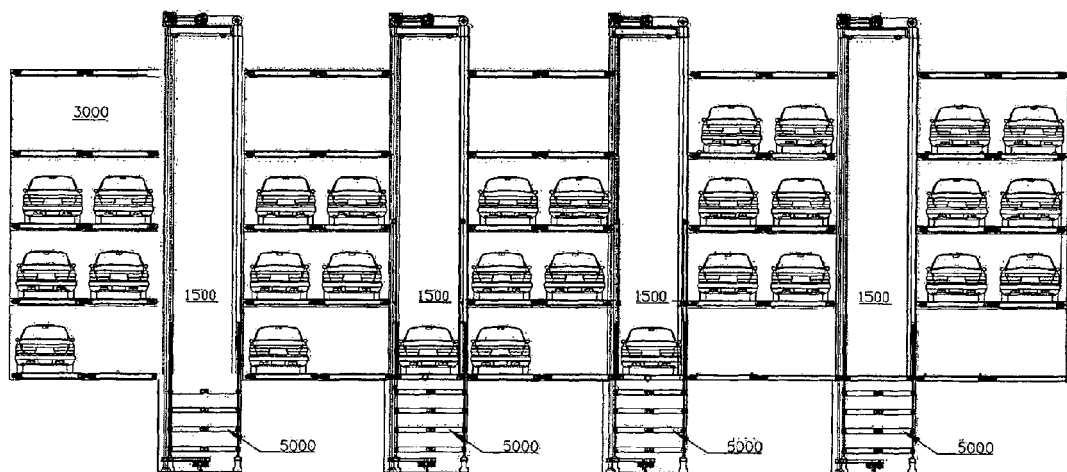


FIG. 16

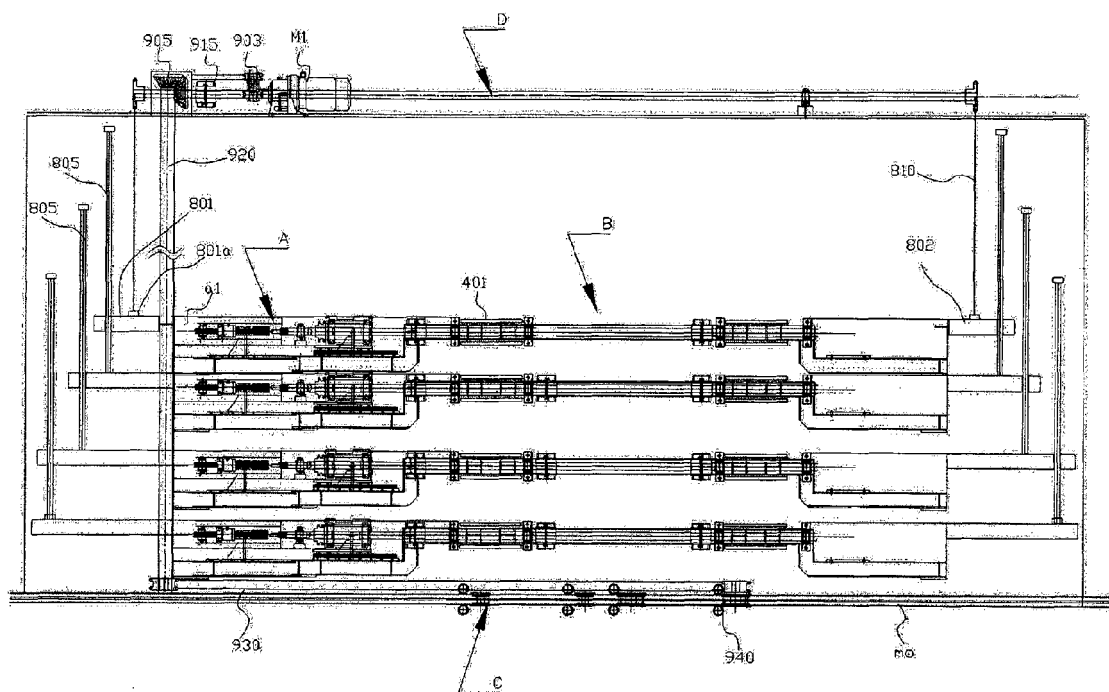


FIG. 17

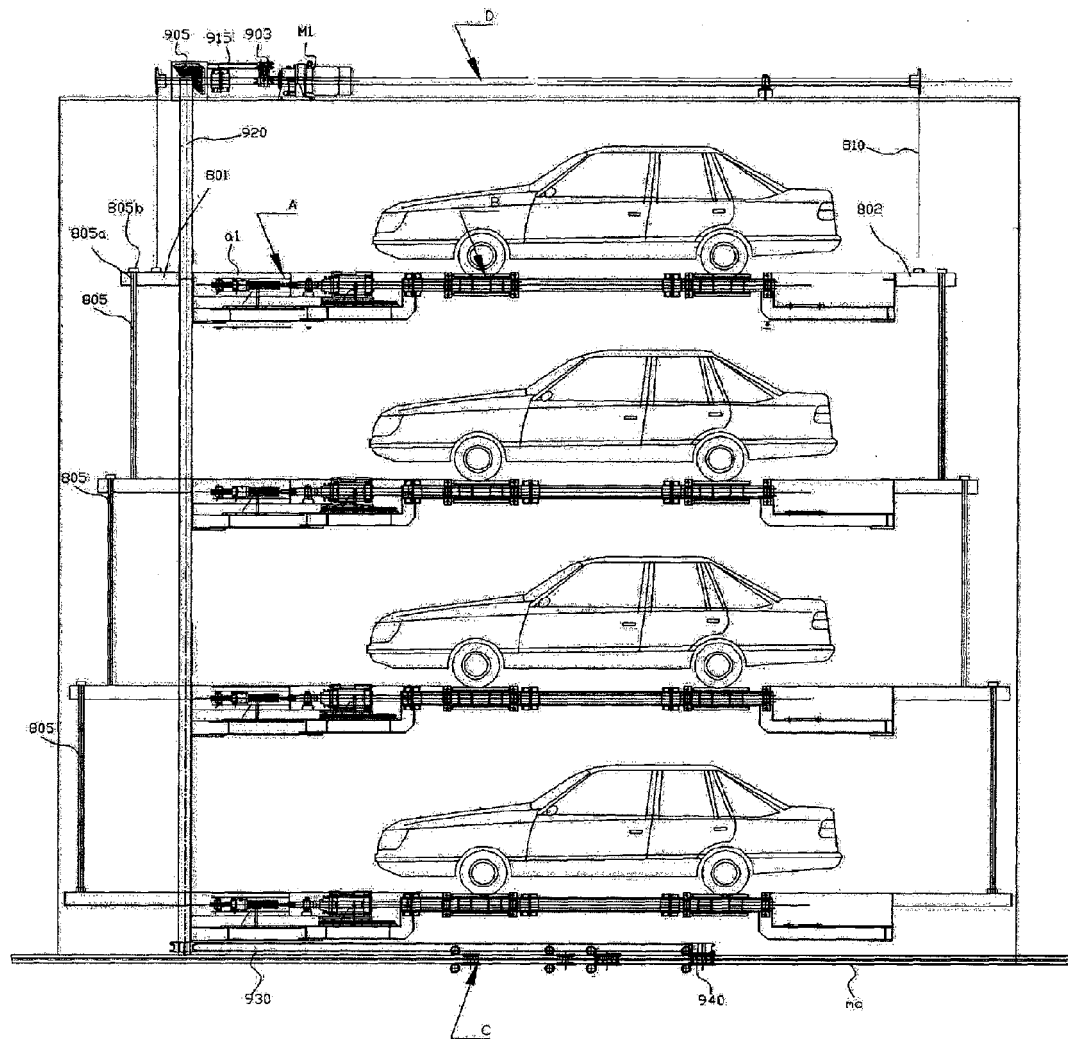


FIG. 18

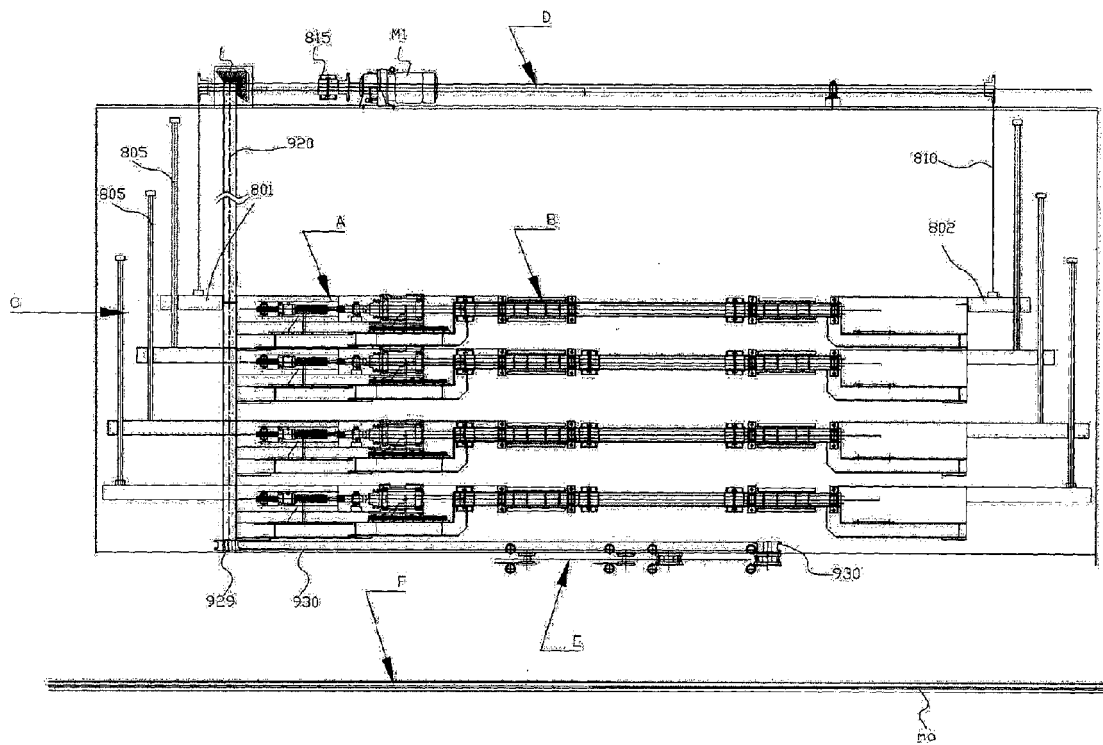


FIG. 19

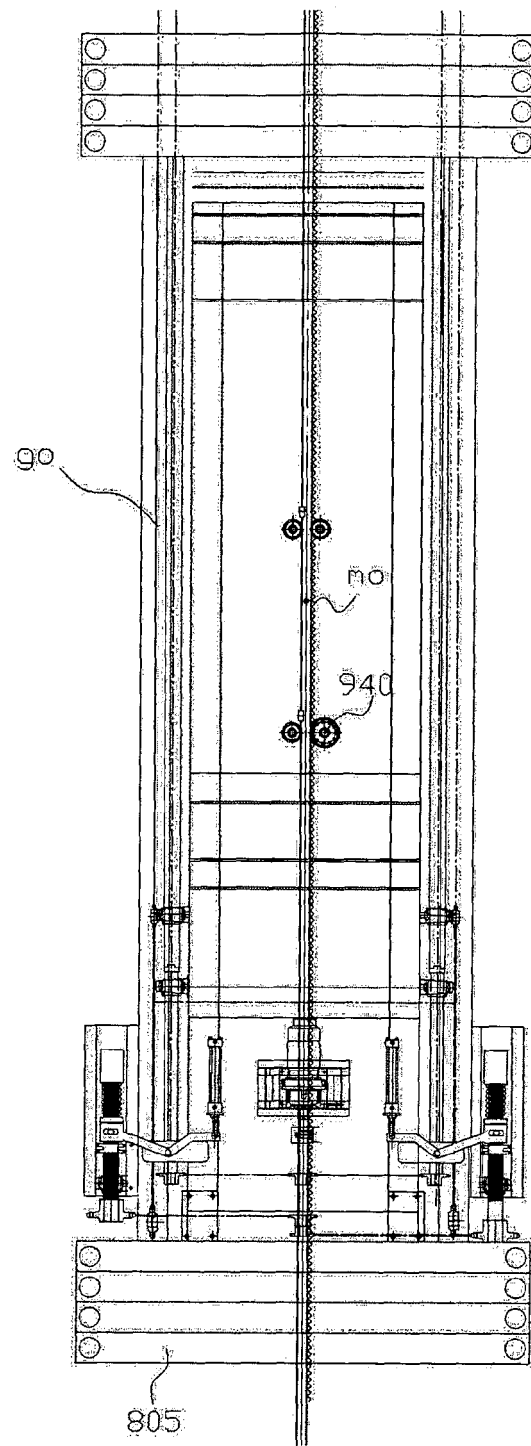


FIG. 20

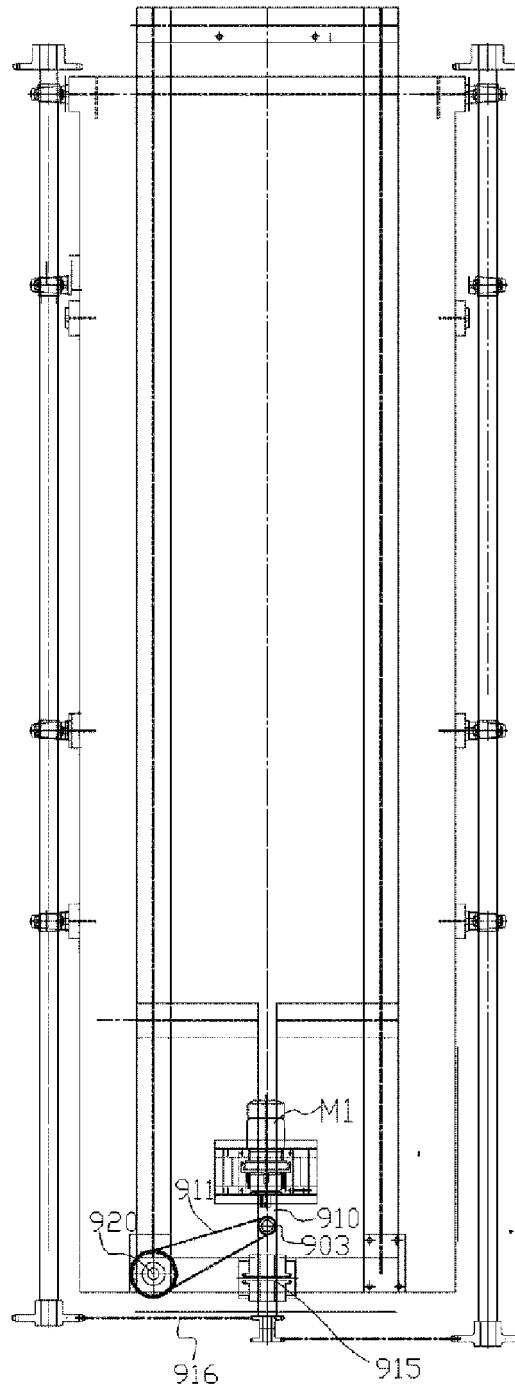
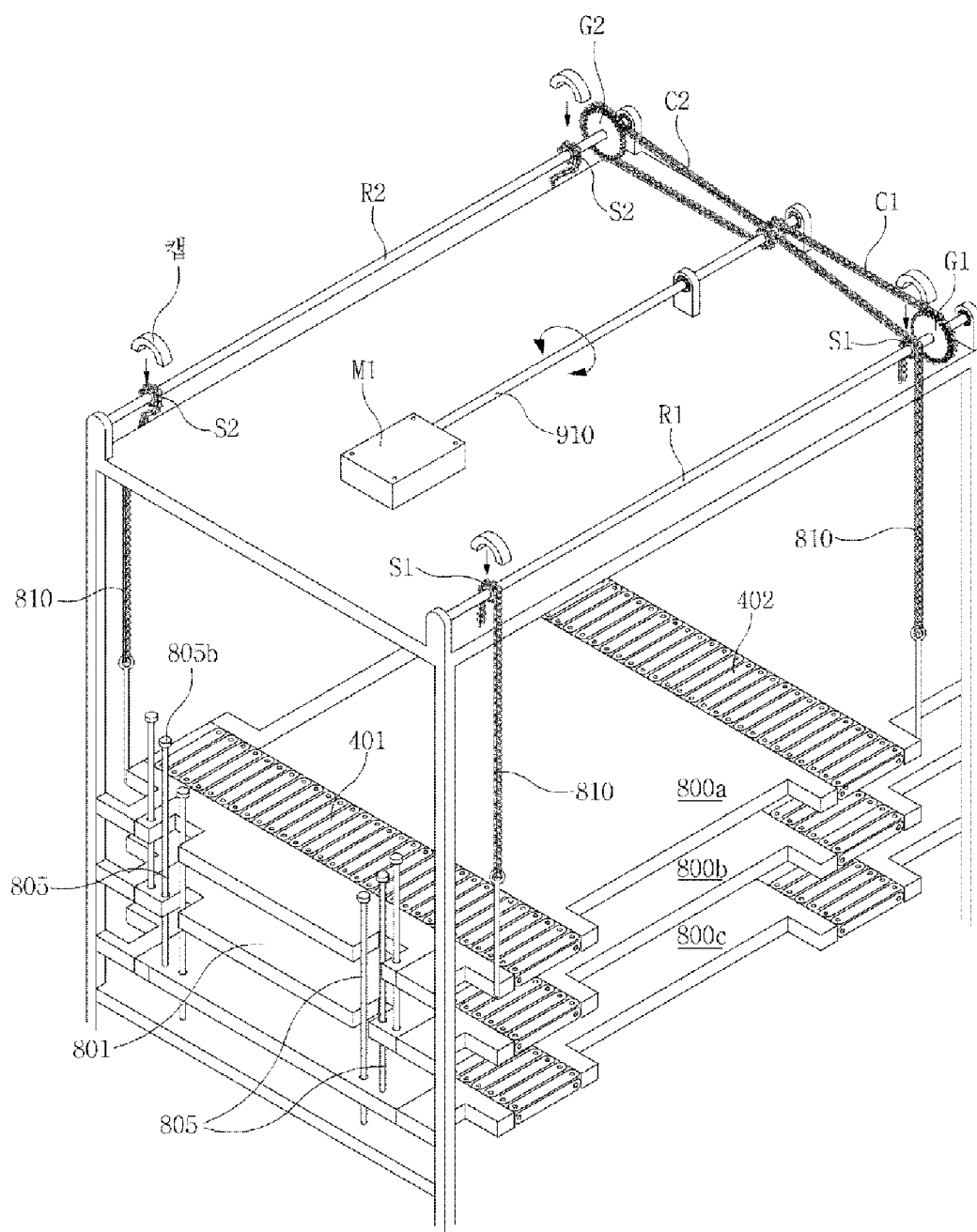


FIG. 21



REFERENCES CITED IN THE DESCRIPTION

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- KR 100403484 [0003] [0036]
- KR 10200966993 [0010] [0011] [0036] [0043]