

Sept. 13, 1955

E. E. WHITE

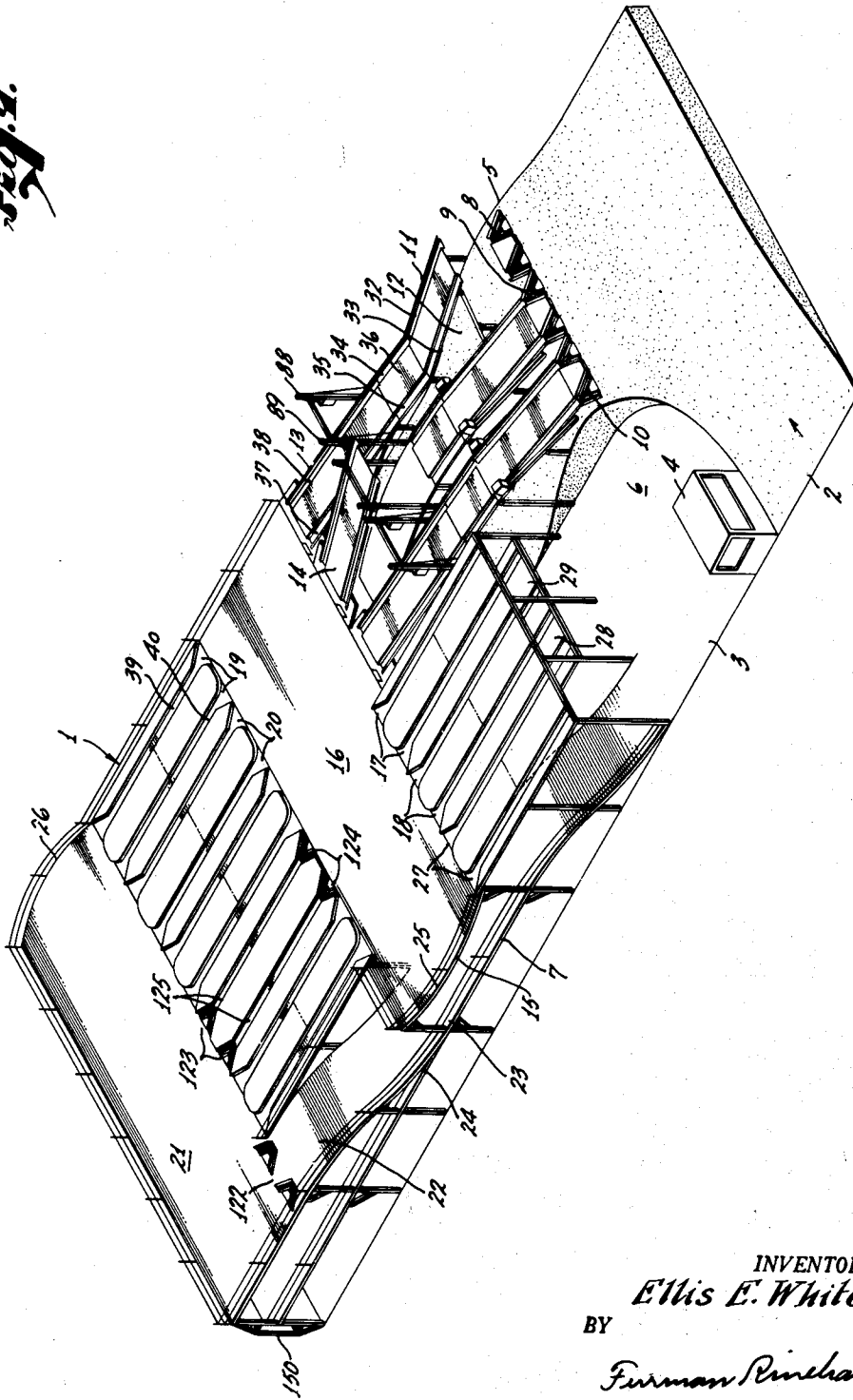
2,717,428

MULTIDECK PARKING RACK

Filed Dec. 21, 1949

9 Sheets—Sheet 1

Fig. 1.



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Fig. 2.

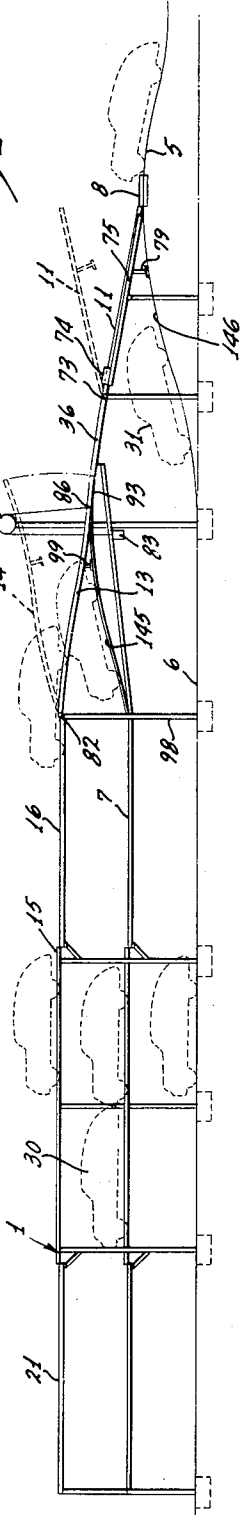


Fig. 3.

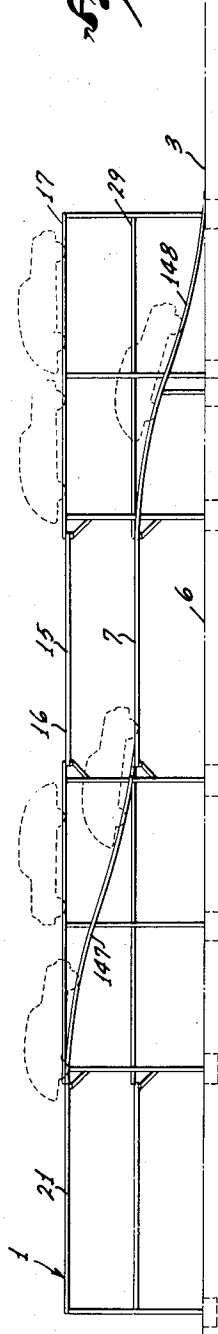


Fig. 4.

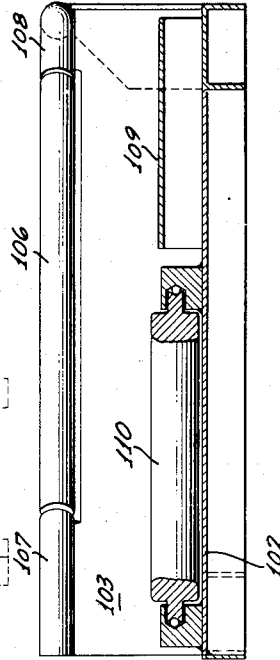
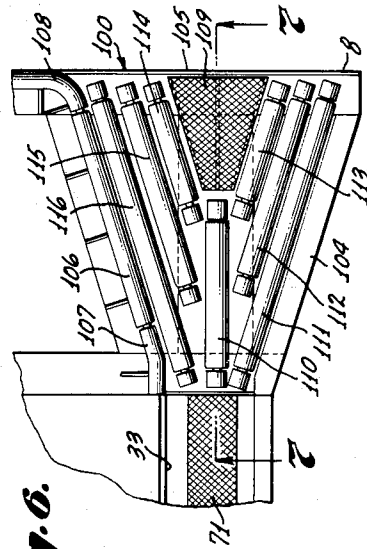


Fig. 5.



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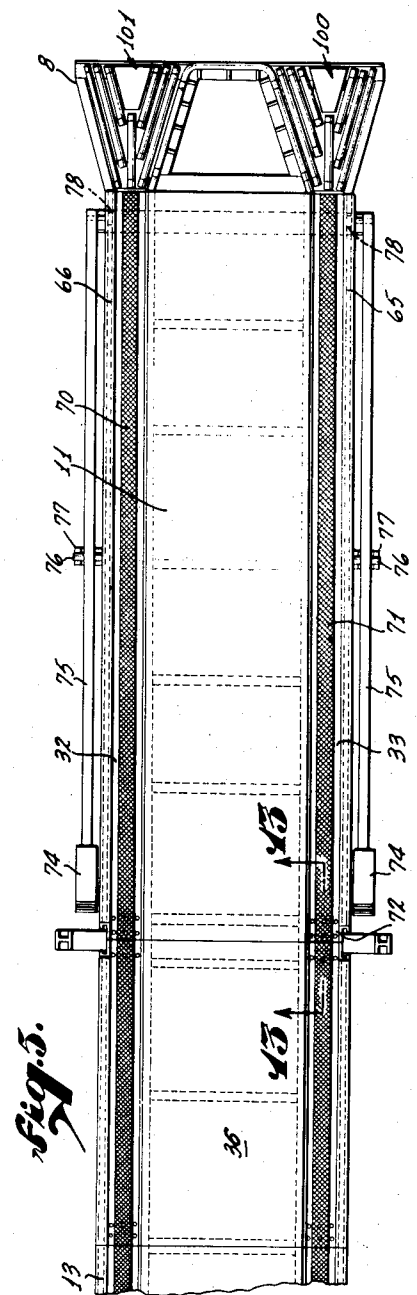
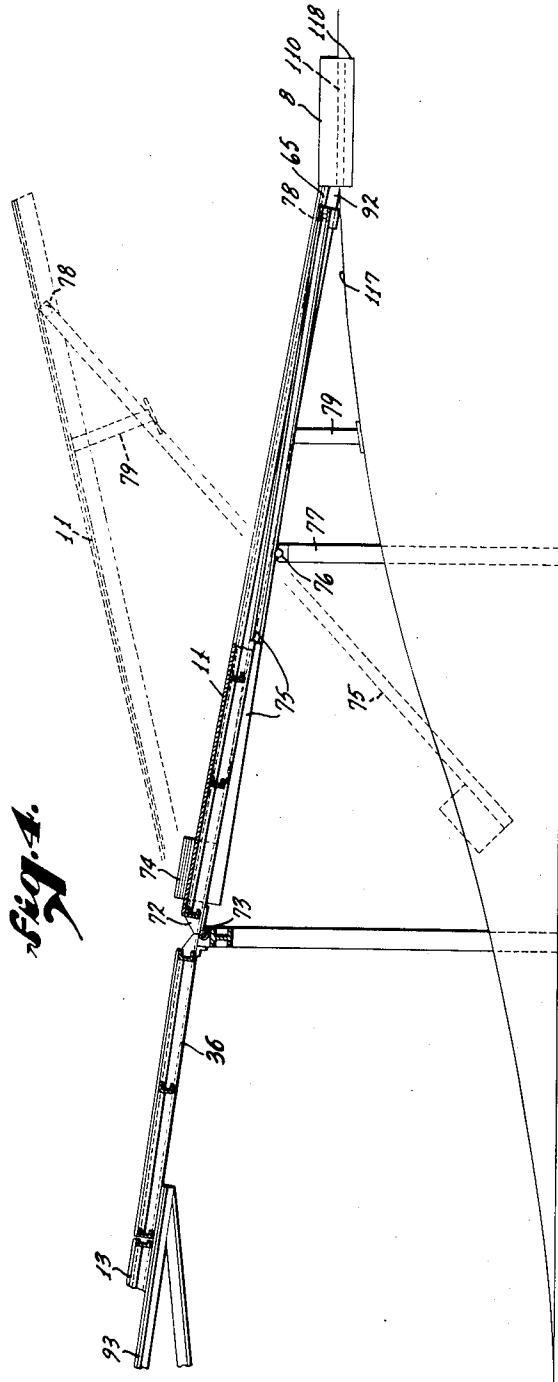
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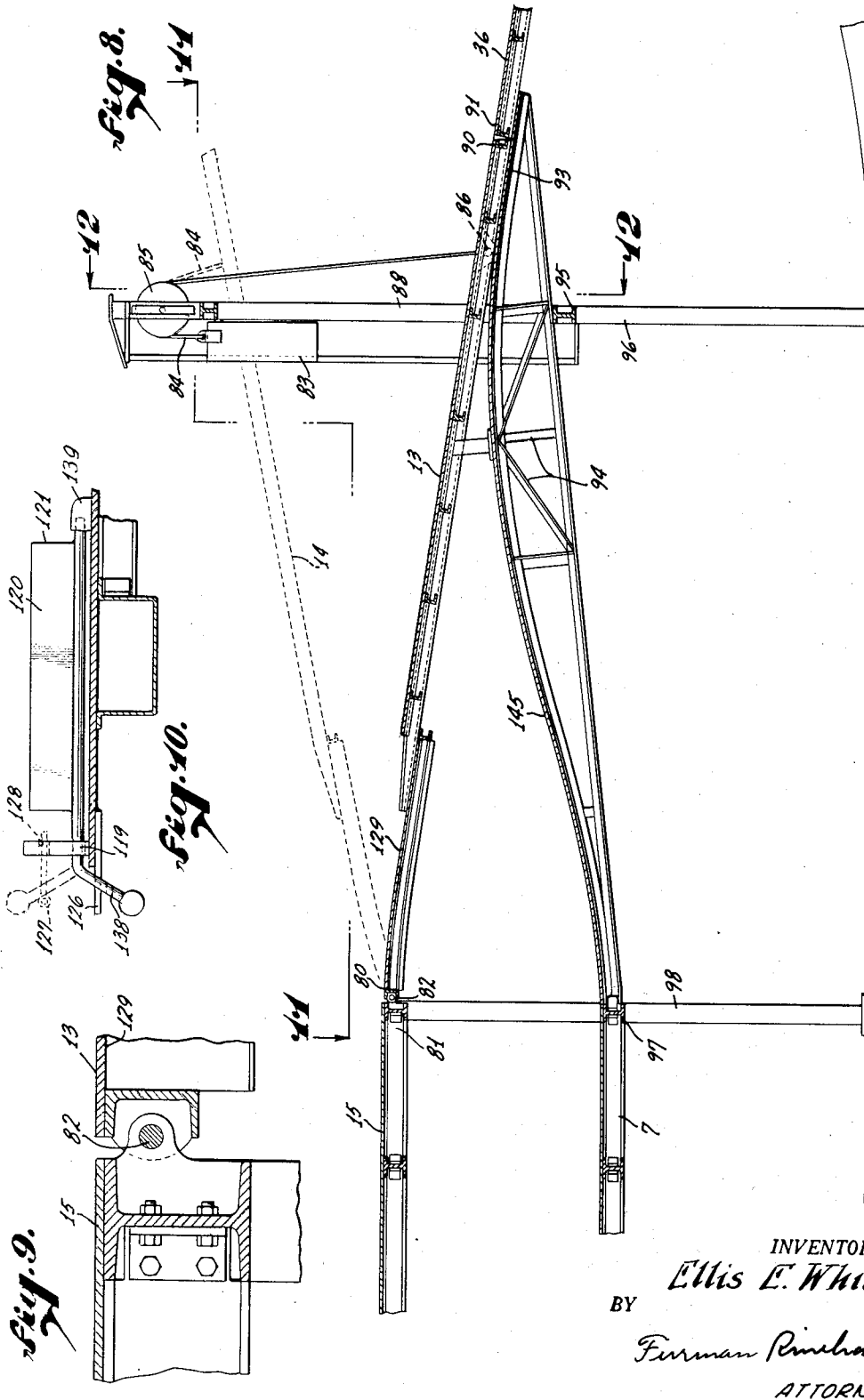
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MULTIDECK PARKING RACK

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Fig. 11.

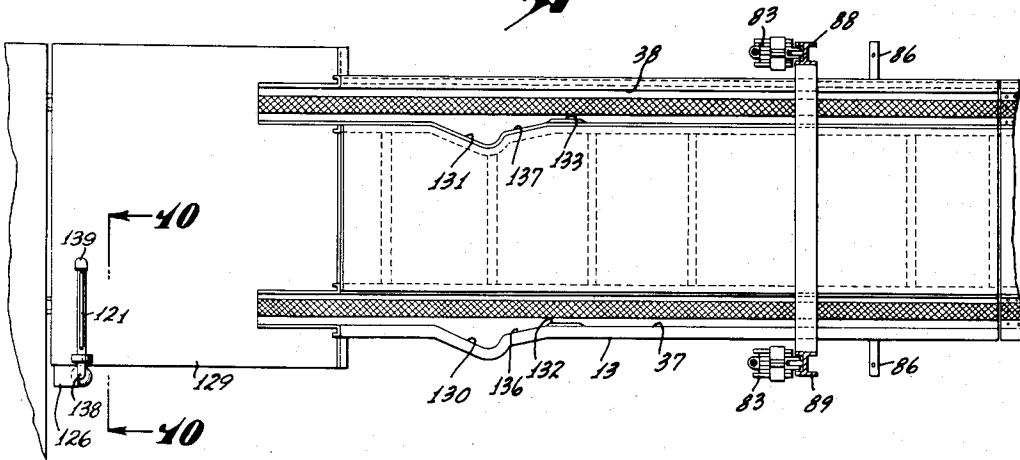


Fig. 12.

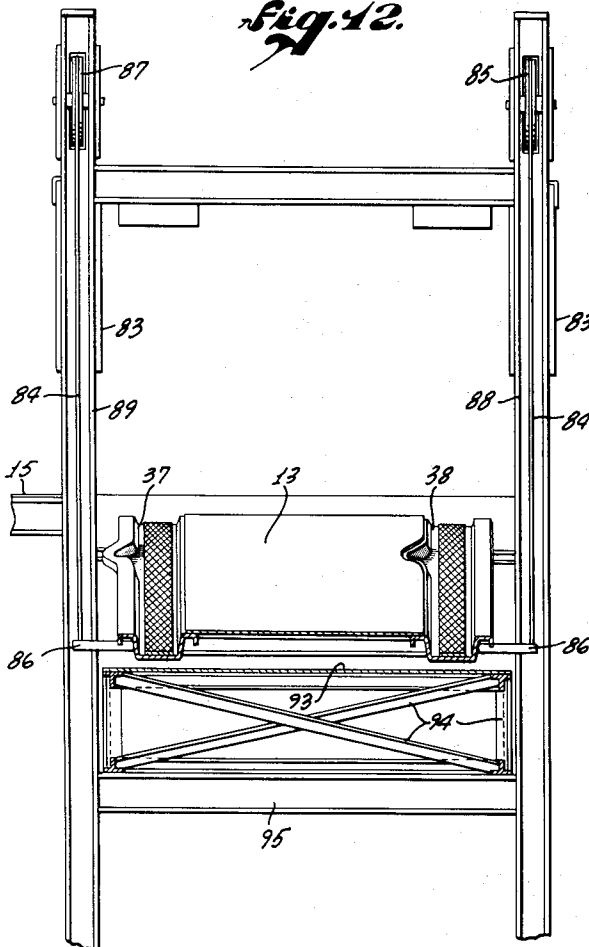
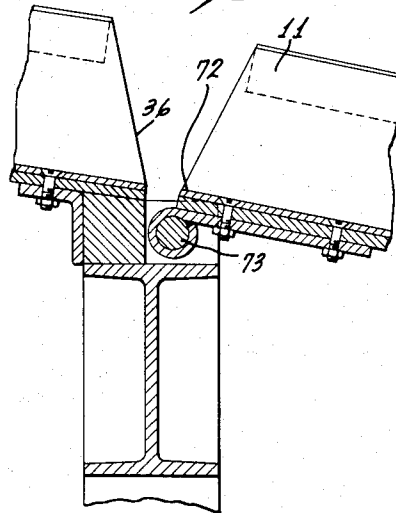


Fig. 13.



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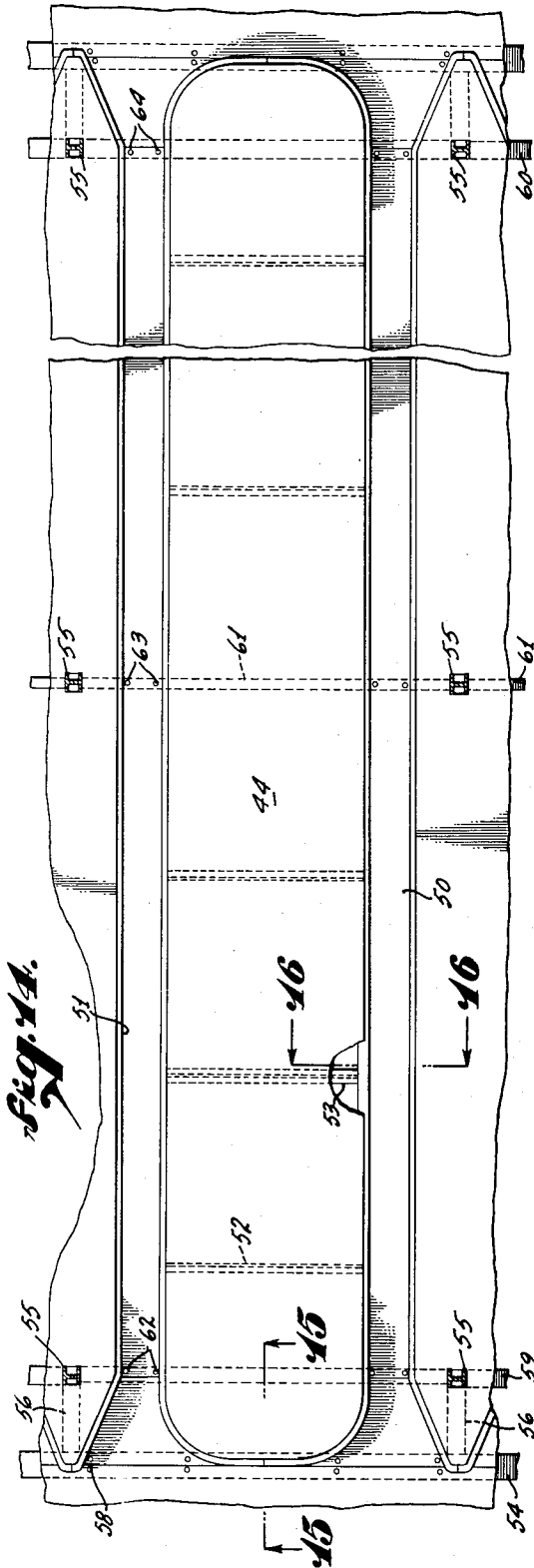


Fig. 14.

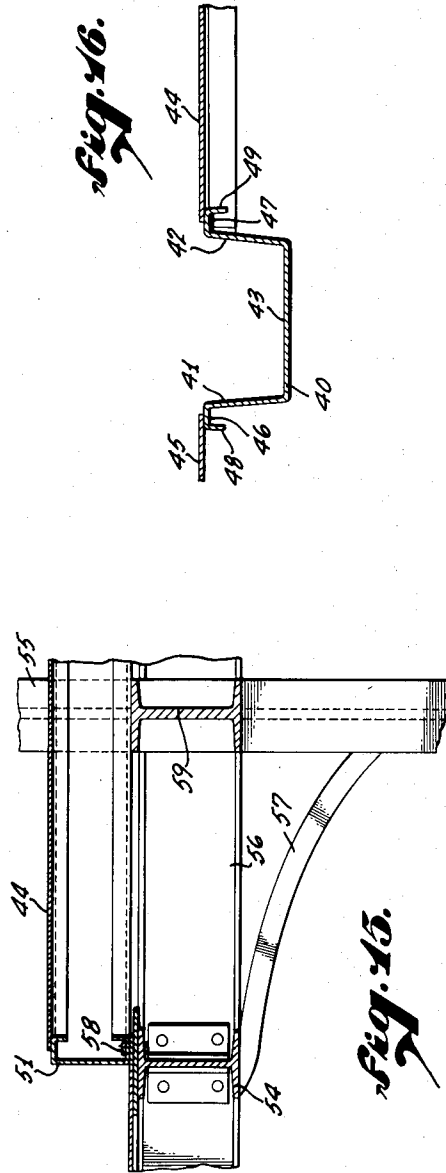


Fig. 16.

Fig. 15.

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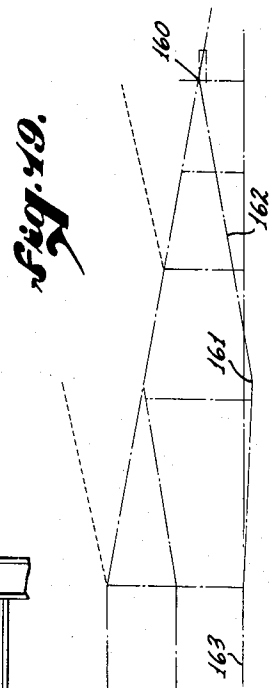
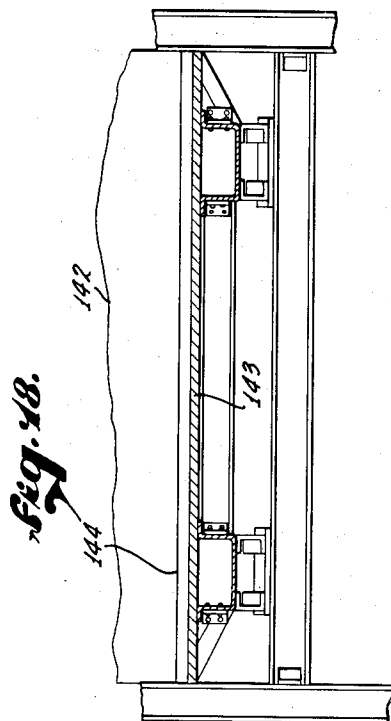
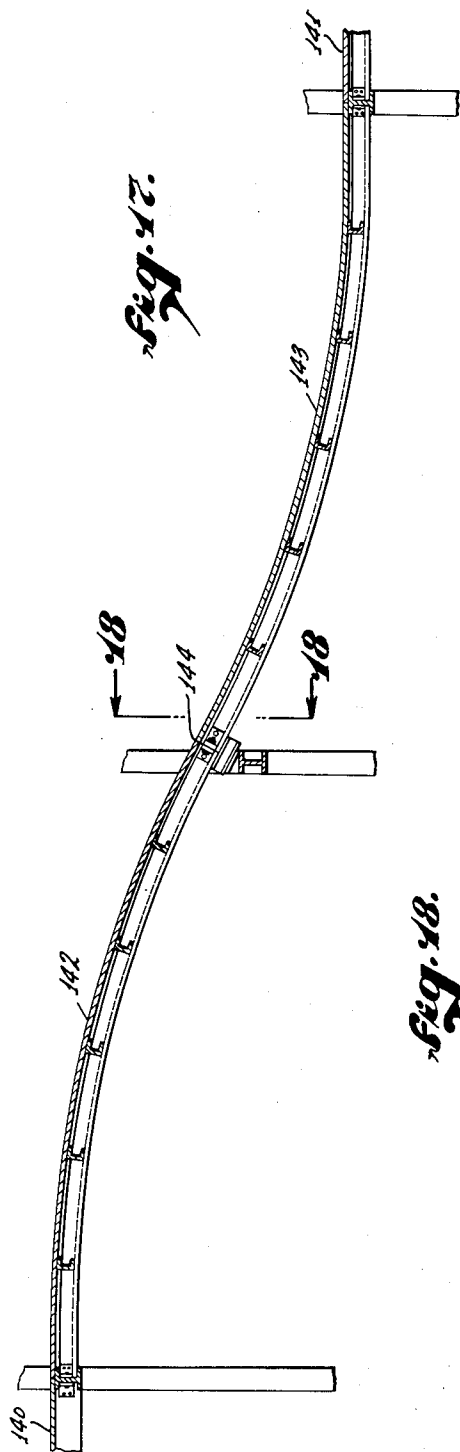
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9 Sheets-Sheet 7



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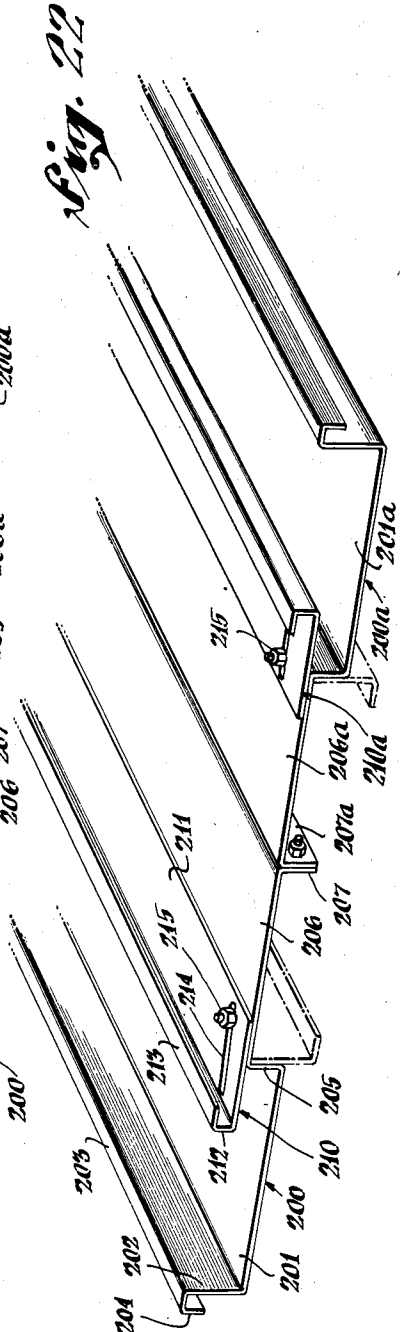
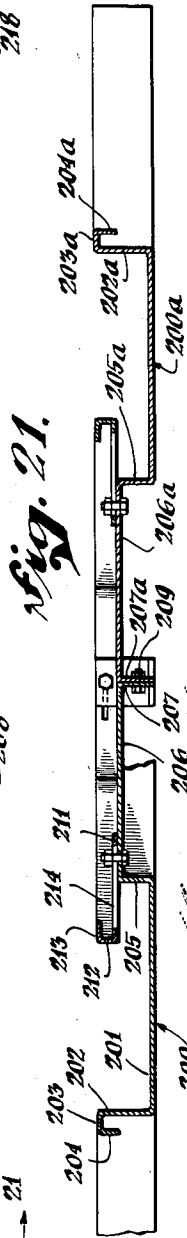
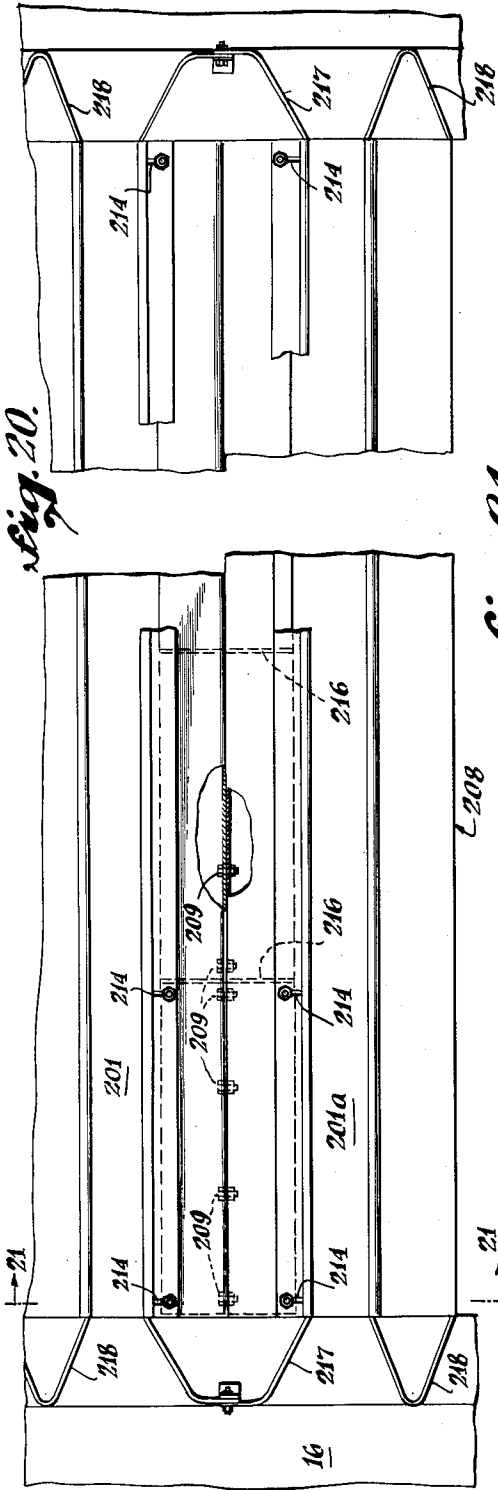
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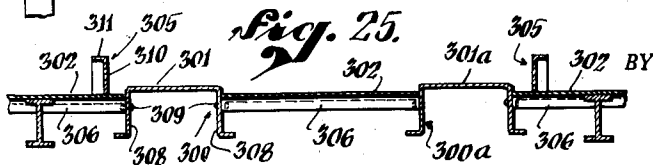
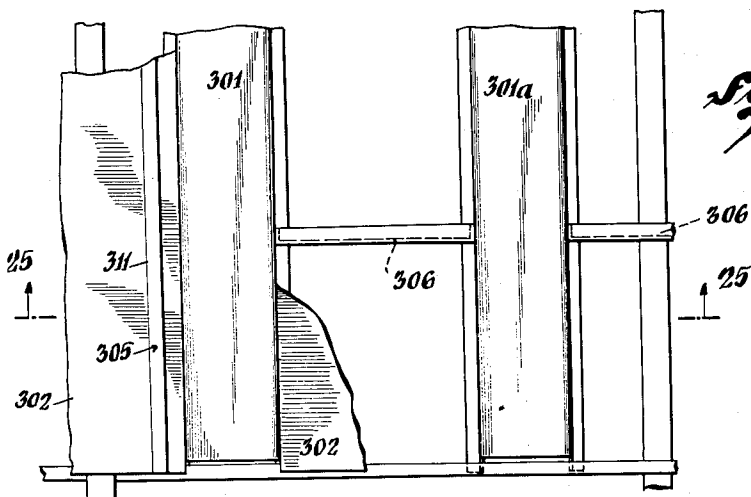
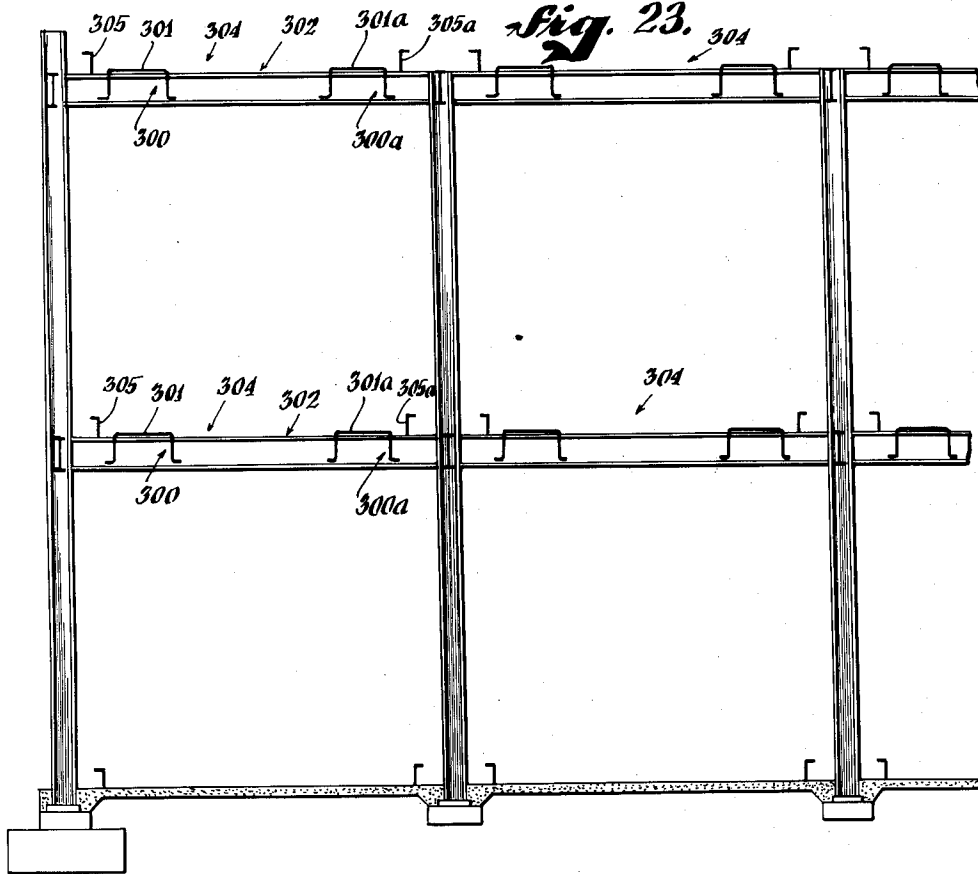


Fig. 24.

Fig. 25.

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2,717,428

MULTIDECK PARKING RACK

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Application December 21, 1949, Serial No. 134,293

6 Claims. (Cl. 20—1.13)

The invention relates to a multi-deck parking rack for automobiles or the like and has for an object to provide an improved economical structure; this application being a division and continuation-in-part of my co-pending application S. N. 38,689, filed July 3, 1948, now Patent No. 2,698,974, issued January 11, 1955.

Some things which are in common use, but not economical, are the provision for an upper story or deck for parking cars wherein the cars can move at random. This random ability is wasteful of space, dangerous to fenders, and not conducive to economy for the reason that the floor throughout must be made strong enough to support the full weight of the car or cars.

Another item which is not conducive to economy, particularly economy of space, is the used of a fixed ramp leading to an upper deck. The reason for this lack of economy is that a certain amount of clearance such as seven or eight inches must be provided for the crank case or undercarriage of the car and this necessitates a gradual slope for the upper end of the incline. This great length of incline is also necessary in the conventional arrangement, in order to prevent the front bumper from striking the lower level and the rear bumper from striking the incline when descending, and to prevent the front bumper from striking the incline and the rear bumper from striking the lower level when ascending. Also the fixed ramp blocks the lower level.

A third conventional item which is not conducive to economy of spacing is the necessity for an entrance aisle large enough to permit the car to turn and approach the parking space in a direct line so that the cars can be parked substantially parallel to each other.

More particularly, it is an object of the present invention to overcome or reduce the three uneconomical features referred to above and to provide multi-rack parking structure which is less expensive to build and wherein more cars can be parked in a given space than heretofore.

Generally speaking, the invention comprises the following features, separately, and in combination: (1) U-channels are provided to form a metal way, or track, and parking space for the car, the channels having elevated sides to guide the wheels along the channel, thereby reducing the over-all structural strength which must be provided, as at this part of the structure the car cannot have random movement but is confined to the metal way. (2) An elevated or multi-story parking structure is provided wherein such U-channels serve as cross-supports for the framework. (3) A cross aisle serves a plurality of parallel metal ways for flexibility in parking and removing cars, and a ramp which may be a fixed conventional ramp or an improved shorter ramp according to the present invention is provided for an exit. (4) A bascule bridge or tilt ramp gives choice of entrance to either an upper level or a lower level, as opposed to a fixed ramp which only gives access to the upper level and blocks off the lower level. (5) A movable ramp is provided whereby the car may have

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access either into a lower level or an upper level, the entrance path to the ramp being elevated to a position intermediate the height of the lower level and the upper level. This feature contributes to a movable ramp which is shorter than would otherwise be possible in reaching from such intermediate elevation to the upper level. (6) The invention provides an incline having a shorter length than heretofore, the reduction may be as much as fifty percent, with a clearance of 7 or 8 inches in 12 feet to avoid bumping the crankcase or bumpers. This is accomplished by arching the upper half of the incline upwardly and arching the lower half downwardly, with respect to a plane through the ends of the incline (7) The bascule bridge preferably has a curvature conforming to the incline curvature referred to above. (8) An improved wheel guide is provided for directing the wheels of the car into the U-channel track, by reducing lateral friction of wheel alignment with the track while maintaining forward traction. (9) A wheel guide or a parking rack is adapted to serve a plurality of different floor levels by associating with the guide one or more tilt ramps which give a choice as to the various levels. (10) A garage floor is provided for efficient and close parking of a plurality of parallel lines of cars wherein the major portion of the floor is of lightweight material insufficient to support the weight of the car while only a minor portion of the floor has a high load bearing ability for guiding and supporting the cars to the parking lanes.

The invention provides a multi-deck parking framework which can be prefabricated to save erection time. Also it is portable, salvageable, and has interchangeable units.

The invention comprises a number of other improvements and modifications referred to hereafter.

For further details of the invention reference may be made to the drawings wherein Fig. 1 is a perspective schematic diagram of the multi-deck parking rack according to the present invention.

Fig. 2 is a schematic view of the approach ramp in side elevation.

Fig. 3 is a schematic diagram of the exit ramp in elevation.

Fig. 4 is an enlarged sectional view of a lower portion of the approach ramp.

Fig. 5 is a plan view of a lower portion of the approach ramp.

Fig. 6 is a plan view of the wheel guide.

Fig. 7 is an enlarged sectional view on line 7—7 of Fig. 6.

Fig. 8 is a vertical sectional view of the upper portion of the approach ramp.

Fig. 9 is an enlarged vertical sectional view of the hinge member at the inner end of the upper ramp.

Fig. 10 is an enlarged vertical sectional view on line 10—10 of Fig. 11.

Fig. 11 is a plan view, partly in section, on line 11—11 of Fig. 8.

Fig. 12 is an enlarged vertical sectional view on line 12—12 of Fig. 8.

Fig. 13 is an enlarged vertical sectional view of the hinge detail at the inner end of the lower ramp on line 13—13 of Fig. 5, with parts broken away.

Fig. 14 is a plan view of a typical parking space, with parts broken away.

Fig. 15 is an enlarged sectional view on line 15—15 of Fig. 14.

Fig. 16 is an enlarged sectional view on line 16—16 of Fig. 14.

Fig. 17 is an enlarged vertical sectional view of the exit ramp from one deck to a lower deck, with parts broken away.

Fig. 18 is an enlarged sectional view on line 18—18 of Fig. 17.

Fig. 19 is a schematic diagram of a modified form of the approach ramp.

Fig. 20 is a plan view of a modified form of parking space, with parts broken away and showing adjustable wheel troughs, drip sheets not being included for clarity.

Fig. 21 is a sectional view on line 21—21 of Fig. 20.

Fig. 22 is a view in perspective taken on line 21—21 of Fig. 20, partly broken away.

Fig. 23 is a schematic diagram illustrating a modified form of construction of a typical row of parking stalls or spaces.

Fig. 24 is a plan view partly broken away, of a modified form of parking stall illustrated schematically in Fig. 23.

Fig. 25 is a sectional view on line 25—25 of Fig. 24.

All views which are taken on lines are looking in the direction of the respective arrows.

Referring in detail to the drawings, the multi-deck parking rack 1 in Fig. 1 is given as a typical example, although the space relation of the entrance, exit, and parking facilities may be varied in a number of ways, depending partly upon whether the entrance 2 and the exit 3 are to be served by one office 4, or whether the exit is to be arranged at an alley or side street, and depending further upon how many decks are to be employed and the general arrangement of the ramps and parking facilities. With particular regard to the example shown in Fig. 1, the entrance 2 for automobiles is elevated as indicated at 5, to a height intermediate the height of the ground level indicated at 6 and a first deck 7. This is also illustrated in Fig. 2 wherein the approach 5 is also shown as being elevated to a position intermediate the ground level 6 and the first deck 7. At the approach 5 is a relatively fixed wheel guide 8, a similar wheel guide 9 and 10 being provided for the adjoining lanes, to line up the wheels so that the car is directly in alignment with the path into the parking structure. If it is desired to park a car on the ground floor 6, the inclined ramp 11 here illustrated as a bascule type bridge is moved by the operator to the elevated position shown in Fig. 1 whereupon a car not shown can take the decline 12 to the ground floor.

Ramp 11 has fixed thereto a leg or strut 79, see Fig. 4, and ramp 13 has a similar strut 99, see Fig. 8. If the ground floor is full of cars, the ramp 11 is lowered into juxtaposition with the wheel guide 8 which then serves to guide the car into alignment with the ramp 11 whereupon there are still two choices for parking, namely, an additional inclined ramp 13, a similar one being shown in elevated position at 14, makes it possible to park the car on the deck 7 when the ramp 13 is up, or park the car on the top deck 15 when the ramp like 13 is down.

Adjacent the top ends of the lanes provided by the upper ramps 13, 14 etc. is a cross aisle 16 where the cars can move at random, for example, to park in the parking lanes like 17, 18, etc. at the side of the approach ramps like 11 and 13, or such cars can proceed across the aisle 16 and park in the opposite parking lanes like 19 and 20. At the opposite ends of the parking lanes like 19 and 20 is an additional cross aisle 21 which has a fixed ramp 22 which has a portion 23 at the level of the deck 7 for the exit of any cars leaving that deck, the ramp 22 continuing to the ground level at the exit 3.

The parking lanes like 17, 18, 19, 20 and the cross aisles like 16 and 21 are also provided on the first deck 7.

The deck extensions 25, 26 are typical, so that a car can make a turn and pull straight into the end lane like 19 or 27.

The front end 28 of the bays 17, 18 and the bays 29 therebelow may be extended in line with the front end of the ramps like 11, with the lines of wheel guides like 8 to 10 extended in front thereof to serve the ground floor.

It will be noted that the upper portion of the ramp 22 where it conjoins with the deck 7 is dead end as indicated

at 24 which restricts the parking and handling of cars, whereas such dead end is avoided in the approach lanes by use of the movable ramps like 11 and 13; hence, a car can move forward to the far end of its parking space as indicated at 30 in Fig. 2, and can move forward out of its parking lane, whereas a car like 31 can be parked under ramp 11 on the approach leading into the ground level 6.

On the ramps like 11 and 13 and in the parking spaces like 17 to 20, the car is confined to move in one of several parallel paths, each comprising a metal way preferably having parallel U-channels for the car. In Fig. 1, these U-channels are indicated at 32 and 33 for ramp 11; 34 and 35 for the fixed ramp 36; 37 and 38 for the tilt ramp 13; and at 39 and 40 for the parking lane 19. The U-channels like 39 and 40 for the various parallel parking lanes like 17 to 20 form cross supports for the multi-deck structure.

The U-channels like 32 and 33 and all similar channels referred to above, as shown in Fig. 16, have upright sides like 41, 42 about 5 inches high to guide the wheel and prevent the wheels from riding off the top of the flange, the wheels resting on the bottom 43 of the upwardly facing U-channel. The sides 41, 42 have outwardly extending flanges 46, 47 which are turned down as shown at 48, 49 or turned in at an angle to strengthen the channel, all U-channel tracks having this feature. Between adjacent U-channels is provided a metal sheeting, such as 44, to catch the drip from the car, this sheeting being strong enough to support the weight of the average person but not strong enough to support the weight of the car. At the outside of such channels is a metal sheeting 45 to serve as a walk for the operator.

In the parking area provided by the lanes like 17 to 20, the U-channels have high load bearing ability as required to support the weight of the cars. The area of such U-channels is minor in comparison to the whole parking space provided by the lanes, while a major portion of such area is covered by light metal sheeting such as drip sheets 44, see Fig. 16, and walks 45, the sheets like 44 and 45 being strong enough to support the weight of an average person, but not strong enough to support the weight of the car. This leads to economy in the size of the columns and beams required for the multi-deck structure.

The illustration in Fig. 14 is for a typical parking lane and the U-channels 50 and 51 between their adjacent sides are cross-braced by U-channels on edge, as indicated at 52, 53, the channels thus braced being supported by I-beams like 54 in Fig. 15, wherein the column 55 is set back so as to give more latitude in turning the car into and out of a parking lane. The columns like 55 have curved knee braces like 57 which support deck beam extensions like 56 which are bolted to stringer I-beams like 54 and channels 50, 51 rest on stringer 54 and are fastened thereto, viz, by bolts 58. Also channels 50, 51 are supported near their ends by cross beams 59 and 60 and at its middle by cross beam 61, being secured thereto, viz, by bolts indicated at 62, 63, 64, the curvature of the tire overlying the bolt heads at the corner of the channel. The spacing of the channels 50, 51 is adjustable as the position of the various bolts 58, 62 can be changed. The various sections are likewise interchangeable as the whole metal structure 1 is held by removable bolts and nuts.

All such U-channels which are inclined at the ramps like 11, 13 and 36, preferably have at the bottom thereof a checker plate, as indicated at 70 and 71 in Fig. 5, to insure traction.

As shown in Fig. 4, the upper end 72 of the lower ramp 11 is connected by a hinge 73 to the rear end of the fixed ramp section 36. The weight of ramp 11 is counterbalanced by a pair of weights like 74 carried by a pair of arms like 75 each having a trunnion support like 76 on a post 77. The outer end of each arm like 75 has a roller like 78 under the outside flange 65, 66 of the U-channels 32, 33. The bridle 67 braces the arms 75.

The lower end of ramp 11, when in its lower position shown in full lines in Fig. 4 is suitably locked in its down position in alignment with wheel guide 8, by a lock or catch not shown. The operator removes the catch and the ramp moves to elevated position as it is overbalanced, when it is desired for the car to enter underneath the ramp 11 to park on the lower level. When it is desired to park the car on an upper level, the operator pulls the ramp 11 down, locks it or catches it in the full line position shown in Fig. 4, whereupon the car can pass over the ram 11 to the upper level. When ramp 11 is in its lower position, the lower end 92 of the ramp is supported on the ground on the downgrade 117, and wheel guide 8 is sunk into the ground as indicated at 118 so that its rollers 110 to 116 will be only slightly above the contour of the grade 117.

The ramp 13, as shown in Fig. 8, is also in the form of a bascule bridge in having its inner end 80 connected to the outer end 81 of the deck 15 by a hinge 82 while its weight is counterbalanced by a pair of weights like 83 each connected to a cord like 84 which passes over a pulley like 85, the other end of the cord being connected to the ramp, as indicated at 86. The pulley 85 and companion pulley 87, as shown in Fig. 12, are carried by suitable posts 88, 89. When the ramp 13 is in lower position shown in full lines in Fig. 8, its lower end 90 is in alignment with the upper end 91 of the fixed ramp 36. The upper end of ramp 36 is supported by an arch metal roadway 93 which serves also to support the outer end 90 of ramp 13 when in its lower position. The roadway 93 comprises a flat floor plate as indicated in Fig. 1 and it is suitably cross braced as indicated at 94 and carried by an I-beam like 95 on columns like 96, the other end of the roadway section 93 being similarly supported by I-beams and columns as indicated at 97 and 98.

As shown in Fig. 13, the ends of the U-channels at the lower end of the ramp section 36 and at the upper end of the ramp 11 are cut away or tapered in order to permit movement of the ramp 11 about the hinge 73.

As shown in Fig. 5, the wheel guide 8 comprises a converging guide 100 for the U-channel 33 and a similar converging wheel guide 101 for the companion channel 32. Both of these guides are alike and the one indicated at 100 will be described in connection with Figs. 6 and 7, wherein the bed-plate 102 of the guide carries an elevated flange 103 having a height substantially the same as the height of the side of its U-channel 33. Flange 103 has a cooperating similar flange 104, these two flanges having a wide entrance 105 and converging to the same distance apart as the width of the U-channel 33 to guide the wheel into the U-channel. The top of flange 103 has an elongated roller 106 mounted between fixed rounded sections 107 and 108 to avoid damage to the tire if it should strike these elements. On the bed 102 is arranged a triangular traction plate 109 in line with the center line of the channel 33 and, also on that center line and between the plate 109 and the channel, is a cylindrical roller 110 and on which the car wheel rides. Between the roller 110 and the flange 104 are arranged a plurality of other cylindrical rollers 111, 112 and 113 carried by the bed-plate 102. A cylindrical array of rollers 114, 115, 116 is arranged at the other side of traction plate 109. The rollers 111 to 116 have their axes inclined in the general direction of the path leading into the channel so that a wheel riding on such rollers and approaching the center line of channel 33 at an angle is guided into alignment with the channel 33. The rollers are so arranged as to reduce the lateral friction of the wheel away from the flanges 104 and 103 while providing traction for the wheel in the direction of roller axes leading into the channel, such traction being increased by reason of the traction plate 109 which provides traction at the entrance to the guide when the wheel is substantially in alignment with the channel. It has been found by actual test that a

cylindrical roller lengthwise or substantially lengthwise of its axis has sufficient traction for the purpose.

An aligning rack like 8 may be employed as indicated at 122 at the entrance to the ramp 22, see Fig. 1. Also similar aligning racks, as indicated at 123 and 124, may be employed at opposite ends of one of the lanes 125 so that it can be used as a through lane connecting the aisles 16 and 21.

The elevated guard roller 106 has been illustrated only on flange 103 at the right of the wheel guide, on the assumption that a car would approach from the left, although a similar guard may be provided for the flange 104 if the cars are to approach from a position at the right, or from either direction.

If desired, a safeguard may be employed to prevent a car from rolling unattended down one of the ramps. As shown in Figs. 10 and 11, this safeguard may take the form of a pivoted catch 120 having a gate 121 in the path of the wheels at one side of the car. The gate 121 has a hinge support 119, 139 mounted on floor plate 129 and an arm 138 which strikes a stop 126 to prevent the gate from moving clockwise as seen in Fig. 8, while permitting a car climbing the incline to force the gate 121 down and ride over it. If it is desired to drive down the incline, the gate 121 can be locked in its down position, by means of a pin 127 and a lock aperture 128 on the hinge support 119.

Also as a safeguard to prevent a car from rolling down an incline, when parked thereon, the sides of the U-channel may be laterally displaced to provide pockets 130 and 131 as shown in Fig. 11, to receive and hold the front wheels of the car while permitting the car to proceed in a forward direction. On the downhill side of each pocket 130, 131 is a pad 132, 133 to crowd the wheels away so they will not strike the corners 134, 135 when ascending. The downhill end of each pocket is tapered as shown at 136, 137 to guide the wheels out of the pockets when descending.

Calculation to scale has shown that the improved form of arcuate roadway, as illustrated in Fig. 17, makes it possible to reduce the length of an incline by as much as 50%, while providing the necessary clearance to avoid bumping the under-carriage or bumpers as above explained. In Fig. 17, the deck 140 represents an upper level while the deck 141 represents the next lower level and if, for reference purposes, a plane is passed through the opposed ends of these decks, it will be noted that the upper half portion 142 of the incline arches upwardly away from such plane, while the lower half portion 143 arches downwardly from such plane. The sections 142 and 143 of course join or merge together at their lower and upper ends respectively as indicated at 144 and the upper end of section 142 merges with the deck 140 while the lower end of section 143 merges with the deck 141. The contour illustrated in Fig. 17 is also preferably employed as indicated at 145 for the approach to the first level deck 7, for the approach 146 to the ground level 6 as shown in Fig. 2, and for the incline 147 from the upper deck 15 to the first deck 7, and from the deck 7 to the ground as indicated at 148, the inclines 147 and 148 being fixed ramps as above described. Also if desired, the ramps like 11 and 14 may conform to the curvature shown in Fig. 17.

If the parking lot is large enough, the ramps like 147 and 148, as well as the tilt ramps like 11 and 14 may be straight.

The sections 142 and 143 in Fig. 17 are substantially arcs of a circle having a radius of about 37 feet.

If desired the U-channels, referring to Fig. 16, may have sloping sides instead of straight sides 41, 42 so that one will nest in the other to save space when packing a plurality of U-channels together.

If desired, a queen truss 150 as shown in Fig. 1 may be used to brace the end of the structure. Also an out-board or overhanging bumper guard may be employed whereby the wheels of the car may be parked practically

to the edge of the deck like 21. If desired, a one or two story structure, as shown in Fig. 1 may have superimposed thereon another one or two story structure and, if desired, the upper multi-story structure may be arranged at right angles to the lower structure, the two structures being connected by a fixed ramp.

Referring to Fig. 19, the height of the approach hill indicated at 160, can be lowered by providing a relief dip 161 at the bottom of the ground floor hill 162, the dip 161 extending below the level 163 of the ground. The dip 161 may be deep enough so that deck 7 is level with the ground.

The rack 1 is preferably wholly of metal and, hence, does not absorb grease like cement. Also preferably the whole rack 1 pitches toward the entrance, to drain rain or wash-water, the U-channels serving as sluice ways. All drip pans, such as indicated at 44 in Fig. 14, preferably have a convex crown for stiffening and to drain rain or wash-water into the U-channels.

If desired, a switch may be mounted under the U-channel portion for a car. Such channel sags slightly when the car is in position on the channel and this sag may operate the switch to control a signal light at the office to show the area where cars are parked, to direct traffic to empty areas.

Instead of the U-channels, use can be made of a single vertical wall. Also one of the side flanges 103 or 104 of the aligning rack may be omitted if the cars approach the remaining flange 103 or 104.

By confining the movement of the car to a definite track, it is possible to use a closer spacing of columns such as 55 throughout the structure, whereby lighter beams like 54 can be used because of such closer spacing of the columns. A wider spacing of columns and, hence, heavier beams are required for concrete floors where the cars can move at random.

Referring now to the modified form of parking lane or stall illustrated in Figs. 20, 21, and 22, it will be observed that provision is made for adjustability of the width of the U-shaped troughs which form the trackways for the wheels of a motor vehicle.

A typical trough of this kind is shown perhaps most clearly in Figs. 21 and 22. Such a trackway or trough comprises a heavy gauge sheet metal section 200 of suitable length as shown in Fig. 20. It has a tread portion 201, an upstanding web portion 202 substantially at right angles to the tread portion 201 and an inverted U-portion comprising portions 203 and 204 to provide additional strength at the outside of the trough. On the opposite side of the tread portion 201 is an upstanding web portion 205 of less height than web portion 202. Extending horizontally from portion 205 is a horizontal plate portion 206 bent downwardly to form a vertical portion 207 which abuts a corresponding portion 207a of trough section 200a constructed in like manner as trough section 200; it being noted that the vertical portions 207 and 207a abut each other midway between the troughs 200 and 200a, these parts being secured together by suitable means such as threaded bolts and nuts 209 spaced along the length of the parking stall designated generally by reference character 208 (see Fig. 20).

To provide means for adjusting the width of the troughs or trackways 200 and 200a, each is equipped with a side wall adjusting plate 210, 210a. Such a plate comprises a horizontal base plate portion 211 bent upwardly at its inner edge to form an upstanding tire-engaging portion 212 and then bent to form a flat portion 213. The base portion 211 is provided with a plurality of elongate slots 214 spaced along and crosswise of its length. These adjustable side wall plates 210 and 210a are secured to the horizontal portions 206 and 206a which serve as base plates. Screw threaded bolts and nuts 215 extend through these base plates and through the slots 214 so that these adjustable side wall plates 210 and 210a may be moved laterally and then clamped by the

bolts at any desired adjusted position. Thus provision is made to adjust the width of the trackway troughs and they may also be adjusted within limits to different gauges between the wheels of a motor vehicle so that in the event the width or gauge of motor vehicles is changed in the future, the trackways of the parking lanes 208 can be readily changed to meet the changed condition. Reinforcing plates 216 and guide noses 217 and 218 may be provided to provide wide mouth entrances from the aisles 16 into the trackways of the parking stall 208. Also, it will be understood that drip plates of relatively light gauge sheet metal will be installed on the parking lane between the trackways as hereinbefore mentioned.

In some instances it may not be desirable to utilize up-turned U-shaped channels, as shown for example in Fig. 14. In such a case an arrangement such as disclosed in Figs. 23-26 may be used wherein the U-shaped channels are inverted or other structural members are placed where they form bearing surfaces for the wheels of a motor vehicle where strength is needed but at the same time the major portion of the floor area is covered with relatively light gauge metal sheets. Nevertheless guide means are provided to guide the wheels of the vehicle into the parking stalls or lanes so that the weight is carried on the structural steel members which also serve as cross supports for the construction.

Referring first to Fig. 23, it will be observed that the members forming the trackways for the wheels of motor vehicles are inverted U-shaped channels 300-300a arranged in pairs these serving also as cross structural members. As in the case of the parking lanes shown, for example, in Fig. 14, the cross webs of the channels serve as trackways except that the wheels ride on the outside face of the web of the inverted U-shaped channels. Relatively light gauge metal sheeting 302 spans the area between and on either side of these channels. Also each stall 304 is provided with a pair of guide rails 305-305a to guide the wheels of a motor vehicle so that they will ride on the trackways 301-301a.

A typical parking stall utilizing this type of construction is illustrated in Figs. 24 and 25, it being noted that the columns and other structural members are otherwise the same as previously described. The inverted U-channels 300 and 300a are secured to the stringers 45 and are reinforced by cross braces 306 and otherwise braced as desired. The metal drip sheeting 302 (see Fig. 25) may be secured to the downwardly extending flanges 308 of inverted channel 300 by removable bolts 309 and the drip sheeting 302 between the trackways 50 may be secured to their adjoining channels. Guide rails 305 and 305a one on the outside of each trackway, are secured to the plates 302 in spaced parallel relation so that the wheels of a motor vehicle will be engaged by the outside walls of the tires and the wheels will thereby be guided on the trackways to maintain the wheels of the vehicle on the trackways when it is driven into the stall. These guide rails are metal rails formed of an upstanding portion 310 and an outwardly bent portion 311 and they are secured in spaced parallel relation along the parking stall to accommodate the width of a motor vehicle. Consequently when driving a car into the parking stall, the side walls of the tires are guided so that the wheels of the car will ride on the cross webs 301 and 301a of the inverted U-channels forming the trackways.

When the entire structure is assembled, it may, if desired, be coated with a corrosion-inhibiting and fire-resisting coating. For example, the bottom surfaces of all steel transverse aisles and parking lanes or stalls as well as the vertical columns may be advantageously sprayed with a coating approximately three-sixteenths of an inch thick, consisting substantially of a mixture of emulsified asphalt and asbestos fiber. The upper surface which is subjected to both weather and tire wear may be advantageously coated with a tough abrasion-resistant, long-wearing compound with a plastic base. Such coat-

ings will not only protect the metal parts from unwanted corrosion but will also enhance the general appearance of the entire multi-deck parking structure.

The terms and expressions which have been employed herein are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalent of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of invention claimed.

What is claimed is:

1. A multi-deck parking structure for parking and un-parking motor vehicles driven under their own power which comprises an upper parking deck, structural steel column members supporting the weight of said upper deck, a lower parking deck subjacent said upper deck, a ramp connecting said lower deck with said upper deck over which to drive a motor vehicle from one of said decks to the other, said upper deck comprising horizontally disposed I-beam structural steel members connected to and supported by said columns, a plurality of parking lanes placed side by side in parallel spaced relation in a row for close parking of a plurality of parallel lines of automobiles, a transverse aisle at one end of said plurality of parking lanes along said row for random movement of automobiles when they may be driven into selected parking lanes of said row, said row of parking lanes comprising pairs of parallel elongate U-shaped structural steel track members, lightweight metal plate material connected to the flanges of said U-shaped members and spanning the areas between said U-shaped members, the metal plate material being of sufficient strength to support a person but insufficient to support the weight of an automobile and said pairs of U-shaped track members having high load bearing ability sufficient to support the weight of an automobile, a pair of guide rails for each pair of track members, each pair of guide rails extending along and parallel with its adjacent pair of track members to guide a motor vehicle on the track members to a selected parking lane when the vehicle is driven into said selected lane for parking, said U-shaped track members being connected to and supported by said horizontally disposed I-beam structural steel members and also serving as cross supporting frame members for said upper deck.

2. In a multi-deck parking structure for parking and un-parking motor vehicles, an upper parking deck supported on column members which deck comprises a plurality of parking lanes spaced side by side in parallel spaced relation in a row for close parking of a plurality of parallel lines of automobiles, a transverse aisle at one end of said plurality of parking lanes along said row for random movement of automobiles whence they may be driven into selected parking lanes of said row, said row of parking lanes comprising pairs of parallel elongate trough members providing trackways, side wall members adjustably secured to said trough members adapted to be adjusted to vary the width of said trackways, said pairs of trough members having high load bearing ability for supporting said automobiles; guide means for each pair of trough members adapted to guide a motor vehicle onto the trackways of a selected parking lane when the vehicle is driven from said transverse aisle into said selected lane for parking, and a ramp joining said transverse aisle and a subjacent deck over which to drive the automobiles from said subjacent deck to said transverse aisle.

3. In a multi-deck parking structure for parking and un-parking motor vehicles driven under their own power, an upper parking deck supported on column members which deck comprises a plurality of parking lanes spaced side by side in parallel spaced relation in a row for close parking of a plurality of parallel lines of automobiles, a transverse aisle at one end of said plurality of parking lanes along said row for random movement of automo-

biles whence they may be driven into selected parking lanes of said row, said row of parking lanes comprising pairs of parallel elongate U-shaped trough members and a removably clamped and laterally adjustable plate along each of said members to vary the effective width of said trough members, said pairs of U-shaped troughs forming pairs of trackways having high load bearing ability for supporting said automobiles and guide means for each pair of trackways adapted to guide a motor vehicle onto the trackways of a selected parking lane when the vehicle is driven from said transverse aisle into said selected lane for parking, and a ramp extending from said transverse aisle to a subjacent deck over which to drive automobiles from one to the other of said decks.

4. A multiple deck parking structure for parking and un-parking automobiles driven under their own power which comprises a plurality of decks one above the other, inclined ramps connecting adjacent decks, column members supporting the weight of said decks, horizontally disposed structural I-beam members connected to said columns, for supporting the hereinafter mentioned U-channels, each of said upper decks comprising a plurality of parking lanes spaced side by side in parallel spaced relation in a row for close parking of a plurality of parallel lines of automobiles, a transverse aisle at one end of said plurality of parking lanes along said row for random movement of automobiles whence they may be driven into selected parking lanes of said row, said row of parking lanes comprising pairs of parallel elongate inverted U-channels connected to and supported by said horizontally disposed I-beam members, and serving as cross support frame members, the upper surfaces of the cross webs of each pair of channels providing a trackway upon which the wheels of the automobile roll when driven into a selected parking lane, structural cross brace members extending from the inner downwardly extending flanges of each pair of said channels, said cross brace members being removably connected to said downwardly extending flanges, lightweight metal plate material resting on said cross brace members and spanning the area between each pair of channels and removably connected to said inner downwardly extending flanges, lightweight metal plate material spanning the area between adjacent pairs of channels and removably connected to the outer downwardly extending flanges of adjacent pairs of channels, said metal plate material being of sufficient strength to support a person but insufficient to support the weight of an automobile, each of said pairs of channels forming the trackways of a parking lane having high load bearing ability for supporting said automobile when rolled on to and in contact with the cross webs of said channels forming the trackway of that parking lane, and a guide rail along each inverted channel of each pair of channels and resting on and extending upwardly from said plate material and adapted to guide an automobile on to the cross webs of a selected parking lane when the automobile is driven over said transverse aisle into said selected lane for parking.

5. A multi-deck parking structure for parking and un-parking motor vehicles driven under their own power which comprises an upper parking deck, a lower parking deck subjacent said upper deck, structural steel column members supporting the weight of said decks, a ramp connecting said lower deck with said upper deck over which to drive a motor vehicle from one of said decks to the other, each of said decks comprising horizontally disposed I-beam structural steel members connected to and supported by said columns, a plurality of parking lanes placed side by side in parallel spaced relation in a row for close parking of a plurality of parallel lines of automobiles, a transverse aisle at one end of said plurality of parking lanes along said row for random movement of automobiles whence they may be driven into selected parking lanes of said row, each of said rows of parking

lanes comprising pairs of parallel elongate inverted U-shaped channels connected to, and supported by, said horizontally disposed I-beam members and having their cross webs exposed to provide trackways on which the wheels of a motor vehicle roll when it is driven into a selected lane, lightweight metal plate material removably secured to the downwardly extending flanges of said channels and spanning the areas between said channels, the metal plate material being of sufficient strength to support a person but insufficient to support the weight of an automobile and said pairs of track members having high load bearing ability sufficient to support the weight of an automobile, and a pair of guide rails for each pair of track members, each pair of guide rails extending along and parallel with its adjacent pair of track members to guide a motor vehicle on the track members to a selected parking lane when the vehicle is driven from the adjacent transverse aisle into said selected lane for parking, said U-shaped channels being connected to and supported by said horizontally disposed I-beam structural steel members and also serving as cross supporting frame members for said decks.

6. A multiple deck structure for parking and unparking automobiles driven under their own power, a plurality of upper decks, structural steel columns, supporting the weight of said upper decks, ramps connecting adjacent decks, each of said upper decks comprising a plurality of parking lanes spaced side by side in parallel spaced relation in a row for close parking of a plurality of parallel lines of automobiles, a transverse aisle at one end of said plurality of parking lanes along said row for random movement of automobiles whence they may be driven under their own power into selected lanes of said row and a transverse aisle at the other end of said plurality of parking lanes along said row for random movement of automobiles whence they may be driven to a lower deck, horizontally disposed I-beam structural steel frame members connected to and supported by said columns, said row of parking lanes comprising pairs of parallel inverted U-shaped channels connected to and supported by

said horizontally disposed I-beam structural steel frame members and serving as structural frame members, the upper horizontal surface of the cross webs of each pair of said channels in each parking lane being exposed and serving as a trackway upon which the wheels of an automobile roll when driven into a parking lane, lightweight metal plate spanning the area between the pair of channels of each lane and lightweight metal plate spanning the area between adjacent pairs of channels, said metal plates being removably secured to the downwardly extending flanges of said inverted U-shaped channels, said metal plates being of a gauge of sufficient strength to support a person but insufficient to support the weight of an automobile, said pairs of channels having sufficient load bearing ability to support automobiles when parked thereon with their wheels resting on the cross webs thereof, a guide rail running along the outside of each of each pair of inverted channels secured to and extending upwardly from said metal plates, said guide rails guiding the wheels of an automobile driven from a transfer aisle on to the trackway of the parking lane selected for parking.

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