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BACKGROUND OF THE INVENTION

Field of the Invention

This invention refers to a mechanized, radial type parking system, allowing twelve vehicles to be parked per floor without the need of areas for manoeuvring or circulation, and which applies to any urban area, especially where the land is scarce and expensive. The result is a high level of efficiency and density for vehicle parking as compared with the overall land and building area. A parking lot of this type is disclosed in Mexican patent applications Nos. 927515 and 936173, belonging to the same titleholder of the present patent application.

Prior Art

Previously-existing parking systems are very varied, and can be classified in non-mechanized and mechanized categories. The first provide ease of circulation to allow vehicles to move from the entrance to the parking space, whether located on a single ground-level floor, or on a higher floor where access is by means of a sloping ramp, or where the parking spaces form part of such ramp. These parking lots are characterized by low efficiency, high investment costs, the need for a large land and construction area, and low operating and maintenance costs. The second type of parking lots (mechanized) are characterized by a higher level of efficiency, ranging from those with a low level of sophistication which combine an elevator mechanism with circulation lanes, to fully mechanized systems where the vehicles are suspended in the lifting equipment itself or in vertically-placed niches. Use of the latter has been extremely restricted and for very specific applications, due to their high investment cost.

The foregoing demonstrates the need for designing and building parking systems which combine the following factors of primary importance:

a) An efficient use of urban land
b) Vertical construction, to allow greater parking capacity
c) The requirement for land or reduced dimensions
d) A low investment cost
e) A low operating cost
f) High efficiency in connection with the area needed for parking a car vs. the overall construction area
g) Reliability
h) Low maintenance
i) Low live weight vs. dead weight ratio of the parking system
j) Easy operation
k) Modular construction
l) A capacity which can be expanded
m) Recovery of investment plus operating costs

A radial mechanized parking system takes the foregoing design factors into consideration, providing potential benefits in technical and economic aspects.

A closest prior art that is of interest is US-A-3 497 087 that discloses a multi-storey car park of cylindrical form having a central lift structure in which is mounted an elevating platform for cars, the arrangement being such that when said platform has arrived at a desired floor level, the lift structure can be rotated to a selected orientation to permit a car carried by said platform to drive into a selected one of several parking positions arranged in a circumferential array to define a central lift shaft. The lift structure is an open, rectangular cross-section arrangement composed of vertically extending members braced on its two major sides by diagonally extending members; and being open at its two minor sides to provide access for cars to drive off and onto said elevating platform. Four pairs of endless chains extend from the bottom to the top of the lift structure and pass around sprocket wheels mounted at these locations. The elevating platform is carried by these endless chains. The rotatable lift structure has rollers at its lower end running on a circular base edge, power for rotation being an electric motor positioned below said structure and coupled by a belt and pulley arrangement to a central drive shaft of the lift structure beneath its lower extent. The power for the aforesaid spockets is an electric motor mounted on the rotatable lift structure. On the elevating platform there is an additional car supporting platform on which cars to be parked or removed stand. On reaching a desired level, this additional car supporting platform is automatically moved radially of the lift shaft to close a gap between the central lift structure and the car parking area.

OBJECTS OF THE INVENTION AND THE INVENTION

An object of the present invention is to provide an improved car parking system of the mechanized radial type which is efficient, novel, functional and extremely economical for installation in urban areas.

To this end a car parking system according to the present invention is as defined in the accompanying claims.

The other object of the present invention is to optimize the use of urban land areas by parking vehicles on two or more floors.

Another object of the present invention is to eliminate car circulation, ascent and descent ramps and lanes, in order to better utilize the available construction area of the parking system.

An additional object of the present invention is to have a car-lifting system which, once vehicles are lifted from one level to another, revolves on its own access to allow them to be placed at a suitable angle for ascent and descent.

Another object of this invention is to provide parking where the dead weight of the building is relatively low.
vehicles, revolves around a central axis to acquire any two or more floors in the form of a circular crown, placed the elevator cabin.

Finally, a object of the present invention is the possibility to provide a modular parking system the capacity of which can be increased in accordance with the needs of each specific case, and which is easily made, put together and operated.

The foregoing objects become reality with a new parking system of the radial, mechanized type, consisting basically of a foundation slab of reinforced concrete which will serve as a supporting platform for the structure of the building, as well as, serving as the lower floor of the parking system; a metallic or concrete structure with radial girders sustained by suitably-distributed columns for supporting both the dead weight of the building and the live weight of the cars and their occupants; a revolving elevator of a hydraulic with cables type in the center of each tower which, in addition to hoisting the vehicles, revolves around a central axis to acquire any of twelve preselected positions within 360°, a signalling and control system which allows the operator to identify unoccupied spaces and make the elevator cabin stop vertically on the desired floor and horizontally in the required position, while at the same time allowing safe operation of the elevator in order to prevent any movement or rotation while a vehicle is being lifted or lowered to the elevator cabin.

More specifically, the parking system of the present invention consist of a cylindrically-shaped building of two or more floors in the form of a circular crown, placed one above the other in perfect alignment, in such a way that its structural elements coincide when seen from above. The floors are supported by columns in such a way that each floor has the capacity to house twelve radially-placed cars.

A car elevator is placed in the center of the circular crown of each floor, which will raise or lower these to each floor or from each floor to ground level, and will position them by revolving on its central axis in the ascent or descent angle of the elevator required, according to the relative position of the parking space or point of exit. A feature of this elevator is that, in addition to its transfer movement, it also rotates the structural guide tower, the carlift and hydraulic lifting system. The elevator consists of a vertical revolving structure which turns on its vertical longitudinal axis and which, in its lower part, serves as a support for the hydraulic lifting equipment and as a guide for the lifting cabin which runs vertically within the guide bars of structure itself. The metallic structure consists basically of a revolving table in the form of an inverted pyramid which supports two structural legs throughout the vertical length of the entire elevator and the hydraulic equipment, and whose upper extremity is another pyramid. Two central axis (an upper and a lower placed on the vertexes of the pyramids) formed by ball bearings, make up the revolving axis of the structure, the cabin and the hydraulic equipment by the action of an operator on the lower part of the table who, through a crown gear, a pinion and an electrical gearmotors, starts the rotatory movement which will permit the radial positioning of the elevator cabin in each of the twelve parking places corresponding to each of the floors.

The elevator will be actived by an oleohydraulic system equipped with hydraulic pistons and pumps so that, when the pistons move outside the cylinders, the elevator cabin is raised, and vice versa. The elevator is also equipped with electrical and electronic controls to allow its ascent and descent operation, turn clockwise and counterclockwise, and controls to prevent its transfer and rotating movements if the vehicles obstruct the light ray of the photocell installed at the entrance to the rotating platform of the elevator itself.

The parking system will be equipped with a complete indication and control system, by means of which the equipment moves semi-automatically to allow the admission of cars, indication of vacant spaces, access, raising and rotation of the elevator, and the elevator call. The indication and control system consists basically of a logical control programmer, a control panel which governs the elevator, call buttons, obstruction sensors, positioning sensors and proximity sensors. The system as a whole will have a specially-designed operating language and logical programs for exercising the desired actions in accordance with the specific configuration of the equipment.

Finally, the parking lot will be equipped with stairs and an elevator for transporting clients in order for users to be transported to or from each floor of the building.

The characteristic aspects of the present invention will become clearer and easier to understand as the features of the new parking system are described, making use of the attached drawings for this object.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows an isometric view of the parking lot in accordance with its embodiment as a seven storey building giving a general placement and showing principal equipment;

Figure 2 shows an upper floor of the parking building, indicating the radial distribution of the parking spaces, the car elevator, the stairs and the client elevator;

Figure 3 a vertical cross sectional view of the parking building, showing the different floors, the car elevator and the client elevator;

Figure 4 is a cross sectional view from a 30° angle, seen from the back, showing the elevator;

Figure 5 is a complete view of the car elevator;
Figure 6 shows details of the elevator cabin, including protection and signaling equipment; Figure 7 is an isometric view of the lower section or base of the car elevator; Figure 8 shows a protection barrier in an extended position; Figure 9 shows a retracted protection barrier; Figure 10 shows an alternative arrangement of two parking towers in modular form.

Figure 11 shows the general configuration of the semiautomatic control system, with a logical control programmer.

Figure 12 shows a second embodiment of the parking system, the car elevator of which operates based on two telescopic-type hydraulic cylinders; Figure 13 shows the car elevator with the hydraulic system depicted in the previous figure; Figure 14 represents a third embodiment of the parking lot, wherein the car elevator is driven by four hydraulic telescopic pistons, two of which rise vertically and the other two descend vertically. In this figure, the elevator cabin is located on the ground floor of the parking building.

Figure 15 is an isometric view of the elevator shown in the preceding figure, wherein the elevator cabin is located on one of the upper floors of the parking lot; Figure 16 is a closeup of the car elevator in the embodiment shown in the preceding figure; Figure 17 is a partial view, in perspective, of another embodiment of the car elevator system based on cylinders with hydraulic pistons, pulleys, cables and counterweights.

Figure 18 is a complete perspective view of the preceding elevator system, with the cabin shown on the ground floor; Figure 19 is a view similar to that of the preceding figure, but in this case showing the cabin in the higher part of the structural tower of the elevator system; Figure 20 is a partial view, in perspective, corresponding to another embodiment of the car elevator system based on cylinders with hydraulic pistons, pulleys and cables; Figure 21 is a complete view, in perspective, of the system illustrated in the preceding figure, wherein the cabin appears at the ground floor; Figure 22 is a view equivalent to that of the preceding figure, with the difference that the cabin is located in the upper part of the structural tower of the elevator system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

Multiple parking systems can be classified as unmechanized and mechanized. The first ones can consist of one or several floors where the vehicles circulate by a central horizontal, or sloping ascending lane, with parking spaces at the sides the cars require extensive space for circulation and a relatively large turning ratio for parking in battery form. The second, mechanized parking systems, have evolved in some of the industrialized nations and usually include elevator systems or mechanical vehicle parking.

The system presented here falls within the mechanized type parking, with different alternatives for transporting the cars and the automatization desired. This type of parking system can sufficient space for installing one or several towers of two floors or more, as needed. In order to explain better and clearly the new parking system, the following description has been divided into chapters, each of which refers to a fundamental part of the parking system.

PARKING BUILDING

The parking building consists of a vertical structure, of either reinforced concrete or preferably of metal, which is cylindrical in form with several floors, which can be from two to an indefinite number, in accordance with the special conditions of each case.

The building structure is supported by foundations, depending on the specific conditions of the project, the height of the building, the overall weight, the soil conditions, etc. These foundations can take the form of an extended slab of reinforced concrete (1), isolated shoes or continuous foundations in the form of concentric circular rings.

Columns (2) are placed on the foundation slab to support the first floor and the primary girders (3), which are placed in radial form, the interior end of each radial girders (3) in cantilever, since there is no center column as this would hinder the transit of the cars. All the radial girders on each floor (3) shown in figure 3, finish and are joined in a circular ring or a structural dodecagon (4), which limits the central space where the car elevator (10) circulates. Secondary and tertiary girders (5,6) are connected to the primary girders in transversal form in order to provide sufficient rigidity and support for the floor (7) of each parking level.

The floor on each level can be made of reinforced concrete slabs or, preferably, steel sheeting (7) of a caliber suitable for the live weight it must support, being in the form of a natural U and an inverted U to form a continuous accordion shaped surface, thus achieving a substantial reduction in the weight of each level, with a reduced dead weight and a lower investment cost.

The building will have stairs (8) and an elevator (9) for parking users, to be placed as shown in figures 1, 2, 3 and 4.

EQUIPMENT

The equipment will consist basically of two items, each covering various components of the system. The first item is the car elevator (10), in its various embodi-
MECHANICAL EQUIPMENT FOR LIFTING AND POSITIONING CARS

The car elevator (10), as its name indicates, is intended to lift or lower vehicles to each of the operating levels and place them in an exact entry or exit position, complementing the effects of the transfer and rotation required for car placement, and reducing manoeuvres to a minimum. The car elevator consists of a supporting, rotating and guiding metallic structure (11), as shown in figures 5, 13, 15, 18 and 21 related to each embodiment of the elevator, which is formed by two structured metallic columns (11) joined only at top and bottom which are vertically parallel and serve as a guide for the elevator cabin (25). The lower part of the structure (11) ends in a kind of inverted pyramid (12) (partially shown), where the lower corner acts as a rotating support for the entire tower, including the elevator cabin and hydraulic equipment, utilizing an axial type bearing (15) which is firmly attached to the foundations on one side, and to the lower inverted pyramid of the structure also ends in a kind of structural pyramid with a transversal element which joins the two legs of the structure (11) guiding the elevator, the pyramid having another bearing, in this case for axial type loads, in the center of the vertex (21), the lower part of which is joined to the elevator tower (11), while its upper part is connected to four horizontal girders (22) forming a cross-shaped member. Girders (22) are, in turn, attached to four internal columns (2) of the parking building (figure 4), in order to keep the vertical rotating shaft of the elevator itself centered and properly aligned. The two structural metallic columns are composed of primary elements (11), which form a vertebral column in conjunction with secondary elements (12), which will increase their rigidity by providing better proportions, above all in parking system where it is necessary to install a greater number of floors. The primary vertically-placed structural elements (11), serve as support for installing the vertical parallel rails (17), which will guide the ascent or descent of the elevator cabin (25). The secondary elements (13), aside from providing additional rigidity to the primary elements, allow the secondary guiding rails (14) to be stiffened for the upper pulleys (20) of the pistons (36) of the elevator's hydraulic system, avoiding in this way any possible misalignment in the vertical piston stroke on leaving or entering the cylinders (35).

The lower part of the elevator structure is also intended to house the elevator hydraulic system (19), consisting of the oleohydraulic tank, the hydraulic pressure pumps, the control valves and the cylinders (35), together with their hydraulic pistons (36) and, on the other hand, houses two speed reducing electrical gearmotors (24), which are vertically placed and which at their ends, protruding from the rotor shaft, are connected by two pinion-type gears which turn around a circular crown (23) of straight gears which are firmly attached to the concrete foundation (1) of the elevator itself. The drive of the two gearmotors will result in the entire elevator (10) as a whole (metallic structure, cabin, hydraulic system, etc.) turning around the vertical shaft driven by the movement of the electric speed reducing gearmotors (24) around the crown of gears (23). The motive elements consist of electric motors which receive a precise signals from the control system in order to adopt a position preselected by the master control of the logical control programmer, clockwise or counterclockwise, permitting a turn in the shortest direction between the original cabin position and final destination position.

The oleohydraulic equipment of the elevator consists basically of the following essential elements: One or two metallic tanks (19) for storing and returning the system's hydraulic oil, one or two hydraulic pumps activated by electric motors (not shown in the drawings), which are placed inside the oleohydraulic tanks with a submersed type installation, and are moved by one or two electric motors (not shown) which, on functioning, inject the hydraulic oil through the control valves (not shown) towards the lower part of the hydraulic cylinder (35) placed on each side of the cabin (25), and running parallel to the metallic structure (11) and the guide rail (17). Two pulleys (20) are placed on the upper ends of the cylinder pistons (36), said pulleys supporting the elevator cables (34), and being fastened at one end to the structural base of the revolving tower (12) and, at the other end, are connected to the elevator cabin (25). The electric actuation of the hydraulic pump motors results in the oil from the storage tanks being injected at high pressure at the base of the hydraulic cylinders (35), which results in the pistons (36) being vertically displaced upwards and outwards, so that the metallic cables (34) fastened to the elevator cabin are displaced in one direction so that the cabin itself rises with a run equal to twice the stroke of the hydraulic pistons. When the electric motors of the pumps turn anticlockwise, they will absorb oil from the hydraulic cylinders and transfer this to the storage tanks, retracting the pistons and displacing the metallic cables anticlockwise, so that the elevator cabin descends.

The elevator cabin (25) consists of a box of metallic sheeting in parallelepiped form, suitably reinforced by structural elements (26) to allow it to be hoisted from the transversal ends, preventing their permanent deformation. Some guides (27) are placed on the upper and lower edges of the cabin, which can be the sliding shoe or revolving bearing type which engage the guide rails (17) on three sides, allowing the cabin to move vertically, perfectly guided, thus achieving the desired alignment of the cabin (25) throughout its vertical journey. Two metallic guides (28) are placed inside the cabin for car tires, so that these enter or leave the elevator in the direction and with the alignment required for their suitable functioning. At one end of the elevator guides (28), automatic traps (29) are placed for the front wheels of the vehicles,
in such a way that when they are activated the movement of the wheels is hampered either accidentally or on purpose. The traps (29) consist, for example, of four structural steel plates or angles placed in reverse, which slide or turn by means of a gear and lever mechanism, which is moved by a mechanical actuator (30), with an electrical or reversible hydraulic motor, so that the angle wedges or plates in front of and behind the front wheels of cars to prevent their moving when the traps are applied, or are withdrawn by either sliding or turning a center at one end to withdrawn from the path of the vehicles and free the tires, allowing them to move over the guides (28) of the elevator cabin. Bipartite metallic doors (31) will be placed at both ends of the elevator cabin, which slide towards each side of the cabin. The doors are electrically operated by a mechanism which is activated once the elevator cabin has been vertically and angularly placed in front of each of parking spaces.

Protective barriers (32) are placed on each floor of the parking building, around the car elevator shaft, for the purpose of preventing any person or car from coming too close to the open elevator shaft. These barriers are folding and are raised upwards by pushing a stem (33), which is moved automatically by an extension mechanism of the elevator itself, connected to the actuator (30) of the elevator traps.

Two spring shock absorbers (18) are placed on the upper part of the turntable (12), the purpose of which is to progressively reduce the impact of a sudden descent of the elevator cabin.

INSTRUMENTATION AND CONTROL EQUIPMENT

The signalling and control system of the parking system forms a basic part of same, since this permits the semiautomatic and safe operation of the entire system. A more advanced version of the same is the fully automatic control system, which is described as embodiment hereafter.

The general configuration of the semiautomatic control system for the parking system takes various forms into consideration, based on the basic equipment, the sophistication of which can increase to the point where a fully automatic system is obtained.

The basic equipment consists of the elements shown in figure 11. The instrumentation and control system consists basically of three interconnected subsystems to provide the necessary operating and safety conditions, which are:

a) Subsystems for entering, paying and leaving the parking building.

b) Subsystem for occupying and calling the elevator.

c) Subsystem for controlling and raising the elevator cabin, together with the latter’s security system.

SUBSYSTEM FOR ENTERING, PAYING AND LEAVING THE PARKING.

This system consists of one, two or three folding access barriers (37) and conventional ticket machines (38), which will have car presence detectors which permit these to enter when there are spaces available, or refuse entry when the signal of the Logical Control Programmer shows that there are no places available. On another aspect, this system includes the conventional collection system (39), which consists of a parking time reader which issues the cost when the time recorded is multiplied by the unit cost of the time unit. Both items of equipment, that for issuing tickets and that for reading and invoicing, can be replaced by access and exit equipment which utilizes plastic cards with magnetic tapes, achieving the same effect.

The system described here is connected to a logical control programmer and a conventional personal-type computer (40) which, in turn, forms part of the elevator operation and call subsystem.

If the ticket issuer is of the bar code type, showing date, hour and minute, a car reader will be installed which will calculate the length of stay and the invoicing.

ELEVATOR OPERATION AND CALL SUBSYSTEM

This system consists basically of a Logical Control Programmer (41) with suitable entry and exit signals, for receiving occupation signals from each parking space, the permanent location of the elevator cabin, and to give the command signal to the elevator to attend a request. The Logical Control Programmer will have doors to connect the personal computer, which will have doors occupancy conditions and the calls pending answer on the monitor screen, together with the possibility of calculating invoicing and showing the operation scrawl. It will also show autodiagnoses of the status of different system elements.

The Logical Control Programmer has additional communication ports for connecting a portable programming computer, the card reader, a VHF frequency radio modem (42), the ticket issuer and the data channel or “bus” (43), obtained from the cable concentrators (44) on each floor of the parking building.

There are two primary elements in each parking space which will transmit signals to the logical control programmer. The first are photoelectric cells (45), which will detect the presence or absence of a car in each space, showing their availability for occupancy, which will be located by means of the logical control programmer to a specific space as a possible destination of the elevator to unload cars. The second will be the call buttons (46) located in each parking space which, on being pushed, will request the presence of the elevator at the correct floor and in the correct radial position, to permit the exit of a specific car from the parking building. Both the photoelectric cells and the call buttons will be connected to the logical control programmer by means of cable concentrators (44), which will classify the signals
to identify their origin and send them through a data bus to a signal converter (47) which, in turn, be connected to the logical control programmer.

**ELEVATOR CABIN ROTATION AND RAISING CONTROL SUBSYSTEM AND SAFETY SYSTEM THEREFOR**

The purpose of this invention is to command the actions of the elevator. Some of these are of the conventional type, such as the opening and closing of doors, the detection of door obstructions, the raising and descent of the elevator cabin, the closing of the hydraulic valves, the sequential registration of calls requesting the elevator and the floor destination to which the elevator should be sent. Others are completely innovative, such as the transmission by VHF bandradio (42) of requests from the different users located in parking space, the rotation of the elevator around its vertical shaft to place itself in a required radial position, application of the countermotor brake to avoid horizontal rotation, the permanent location of the cabin transmitted to the logical control programmer and application of the elevator cabin's tire traps, among others.

The control equipment consists of the conventional equipment used for elevators, which is not described since it is in common use, to which controls similar to that of vertical elevation will be added to achieve the startup, acceleration, deceleration, stoppage and braking of the angular rotation motors of the elevator cabin by means of the speed reducing electrical gear motors (24), which act on the gear crown (23). In order to transmit the orders coming from the parking system, photoelectric cells (45) and call buttons (46), a cordless data transmission will be utilized, using a pair of "duplex" frequency) waveband (42), connected to signal modulators for converting digital signals into radio signals and vice versa. One radio terminal is mounted in the fixed part of the parking building and the other in the revolving structure (11) of the car elevator. The elevator cabin has a command panel with buttons (49) for indicating the desired destination to the control panel, with regard to the floor and the anular location of the specific space. There are also emergency stoppage buttons, a manual and automatic operator selector and indicating lights.

The safety control equipment is to be found within this subsystem, consisting of photoelectric cells on each of the elevator doors which avoids their closing if any obstruction exists, in which case they do not give the affirmative signal to the control panel for beginning the lifting and rotation movements; and, on the other hand, the starting controls of the tire trap actuators which, on being applied, should similarly give permission to commence the lifting and rotation movements of the elevator cabin.

**DESCRIPTION OF THE OPERATION OF THE PRINCIPAL EMBODIMENT**

The operation described is following the sequence of entering the car park, parking the car and, subsequently, leaving the parking building.

All cars will arrive at the ground floor entrance, which can be one of the parking spaces (two or three), the sole purpose of which is to permit entrance. On stopping in front of the access barrier (37), Fig. 11, the optical or loading sensors will detect their presence, and the automatic ticket issuer (38) will print the date and time and, if desirable, the exact location of a vacant space to which the parking of the vehicle has been allocated, and will send an automatic signal to the logical control programmer (41) notifying the presence of a car which wishes to enter, which will look for a vacant space as near as possible to the ground floor, in accordance with the period of time the vehicle is scheduled to be parked, which will be defined by the entrance space utilized. When the driver takes the ticket, the entrance bar or barrier (37) will be lifted to allow the car to enter the ground floor parking space acting as a passage, to then enter the elevator cabin. If the cabin is not placed in front of this space, the ground floor protection barrier (32) will be in place, preventing the car from going farther. Once the elevator cabin (25) has been placed facing the access space, the barrier (32) will be vertically lifted, the doors (31) of the elevator cabin will be opened, the tire traps (29) will be released, and a green light will go on the advise the driver that the car should enter the elevator cabin.

When the vehicle is temporarily parked in the cabin and there is no obstruction in the photoelectric cell of the door, the elevator operator can see from the command panel which of the pilotlights is lighted, indicating a vacant space on a specific level. On pressing the button which assigns the destination to which the vehicle should be taken, the operator gives an order to the logical control programmer (41) to commence the operation of the hydraulic pumps (19) of the car elevator (10), and the rotation movement of the platform will begin simultaneously, in order to place the elevator in the required direction. Before beginning either movement and after having selected the car’s destination, three simultaneous actions will take place: the first will be to draw back the piston of the safety barrier (32) on the ground floor, allowing it to fall, corresponding to the space where the car is located, and the safety device will be activated to prevent this rising solely by pushing same; the second, that the traps (29) be applied to the front wheels of the car, and the third is that of shutting the sliding doors (31) of the elevator cabin. The confirmation of these three actions by the logical control programmer (41) will give the command to begin opening the hydraulic valves connecting the hydraulic cylinders, and release of the countermotor brake of the horizontal rotation gearmotors.
(24), commencing the vertical transfer and rotation of the elevator cabin through the control panel and the respective motors (19 and 24).

When the car elevator reaches its destination, the hydraulic valves of the oleohydraulic plant and the counterrturn brake of the rotation motors (24) will be automatically applied and the tire traps (29) will be deactivated one by one, while the elevator doors will be opened (31) and the protective barrier (32) corresponding to the parking space of destination will be lifted, allowing the driver of the vehicle to park this in reverse in the assigned space with the assistance and help of the elevator operator. The vehicle should be driven to some stops placed on the floor to limit the perimetral transit passage of pedestrians in the area, whether or not they are coming for their vehicles.

Once the elevator cabin has been vacated, the elevator can be requested by the driver of another vehicle on the same, or another, floor, or by the driver of any vehicle which is entering the parking building. The selection of priorities can be automatically programmed, or the elevator operator can decide manually, depending on the proximity of the space of the vehicle wishing to leave, or the demand for the entry or exit of vehicles at a certain time of day.

In order for a vehicle to be able to leave the parking building, drivers should reach same by using the passenger elevator (9) or the stairs (8), or the perimetral passages. Once within his vehicle, the driver should press the call button (46) for the elevator, located on the inside columns of the building at the height of the driver's window. At the same time, the driver should start his car and await the elevator. When the elevator call button is pushed, the signal is transferred through the cable concentrators (44) and the data bus (43) to the logical control programmer (41), which will process the call and send a coded signal to the VHF radio equipment which will, in wireless form, transmit this signal to the radio receiving equipment located close to the oleohydraulic system of the elevator. Signals are modulated and demodulated in order to be digitally led to the car elevator control panel, in response to the request for positioning the elevator cabin (25), exactly opposite the parking space from which the call came. When the latter detects the call, the signal can be stored in the waiting line control or automatically or manually executed directly by the operator, so that the elevator descends vertically with a circular movement in the desired direction.

If the elevator reaches the desired level and place, the counterrturn brakes will again be applied and the hydraulic valves closed, the protective barrier will be lifted and the green light of the elevator parking lights will be put onto the indicate that the vehicle can drive into the elevator cabin. No elevator operation can be carried out while the car is blocking the light ray from the photoelectric cells, signifying that the doors cannot be closed. Once the vehicle is inside the elevator cabin, the motor should be kept running, but with the brake on to avoid any movement, and so supplement the restraining action of the tire trap described above.

The elevator, on descending to the ground floor, should evolve as necessary in order for the platform to be orientated in such a way that the front of the vehicle is pointing towards the exit lane. Once the elevator has come to a standstill, the driver will be allowed to approach the payment booth, where he will deliver his ticket so that the amount owing can be calculated.

The platform can return up to 360°, however, control will be programmed so that the maximum turn in any direction either clockwise or counterclockwise, is up to 180°, in order to minimize the time and length of the rotating movement.

As a part of the safety equipment operations is a startup by electrogenic alternate current generating equipment due to lack of power when a breakdown occurs in the normal power supply, thus permitting the electrical and electronic equipment to continue in normal operation until normal operating conditions are resumed.

Operation of the passenger elevator is normal and usual and it is not therefore described in this document.

ALTERNATIVE EMBODIMENTS OF THE INVENTION

Figures 12 and 13 represent an alternative embodiment of the radial parking system, in which the parking is similar to that previously described but with the difference that the elevator(10), instead of using cylinders with a single piston, use hydraulic cylinders (55) of the telescopic piston type, thus reducing the length of piston (56) to half if there are two telescopic piston sections, or to one-third in the case of four telescopic pistons. These telescopic cylinders are in common use, for which reason no further details are given here. The rest of the components, both for the building, the elevator, the controls, etc., remain as in the previous description.

The embodiment proposed in Figures 14, 15 and 17 is characterized by a parking elevator (10) being moved by four cylinders (60) with a single piece tubular piston (not shown), or by telescopic pistons (61, 62), as in the case shown, which can be two, three or four-stage. This alternative embodiment can be used to advantage in installations where the number of floors to be served by the elevator are numerous, and the length of the cylinder and the pistons must be limited. At the same time, this embodiment reduces the diameter required for each piston by duplicating the number if pistons for the same given weight and the same hydraulic fluid pressure. The elevator system consists of a system similar to that described in the preferred embodiment, where a rotary tower (11), is moved around a vertical center by two electric gearmotors (24), and which has a cabin (25) to lift the cars through a hydraulic system (19) consisting of an oil tank, hydraulic pumps, valves and four cylinders with hydraulic pistons, normal or telescopic type, which are placed vertically at the sides of the cabin, two in ver-
ical ascending form and two in vertical descending form. Each of the pistons has a metallic pulley (63) at the protruding end, over which the cables of flexible steel run in the form of an S or an inverted S, and which at one end are fixed to the base plate (64) of the inverted pistons (62) and, at the other, to the elevator cabin (25), so that the movement transmission ratio is 4:1; that is, for each unit of distance travelled by the pistons (61, 62), the cabin travels four units of distance. In other words, the distance travelled by the cabin and the speed of ascent and descent is four times greater than that of the pistons.

Another embodiment is shown in Figures 17, 18 and 19 in which the parking system is similar to those previously shown but with the elevator featuring two sets of mechanisms consisting of pulleys, cables, counterweights and hydraulic pistons, to obtain vertical movement transmission ratios of 6:1. The system consists of two sets of five grooved pulleys placed on the upper part of the elevator tower, at each side of the cabin; three pulleys (66) are fixed at each side and the remaining two (67) are movable, and move vertically up or down; each of the pulleys having free rotatory movement. The movable pulleys (67) are linked by a metallic structure or member (68), which keeps them separated and includes at its ends two sliding guides for pulley rails (69), which will keep the movement straight throughout the journey of ascent or descent, which will only be one-sixth of the vertical journey of the elevator cabin (25). The rails are suitably supported and spaced from the secondary structure (11) of the elevator. Two counterweights (70) are hung from the center of the metallic structures (68) of the pulleys, the purpose of which is to reduce the power necessary for raising the elevator cabin plus the weight of the cars and their occupants. The total weight of the two counterweights will in fact be approximately equal to between 120% and 140% of the dead weight of the cabin, plus the elevator load. The mobile pulleys and the fixed pulleys are connected as shown in figure 17, by means of flexible metal cables (71) in the form of a vertical zigzag with 6 steps, one end of the cables being fixed to the structure of the elevator tower (11) and the other to the elevator cabin. Below the counterweights are two cylinders with oleohydraulic pistons (72), which are supported by the elevator structure (11), and their pistons (73) work vertically underneath the counterweights. This results in the following advantages: first, a ratio of cabin travel as compared with the hydraulic piston travel is obtained of six to one; secondly, the counterweights are used to raise the elevator cabin and load, and the hydraulic pistons are only used to lift the counterweights and thus lower the elevator cabin. In fact, the form of operation consists of whether or not the cabin is loaded, oil is drained from the hydraulic cylinders, allowing the pistons to retract and lower the counterweights, so that the steel cables move one way only and the elevator cabin rises.

When it is wished to lower the cabin, then the hydraulic pump or pumps of the station (19) will inject oil to the cylinders, resulting in the pistons extending beyond the cylinders and pushing the counterweights upwards, thus raising the mobile pulleys, and the cables will move in the opposite direction so that the elevator cabin descends.

This embodiment can result in substantial saving in the cost of the elevator mechanisms, since the needs of the oleohydraulic mechanisms is considerably reduced, and also gives relatively large elevation distances with relatively small pistons.

The embodiment proposed in figures 20, 21 and 22 corresponds to a parking system similar to those previously described but with the difference, as in the previous case, that the car elevator has a cable system (71), fixed pulleys (66) and hydraulic cylinders (72), with a transmission ratio of 6:1. In contrast to the previous embodiment, in this case there are no counterweights to raise the elevator cabin (25), and the pistons act in the opposite direction, pushing the mobile pulleys downwards to increase the distance separating them from the fixed pulleys. In this case the manner of operation is different from that described in the previous embodiment since, in order to raise the elevator cabin plus the load, hydraulic oil would have to be pumped to the cylinders (72), causing the pistons (73) to extend downwards and the mobile pulleys (67) on each side of the elevator to descend, increasing the distance between the mobile and fixed pulleys so that the elevator cabin (25) rises. On suppressing the hydraulic pressure inside the cylinders (72), the pistons contract and the mobile pulleys go up, pulled by the cables, due to the weight of the cabin and load transported. The advantage of this system is a reduction in the overall weight of the elevator, maintaining relatively small cylinders with very short runs due to the 6:1 ratio.

In either of the foregoing embodiments, the present invention can consist of two or more adjacent parking towers, utilizing the same passenger elevator services and stairs, with the possibility of transferring vehicles from one building to another should any operational problem arise in one of the car elevators. Even though the invention has been described in its preferred embodiments, it should be emphasized that other variations and modifications can be made as may fall within the scope of the accompanying claims.

Claims

1. A car parking system allowing a reduction in the overall area required for parking vehicles on two or several levels and reducing to an important extent the maneuvering area for placing vehicles in their respective space, consisting of a building of two or more floors (7) in cylindrical form having a rotary car elevator (10) in the center to carry the vehicles to the required parking level or floor (7), and placing
2. Car parking system, according to Claim 1, characterized in that they are placed in their final parking position; said parking system including also signalling and control equipment (40) to (47), stairs (8) and passenger elevator (9); the vehicles being parked in radial form and without the need for circulation passages since the car elevator (10) has a turning central cabin (25) which, as it rises, is turned to place it at the required angle for parking; and said rotary car elevator (10) is operated by an hydraulic system (19) combined with cables (34), which provides the cabin (25) carrying the vehicle with a vertical transfer movement for raising or lowering the vehicles, and with a horizontal rotary movement for placing the vehicles in a final position at a suitable angle for ascent or descent; said elevator comprising:

a) a metallic rotary structure (11) consisting of two structural legs facing one another and interconnected in their upper and lower parts by reinforcement and supporting elements; each leg includes guides (17) extending along the length of same;

the rotary structure (11) is connected at its upper part to the building, and at its lower part to the foundations (1) by means of rollers, in order to keep the vertical rotation axis of the elevator centered and without variations;

b) said cabin (25) for receiving a car being movable vertically up and down between the legs of the rotary structure (11) and along the guides (17) provided therein; the cabin includes guides or tracks (28) coupled to the floor thereof for receiving the tires of the vehicles being transported therein, and means (29) for fastening and releasing said tires;

c) driving means to operate the hydraulic system to move the cabin up and down; and
d) turning means located on the lower part of the metallic structure (11) for turning this so that the cabin (25) is suitably placed on termination of its vertical travel and comprising two gear motors (24) connected by gear mechanisms to the metallic structure, for imparting movement to said structure in both directions;

and guiding elements (27) placed on the side of the cabin, which slide along the structure guides (17) during the vertical movement of the cabin; the sliding relation of both guides (17, 27) allowing the cabin to move vertically in a form which is perfectly guided and aligned throughout its course;

2. Car parking system, according to Claim 1, characterized in that the driving means consist of:

a pair of cylinders (35) with hydraulic pistons (36) having pulleys (20) at the upper part thereof, said cylinders (35) being placed on a base adjacent to the lower part of said rotary structure (11) and an oleohydraulic center (19) placed at the lower part of said rotary structure (11) which is in fluid flow communication with the cylinders (35) so that the telescopic pistons (36) thereof move vertically.

3. Car parking system, according to Claim 1, characterized in that the driving means consists of a pair of cylinders (55) with hydraulic telescopic pistons (56); having pulleys (20) at the upper part thereof, said cylinders (55) being sustained by bases essentially located at the middle of each structural leg; and an oleohydraulic center (19) placed at the lower part of said rotary structure (11) which is in fluid flow communication with the cylinders so that the telescopic pistons (56) move vertically.

4. Car parking system, according to Claim 1, characterized in that the driving means consists of:

i) an hydraulic telescopic piston (57, 58) connected at the upper end thereof with the lower part of the cabin (25) and which is embedded in the lower part of the parking lot, and has a cylindrical tubular casing embedded in the ground which has the length of the telescopic hydraulic piston of the elevator divided between the number of sections of the piston itself; and

ii) an oleohydraulic system (19) placed at the lower part of the rotary structure (11) which is in fluid flow communication with the hydraulic telescopic piston (57, 58) for vertically moving same.

5. Car parking system, according to Claim 1, characterized in that the driving means consists of:

i) an assembly of hydraulic telescopic pistons formed by a first pair of pistons (60, 61) which move vertically up, and a second pair of inverted pistons (60, 62) which move vertically down; each of said pistons having a grooved pulley (63) at the protruding end thereof, through the groove of which cables (34) slide; said cables (34) being connected at one end to the elevator cabin (25) and at the other are fixed firmly in a base plate (64) supporting the pistons; and

ii) an oleohydraulic system (19) placed in the lower part of said rotary structure (11), and in fluid flow communication with the telescopic hydraulic pistons (60, 61; 60, 62) to move these vertically.

6. Car parking system, according to Claim 1, characterized in that the rotary car elevator (10) is operated by means of a combined hydraulic system with pulleys (66, 67), cables (71) and counterweights
7. Car parking system according to Claim 1, characterized in that the rotary car elevator is operated by a hydraulic system combined with pulleys and cables, providing vehicles with a vertical transfer movement and a horizontal rotation movement; and the driving means comprise:

i) a first set of pulleys (66) fixed to the upper part of the elevator structure (11), and a second set of movable pulleys (67), these latter being linked between themselves by a metallic member (68) having guides at its ends; the movable pulleys (67) being moveable vertically up and down; the fixed pulleys and the movable pulleys being freely rotatable; said fixed and movable pulleys are connected by the cables (71) which are fixed to the cabin (25) by one end and, by the other, to the rotary metallic structure (11).

ii) a counterweight (70) placed immediately below the movable pulleys (67) and fastened to the metallic member (68) joining same, so that said counterweight (70) also moves vertically up and down; and

iii) a cylinder with a hydraulic piston (72) placed under each counterweight (70) for moving this vertically upwards when it is wished to move the elevator cabin (25) down; said cylinders being supported by the rotary elevator structure (11).

Patentansprüche

1. Fahrzeug-Parksystem, das eine Verringerung der Gesamtfläche, die zum Parken von Fahrzeugen auf zwei oder mehreren Niveaus erforderlich ist, gestattet und zu einem wichtigen Ausmaß den Manövrierbereich zum Anordnen der Fahrzeuge an ihrem jeweiligen Platz verringert und das aus einem Gebäude mit zwei oder mehr Stockwerken (7) in zylindrischer Form besteht, das einen sich drehenden Fahrzeugaufzug (10) in der Mitte zum Tragen der Fahrzeuge zu dem erforderlichen Parkniveau oder -stockwerk (7) und zum Anordnen dieser derart, daß diese lediglich durch Verlassen des Aufzugs in ihrer endgültigen Parkstellung angeordnet sind; wobei das Parksystem ferner eine Signalisierungs- und Steuerungsausrüstung (40 bis 47), eine Treppe (8) und einen Personenaufzug (9) aufweist; wobei die Fahrzeuge in radialer Form und ohne die Notwendigkeit von kreisförmigen Wegen geparke werden, da der Fahrzeugaufzug (10) eine sich drehende mittlere Kabine (25) aufweist, die während des Nach-oben-Fahrhens gedreht wird, um sie mit dem zum Parken erforderlichen Winkel anzuordnen; und wobei der sich drehende Fahrzeugaufzug (10) durch ein hydraulisches System (19) in Kombination mit Kabeln (34) betrieben wird, das für das das Fahrzeug tragende Kabine (25) für eine vertikale Übertragungsbewegung zum Anheben und Absenken der Fahrzeuge und für eine horizontale Drehbewegung zum Anordnen der Fahrzeuge in einer Endstellung unter einem geeigneten Winkel zum Nach-oben- oder Nach-unten-Fahren sorgen, wobei der Aufzug folgendes aufweist:

a) eine metallene Drehanordnung (11), die aus zwei Konstruktionsbeinen besteht, die zueinander gerichtet sind und in ihren oberen und unteren Teilen durch Verstärkungs- und Tragelemente miteinander verbunden sind; wobei jedes Bein Führungen (17) aufweist, die sich entlang der Länge desselben erstrecken; wobei die Drehanordnung (11) an ihrem oberen Teil an das Gebäude und an ihrem unteren Teil mittels Rollen an das Fundament (1) angeschlossen ist, um die vertikale Drehachse des Aufzugs zentriert und ohne Abweichungen zu halten;

b) wobei die Kabine (25) zum Aufnehmen eines Fahrzeugs vertikal nach oben und unten zwischen den Beinen der Drehanordnung (11) und entlang der Führungen (17), die darin vorgesehen sind, beweglich ist; wobei die Kabine Führungen oder Bahnen (28), die an deren Boden zum Aufnehmen der Reifen der Fahrzeuge gekoppelt sind, die darin transportiert werden, und Einrichtungen (29) zum Befestigen und Lö-
2. Fahrzeug-Parksystem nach Anspruch 1, 
durch gekennzeichnet, daß
die Antriebseinrichtungen aus folgenden Elementen bestehen:
einem Paar von Zylindern (35) mit hydraulischen Kolben (36) mit Riemenscheiben (20) an deren oberem Teil, wobei die Zylinder (35) an einer Basis an den unteren Teil der Drehanordnung (11) benachbart angeordnet sind, und wobei ein ölhydraulisches Zentrum (19) an dem unteren Teil der Drehanordnung (11) angeordnet ist, das in Flüssigkeitsströmungsverbindung mit den Zylindern (35) steht, so daß die teleskopischen Kolben (36) derselben sich vertikal bewegen.

3. Fahrzeug-Parksystem nach Anspruch 1, 
durch gekennzeichnet, daß
die Antriebseinrichtung aus einem Paar von Zylindern (55) mit hydraulischen teleskopischen Kolben (56), die Riemenscheiben (20) an deren oberem Teil aufweisen, wobei die Zylinder (55) durch Basen getragen werden, die im wesentlichen an der Mitte eines jeden Konstruktionsbeines angeordnet sind; und einem ölhydraulischen Zentrum (19) besteht, das an dem unteren Teil der Drehanordnung (11) angeordnet ist, das sich in Flüssigkeitsströmungsverbindung mit den Zylindern befindet, so daß sich die teleskopischen Kolben (56) vertikal bewegen.

4. Fahrzeug-Parksystem nach Anspruch 1, 
durch gekennzeichnet, daß
die Antriebseinrichtung aus folgenden Elementen besteht:
i) einem hydraulischen teleskopischen Kolben (57, 58), der an dem oberen Ende desselben an dem unteren Ende der Kabine (25) angeschlossen ist, und in den unteren Teil des Parkplatzes eingebettet ist und ein zylindrisches röhrenförmiges Gehäuse aufweist, das in den Boden eingebettet ist; das die Länge des teleskopischen Kolbens des Aufzugs geteilt durch die Anzahl der Bereiche des Kolbens selbst aufweist; und

5. Fahrzeug-Parksystem nach Anspruch 1, 
durch gekennzeichnet, daß
die Antriebseinrichtung aus folgenden Elementen besteht:
i) einer Anordnung von hydraulischen teleskopischen Kolben, die durch ein erstes Paar von Kolben (60, 61), die sich vertikal nach oben bewegen, und durch ein zweites Paar von umgekehrten Kolben (60, 62) gebildet wird, die sich vertikal nach unten bewegen; wobei ein jeder der Kolben eine mit einer Nut versehene Riemenscheibe (63) an dem vorstehenden Ende desselben aufweist, wobei durch die Nut desselben die Kabel (34) gleiten; wobei die Kabel (34) an einem Ende an der Aufzugskabine (25) angeschlossen sind und an dem anderen Ende fest in einer Basisplatte (64), welche die Kolben trägt, befestigt sind; und

6. Fahrzeug-Parksystem nach Anspruch 1, 
durch gekennzeichnet, daß der sich drehende Fahrzeugaufzug (10) mittels eines kombinierten hydraulischen Systems mit Riemenscheiben (66, 67), Kabeln (71) und Gegengewichten (70) betrieben wird, und daß die Antriebseinrichtungen an einem jeden Konstruktionsbein (11) zum Bewegen der Kabine (25) nach oben oder unten angeordnet sind, wobei die Antriebseinrichtungen folgendes aufweisen:
i) einen ersten Satz von Riemenscheiben (66), die an den oberen Teil der Aufzugsanordnung

7. Fahrzeug-Parksystem nach Anspruch 1, dadurch gekennzeichnet, daß der sich drehende Fahrzeugaufzug durch ein hydraulisches System in Kombination mit Riemenscheiben und Kabeln betrieben wird, die für die Fahrzeuge für eine vertikale Übertragungsbewegung und eine horizontale Drehbewegung sorgen, und wobei die Antriebseinrichtung folgendes aufweist:

i) einen ersten Satz von Riemenscheiben (66), die an den oberen Teil der Aufzugsanordnung (11) befestigt sind, und einen zweiten Satz beweglicher Riemenscheiben (67), wobei die letzteren zwischen einander durch ein metallenes Element (68) mit Führungen an dessen Enden verbunden sind; wobei die beweglichen Riemenscheiben (67) vertikal nach oben und unten bewegbar sind, und wobei die festen Riemenscheiben und die beweglichen Riemenscheiben frei drehbar sind; wobei die festen und die beweglichen Riemenscheiben durch die Kabel (71) verbunden sind, die mit einem Ende an die Kabine (25) und mit dem anderen Ende an die sich drehende metallene Anordnung (11) befestigt sind, wobei die festen Riemenscheiben (66) mit Führungen an dessen Enden verbunden sind; wobei die beweglichen Riemenscheiben (67) vertikal nach oben und unten bewegbar sind, und wobei die festen Riemenscheiben und die beweglichen Riemenscheiben frei drehbar sind; wobei die festen und die beweglichen Riemenscheiben durch die Kabel (71) verbunden sind, die mit einem Ende an die Kabine (25) und mit dem anderen Ende an die sich drehende metallene Anordnung (11) befestigt sind; wobei die festen und die beweglichen Riemenscheiben durch die Kabel (71) verbunden sind, die mit einem Ende an die Kabine (25) und mit dem anderen Ende an die sich drehende metallene Anordnung (11) befestigt sind, wobei die festen Riemenscheiben (66) mit Führungen an dessen Enden verbunden sind; wobei die beweglichen Riemenscheiben (67) vertikal nach oben und unten bewegbar sind, und wobei die festen Riemenscheiben und die beweglichen Riemenscheiben frei drehbar sind; wobei die festen und die beweglichen Riemenscheiben durch die Kabel (71) verbunden sind, die an einem Ende an die Kabine (25) und am anderen Ende an die sich drehende metallene Anordnung (11) angebracht sind; und

ii) einen Zylinder (72) mit einem hydraulischen Kolben (73) für eine umgekehrte Bewegung, der durch die Aufzugsanordnung (11) unmittelbar unterhalb der festen Riemenscheiben (66) getragen wird, wobei das Ende des Kolbens fest an das metallene Element (68) befestist ist, das die beweglichen Riemenscheiben (67) zum Bewegen dieser nach oben und unten verbindet, und somit die Aufzugskabine (25) vertikal bewegt.

Revendications

1. Système de parc de stationnement pour voiture permettant une réduction de la surface totale requise pour parquer des véhicules sur deux ou plusieurs niveaux et pour réduire dans une grande mesure l'aire de manœuvre pour placer les véhicules dans leur espace respectif, qui est constitué d'un immeuble à deux ou plus étages (7) sous forme cylindrique, ayant un élévateur de voiture rotatif (10) au centre pour transporter les véhicules au niveau ou étage de parc de stationnement requis (7) et pour les placer d'une manière telle que c'est seulement en quittant l'élévateur, qu'ils sont placés à leur position de stationnement final ; ledit système de parc de stationnement comprenant également un équipement de signalisation et de commande (40 à 47), des escaliers (8) et un ascenseur pour passagers (9) : les véhicules étant parqués sous forme radiale et sans avoir besoin de passages de circulation puisque l'élévateur de voiture (10) a une cabine centrale tournante (25) qui, à mesure qu'elle monte, est tournée à l'emplacement et est tournée pour la placer à l'angle requis pour le stationnement ; et

ledit élévateur de véhicule rotatif (10) est mis en œuvre par un système hydraulique (19) combiné avec des câbles (34), qui procède à la cabine (25) transportant le véhicule un déplacement de transfert vertical pour monter et abaisser les véhicules et un déplacement rotatif horizontal pour placer les véhicules dans une position finale à un angle approprié pour la montée ou la descente ; ledit élévateur comprenant :

(a) une structure rotative métallique (11) qui est constituée de deux jambes structurelles mutuellement en regard et interconnectées à leurs parties supérieure et inférieure par des éléments de renforcement et de support ; chaque jambe comprenant des guides (17) s'étendant le long de la longueur de celle-ci ;

la structure rotative (11) est raccordée à sa partie supérieure à l'immeuble et à sa partie inférieure aux fondations (1) au moyen de rouleaux, afin de maintenir l'axe de rotation vertical de l'élévateur centré et sans variations ;

(b) ladite cabine (25) pour recevoir une voiture
étant déplaçable verticalement vers le haut et vers le bas entre les jambes de la structure rotative (11) et le long des guides (17) prévus dans celle-ci, la cabine comprend des guides ou des chemins (28) couplés à son plancher pour recevoir les pneus des véhicules étant transportés dans celle-ci et un moyen (29) pour fixer et libérer lesdits pneus ;

(c) un moyen d'entraînement pour mettre en œuvre le système hydraulique pour déplacer la cabine vers le haut et vers le bas ; et

(d) un moyen de rotation placé à la partie inférieure de la structure métallique (11) pour tourner celle-ci de sorte que la cabine (25) est placée de manière appropriée lors de la fin de son déplacement vertical et comprenant deux moteurs à engrenage (24) accouplés par des mécanismes d'engrenage à la structure métallique, pour communiquer le déplacement à ladite structure dans les deux directions ;

et des éléments de guidage (27) placés sur le côté de la cabine, lesquels coulissent le long des guides de la structure (17) pendant le déplacement vertical de la cabine ; la relation de coulissement des deux guides (17, 27) permettant à la cabine de se déplacer verticalement sous une forme qui est parfaitement guidée et alignée sur toute sa course.

2. Système de stationnement pour voiture selon la revendication 1, caractérisé en ce que le moyen d'entraînement est constitué de :

une paire de cylindres (35) avec des pistons hydrauliques (36) ayant des poulies (20) à leurs parties supérieures, lesdits cylindres (35) étant placés sur une base adjacente à la partie inférieure de ladite structure rotative (11) et une structure oléohydraulique (19) placée au niveau de la partie inférieure de ladite structure rotative (11) qui est en communication fluidique avec les cylindres (35) de sorte que les pistons télescopiques (36) de ceux-ci se déplacent verticalement.

3. Système de parc de stationnement pour voiture selon la revendication 1, caractérisé en ce que le moyen d'entraînement est constitué d'une paire de cylindres (55) avec des pistons télescopiques hydrauliques (56) ; ayant des poulies (20) à leurs parties supérieures, lesdits cylindres (56) étant soustenus par des bases essentiellement placées au milieu de chaque jambe structurelle ; et un centre oléohydraulique (19) placé à la partie inférieure de ladite structure rotative (11) qui est en communication fluidique avec les cylindres de sorte que les pistons télescopiques (56) se déplacent verticalement.

4. Système de stationnement pour voiture selon la revendication 1, caractérisé en ce que le moyen d'entraînement est constitué de :

i) un piston télescopique hydraulique (57, 58) connecté à son extrémité supérieure à la partie inférieure de la cabine (25) et qui est encastré dans la partie inférieure de l'ensemble du parc de stationnement et a un boltier tubulaire cylindrique encastré dans la terre qui a la longueur du piston hydraulique télescopique de l'élévateur divisé entre le nombre de sections du piston lui-même ; et

ii) un système oléohydraulique (19) placé à la partie inférieure de la structure rotative (11) qui est en communication fluidique avec le piston télescopique hydraulique (57, 58) pour déplacer verticalement celui-ci.

5. Système de parc de stationnement pour voiture selon la revendication 1, caractérisé en ce que le moyen d'entraînement est constitué de :

i) un ensemble de pistons télescopiques hydrauliques formés par une première paire de pistons (60, 61) qui se déplacent verticalement vers le haut et une seconde paire de pistons inversés (60, 62) qui se déplacent verticalement vers le bas ; chacun desdits pistons ayant une poulie à gorge (63) à son extrémité dépassante, à travers laquelle gorge des câbles coulissent (34) ; lesdits câbles (34) étant connectés à une extrémité à la cabine de l'élévateur (25) et à l'autre extrémité sont fixés solidement dans une plaque de base (64) supportant les pistons ; et

ii) un système oléohydraulique (19) placé dans la partie inférieure de ladite structure rotative (11) et en communication fluidique avec les pistons hydrauliques télescopiques (60, 61 ; 60, 62) pour déplacer ceux-ci verticalement.

6. Système de parc de stationnement pour voiture selon la revendication 1, caractérisé en ce que l'élévateur de voiture rotatif (10) est mis en œuvre au moyen d'un système hydraulique combiné avec des poulies (66, 67), des câbles (71) et des contre poids (70) et les moyens d'entraînement sont placés sur chaque jambe structurelle (11) pour déplacer la cabine (25) vers le haut et vers le bas, lesdits moyens d'entraînement comprenant

i) un premier ensemble de poulies (66) fixées à la partie supérieure de la structure d'élévateur (11) et un second ensemble de poulies déplaçables (67), ces dernières étant raccordées entre elles par un élément métallique (68) ayant des guides à ses extrémités ; les poulies déplaçables (67) étant déplaçables verticalement vers le haut et vers le bas ; lesdites poulies fixes
et lesdites poulies déplaçables étant librement rotatives ;
lesdites poulies fixes et déplaçables sont connectées par les câbles (71) qui sont fixés à la cabine (25) à une extrémité et à l'autre extrémité à la structure métallique rotative (11) ;
ii) un contrepoids (70) placé immédiatement au-dessous des poulies déplaçables (67) et fixé à l'élément métallique (65) raccordant celle-ci de sorte que ledit contrepoids (70) se déplace également verticalement vers le haut et vers le bas ; et
iii) un cylindre avec un piston hydraulique (72) placé sous chaque contrepoids (70) pour déplacer celui-ci verticalement vers le haut lorsqu'il est souhaité déplacer la cabine de l'élévateur (25) vers le bas ; lesdits cylindres étant supportés par la structure d'élévateur rotatif (11).

7. Système de parc de stationnement pour voiture selon la revendication 1, caractérisé en ce que l'élévateur de voiture rotatif est mis en œuvre par un système hydraulique combiné avec des poulies et des câbles procurant aux véhicules un déplacement de transfert vertical et un déplacement de rotation horizontal ; le moyen d'entraînement comprend :

i) un premier ensemble de poulies (66) fixées à la partie supérieure de la structure d'élévateur (11) et un second ensemble de poulies déplaçables (67), ces dernières étant raccordées entre elles par un élément métallique (65) ayant des guides à ses extrémités, les poulies déplaçables (67) étant déplaçables verticalement vers le haut et vers le bas ; lesdites poulies déplaçables et les poulies fixes étant librement rotatives ; les poulies fixes et déplaçables sont raccordées de manière fonctionnelle au moyen de câbles (71) qui sont fixés à une extrémité à la cabine (25) et à l'autre extrémité à la structure métallique rotative (11) ; et
ii) un cylindre (72) avec un piston hydraulique (73) pour déplacement inverse soutenu par la structure d'élévateur (11) immédiatement sous les poulies fixes (66), l'extrémité du piston étant solidement fixée à l'élément métallique (65) raccordant les poulies déplaçables (67) pour déplacer celles-ci vers le haut et vers le bas et déplaçant ainsi verticalement la cabine de l'élévateur (25).
FIG. 3