

Nov. 3, 1964

F. J. BAUME
PARKING EQUIPMENT

3,155,246

Filed July 27, 1962

4 Sheets-Sheet 1

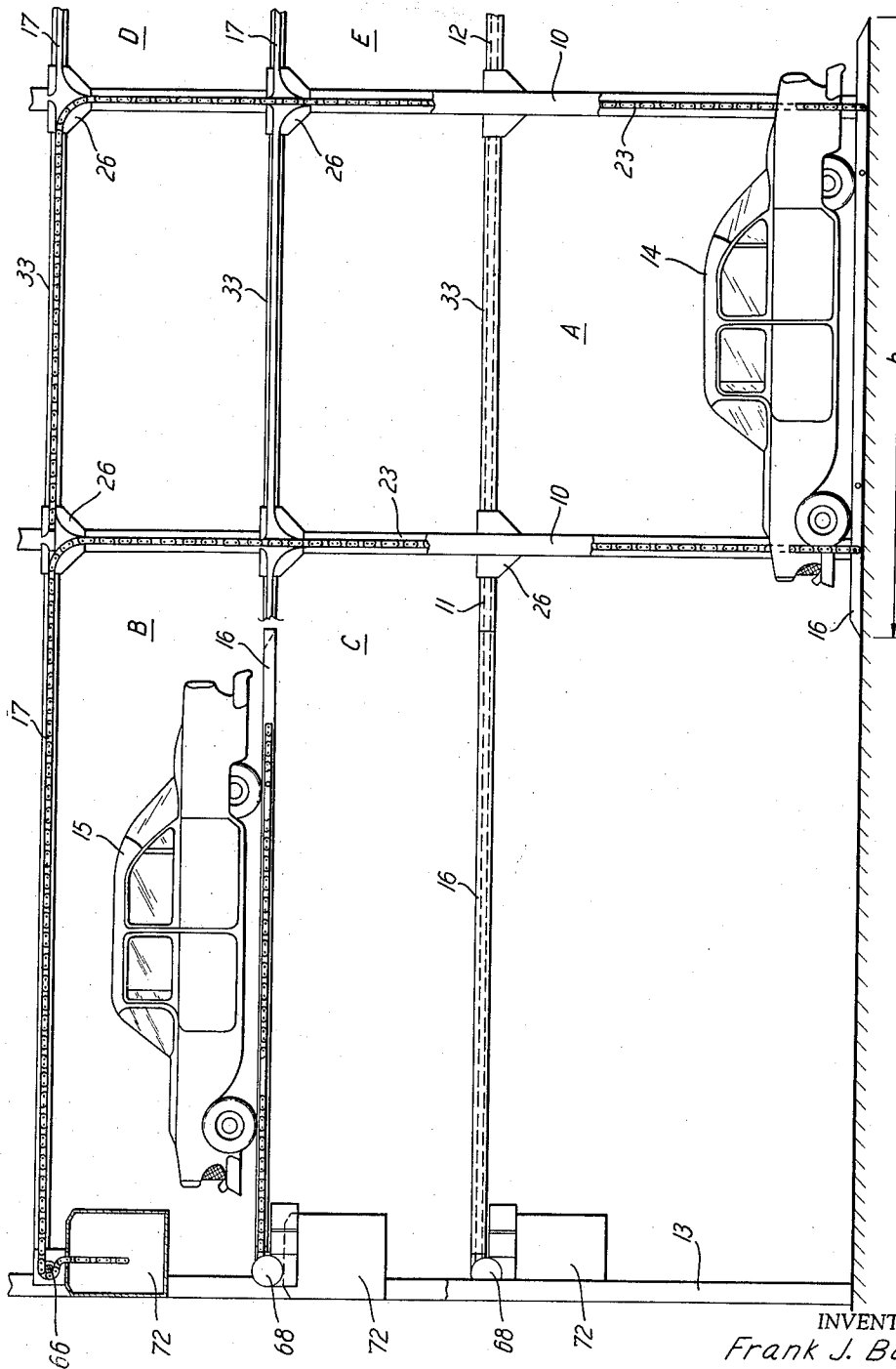


Fig. 1

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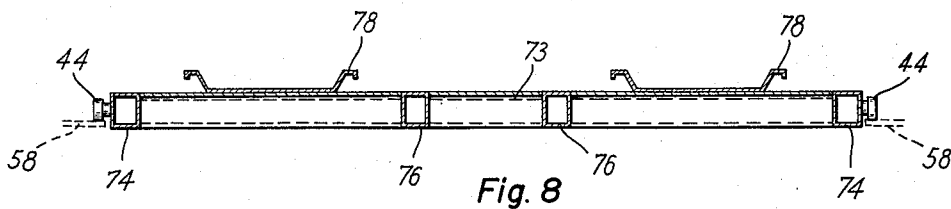
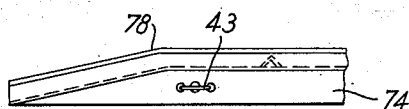
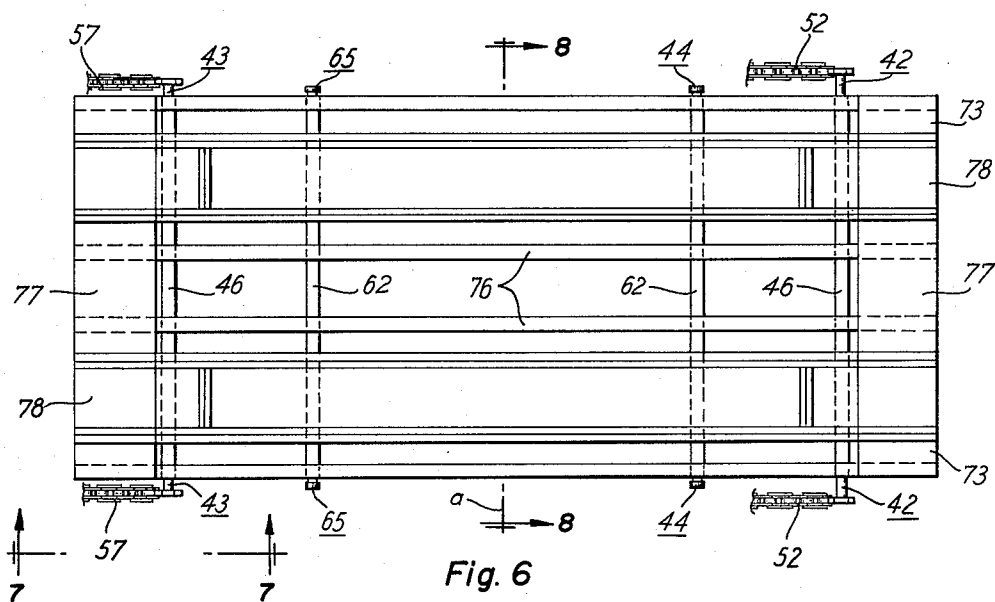
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4 Sheets-Sheet 3



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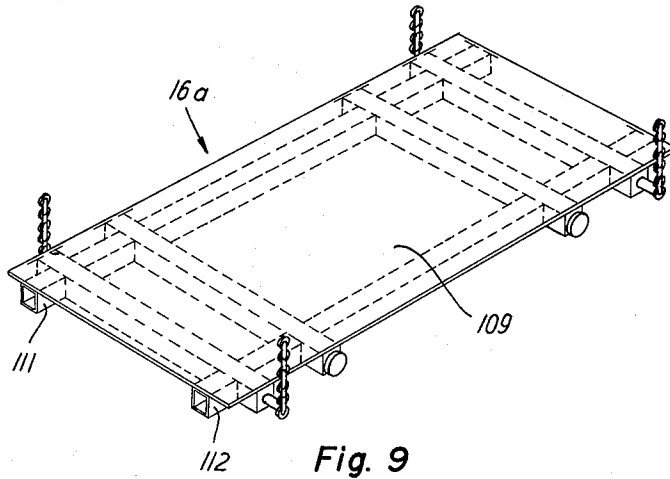


Fig. 9

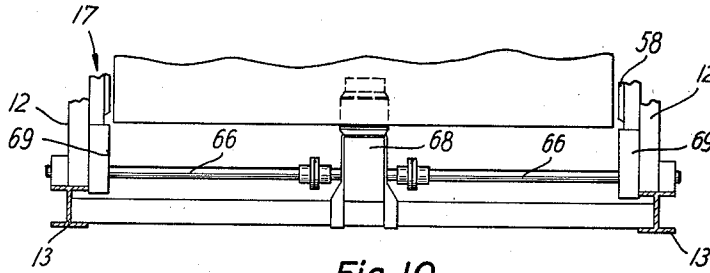


Fig. 10

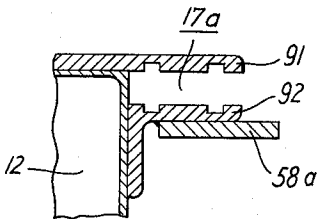


Fig. 11

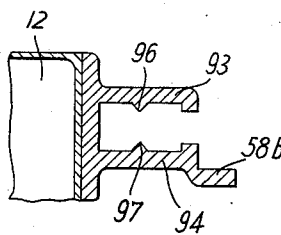


Fig. 12

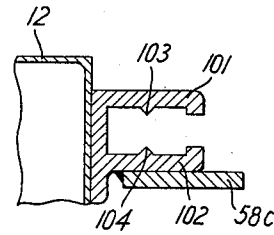


Fig. 13

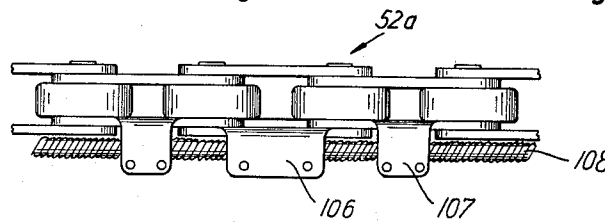


Fig. 14

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3,155,246

PARKING EQUIPMENT

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3 Claims. (Cl. 214-16.4)

This invention relates generally to equipment for the handling and storage of mobile or portable units, such as automobile trucks, trailers, portable packaged material or merchandise stock, and the like. As disclosed therein, the equipment is intended primarily for the parking of automobiles, trucks, and trailers.

In my prior Patents Nos. 2,658,632, 2,824,654, and 3,027,024, I have shown equipment suitable for the automatic or semi-automatic parking of vehicles, such as automobiles, trucks, and trailers. Such equipment utilizes a building structure which provides at least one vertically extending elevator hatch, together with parking stalls which extend laterally from the hatch, at various levels. In a parking operation, a car is driven upon a platform at the ground level, after which it is elevated to an empty stall and moved laterally into the stall, where it is held for the desired period of storage. The motive means employed for moving the platform structure preferably is of the type disclosed in my Patent No. 2,824,654, and makes use of special chains which are constrained whereby they are capable of elevating and pulling a platform structure into the stall, and in addition they serve to eject the platform from a stall into the hatch.

It is an object of the present invention to provide improved equipment of the type described above, and which in particular will have more rapid and better operating characteristics, and which will be less costly to erect and operate.

It is another object of the invention to provide improved cross-over means for insuring proper movement of a platform between a stall and the hatch.

Another object of the invention is to provide improved means for insuring transition from horizontal to vertical track means, without jerking action or sudden changes in direction of movement.

Another object of the invention is to provide improved equipment of the above character, characterized by the feature of means serving to prevent simultaneous movement of parked cars from two or more stalls.

Another object of the invention is to provide a novel platform or pallet structure for the support of automobiles, trucks or trailers.

Additional objects and features of the invention will appear from the following description, in which the preferred embodiments have been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

FIGURE 1 is a schematic elevational view illustrating equipment in accordance with the present invention;

FIGURE 2 is a detail, on an enlarged scale, illustrating a track on one side of a stall, together with two transition devices;

FIGURE 3 is a cross-sectional view taken along the line 3-3 of FIGURE 2;

FIGURE 4 is a cross-sectional detail taken along the line 4-4 of FIGURE 3;

FIGURE 5 is a detail illustrating one of the devices for connecting the platform structure to a cooperating chain;

FIGURE 6 is a plan view showing one form of supporting platform structure;

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FIGURE 7 is a detail on an enlarged scale taken along the line 7-7 of FIGURE 6;

FIGURE 8 is a cross-sectional view taken along the line 8-8 of FIGURE 6;

FIGURE 9 is a perspective view, illustrating another type of platform structure;

FIGURE 10 is a schematic view illustrating one form of drive means which can be used for driving the operating chains;

FIGURE 11 is a detailed section on an enlarged scale, showing another embodiment of the track means incorporated in FIGURE 4;

FIGURE 12 is a detail in section similar to FIGURE 11, but showing another type of track means;

FIGURE 13 is a view like FIGURE 12, but showing another track means;

FIGURE 14 is a plan view showing another type of chain which can be used.

The equipment as illustrated in FIGURE 1 consists generally of a vertically extending elevator hatch A, which communicates at its sides with the laterally extending parking stalls B, C, D and E. The supporting structure forming the elevator hatch and the stalls need not be described in detail, but as illustrated schematically it included the vertical supporting columns 10, the horizontal structural members 11 and 12, and the exterior supporting columns 13. In FIGURE 1, an automobile 14 has been shown within the elevator hatch at the ground level. Another parked automobile 15 is shown in the stall B.

As it will presently appear, the posts or columns 10 are not located in the limiting corners of the elevator hatch. The full length of the elevator hatch has been indicated at *h* in FIGURE 1, and extends substantially beyond the columns 10. This makes it possible to use the columns as mounting means for the vertical tracks to be presently described.

Each of the stalls is equipped with a platform or pallet structure 16, which is adapted to support the automobile or other load to be parked. The platform structure has a length somewhat less than the hatch length *h*, whereby the platforms, may be elevated to the levels of the various stalls, without interference.

In its movements between ground level and parking positions, each platform structure is guided by special track means. Also means are provided for applying the forces required to elevate and move the platform into and out of a stall space. Thus, each stall is provided with horizontal (or substantially horizontal) tracks 17 which for convenience can be directly mounted upon the horizontal beams 12. The track in this instance is formed from the structural steel angles 18 and 19, which provide parallel flange portions 20 and 21. These flange portions are shown provided with opposed roller-tracking grooves 22.

The sides of the vertical columns 10 are provided with vertical tracks 23. These tracks provide similar roller-engaging grooves 24.

At each end of the stall levels, the four vertical tracks 23 communicate with the transition devices 26. In other words, at each stall level transition devices 26 are interposed between the upper end of the tracks extending from a lower level, and the lower ends of tracks extending to a higher level. The transition devices can conveniently be in the form of steel castings as shown in FIGURE 2. Each casting (on the left side) consists of a web-like

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base 27, which is attached by suitable means to the corresponding vertical column. A curved flange 28 forms a grooved track which extends between and connects the lower flange 21 of track 17 with the left-hand flange 29 of the track 23.

The curved flange 31 connects between the lower flange 32 of the track 33, and the right-hand flange 34 of the vertical trackway 23. The tracks 33 are located as shown in FIGURE 1, and extend between two transition devices located on the same level and upon the same side of the hatch. Additional flanges 34 and 35 overlie the space 37 above the flanges 28 and 31. They terminate short of the vertical centerline of the device, thus leaving a gap 36. Flange 34 is on the same level as the upper flange 20 of the corresponding track 17, while flange 35 is on the same level as the upper flange 38 of the track 33.

All of the transition devices are aligned vertically, whereby an unobstructed passage is provided by the aligned tracks 23, and spaces 41 between the lower portions of the flanges 28 and 31, and the gaps 37. In general, these transition devices can be described as Y-shaped, with the branches of the Y being arcuate and forming trackways that converge downwardly and connect with the vertical trackway 23.

A plurality of roller devices are provided for supporting the platform structure. Thus a pair of roller devices 42 are carried near the forward end of the platform structure (FIGURE 6), and a similar pair of roller devices 43 are carried near the trailing or rear end. The term "forward" and "rear ends" as used in this connection has reference respectively to the end of the platform structure nearest the hatch, and the end most remote from the hatch when the platform structure is in a parking stall. In addition to the roller devices 42 and 43, there are provided additional roller devices 44, which are secured to the platform along a centerline intermediate the centerline of devices 42, and the centerline *a* of the platform structure.

The devices 42 and 43 can be duplicates, and can be constructed and mounted in the manner shown in FIGURES 3 and 5. Therefore, for mounting the devices 42, the platform structure is provided with a tube 46, which is secured as by welding, and which at its ends are provided with bushings 47 for rotatably receiving the stud shafts 48. The outer end or head portions 49 of these shafts may be flattened as indicated in FIGURE 5, and are constructed like the link of a roller chain. Thus each head portion carries the track-engaging rollers 51 which are dimensioned to engage within the grooves of the various tracks. A chain 52 is shown connected to the head 49, and is of the type provided with rollers 53, dimensioned the same as rollers 51. The rollers 53 likewise engage within the grooves of the track elements, thus reducing friction of chain movement, and permitting portions of the chain to operate both as pushing and pulling elements, as will be presently described. The shaft 48 is free to rotate about its axis, whereby when the platform moves from a parking position into the hatch, each of the shafts 48 turns through 90 degrees.

The roller devices 43 are constructed in the same manner as the devices 42. However in this instance the shafts 56 are somewhat shorter, to accommodate the spacing between the tracking grooves. Here again each roller device is connected to a roller chain 57.

The roller devices 44 are adapted to engage a simple track flange 58 (FIGURE 3), which can be secured to the flange 21 of the track 17 (FIGURE 4). These devices can consist of rollers 59 carried by the shafts 61, the shafts in turn being secured to tubes 62 that are attached to the platform structure.

It is preferable, although not essential, to provide the additional roller devices 65. These devices can be constructed in the same manner as devices 44, or in other words, they can consist of rollers 63 carried by the shafts

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64. These rollers are likewise disposed to engage the track flange 58.

Motor driven means are provided in conjunction with each stall for driving the chains. Thus a rotatable shaft 66 is mounted near the rear end of each stall, and is provided with sprocket wheels 67, for engaging the chains 52 and 57. The shafts 66 are operatively connected with drive means 68, which can consist of a reversible electrical motor together with suitable reduction gearing. The sprockets 67, and also the adjacent portions of the chains, are enclosed within the housings 69. These housings are provided with passages 70 and 71, through which the chain passes. Extending across the rear ends of the next lower stall and below the sprocket 67, there is a chain locker 72, which is of sufficient size to accommodate the chains as they are being retracted to elevate a platform structure and to translate it into the stall.

The particular type of platform structure shown in FIGURES 6-8 is made as follows: the lateral-extending members 45 and 62 are tubes serving to mount the roller devices previously described. A metal sheet 73 forms the top of the platform, and is secured as by welding to the tubes 46 and 62. The side and central longitudinally-extending stiffening members 74 and 76, can be in the form of box-like structural members, secured to the top plate and to the laterally-extending tubes, as by welding. Both end portions 77 of the platform are tapered to facilitate the movement of an automobile onto and off of the platform. Trough-like wheel guideways 78 extend longitudinally of the platform, to insure proper positioning of the car.

Operation of the equipment described above is as follows: When it is desired to park an automobile, one of the platforms 16 is positioned on the ground level as shown in the right-hand portion of FIGURE 1. An automobile is then driven upon the platform, and the brakes set by the operator. The operator now operates a master control which closes the electrical circuit for the driving motor of the stall with which this particular platform is associated. In this instance it is assumed that the stall will be one immediately above the stall B. Rotation of shaft 66 together with sprockets 67, winds up the chains connected to the platform. Since the two sets of chains are moved synchronously, the platform 16 is elevated and maintained in horizontal position. Roller devices 42 and 43 operate within the vertical tracks 23, and serve to minimize swinging or side play. When the platform approaches the level of the particular stall in which it is to be placed, roller devices 42 and 43 enter the corresponding transition devices 26, and then the roller devices ride up over the curved flange portions 28, thus gradually changing the motion from vertical to horizontal. After passing through the transition devices, the rollers 43 enter the tracks 17, and rollers 42 enter the tracks 33, which are in the elevator hatch. Continued winding up of the chains causes the platform to move smoothly into the stall, with the weight of the platform being carried by roller devices 42 and 43, which in turn rests upon the tracks 33 and 17. When the rollers 42 enter the region of the left-hand transition devices 26, it is evident that they no longer support the platform. However, at this time the load is shifted to the roller devices 44, resting upon the flange 58. Thus the roller devices 42 pass through the left-hand transition devices, until they enter the horizontal track 17, where they again can support a part of the load.

The procedure described above is reversed when it is desired to remove a parked automobile. Assuming now that the automobile 15 in stall B is to be removed, and an electrical motor associated with this stall is energized by the operator to drive the shaft 66 in a reverse direction. This serves to place compression upon a portion of the chains, namely, those portions extending from the sprockets to the roller devices 42 and 43. It is possible to apply forces in compression because the chains are constrained against buckling by the side tracks 17. The net result is

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that thrust is applied to the platform to cause movement of the platform from the stall into the elevator hatch. As the car reaches approximate alignment with the elevator hatch, the roller devices 42 and 43 pass through the transition devices 26, with the result that there is a gradual and smooth change in the direction of motion from horizontal to vertical.

It will be apparent from the above that my equipment permits a parking attendant to park a car in any stall desired, or to remove a parked car from any one of the stalls. It is only necessary for the attendant to position the automobile upon the platform at the ground level, after which elevation and actual movement into parking position proceeds automatically.

One desirable feature of the equipment described above is that it is impossible to attempt removal of two or more cars simultaneously, or the parking of a car while another car is being removed. This is because while a car is in the loading zone, its corresponding chains extend through the transition devices of all stalls below that for which the platform is intended. Thus, as previously explained in connection with FIGURE 1, the automobile 14 shown at the ground level, is associated with the platform which moves into the stall immediately above the stall B. While in the ground level position the chains for this particular platform extend through the lower transition devices. While this condition exists, it is obviously impossible to move any platform at the same level as stall B or below stall B, into the hatch, because such movement is prevented by engagement of the roller devices 42, with the vertically extending chain portions.

The roller devices 65 are not essential to the operation described above. However, it has been found that their use, in conjunction with the flange 58, tends to steady movement of the loaded platform, and to aid in carrying the over-all load applied by the vehicle.

It will be apparent that the various tracks can vary in construction. For example, the horizontal tracks in the stalls can be constructed as shown in FIGURE 11. In this instance the track 17a consists of the upper plate 91 together with the flange 92, both carried by the beam 12. Another plate 58a is secured to the flange 92, and forms the equivalent of the flange 58.

In FIGURE 12, parallel flanges 93 and 94 are provided, and instead of utilizing roller engaging grooves, these flanges are provided with separating ridges 96 and 97. The chain roller operates in the spaces on opposite sides of the ridges. Flange 58b in this instance performs the function of the flange 58 of FIGURE 3.

In FIGURE 13 the parallel flanges 101 and 102 are likewise provided with ribs 103 and 104. This, likewise, forms the equivalent of two grooves for receiving the chain rollers. A welded-on plate 58c forms the equivalent of the flange 58.

While a simple roller-type chain can be used with good results, it is possible to provide a feature of safety by utilizing the structure of FIGURE 14. In this instance the roller chain 52a has its links, on one side of the chain, provided with projecting tabs 106 and 107. Suitable clamping means (not shown) serve to attach these tabs to the cable 108. With this cable, if there should be a failure of the chain, the cable will provide emergency support. With this type of arrangement it is possible to utilize chains of lighter weight, with reliance upon the cable to provide safety.

FIGURE 9 shows a simplified type of platform. In this instance the platform 16a consists of the top plate 109, stiffened by the transverse and longitudinally-extending reinforcing members 111 and 112. The roller devices may be the same as previously described.

With respect to the electric circuitry and controls, I can employ a standard control switchboard of the interlocking type, whereby when one motor is in operation to move a platform into its stall, none of the other motors can be

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operated. Standard limiting switches can be used in the stalls to stop each motor automatically when a platform has reached parking position. A similar limiting switch can be used to stop downward movement of each platform at the end of its downward movement, or in other words to stop automatically in the loading position.

I claim:

1. In apparatus of the character described, a structure forming a vertical elevator hatch and at least one stall extending laterally from one side of the hatch at an upper elevation, a platform structure adapted to receive and support a load for storage and movable vertically within the hatch and laterally within the stall, horizontal track means carried along the sides of the stall and forming two pairs of parallel side by side trackways, two pairs of rollers means secured to the sides of the platform structure near the forward and rear ends thereof for engaging said trackways, two pairs of vertical tracks disposed along the sides of the shaft that correspond to said sides of the stall, said roller means being adapted to register with and engage said vertical tracks when the platform structure is shifted from a position within the stall to a position substantially in alignment with the hatch, horizontal track means within the hatch and extending between the vertical tracks at the level of the first named tracks and forming trackways for the forward pair of roller means, motive means for moving the platform structure vertically within the hatch and laterally within the stall, additional roller means carried by the platform structure near the forward end and disposed inwardly of said first named trackways, and additional tracking means carried along the sides of the stall and serving to underlie and support said last-named means and said platform structure when said forward roller means passes over the region of the two vertical tracks nearest to said one hatch, said last named tracking means extending parallel to said first-named trackways and adjacent the inner sides of the same.

2. Equipment as in claim 1 in which said motive means includes chains operating within said first named trackways and in which said forward and rear roller means consists of links of said chains, together with rollers carried by said links.

3. In apparatus of the character described, a structure forming a vertical elevator hatch and two stalls extending laterally from opposite sides of the hatch at an upper elevation, two platform structures adapted to receive and support loads for storage and movable vertically within the hatch and laterally within a corresponding stall, horizontal track means carried along the sides of each stall and forming two pairs of parallel side by side trackways, two pairs of roller means secured to the sides of each platform structure at the forward and rear ends thereof for engaging said corresponding trackways, two pairs of vertical tracks disposed along the sides of the hatch that correspond to the said sides of the stalls, said roller means being adapted to register with and engage said vertical tracks when a platform structure is shifted from a position within its stall to a position substantially in alignment with the hatch, horizontal track means within the hatch and extending between the vertical tracks at the level of the first named tracks and forming trackways for the forward pair of roller means for platform structure, separate motive means including chains adapted to extend through said horizontal track means and the vertical tracks for moving each platform structure vertically within the hatch and laterally within its stall, transition devices forming junctions between the horizontal and vertical tracks, each of said transition devices forming curved downwardly convergent trackways conforming substantially to a Y for movement of rollers for both platform structures between horizontal and vertical tracks, additional rollers carried by each platform structure near the forward end thereof and disposed inwardly of said first-named trackway, and additional tracking means carried

along the sides of each stall and serving to underlie and support said last-named roller means and the corresponding platform structure when said forward roller means passes over the region of corresponding transition devices nearest to the stall, said last-named tracking means extending parallel to said first-named trackways and adjacent the inner sides of the same.

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