

Feb. 2, 1954

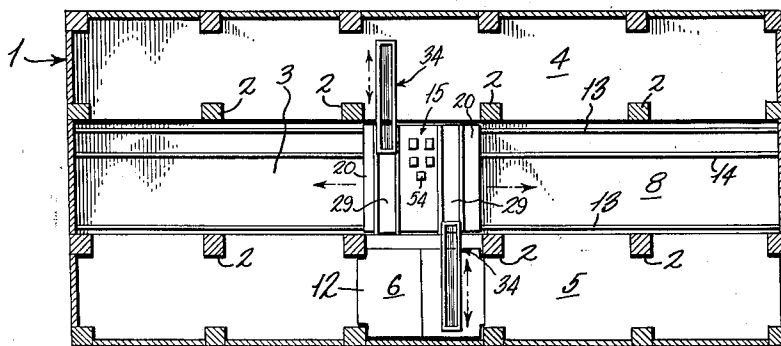
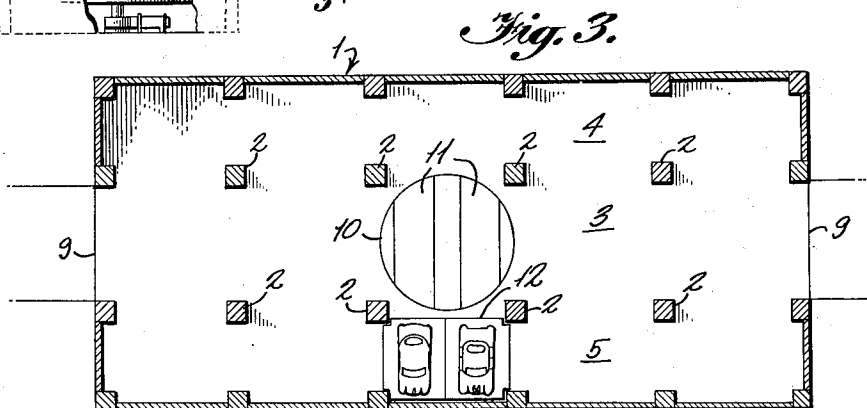
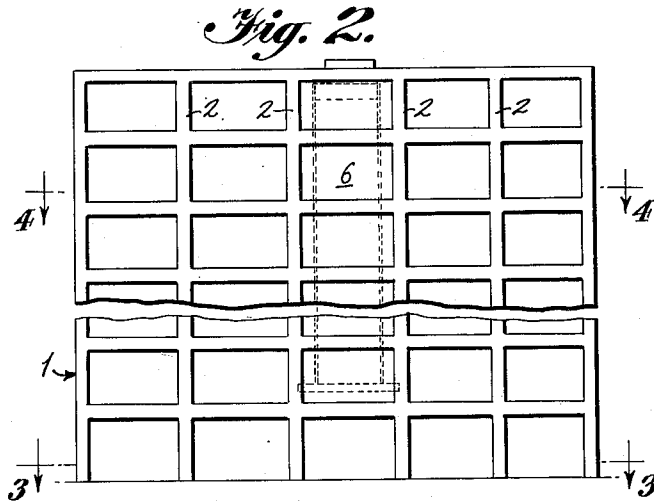
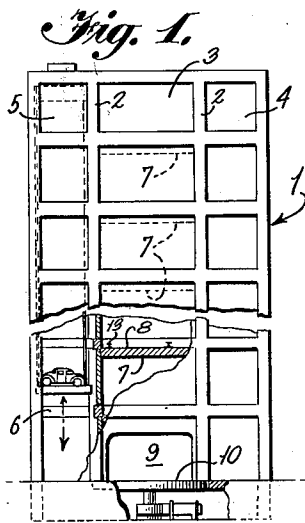
M. H. DAWSON

2,667,980

SEMI-AUTOMATIC PARKING GARAGE BUILDING

Filed Jan. 28, 1952

4 Sheets-Sheet 1



INVENTOR

Melvyn H. Dawson

BY *Mason, Fenwick & Lawrence*
ATTORNEYS

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M. H. DAWSON

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Fig. 5.

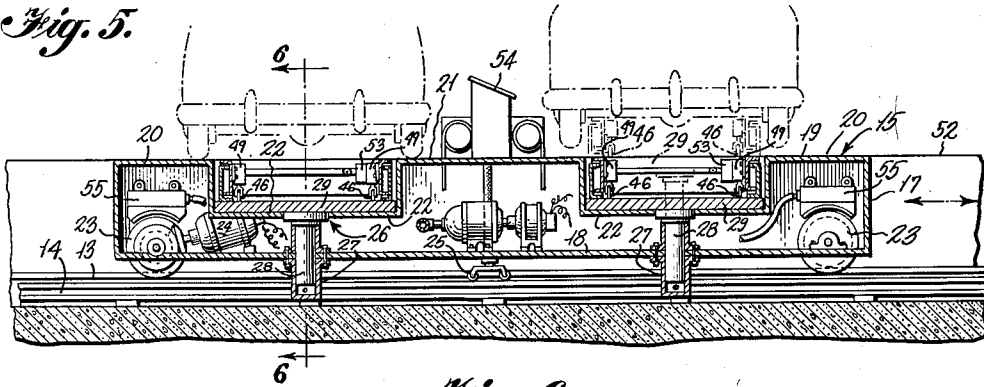


Fig. 6.

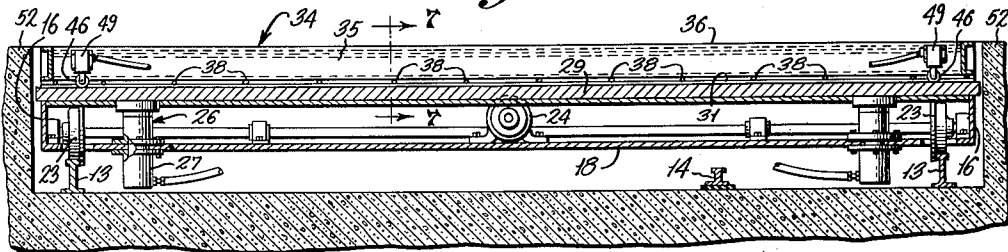


Fig. 7.

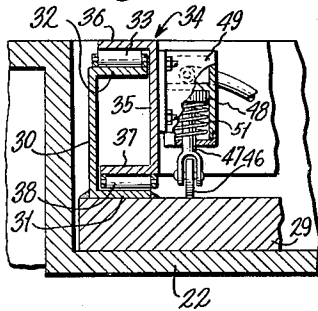


Fig. 12.

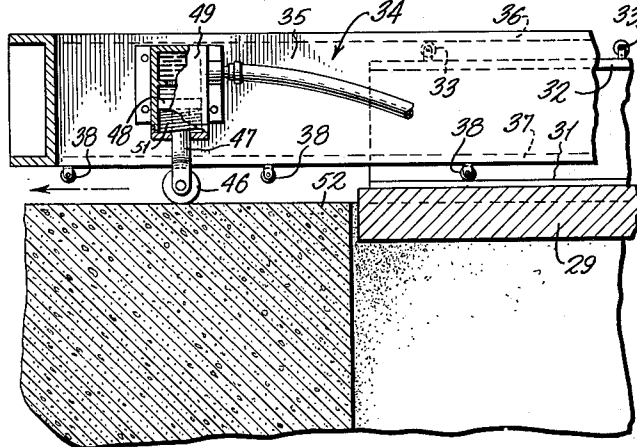


Fig. 8.

LEFT HOIST		RIGHT HOIST	
☐ UP		☐ UP	
☐ DOWN		☐ DOWN	
☐ EXTEND	☐ RETRACT	☐ EXTEND	☐ RETRACT
☐ STOP CARRIAGE CONTROLS			
☐ FORWARD BRAKE			
☐ REVERSE			

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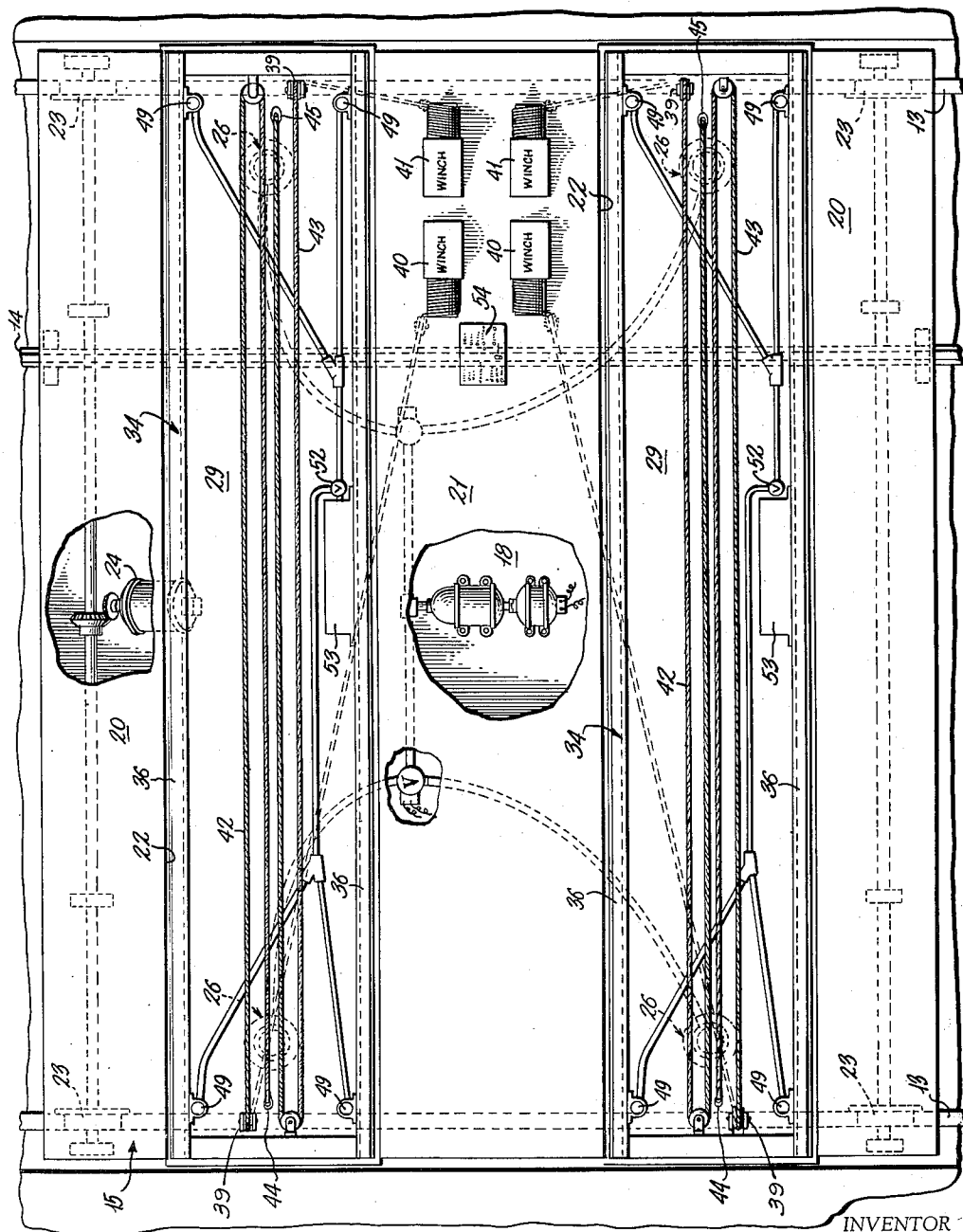


Fig. 9.

INVENTOR
Melvyn H. Dawson

BY

Mum, Fenwick & Lawrence

ATTORNEYS

Feb. 2, 1954

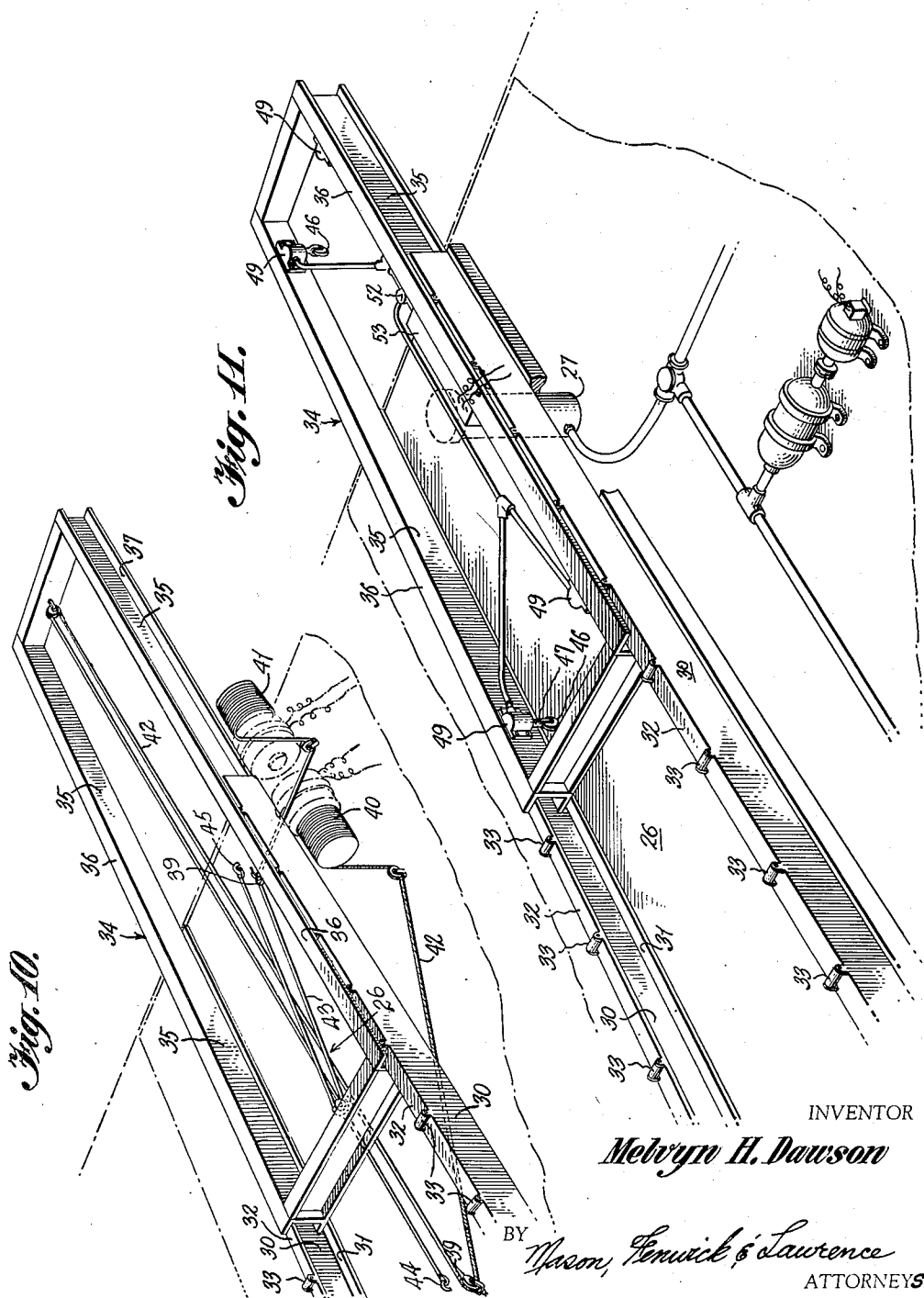
M. H. DAWSON

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SEMI-AUTOMATIC PARKING GARAGE BUILDING

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UNITED STATES PATENT OFFICE

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SEMI-AUTOMATIC PARKING GARAGE
BUILDING

Melvyn H. Dawson, Coral Gables, Fla.

Application January 28, 1952, Serial No. 268,497

3 Claims. (Cl. 214-16.1)

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This invention relates to a semiautomatic parking garage building.

The invention has for its general object to provide a garage building of several more stories in height, each floor above the ground floor, by which is meant the floor at which the automobiles enter, having a longitudinal runway with a row of parking stalls on each side of the runway, and a vertical elevator at one side of the runways of all floors, upon which elevator automobiles are driven upon entering the building, and which carries the automobiles to any of the parking floors. Each of the parking floors is provided with a power driven carriage controlled by a man who rides with it, which traverses the runway lengthwise and stops in front of any parking stall. The carriage carries a normally retracted hoist capable of rising vertically a few inches, and on the hoist is a platform having its length dimension at right angles to the direction of travel of the carriage, narrower than the wheel base of the automobile, so as to rise beneath the wheels when the hoist moves upward, to contact the rear axle and the front wheel supporting members, and to lift the automobile bodily so as to solely support it. The platform is movable outwardly with the automobile into the parking stall, and then lowers, depositing the automobile on the floor of the parking stall; then it is retracted and the hoist lowered, the carriage being then in readiness to receive another automobile. When it is desired to unpark a particular automobile, the carriage is moved to a position in front of the proper stall. The platform is then extended to a position beneath the automobile, the hoist elevated to raise the platform sufficiently to assume support of the automobile, and the platform then retracted with the automobile, to bring the latter over the carriage. The carriage is then moved to a position in front of the elevator, at which point the platform with the automobile is extended out over the floor of the elevator. It is then lowered by the hoist until the automobile rests upon the elevator floor. The platform is then retracted and the elevator takes the automobile down to the ground floor.

Other objects of the invention relate to the several instrumentalities by which the above operative functions are accomplished, and will appear as the following description of a practical embodiment of the invention proceeds.

In the drawings which accompany and form a part of the following specification, and throughout the several figures of which the same reference characters have been used to denote identical parts:

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Figure 1 is a front elevation, somewhat diagrammatic, of a garage building embodying the principles of the invention, partly in section, and having an intermediate portion broken away;

5 Figure 2 is a side elevation of the building shown in Figure 1;

Figure 3 is a horizontal section taken along the line 3-3 of Figure 2, showing the ground floor in plan;

10 Figure 4 is a section taken along the line 4-4 of Figure 2, showing an upper floor in plan;

Figure 5 is a vertical section through the carriage and the adjacent part of the runway, the section being taken longitudinally of the runway;

15 Figure 6 is a vertical transverse section taken along the line 6-6 of Figure 5;

Figure 7 is a section taken along the line 7-7 of Figure 6;

20 Figure 8 is a fragmentary view showing a portion of the platform slightly extended, with the supporting wheel retracted;

Figure 9 is a plan view of the carriage with the two hoists and platforms, parts being broken out to show underlying elements;

25 Figure 10 is a perspective view of a platform and the adjacent portion of the hoist frame showing the cable system for extending and retracting the platform;

30 Figure 11 is a perspective view of a platform and the adjacent portion of the hoist frame illustrating the hydraulic system which serves the supporting wheels for the platform, and the pneumatic system which serves the hoist;

35 Figure 12 is a plan view of a suggested control panel arrangement.

Referring now to the details of construction, the numeral 1 represents a garage building of several or more stories in height, having the inside load bearing columns 2 arranged to form a middle longitudinal aisle 3 and lateral longitudinal aisles 4 and 5, on each floor. The lateral aisles are for parking stalls, with the exception of the area occupied by the vertical elevator shaft 6. The floors 7 of the middle aisles are sunk below the levels of the floors of the lateral aisles, except with respect to the ground floor, to form depressed runways 8 for carriages, so that the tops of the carriages may be flush with the floors of the parking stalls.

In the embodiment herein shown for purposes of example, there are openings 9 for entrance and exit at the opposite end walls of the building, at the ends of the middle aisle on the ground floor, as shown in Figure 3. A turntable 10 is located in the middle aisle in front of the ele-

vator shaft. The turntable has parallel guideways 11 for two automobiles, and the elevator 12 is wide enough to take two automobiles. After entering automobiles have been driven onto the turntable, the latter is turned through 90° to the position shown in Figure 3, and the automobiles are driven onto the elevator which stops at any of the above floors, level with the floor of the parking stalls.

Referring to Figure 4, it shows spaced rails 13 extending longitudinally along the bottom of the runway 8, and a third longitudinal rail 14 is also shown which is charged, and from which power is picked up for the electric motor which drives the carriage along the rails. The carriage is shown diagrammatically at 15.

Referring now to Figures 5, 6, and 9, the principal details of the carriage are shown. It consists of a rectangular frame having vertical sides 16, ends 17, a horizontal bottom 18 connected to the sides and ends, and a top 19 which consists of flat end portions 20 and a flat intermediate portion 21 in the same horizontal plane alternating with transverse depressed portions 22, also in a common horizontal plane and of rectangular cross-section. The portions 20 and 21 will be referred to generally as the deck of the carriage. Flanged wheels 23 are secured in pairs at opposite sides of the frame at each end, journaled in suitable bearings secured to the bottom 18. These wheels run on the rails 13. The wheels 23 at one end are driven through suitable gearing by the electric motor 24, which is electrically connected to a trolley 25 that runs along the third rail 14, and by means of which the carriage is propelled in either direction. The carriage carries two hoists which rise and fall vertically in the depressions 22. The hoists are similar, and the same reference characters will refer to each. The hoists as a whole are designated by the reference numeral 26. Each hoist consists of a pair of pneumatic cylinders 27 transversely displaced with respect to the carriage, as shown in Figures 6 and 9, each being axially vertical and secured at an intermediate point in its length to the bottom 18 of the carriage. A plunger 28 reciprocates in each cylinder. The upper ends of the plungers of both cylinders are fixed to a planiform horizontal stage 29 which fits for vertical movement within the depression 22. It normally rests against the bottom of said depression, but can be raised to a position above the floor of the carriage, as shown at 29 on the righthand side in Figure 5.

The stage 29 carries the parallel spaced rails 30 longitudinally thereof, that is, transverse with respect to the carriage. Each of said rails, as is best shown in Figures 7 and 10, comprises a beam of channel cross-section, the open sides of said channels facing each other, said beams being fixed to the stage 29 by their lower flanges 31. At intervals, along the upper flanges 32 of said beams are roller bearings 33. A platform designated as a whole by the numeral 34 runs on the rails 30, and is extensible therebeyond at either end in cantilever fashion, one of said platforms being shown thus extended in Figures 10 and 11.

Said platform, as shown, is a rectangular frame consisting of side and end channel members. The platform is of such width as to slide between the rails 30, and to pass between the wheels of an automobile. The side channel members 35 have their open sides facing outwardly, their upper flanges 36 overlapping the

upper flanges 32 of the rails 30, and resting upon the bearings 33. The lower flanges 37 of said side channel members have similar roller bearings 38, secured at intervals to their under surface, which bear against the top surface of the lower flanges 31 of the rails.

A cable system is provided for moving the platform from its central position with respect to the carriage to either of its extended positions. This system comprises pulleys 39 secured to the carriage at opposite sides, a pair of independently operable motor driven winches 40 and 41 mounted on the floor of the carriage in the middle, and a pair of cables 42 and 43, one for each winch, suitably passed about pulleys at the respective ends of the platform and finally secured at their respective ends 44 and 45 to the ends of said stage. When the winch 40 is operated to wind the cable 42, it moves the platform to the right, as shown in Figure 10, and when the winch 41 is operated to wind the cable 43, it moves the platform leftward. When either winch is operated to wind its cable, the movement of the platform automatically correspondingly unwinds the cable from the other winch.

The platform 34 is supported as its outlying end when extended, by the auxiliary wheels 45, there being a pair of such wheels at each end of the platform. Said wheels are each journaled in the bifurcated ends of downwardly extending plunger rods 47, the inner ends of which are each secured to a hydraulic plunger 48 in a hydraulic cylinder 49, said cylinder being secured to the inner sides of the channel members 35. Naturally, the wheels are retracted, but when the automobile is on the platform and the latter is extended, the wheels sustain the weight of the automobile on the extended end. Springs 51 surround the plunger rods 47 within the hydraulic cylinders between the plungers and the lower ends of the cylinders, which springs hold the plungers retracted at times when they are not subjected to hydraulic pressure.

Figures 5, 6 and 7 show that when the hoist 26 is at the lower limit of its range of vertical movement, the stage 29 is nested within the depression 22 so that the platform 34 is wholly within said depression. Figure 8 shows the hoist elevated to an intermediate height at which the stage 29 is slightly above the floor 52 of one of the lateral aisles. The hoist is in this position at the time the platform 34 is extended, the wheels 46 being retracted when no automobile is on the platform.

Assuming now that an automobile is on the elevator 12 awaiting to be taken to a parking stall upon the carriage, the latter is propelled along the rails 13 until one of the platforms 34 is in end registry with the automobile. The platform at this time will be in its unextended position relative to the stage 29. The operator who rides with the carriage operates the control which raises the hoist until the stage 29 is in the position shown in Figure 8 slightly above the floor of the elevator. He then operates the control for the winch which extends the platform 34 in the direction toward the elevator. The operator then raises the hoist further, elevating the stage 29 and with it the platform 34 until the latter makes contact with the axle and front wheel supporting members of the automobile and lifts the latter from the elevator floor. As the stage is raised beyond the position shown in Figure 8, a hydraulic system is operated to deliver hydraulic pressure to the upper face of the plungers 48

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within the hydraulic cylinders 49, thrusting the wheels 46 downward against the floor of the elevator as the platform 34 is raised, thus supporting the extended end of the platform with the weight of the automobile, maintaining the platform level at all times.

The hydraulic system is shown in Figure 11, comprising a motor driven pump 53 and suitable conduits which lead to each pair of hydraulic cylinders 49, and which are alternately opened and closed by the valve 52 shown in Figures 9 and 11, according to which end of the platform is to be extended. When the automobile is platform-borne, the platform is retracted by operation of the appropriate winch until it is again in normal position relative to the carriage. As the wheels 46 approach the end of the elevated platform, the hydraulic pressure on the plungers 48 is released and the wheels retracted so that they do not collide with the edge of the platform. The carriage is then propelled along the rails 13 until it reaches a position in which the platform is in front of the proper parking stall. The operator then actuates the control which operates the proper winch to extend the platform into the parking stall and simultaneously applies hydraulic pressure to the plunger cylinders of the corresponding wheels 46. When the automobile is over the floor of the parking stall, the hoist is operated to lower the platform, the fluid pressure control being operated at the same time to release the pressure upon the plungers of the wheels 46. The platform is lowered until the wheels of the automobile rest upon the floor of the parking stall and the platform is out of contact with the under surface of the automobile. The platform is then retracted onto the stage 29. It is optional with the operator whether the hoist shall be left in its partially elevated position between trips from the elevator to the parking stalls, or vice versa, or whether it shall be lowered to its limit with the platform fully nested within the depression 22.

A control panel 54 is mounted at a convenient place toward the middle of the carriage on the deck of the latter, near which the operator stands or sits, accessible to the control buttons. A suggested panel arrangement is shown in Figure 12, in which the buttons marked "Up" and "Down" control the movements of the respective hoists. It is noted that there are two buttons marked "Extend" for each of the platforms, one of which controls the extension of the platform to the right, and the other to the left, and there are two additional buttons for operating the hydraulic systems for the respective pairs of wheels 29. There are likewise two buttons designated "Retract," which are operated for bringing the extended platform back to normal position upon the carriage, and there are also two additional buttons for releasing the hydraulic pressure from the respective pairs of wheels 46. Two buttons marked "Forward" and "Reverse" control the direction of travel of the carriage in either direction along the rails 13, while the button marked "Stop" is used to stop the carriage at any point. A brake 55 is shown in Figure 5, operatively associated with one of the wheels of the carriage, actuated by the lever marked "Brake" on the control panel, for bringing the carriage quickly to a precise stop. Since the electrical connections to the several instrumentalities are not part of the present invention, and are within the skill of the routine electrician, it has not been thought necessary to disclose or describe them.

While I have in the above disclosure described

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what I believe to be a practical embodiment of the invention, it will be understood by those skilled in the art that the specific details of construction and the arrangement of parts, as shown, are by way of example and not to be construed as limiting the scope of the invention.

What I claim is:

1. Parking garage comprising a building having superposed stories each having lateral aisles with floors at a common relatively high level, for parking, and a central aisle contiguous to said lateral aisles having a floor at lower level, defining a runway, an elevator shaft intersecting each of said lateral aisles on one side of said runway and contiguous thereto, an elevator in said shaft, a railway extending longitudinally through each runway, a wheeled carriage for each runway mounted on said railway, movable forward or backward and capable of being stopped in front of said elevator shaft and at any point in front of said high level floor, a hoist on said carriage movable vertically, fluid pressure means for operating said hoist, a platform on said hoist sufficiently narrow to pass between the wheels of an automobile and sufficiently long to support the automobile beneath the rear axle and the front wheel supporting means, said platform being extensible beyond said carriage at either side thereof in a direction perpendicular to the direction of movement of said carriage, electrically actuated means for extending and retracting said platform, an electric motor on said carriage geared to certain of the wheels of said carriage for propelling the same, wheels at the ends of said platform for supporting the extended end of said platform, fluid pressure means reacting between said platform and wheels to extend them downwardly with load sustaining pressure as the loaded extended platform is elevated by said hoist, an electrically hot rail extending longitudinally through said runway, pick-up means on said carriage engaging said rail for supplying current to said electrically operated instrumentalities and fluid pressure pumps and controls therefor on said carriage for supplying pressure to said fluid pressure operated instrumentalities.

2. Parking garage including parallel aisles in contiguous side by side relationship, the floor of one being at a lower level than the floor of the other, the higher floor including parking spaces facing the depressed aisle, a railway track on the floor of the depressed aisle extending lengthwise thereof, a power driven wheeled carriage on said railway track, controls therefor for selectively propelling it forward or backward and stopping it at any parking space, a hoist mounted upon said carriage movable vertically, said hoist including fixed hydraulic cylinders transversely spaced with respect to said carriage, plungers in said cylinders and a horizontal stage carried by the tops of said plungers, spaced oppositely facing channel beams fixed to said stage perpendicular to the direction of movement of said carriage, a platform carried by said stage consisting of a frame having relatively narrow end members and relatively long side members, said frame being of a width to pass between the wheels of an automobile and of a length to support the automobile beneath the rear axle and front wheel supporting means, the side members of said frame comprising channel beams having their top and bottom flanges overlapping respectively the top and bottom flanges of said fixed beams, anti-friction bearings between said lapped flanges, means for extending said platform beyond the sides of

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said carriage over said higher floor a sufficient distance to place an automobile carried by said platform over a parking space on said higher floor, a laterally spaced pair of hydraulic cylinders carried by said platform adjacent the opposite ends thereof, downwardly extending plungers in said cylinders and extending therebelow, wheels at the lower ends of said plungers, springs associated with said wheels for holding them normally retracted, and means for applying hydraulic pressure to the wheel plungers at the extended end of said platform for lowering said wheels as the loaded platform is raised by said hoist.

3. Parking garage as claimed in claim 2, said carriage having a floor substantially flush with the floor of the higher aisle, said carriage floor having a transverse depressed portion of substan-

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tially rectangular cross-section, the stage of said hoist and said platform nesting in said depression when said hoist is fully retracted.

MELVYN H. DAWSON.

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