Sept. 25, 1951 C. M. WALKER 2,569,393

APPARATUS FOR PARKING AUTOMOBILES

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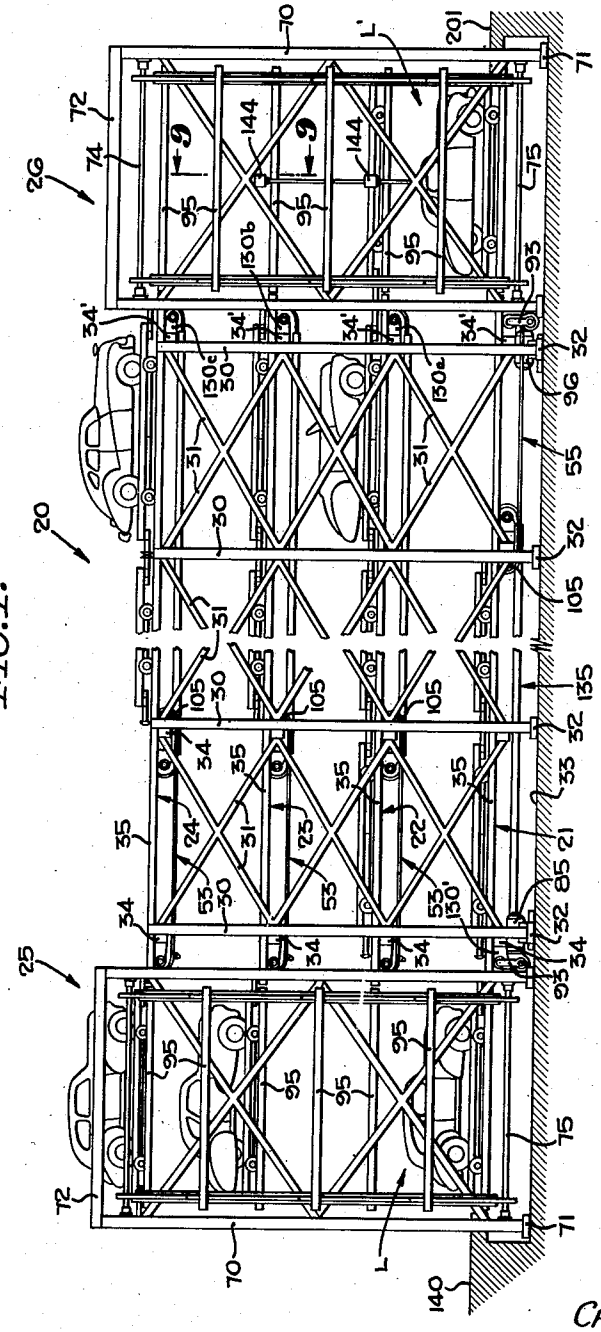


FIG. 1.

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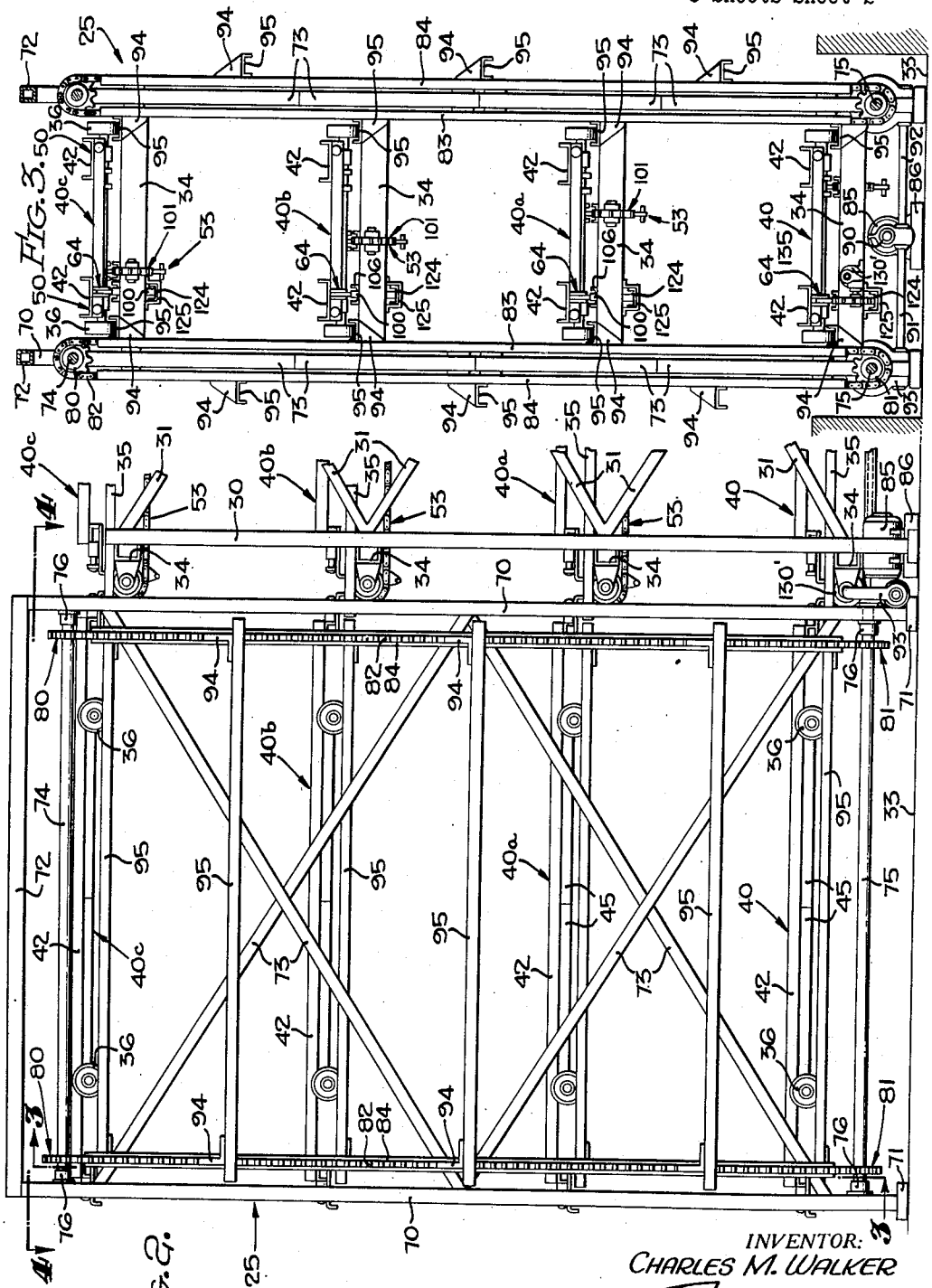


FIG. 3.

FIG. 2.

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APPARATUS FOR PARKING AUTOMOBILES

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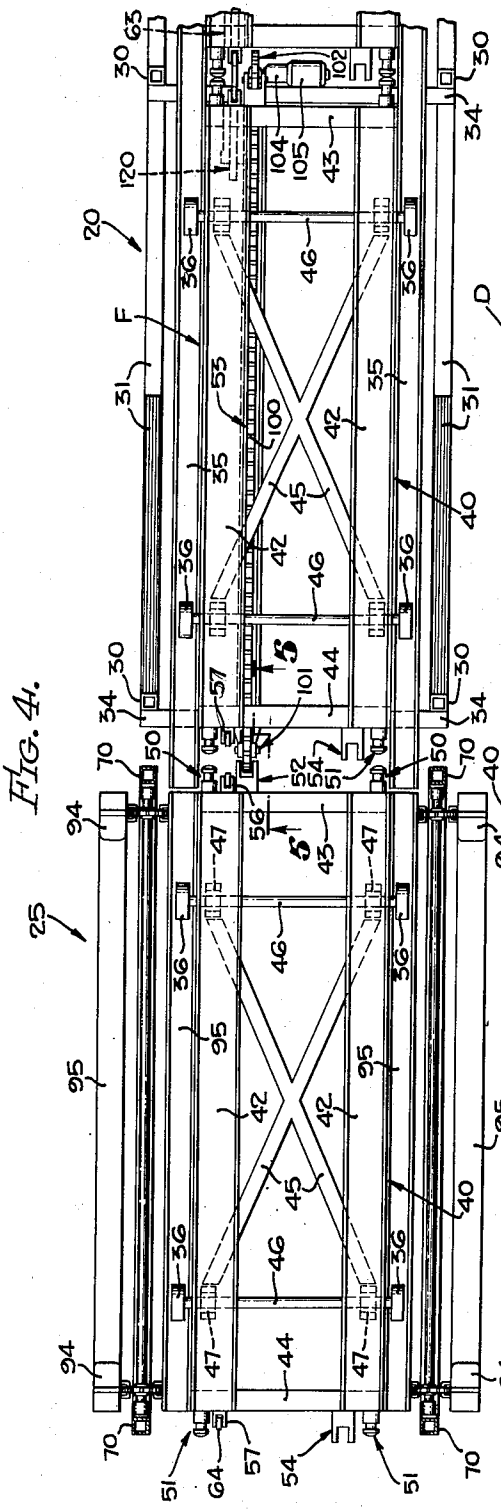


FIG. 4.

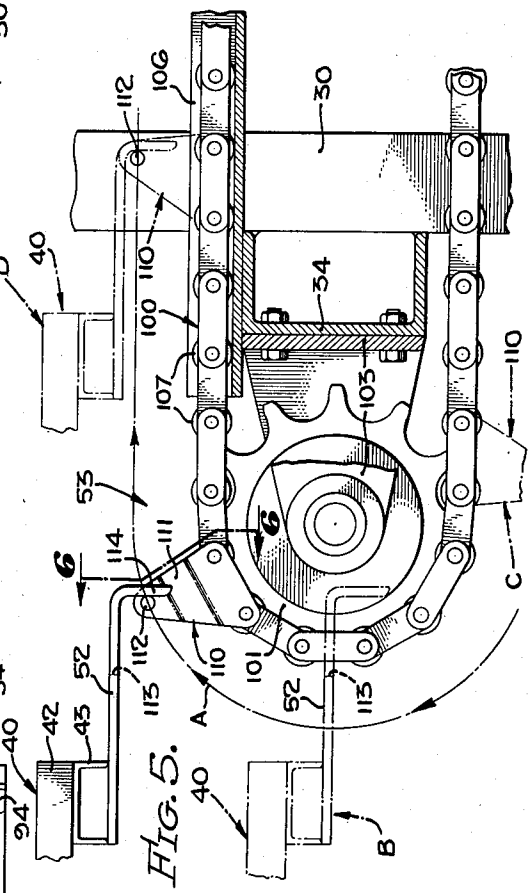


FIG. 5.

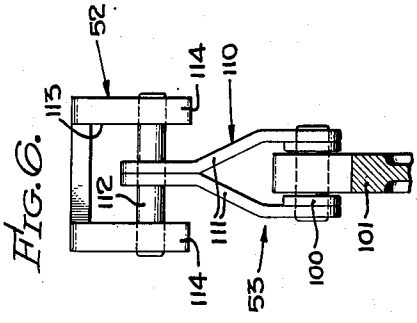


FIG. 6.

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FIG. 7.

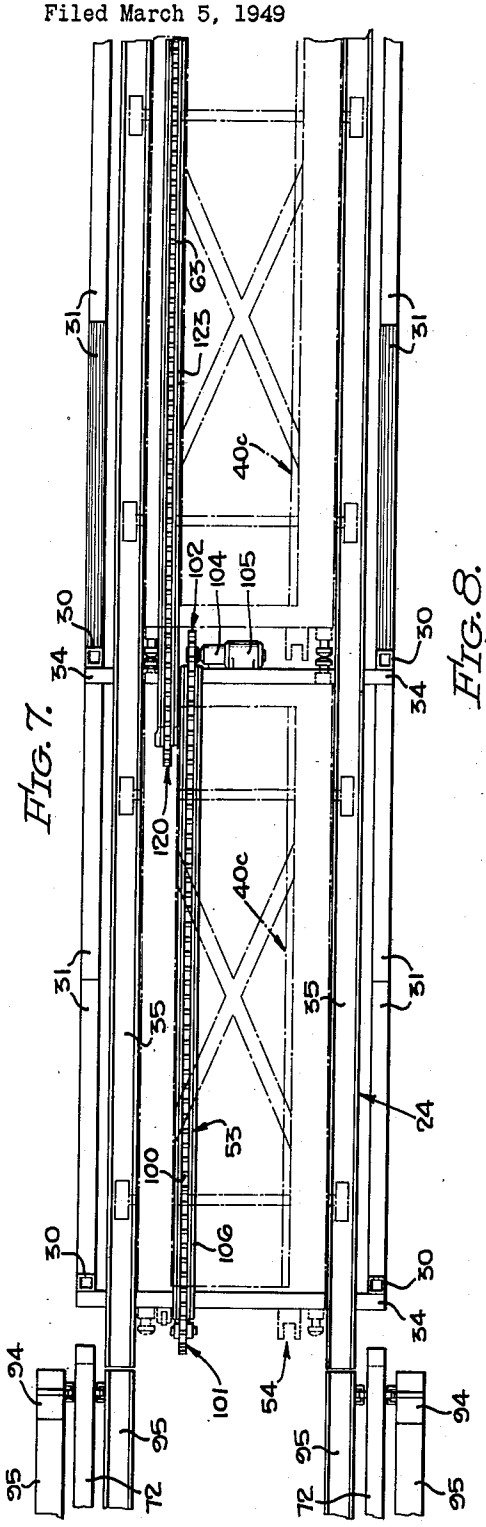
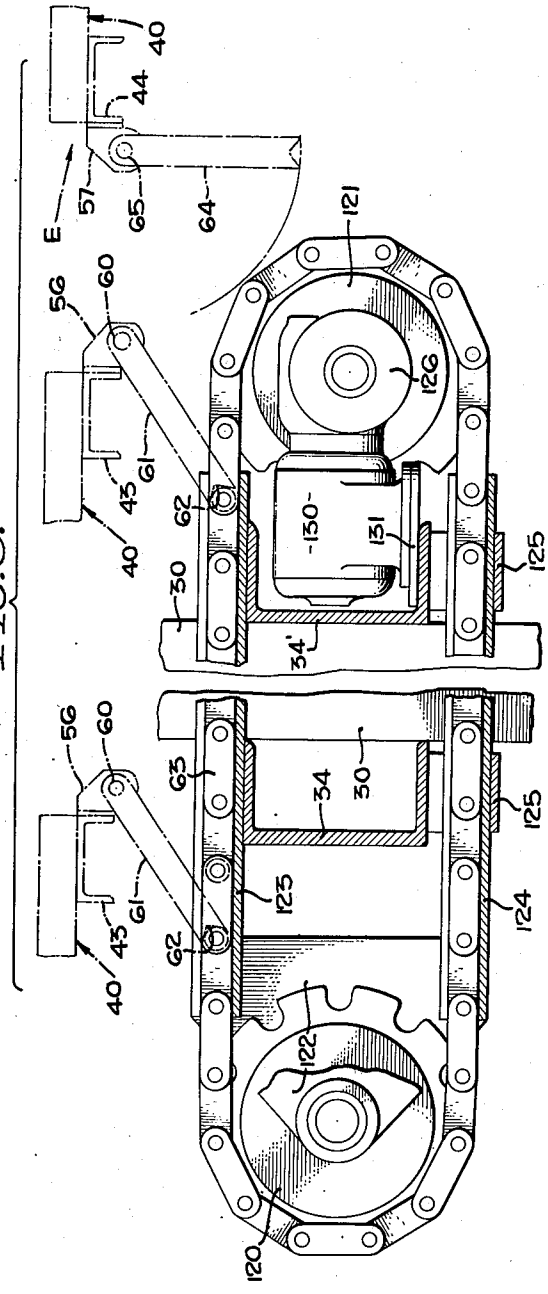


FIG. 8.



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FIG. 9.

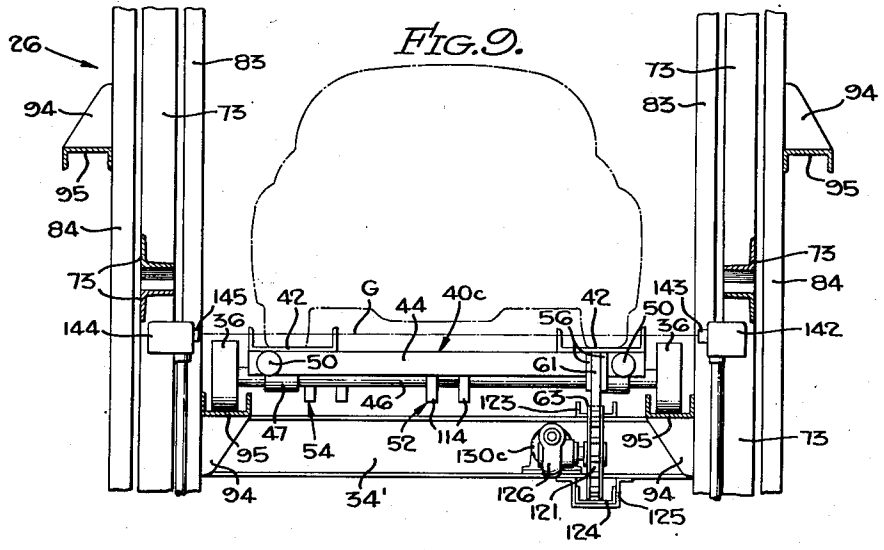
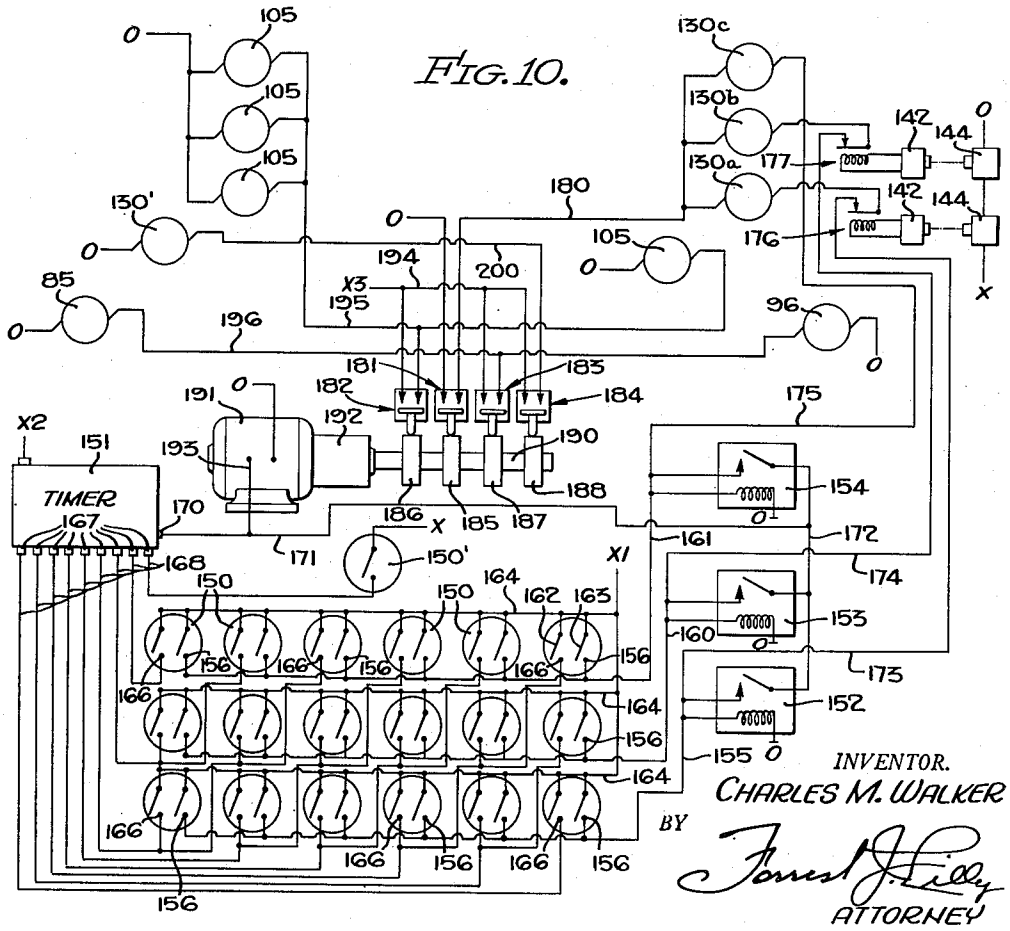


FIG. 10.



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UNITED STATES PATENT OFFICE

2,569,393

APPARATUS FOR PARKING AUTOMOBILES

Charles M. Walker, Manhattan Beach, Calif.

Application March 5, 1949, Serial No. 79,852

9 Claims. (Cl. 214—16.1)

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The present invention relates broadly to apparatus for storing the maximum number of unit loads in a given ground area, and more specifically to an apparatus particularly adapted for use in parking a large number of automobiles in a limited ground area, such as in congested metropolitan shopping or business districts where there is almost invariably insufficient vacant land for adequate off-street parking facilities. The land costs and demand for parking space are such as frequently require relatively high parking fees and frequently a prohibition against all-day parking.

While it is anticipated that the present invention will find its widest application in connection with the parking of automobiles, it is also contemplated that the same principles might be utilized to excellent advantage in warehouses storing large unit loads such as packaged household furnishings, merchandise, and the like. In this case, the articles stored in the warehouse would be packed into vans or loaded into mobile platforms, and would thereafter be carried by the apparatus of the invention to the upper level floors of the warehouse for storage. The principal advantage realized by the use of such an apparatus is the elimination of otherwise wasted space which must be reserved for corridors in conventional warehouses.

The primary object of the present invention, therefore, it to provide means for increasing the capacity of a given storage space, and more particularly, to provided novel and efficient means for parking a considerably larger number of automobiles in a given ground area than has heretofore been possible with any prior parking apparatus.

Another object of the invention is to provide an apparatus of the class described wherein the vehicles are automatically delivered to any desired storage location on the apparatus, or brought down from the apparatus to a loading or unloading station without requiring attention on the part of the attendant except to manipulate the automatic controls. This eliminates the necssity of having the attendant maneuver the cars around a crowded lot when putting a car into the spot to which it is destined, or when extricating the car therefrom when called for by the owner. Also, the present invention eliminates the need for having the attendant shift cars constantly from one place to another during periods of maximum congestion in order to open up lanes through which cars can be driven while being parked or withdrawn from the lot. By thus

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eliminating much of the handling of cars by the attendants, the danger of damage to the cars is greatly diminished.

As compared to the conventional multi-level garage wherein the automobiles are driven up an inclined ramp to reach the upper levels, the present invention enjoys several distinct advantages, chief of which is the more efficient utilization of the total available space by elimination or the wasted space required for the ramps and for the open driveways which must be left clear on each floor level to permit the cars to be maneuvered around. The total floor area thus wasted in even a well-planned garage frequently exceeds the area actually occupied by cars, whereas in the present invention the cars are parked more closely together and the space is utilized more completely, with the result that the area occupied by parked cars greatly exceeds the wasted area. Another disadvantage of the multi-level garage having an inclined ramp, is the fact that several skilled drivers are usually required to drive the cars up the inclined ramps and to maneuver the cars around on the crowded floors, since many car owners lack the necessary confidence and driving skill. The wages of these drivers adds to the operating costs of the garage, with a corresponding reduction in profits. In the present invention, the minimum of space is wasted, and the need for skilled drivers is eliminated; hence the revenue for a given space is increased and the operating costs are reduced.

The foregoing objects are attained by the provision of an apparatus consisting of a stationary loading structure having a lower level track and one or more upper level tracks, with an up-elevator at one end of the tracks and a down-elevator at the other end thereof. Traveling on the tracks are mobile platforms, each of which is adapted to receive an automobile or other load. In the case of a two-level structure, both the upper and lower levels would be filled from end to end with these platforms, which are advanced in one direction along the lower level and in the other direction along the upper level. The up-elevator receives the platform from the lower level track and raises the same to the upper level track, where a pick-off mechanism removes the platform and pulls it onto the upper level track. To bring a particular platform down to the loading or unloading station, the several mechanisms of the structure are set into operation, causing the platform to be advanced along the upper level track onto the down-elevator at the other end thereof, where it is lowered to the ground level.

Another pick-off device then removes the platform from the down-elevator onto the lower level track. Suitable means is provided for operating the various units of the apparatus in the proper sequence so that the platforms are progressively advanced around the apparatus; traveling first along the lower level track, then up on one elevator, back along the upper level track, and down on the other elevator. The automobiles are loaded onto the platforms or unloaded therefrom at any suitable station along the line of travel on the lower level, preferably at the foot of either the up-elevator or down-elevator.

In the case of a multi-level structure having a plurality of vertically spaced upper level tracks, the apparatus is provided with only sufficient platforms to fill the upper level tracks, and when all of the platforms have been moved to their assigned levels, the lower level track and both of the elevators are empty. Each of the platforms is provided with means engageable only by the pick-off mechanism of the level to which the platform is assigned, so that only the platforms belonging on a particular track level will be removed from the up-elevator at that level, and platforms destined to other levels will remain on the elevator until they reach the level to which they belong.

Another object of the invention is to provide an automatic control system which will function to operate the mechanisms of the apparatus in a predetermined sequence and for a predetermined number of cycles to bring any desired platform on an upper level track down to the loading station.

A further object of the invention is to provide a safety device that functions to break the electrical circuit to the motor advancing the platforms along any one of the upper level tracks whenever it happens that the down-elevator at that particular level is already occupied by a platform descending from a higher level. This arrangement prevents the platform-advancing mechanism from trying to push a platform onto an already occupied portion of the down-elevator, which would, of course, cause damage to the apparatus and possibly to the automobiles carried thereon.

While the present disclosure illustrates and describes in particular detail a multi-level apparatus which is believed to be the preferred form of the invention, it should be understood that various other constructions will come within the scope of the invention in its broadest aspects. For example, it has already been mentioned that the invention might be embodied in a two-level structure, in which case both levels would be filled with platforms at all times, and the control mechanism suitably modified, as will be pointed out hereinafter. Also, in connection with the adaptation of the invention to a warehouse, as suggested earlier, it is contemplated that the frame structures of both the up and down elevators might be mounted on transversely extending tracks at opposite ends of the stationary structure, so that the elevators could be moved laterally into registration with any one of several rows of tracks on the stationary structure to serve the same, thereby eliminating duplication of elevators.

The foregoing and other objects and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the

preferred embodiment thereof, reference being had to the accompanying drawings, wherein:

Figure 1 is a side elevational view of a multi-level apparatus embodying the principles of the invention;

Figure 2 is an enlarged side elevational view of the up-elevator at the left-hand end of the structure in Figure 1;

Figure 3 is a transverse vertical section through the up-elevator, taken along the line **3—3** in Figure 2;

Figure 4 is a horizontal section taken along the line **4—4** in Figure 2, and including also a top plan view of the first station along the track of the stationary structure;

Figure 5 is an enlarged sectional view taken at **5—5** in Figure 4, showing one end of the pick-off mechanism, and the manner in which it engages the pick-off hook on the platform;

Figure 6 is an enlarged sectional view of a detail, taken at **6—6** in Figure 5;

Figure 7 is a top plan view of the first two stations on the top level track of the stationary supporting structure;

Figure 8 is an enlarged fragmentary sectional view taken alongside the conveyer chain mechanism at opposite ends thereof, showing the manner in which the conveyor chain drives the platforms;

Figure 9 is an enlarged transverse vertical section through the down-elevator at **9—9** in Figure 1; and

Figure 10 is a schematic circuit diagram of the electrical control mechanism.

In the drawings, the apparatus of the present invention is seen to comprise a stationary structure designated in its entirety by the reference numeral **20** and consisting of a lower level track **21**, and a plurality of vertically spaced upper level tracks **22**, **23** and **24**. The upper level tracks are arranged directly above and parallel to the lower level tracks, and located at the left and right hand ends, respectively, of the tracks is an up-elevator **25** and a down-elevator **26**. The stationary structure **20** with its several track levels may take any desired structural form, and is herein shown as comprising a plurality of vertical posts **30** which are spaced uniformly along the length of the structure on opposite sides thereof, and cross-connected by diagonal bracing members **31**. The bottom ends of the posts **30** are preferably embedded in concrete footings **32** in the bottom of a pit **33**, so that the lower level track **21** is substantially level with the ground. The posts **30** on opposite sides of the structure are arranged in transversely aligned pairs, which are connected at each track level by a transverse channel beam **34**.

Resting on top of the transverse beams **34** and extending from one end of the structure **20** to the other end thereof are laterally spaced tracks **35** which may have any desired cross-sectional shape, but which are shown in the drawings as upwardly facing channel beams. The tracks **35** are adapted to receive the wheels **36** of mobile platforms **40** that are arranged end-to-end on the tracks, said platforms being adapted to receive and support the automobiles or other loads.

In the multi-level structure illustrated, each of the platforms **40** is normally assigned to one particular level of the upper level tracks, and to this end, means is provided for selectively removing the platforms from the up-elevator onto their respective track levels, as will be described

in more detail presently. Thus, when all of the platforms have been loaded onto the upper level tracks, each of the upper level tracks will be filled from one end to the other with platforms which are continuously returned to that same level whenever the machine is set into operation. For the purpose of distinguishing the platforms of one level from those of another, I have designated the platforms on the first of the upper levels as 40*a*, while those on succeeding levels are designated 40*b*, and 40*c*. Means is also provided for advancing all of the platforms on any one selected upper level track, so that the platforms on that level are advanced toward and loaded onto the down-elevator. The platforms can then be successively lowered to the ground level, where they are removed from the down-elevator onto the lower level track and then moved back to the up-elevator to be returned to the upper level track to which they belong. In this way, any desired platform can be brought around to the loading station to receive or discharge an automobile.

Each of the mobile platforms 40 comprises a pair of laterally spaced, longitudinally extending channels 42 which face upwardly to provide tracks onto which the wheels of the automobile are driven. The channels 42 are connected together at their front and rear ends by transverse members 43 and 44, and intermediate of their ends by cross-bracing members 45. The wheels 36 are mounted on the ends of axles 46 which are journaled in bearing members 47 mounted on the undersides of the channels 42 adjacent the ends of bracing members 45.

Fixed to the leading edge of the front cross member 43 adjacent the end thereof, are forwardly projecting, spring-cushioned bumpers 50; while similar bumpers 51 are mounted on the trailing edge of the rear cross member 44 and project rearwardly therefrom. The front bumpers 50 on each platform are aligned with the rear bumpers 51 of the platform ahead of it, providing a cushioned contact between the platforms, whereby one platform can push another if necessary. While the details of the bumpers 50 and 51 are of no consequence to the present invention, it will be noted that the contacting surfaces thereof are smoothly rounded so as to prevent one bumper from catching onto another.

Also mounted on and projecting forwardly from the front cross member 43 of each of the platforms is a pick-off hook 52 which is adapted to be engaged by a cooperating pick-off mechanism 53 on the upper level track to which the platform is assigned, whereby the platform is removed from the up-elevator 25 onto the tracks 35 of the stationary structure. The pick-off hooks 52 on the front ends of the platforms 40 are all identical in construction, and all of the hooks on the platforms of any given track level are located at the same transverse position on the cross member 43. However, the hooks 52 for each track level are off-set laterally from those of the other levels, as best shown in Figure 3. Thus, for example, the hooks 52 of platforms 40*a* on the first upper level track are illustratively located near the right hand side of the platform; while those of platforms 40*b* and 40*c* on the second and third upper level tracks are located near the center and left hand side, respectively, of the platforms.

Each of the pick-off hooks 52 is adapted to be engaged by a pick-off mechanism 53 on the stationary structure 20 when the platform has been raised by the up-elevator to the level to which it belongs, and therefore each of the pick-off mechanisms 53 is located in lateral alignment with the pick-off hooks of the platforms for that level. Thus, the pick-off mechanism 53 for the first upper level track 22 will only engage the pick-off hooks 52 of platforms 40*a*, and will miss the pick-off hooks of platforms 40*b* and 40*c*.

Mounted on the rear cross member 44 of each of the platforms and projecting rearwardly therefrom is another pick-off hook 54; this one being engaged by a pick-off mechanism 55 on the lower level track 21 at the end adjacent the down-elevator 26. The purpose of the pick-off device 55 is to pull the platform off the down-elevator 26 onto the lower level track 21, and since the platforms of all of the upper level tracks are returned along the lower level track 21 to the up-elevator, the pick-off hooks 54 for all of the platforms on the apparatus are located at the same transverse location.

Also mounted on the front and rear cross members 43, 44 adjacent the left hand bumpers 50 and 51, respectively, are forwardly and rearwardly projecting brackets 56 and 57. Pivotally connected to the front bracket 56 by a pin 60 is a downwardly hanging ratchet pawl 61, the bottom end of which is preferably formed with a V notch 62, as shown in Figure 8. The ratchet pawl 61 is free to trail behind or to the left of the pin 60 as the platforms are pulled or pushed, as the case may be, onto or along the stationary structure by the upper level pick-off mechanisms 53; the free end of the pawl ratcheting over the transverse pins or rollers of a conveyer chain 63 which extends longitudinally of the structure parallel to the tracks of each level. When the platform comes to a stop, the notched end of the pawl 61 drops down into engagement with one of the pins or rollers of the chain 63, and then when the chain begins to move, the pawl 61 is pushed along with it, thereby moving the platform along the track.

Another ratchet pawl 64 is swingably connected by a pin 65 to the rear bracket 57, and is likewise free to swing in the same fore and aft, vertical plane as that in which the front ratchet pawl 61 moves. The rear ratchet pawl 64 is therefore engageable also with the conveyer chain 63, and the latter is thus enabled to push against the rear end of the platform to move the same onto the down-elevator. At this point, the chain passes down around the sprocket at the right hand end thereof, and the rear ratchet pawl 64 falls free of the chain down to the depending position shown at E in Figure 8.

The up and down elevators 25 and 26 are generally similar in construction and the following description, which is particularly directed to the up-elevator, will therefore be understood to apply also to the down-elevator. Each of the elevators comprises a supporting frame structure made up of four vertical posts 70 located at the corners of the elevator, the bottom end of each of said posts being embedded in a concrete footing 71. The two posts on each side are connected together at their top ends by a fore and aft extending beam 72, and are also joined together along their lengths by crossed diagonal bracing members 73. Extending between the two posts 70 at each side of the frame near the top and bottom ends thereof are drive shafts 74 and 75 which are journaled at their ends in supporting bearings 76 mounted on the posts. Fixed to the top drive shaft 74 near the opposite ends thereof

are sprockets 80, while other sprockets 81 are fixed to the opposite ends of the bottom drive shaft 75. An endless chain 82 is trained around each pair of sprockets 80, 81, and these chains travel in vertically extending channel members 83 and 84, which provide solid backing support for the chain. The channels 83 and 84 are attached to the cross bracing members 73 on the inside and outside edges thereof, respectively, and the chains 82 are driven in such direction that the portions traveling within the inner channel 83 are ascending, while the portions traveling in the outer channel 84 are descending.

The two bottom shafts 75 of the up-elevator are driven in synchronism by a motor 85 mounted on a platform 86 in the bottom of the pit 33, said motor being connected to the shaft by a speed-reduction and right-angle-drive gear box 90 having oppositely extending drive shafts 91 and 92, that are connected through speed-reduction gear boxes 93 to the ends of the shafts 75.

Fixed to the links of the chain 82 at equidistantly spaced intervals along the length thereof are bracket members 94 which support channel tracks 95. Each of the channel tracks 95 is attached to a horizontally aligned pair of brackets 94 on the two chains 82 at one side of the elevator, and the channel members are mounted on the brackets so that those tracks on the inside, ascending portions of the elevator chain face upwardly to receive the wheels 36 of the platform 40. The tracks on opposide sides of the up-elevator travel upwardly in horizontally aligned pairs, and the ascending tracks are also aligned transversely with the corresponding tracks 35 of the stationary structure. It will also be noted in Figure 3 that the brackets 94 are spaced along the chains 82 so that when the elevator comes to rest, each level of the elevator registers with the corresponding track level on the stationary structure 20.

The down-elevator 26 is generally similar in all structural details to the up-elevator 25 except, of course that the channel tracks on the inside portions of the elevator chain descend instead of ascending. Also, the down-elevator is driven by a motor 96 which drives the chains 82 in the opposite direction to that of elevator 25.

The pick-off mechanism 53 of the upper level tracks and the lower level pick-off mechanism 55 are identical in construction and differ only in placement; the pick-off mechanisms for the upper level tracks being located at the ends of their respective tracks adjacent the up-elevator 25, while the lower level pick-off mechanisms 55 is located on the track 21 adjacent the down-elevator 26. Since the structural details of the upper level pick-off mechanism 53 are more clearly illustrated in Figures 4, 5 and 6 than are those of the lower level pick-off mechanism 55, the description that follows will be directed particularly to the upper level pick-off mechanisms, although it will be understood that the same description applied equally well to the lower level pick-off mechanism 55.

Each of the pick-off mechanisms comprises an endless chain 100 which is trained around spockets 101 and 102. Sprocket 101 is rotatably supported by a bracket member 103 mounted on and projecting horizontally from the cross member 34 at the end of the track adjacent the up-elevator 25. The other sprocket 102 is mounted on the drive shaft projecting from a speed-reduction gear box 104 which may be formed integrally with the housing of a motor 105, as shown in Figure 4, although such integral construction is not essential. The motors 105 of the upper level tracks drive the chains 100 so that the upper courses thereof travel to the right, as seen in Figures 4 and 5, or away from the up-elevator 25. This upper course of the chain 100 is confined between the upwardly extending side flanges of a channel member 106 and is supported by the bottom portion thereof; said channel being mounted on the cross beams 34 and extending parallel to the tracks 35. The connecting cross pins of the chain 100 are preferably provided with rollers 107 which contact the bottom of the channel 106 to provide rolling support for the chain links.

Two of the links of the chain 100 at exactly opposite points thereon are provided with bracket members 110 which project outwardly from the chain. In the preferred embodiment, the bracket member 110 comprises two laterally spaced plates 111 which are joined together at their outer ends and apertured to receive a transverse pin 112. The pin 112 travels along the path A, shown in phantom lines in Figure 5, and engages the hook 52 of a platform 40 on the up-elevator destined for that particular level. The end portion of the hook 52 is cut out at 113 to provide clearance for the bracket 110 and for sprocket 101. The phantom-line representation B (Figure 5) of the front end of the platform and pick-off hook 52 shows the manner in which the hook passes over the sprocket 101 while the platform is being raised by the up-elevator; the cutaway portion 113 providing clearance for the sprocket so that the hook is enabled to pass the sprocket without interfering therewith. The solid-line representation of the front end of the platform and pick-off hook shows the position of these parts when the elevator comes to a stop with the tracks 95 registered with the tracks 35 on the stationary structure.

While the platform is being raised by the elevator, the bracket member 110 remains stationary at position C (Figure 5), and after the up-elevator has come to a stop, the pick-off chain 100 starts up in the direction of the arrows, causing the pin 112 to engage the downwardly bent end portions 114 of the hook 52 as the bracket member 110 approaches the top of the sprocket 101. At this point, the pick-off chain 100, acting through the bracket member 110, pulls the platform 40 off the up-elevator tracks 95 and onto the tracks 35 of the stationary structure 20. The length of the pick-off mechanism 53 is such that the platform 40 is pulled onto the upper level track to the position shown at F in Figure 4, at which point the pick-off mechanism comes to a stop.

The lower level pick-off mechanism 55, as explained earlier, is exactly like the upper level pick-off mechanism 53, except for the fact that the bracket members engage the rear hooks 54 on the platforms when the latter reach the bottom of the down-elevator 26; whereupon the platform is pulled off the down elevator 26, or toward the left as seen in Figure 1.

In order to unload the platforms from any given track level so as to bring a particular platform down to the loading station to receive or discharge an automobile, means is provided for progressively advancing all of the platforms along the track in the direction from left to right, or towards the down-elevator. The aforesaid means is preferably in the form of the endless conveyer chain 63, which is trained around

sprockets 120 and 121 and extends lengthwise along the tracks 35 from a point overlapping the right hand end of the pick-off chain 100 to the extreme right hand end of the track. Sprocket 120 is rotatably supported between two laterally spaced bracket members 122 which are welded or otherwise suitably attached to the left hand ends of two vertically spaced, upwardly facing channels 123 and 124. The top channel 123 rests on top of and is suitably attached to the cross beams 34 of the stationary structure 20, and the top portion of the chain 63 is contained within and slides along the channel. The bottom channel 124 is supported from the undersides of the cross beams 34 by U-shaped brackets 125, and the bottom portion of the chain rests on and slides along the channel on its return trip from sprocket 121 to sprocket 120.

Sprocket 121 is attached to the output shaft of a speed-reduction, right-angle-drive gear box 126 which is mounted on and operatively connected to a motor 130. The suffixes *a*, *b*, and *c* are added to the reference numerals 130 in Figures 1 and 10 to indicate that the motors concerned, drive the conveyer chains of the first, second, and third upper levels, respectively. Each of the conveyer motors 130 is suitably mounted on a bracket 131 which is attached to the bottom flange of the extreme right hand cross beam 34' of the stationary structure 20. The motors 130 drive the sprockets 121 in a clockwise direction, which causes the platforms to be moved along the tracks from left to right. As each platform is pushed onto the down-elevator, the rear ratchet detent 64 falls away from the chain 63 to the downwardly hanging positions shown at position E in Figure 8.

The conveyer mechanism for the lower level track 21 is designated generally by the reference numeral 135, and is similar in construction to the conveyer mechanisms of the upper level tracks, except that its placement and direction of travel are reversed with respect to the others. In other words, the top portion of the bottom level conveyer chain travels from right to left, thereby advancing the platforms toward the up-elevator 25. The transverse placement of the lower level conveyer mechanism 135 is in the same vertical plane as the upper level conveyer mechanisms, and the chain is therefore engaged by the same ratchet pawls 61 and 64 on the platforms. Being freely swingable on their supporting pivots, the ratchet pawls merely trail behind their pivots as the platforms are pulled or pushed, as the case may be, onto or along the stationary structure by the lower level pick-off mechanisms 55, ratcheting over the conveyer chain until the platform comes to a stop. Then, when the conveyer chain is started up, the pawl is engaged and pushed along with it. The motor driving the bottom conveyer mechanisms 135 is located at the extreme left hand end of the lower level track 21, and is designated by the reference numeral 130'.

With the exception of certain minor details which will be taken up presently, it is believed that the foregoing description is complete as to all essential structural details, and the discussion which follows will turn now to the several different ways in which the apparatus may be used. The first method of operation that will be described relates to a multi-level apparatus, such as that shown in the drawings, wherein the automobiles are loaded onto and unloaded from the platforms 40 at a loading station L at the bottom of the up-elevator 25. The automobiles are driven up a ramp or driveway 140 onto the channel tracks 42 of a platform waiting on the up-elevator, after which the mechanism is then set into operation to raise the platform to its assigned level and then pull the loaded platform onto the tracks 35 of the stationary structure 20.

When the attendant wishes to bring a particular platform of a given track level down to the loading station L, he operates the automatic control mechanism, thereby setting the machinery into operation to repeat a predetermined sequence of operations until the desired platform arrives at the loading station. The operational sequence referred to consists of the following four steps: (1) operation of the pick-off mechanisms 53 on all of the upper level tracks, and of the lower level pick-off mechanisms 55, to remove any platfoms that may be standing on either elevator; (2) the conveyer chain 63 of the selected track level is then driven to advance all of the platforms on that track by a distance equal to one platform length, during which operation the platform at the extreme right hand end of the track is pushed onto the down elevator 26; (3) both elevators are then operated to advance one level, i. e., up one level on the up-elevator 25, and down one level on the down-elevator 26; and (4) the bottom conveyer chain 135 is operated to advance all of the platforms on the lower level track 21 by one platform length, during which operation, the platform at the extreme left hand end of the track is pushed onto the up-elevator 25. This sequence of operations is repeated the required number of times, until the machine comes to a stop just after the desired platform has been pushed onto the loading station L at the bottom of the up-elevator 25.

At this point, attention is directed to a safety device on the down-elevator 26 whereby the conveyer chain mechanisms of the upper level tracks below the top level are prevented from being operated and pushing a platform onto the down elevator when the channel tracks of the down-elevator at that particular level are already occupied by another platform descending from a higher track level. The device referred to consists of photo-electric cell mechanisms contained within housings 142 which are mounted on the diagonal cross braces 73 at one side of the down-elevator frame structure at each of the upper levels except for the top one. Directly across from each of the photoelectric cell housings 142 is a lamp housing 144 having a projection lens 145 that directs a beam of light G across the elevator toward the opening 143. Both of the housings 142 and 144 are located at such a level that the light beam G is blocked by the frame of the platform 40 when the latter is standing on the down-elevator channel tracks 95. The photo-electric cell mechanism in the housing 142 acts to open a relay in the circuit to the conveyer drive motor 130 of that particular track level when the light beam G is blocked, and the conveyer chain is thus prevented from pushing another platform onto the already occupied channel tracks of the down-elevator.

A typical control circuit for operating the several units of the apparatus in the manner just described is shown schematically in the circuit diagram of Figure 10. The particular circuit illustrated is for a multi-level structure having three upper levels, with six platfform stations on each level. This circuit can easily be modified in an obvious manner to accommodate a differ-

ent number of upper levels, or a different number of platform stations per level.

Grouped together in a rectangular arrangement at the bottom of the circuit diagram is a plurality of push button control switches 150 which are arranged in horizontal rows corresponding in number to the upper level tracks, and each switch of each row corresponding to a given platform station on its associated track level. Each of the switches 150 is a normally open two-pole, single-throw switch, which, when closed, transmits a momentary current impulse from a current source X1 to both a timer mechanism 151 and to the coil of one of three relays 152, 153, and 154. These relays are in the nature of holding relays, and function to supply current continuously to the conveyer chain motors 130a, 130b, and 130c of the upper level tracks until the operational cycle is completed.

Relay 152 is operatively connected to the conveyer chain motor 130a of track level 22 and is actuated by current impulses derived from any one of the control switches 150 in the bottom row. Relay 153 is operatively connected to conveyer chain motor 130b of track level 23, and is actuated by current impulses derived from any one of the control switches 150 of the center row. Relay 154 is operatively connected to the top conveyer motor 130c, and is actuated by current impulses derived from any one of the control switches 150 of the top row. Current impulses from the bottom row of switches 150 are transmitted to the coil of relay 152 along a wire 155, which is connected to each of the right hand contacts 156 in the bottom row of switches. Current impulses from the middle row of switches are transmitted to the coil of relay 153 along wire 160; while another wire 161 transmits the current impulses from the top row of switches to the coil of relay 154. Wires 160 and 161 are likewise connected to the right hand contacts 156 on all of the switches 150 in the middle row and top row, respectively.

The two poles 162 and 163 of each of the switches 150 are connected by wires 164 to a current source X1, so that the closing of any one of the switches causes current to be carried simultaneously to both of the two contacts 156 and 166. It might be noted at this point that wherever the reference letter X appears, it indicates connection to the current-carrying, or "hot" side of the line, while the reference letter O denotes connection to the grounded side of the line. Thus a circuit may be completed from any one of the points designated X or X plus a suffix to any one of the points designated O. The X references may be connected to the same line terminal, in which case they would all be of the same voltage, or they may be connected to different current sources to suit the voltage requirement of the various relays, timers, switches and the like.

The left hand contacts 166 of each of the switches 150 are connected to the input terminals 167 of the electrical timer 151 by a plurality of wires 168, each of which is connected to those switches 150 requiring the same number of repetitions of the operating cycle to bring a platform from its position on the upper level tracks down to the loading station L. Thus, for example, if the switch at the extreme left hand end of the top row requires sixteen repetitions of the operating cycle to bring its corresponding platform down to the loading station L, the switches to the right of it will require fifteen, fourteen, thirteen, twelve and eleven repetitions, respectively, while the switches of the middle row will require (reading from left to right) fifteen, fourteen, thirteen, twelve, eleven and ten repetitions, and the switches of the bottom row will require fourteen, thirteen, twelve, eleven, ten and nine repetitions.

The mechanism of the timer 151 is operative to cause a current flow to be transmitted from a current source X2 to an output terminal 170 for a predetermined measured length of time responsive to a momentary current impulse received from one of the switches 150 through the input terminals 167. In the example given, a current impulse received at the extreme left hand input terminal 167 would cause a current flow from the output terminal 170 for exactly the period of time required to perform nine cycles of operation, while the input terminals to the right of it cause the current to flow for ten, eleven, twelve, thirteen, fourteen, fifteen, and sixteen cycles of operation, respectively. The extreme right hand input terminal is connected to a single-pole, single-throw switch 150', and gives a current flow for the duration of one cycle only. Switch 150' is therefore in the nature of a manual operation switch.

Referring back for a moment to the cross-connection of the left hand contacts 166 of the switches 150, we see that the extreme left hand switch in the top row of buttons is the only one requiring sixteen repetitions or cycles, and its contact 166 is therefore the only one connected to the sixteen-cycle input terminal of the timer. However, both the switch to the right of it and the one directly below it require fifteen cycles of operation, and therefore the contacts 166 of the two last-named switches are connected together so that if either one of them is pressed a current impulse is transmitted to the fifteen-cycle input terminal of the timer. In like manner the contacts 166 of the third switch from the left in the top row, second switch from the left in the middle row, and extreme left hand switch on the bottom row are connected together and to the fourteen-cycle input terminal of the timer; and so on down the line.

When one of the buttons 150 is pressed, two things occur simultaneously. First, a momentary current impulse is transmitted to the right hand contact 156 of the pressed switch, and this current impulse is transmitted to the coil of the relay (152, 153 or 154) associated with that row of buttons. The circuit to the coil of the relay is completed through the ground connection O, thereby closing the normally open pole of the relay against its contact. At the same time, a current impulse is transmitted to the left hand contact 166 of the closed switch 150, and is carried to one of the input terminals 167 of the timer 151, setting the latter into operation, which causes current to be transmitted immediately from current source X2 to the output terminal 170. A portion of the current from the output terminal 170 is transmitted along line 171 to another line 172 which is connected to the poles of all three of the relays 152, 153 and 154. Thus, as soon as the pole of any one of the relays is closed, current from the timer output terminal 170 is transmitted to the relay contact, where a portion of the current branches off to continue the energization of the coil so that the relay remains closed, while the balance of the current is transmitted to the conveyer motor associated with that relay. The contact of relay 152 is con-

nected by a line 173 to the bottom conveyer motor 130a; while the contact of relay 153 is connected by line 174 to the middle conveyer motor 130b; and the contact of relay 154 is connected by line 175 to the top conveyer motor 130c.

It will be noted that there are normally-closed relays 176 and 177 serially connected into lines 173 and 174, respectively, and the coils of these relays are energized by the photoelectric cell mechanisms 142 whenever the light beam G from the associated lamp housing 144 is interrupted. Thus, the presence of a platform 40 on the down-elevator at either the first or second of the upper levels causes the photoelectric cell mechanism 142 to open the relay and break the circuit to the conveyer motor for that level so that the conveyer chain will not be operated, thereby pushing another platform onto the already occupied elevator. If the relays 176 and 177 are closed, current from any one of the lines 173, 174 and 175 will be transmitted through the motors 130a, 130b, 130c to line 180 which is connected to the right hand contact of a sequence switch 181. The left hand contact of the switch 181 is grounded at O, and the push-pull pole of the switch is normally retracted from the contacts thereof so that the circuit is open except when the pole is pressed upwardly.

Other sequence switches 182, 183 and 184 are arranged alongside of switch 181, and these latter switches are likewise of the normally open variety having two contacts which are closed by a push-pull pole.

The poles of the sequence switches 181, 182, 183 and 184 are closed in the desired sequence and for the proper length of time by means of cams 185, 186, 187 and 188, respectively, which are mounted on a rotatable shaft 190. The shaft 190 is operatively connected to a constant speed, sequence control motor 191 through a speed-reduction gear box 192, whereby the shaft 190 makes one complete revolution for each full cycle consisting of four operational sequences. Thus, for example, if we assume a five-second time interval for each of the four sequences (i. e., a pick-off mechanism, upper level conveyer elevators, and lower level conveyer), the shaft 190 would make one revolution in twenty seconds, closing each of the switches 182, 181, 183 and 184, in the order named, for a five-second interval of time. Current for driving the motor 191 is taken from the line 171 by a connecting line 193, and the circuit is grounded from the motor to the ground connection O.

The left hand contacts of switches 182, 183, and 184 are connected by a line 194 to a current source X3, and the right hand contact of switch 182 is connected by a line 195 to each of the pick-off motors 105 of the upper and lower levels. The circuits to the pick-off motors 105 are completed to the ground connections O, and when the switch 182 is closed by cam 186, the motors are driven simultaneously to pull off any platforms on the up or down elevators onto the levels to which the platforms are assigned.

The right hand contact of switch 183 is connected by a line 196 to the motor 85 of the up-elevator and to the motor 96 of the down-elevator, both of said motors being grounded to the ground connection O. Thus, when switch 183 is closed by cam 187, both of the elevators are operated for the required period of time to raise or lower the platform one level. The right hand contact of switch 184 is connected by a line 200 to the lower level conveyer motor 130', and the latter is operated when the switch is closed by cam 188.

Thus, each time that the shaft 190 makes one rotation, switch 182 is closed first, operating the pick-off motors 105; after which switch 181 is closed, causing the operation of whichever motor of the upper level conveyers has a closed circuit due to the fact that its associated relay 152, 153, or 154 has been energized. Next, switch 183 is closed, causing the two elevators to advance one level; and finally, switch 184 is closed, operating the bottom level conveyer motor 130' to advance the platforms on the lower level by one platform length. Motor 191 continues to operate until the current is shut or by the timer 151, and therefore the number of revolutions made by the shaft 190 depends upon the length of time during which current is delivered by the timer 151. As mentioned earlier, the time interval during which current is delivered by the timer depends upon which of the input terminals 167 receives the current impulse from the switches 150.

When the attendant wishes to clear the lower level 21 and the elevators 25, 26 of platforms, he presses button 150' for whatever number of times is required to clear the machine. When switch 150' is closed, motor 191 is operated only for a sufficient time interval to cause the shaft 190 to make one complete revolution. Since no current is transmitted to the upper level conveyer motors 130a, 130b, and 130c when switch 150' is closed, it will be understood that nothing happens when sequence switch 181 is closed by its cam 185. Thus, the only propulsion of the platforms 40 along the upper level tracks is by the bumper-to-bumper push exerted by whichever platform is being pulled off the up-elevator by one of the pick-off devices.

Another suggested method of utilizing the apparatus is to load the platforms at the loading station L, and to unload the platforms at an unloading station L' (Figure 1) at the bottom of the down-elevator 26. In this case, the cars will be driven forwardly off the channel tracks 42 of the platforms onto driveway or ramp 201, and the empty platform would then travel back along the lower level track 21 to the loading station L to receive its next automobile. The advantage of this arrangement is that it reduces the amount of time necessary to bring an automobile down from one of the upper level tracks to the unloading station, which is decidedly advantageous during rush periods. A slight modification would obviously be required in the control mechanism, due to the fact that a fewer number of operating cycles would be required to bring a particular platform down to the unloading station L'. Since the necessary changes are more or less obvious and will immediately become apparent to those skilled in the art, it is not deemed necessary to go into the same in more detail at this point.

Still another method of operating the multi-level apparatus shown is to perform both the loading and unloading operations at station L' at the bottom of the down-elevator. One important advantage of this mode of operation over those previously described is that it permits the elimination of one of the steps in the sequence of operation; namely, the operation of the bottom level conveyer after the elevators have been operated, which served in the preceding instances to bring a platform onto the loading or unloading station L at the bottom of the up-elevator. In the present case, the platforms are brought down

to the loading or unloading station L' by the operation of the elevators. The switch 184, being unnecessary, would be eliminated, and line 209 carrying current to the bottom level conveyer motor 130' would be connected to switch 181 so that motor 130' would be operated simultaneously with any one of the upper level conveyer motors 130a, 130b or 130c. The time required to bring a platform down from one of the upper levels to station L' can also be reduced further by having the conveyer motors operate simultaneously with the pick-off motors 105, in which case the cams 185 and 186 would be set to operate both of the switches 181 and 182 simultaneously. The cycle of operations would then consist of only two steps: (1) simultaneous operation of all of the pick-off motors 105, bottom level conveyer motor 130', and one of the upper level conveyer motors 130a, 130b, 130c; and (2) operation of both the up and down elevators to advance one level. Assuming five seconds for each sequence, the total time required to complete a cycle would be only ten seconds, and shaft 190 would then be speeded up to make one complete revolution in ten seconds. Cams 185 and 186 would close their respective switches simultaneously for one-half of a revolution of the shaft 190, and cam 187 would then close its switch 183 for the remaining one-half revolution. The timer 151 would also be modified, of course, to deliver current to the output terminal 170 for periods of time graduated in ten second increments.

Where the apparatus is constructed with only two levels instead of with a plurality of upper levels, the operation need consist of only two steps: (1) operation of the pick-off mechanisms to pull the platforms off the two elevators and push the other cars on that level ahead of it; and (2) simultaneous operation of the two elevators to advance the same from one level to the other. In this case, the conveyer mechanisms would be omitted altogether and the only two sequence switches that would be needed are switches 182 and 183. The relays 152, 153, 154 would also be eliminated along with the conveyer motors; and single-pole, single-throw switches 150 could be used instead of the double-pole variety shown, since the right hand contacts 156 of the double-pole switches would no longer be required. Also, shaft 190 would now be speeded up to make one revolution in ten seconds, and cams 186 and 187 would close their respective switches during one-half revolution each.

The foregoing examples are merely illustrative of the several ways in which the apparatus of the present invention can be constructed and operated. It is also contemplated that the automobiles might be loaded on the platforms 40 so that they travel sidewise down the length of the tracks instead of end-to-end as shown. This would have the advantage of reducing the number of elevators required for a given street frontage, since the width of each elevator would then be approximately equal to the length of the automobile instead of only the width thereof. Also, the percentage of unused area due to space required for the downward travel of the elevator tracks on the outside portion of the chain 82 would be reduced. It should also be understood that the apparatus might take any other structural shape, such as reinforced concrete, brick, etc. It is furthermore contemplated that the several levels might be closed off from one another by suitable partitions or fire walls, and that various safety devices might be incorporated into the apparatus to prevent malfunctioning of any part of the mechanism.

While I have shown and described in considerable detail what I believe to be the preferred form of my invention, it is to be understood that such details are not restrictive, and that various changes may be made in the shape and arrangement of the several parts thereof without departing from the broad scope of the invention, as defined in the appended claims.

I claim:

1. Apparatus for storing automobiles and the like, comprising a lower level track and at least one upper level track, a plurality of mobile platforms arranged end-to-end on said tracks, said platforms being adapted to receive an automobile or other load, an up-elevator located at one end of said tracks and a down-elevator located at the other end thereof, said up-elevator being adapted to receive said platforms from said lower level track and to raise the same to said upper level track, said down-elevator being adapted to receive said platforms from said upper level track and to lower the same to said lower level track, a pick-off device engageable with the platform on said up-elevator to pull the same onto said upper level track, another pick-off device engageable with the platforms on said down-elevator to pull the same onto said lower level track, an endless chain conveyer having one portion thereof extending parallel to said upper level track and traveling in the direction from said up-elevator toward said down-elevator, a ratchet pawl pivoted on said platform for swinging movement in a fore and aft vertical plane, the depending end of said pawl being free to trail rearwardly and to ratchet over said conveyer chain when said platform overruns said chain, and being engageable by said conveyer chain when the latter advances along said track, whereby the platform is carried along said upper level track by the chain, and another endless chain conveyer having one portion thereof extending parallel to said lower level track and traveling in the direction from said down-elevator toward said up-elevator, said ratchet pawls on said platforms being engageable by said one portion of said last named conveyer chain, whereby the platform is carried along said lower level track by the chain.

2. Apparatus for storing automobiles or the like, comprising a lower level track and a plurality of vertically spaced upper level tracks, said upper level tracks being arranged directly above and parallel to said lower level track, a plurality of mobile patforms adapted to receive automobiles or other loads, said platforms being adapted to travel along said tracks, and each platform being normally assigned to one particular level of said upper level tracks, an up-elevator located at one end of said tracks to receive platforms from said lower level track and to raise the same to said upper level tracks, a down-elevator at the other end of said tracks to receive platforms from said upper level tracks and to lower the same to said lower level track, a plurality of pick-off devices for selectively removing platforms from said up-elevator onto the upper level tracks to which the platforms are assigned, said pick-off devices being off-set laterally from one another at the different upper levels, means on the front edge of each of said platforms positioned laterally to be engageable only by the pick-off device at the upper level track to which the platform belongs, another

pick-off device associated with said lower level track adjacent said down-elevator, and means on the back edge of each of said platforms positioned laterally to be engaged by said last-named pick-off device, whereby said platforms are pulled off of the down-elevator onto said lower level track.

3. Apparatus for storing automobiles or the like, comprising a lower level track and a plurality of vertically spaced upper level tracks, said upper level tracks being arranged directly above and parallel to said lower level track, a plurality of mobile platforms adapted to receive automobiles or other loads, said platforms being adapted to travel along said tracks, and each platform being normally assigned to one particular level of said upper level tracks, an up-elevator located at one end of said tracks to receive platforms from said lower level track and to raise the same to said upper level tracks, a down-elevator at the other end of said tracks to receive platforms from said upper level tracks and to lower the same to said lower level track, a plurality of pick-off devices for selectively removing platforms from said up-elevator onto the upper level tracks to which the platforms are assigned, each of said pick-off devices comprising an endless chain disposed between and running parallel to one of said upper level tracks, the endless chain of each level being spaced transversely from the endless chains of the other levels, bracket means projecting outwardly from each of said chains, a forwardly projecting pick-off hook on the front end of each of said platforms, said hooks being positioned transversely to be engageable only by the bracket means of the pick-off device on the upper level track to which the platform belongs, and another pick-off device engageable with a hook projecting rearwardly from the back end of each of said platforms for pulling the same off the down-elevator onto said lower level track.

4. Apparatus for storing automobiles or the like, comprising a lower level track and a plurality of vertically spaced upper level tracks, said upper level tracks being arranged directly above and parallel to said lower level track, a plurality of mobile patforms adapted to receive automobiles or other loads, said platforms being adapted to travel along said tracks, and each platform being normally assigned to one particular level of said upper level tracks, an up-elevator located at one end of said tracks to receive platforms from said lower level track and to raise the same to said upper level tracks, a down-elevator at the other end of said tracks to receive platforms from said upper level tracks and to lower the same to said lower level track, a plurality of pick-off devices for selectively removing platforms from said up-elevator onto the upper level tracks to which the platforms are assigned, each of said pick-off devices comprising an endless chain disposed between and running parallel to one of said upper level tracks, the endless chain of each level being spaced transversely from the endless chains of the other levels, bracket means projecting outwardly from each of said chains, a forwardly projecting pick-off hook on the front end of each of said platforms, said hooks being positioned transversely to be engageable only by the bracket means of the pick-off device on the upper level track to which the platform belongs, an endless chain conveyer associated with each of said upper level tracks and extending parallel thereto, each of said chains having a driving portion traveling in the direction toward said down-elevator, a ratchet pawl pivoted on and depending from each of said platforms, the bottom end of said pawl being free to ratchet over said conveyer chain when the platform over-runs the chain, and being engageable by said chain when the latter advances along said track, another pick-off device engageable with a hook on the rear end of each of said platforms for pulling the same off the down-elevator onto said lower level track, and another endless chain conveyer associated with said lower level track and engageable by said ratchet pawl to advance the platforms in the direction toward said up-elevator.

5. Apparatus for storing automobiles or the like, comprising a lower level track and a plurality of vertically spaced upper level tracks, said upper level tracks being arranged directly above and parallel to said lower level track, a plurality of mobile platforms adapted to receive automobiles or other loads, said platforms being adapted to travel along said tracks, and each platform being normally assigned to one particular level of said upper level tracks, an up-elevater located at one end of said tracks to receive platforms from said lower level track and to raise the same to said upper level tracks, a down-elevator at the other end of said tracks to receive platforms from said upper level tracks and to lower the same to said lower level track, a plurality of pick-off devices for selectively removing platforms from said up-elevator onto the upper level tracks to which the platforms are assigned, each of said pick-off devices comprising an endless chain disposed between and running parallel to one of said upper level tracks, the endless chain of each level being spaced transversely from the endless chains of the other levels, bracket means projecting outwardly from each of said chains, a forwardly projecting pick-off hook on the front end of each of said platforms, said hooks being positioned transversely to be engageable only by the bracket means of the pick-off device on the upper level track to which the platform belongs, an endless chain conveyer associated with each of said upper level tracks and extending parallel thereto, each of said chains having a driving portion traveling in the direction toward said down-elevator, a member on each of said platforms engageable by said driving portion of said conveyer chain, whereby the platform is carried along the track by the chain, another pick-off device engageable with a hook projecting rearwardly from the back end of each of said platforms for pulling the same off the down-elevator onto said lower level track, another endless chain conveyer associated with said lower level track and operative to advance the platforms thereon in the direction toward said up-elevator, and control means for automatically operating said pick-off devices first, then the conveyer chain of a selected upper level track, then both of said elevators, and finally said lower level conveyer chain, in the order named.

6. Apparatus for storing automobiles or the like, comprising a lower level track and a plurality of vertically spaced upper level tracks, said upper level tracks being arranged directly above and parallel to said lower level track, a plurality of mobile platforms adapted to receive automobiles or other loads, said platforms being adapted to travel along said tracks, and each platform being normally assigned to one particular level of said upper level tracks, an up-elevator located at one end of said tracks to receive platforms from

said lower level track and to raise the same to said upper level tracks, a down-elevator at the other end of said tracks to receive platforms from said upper level tracks and to lower the same to said lower level track, a plurality of pick-off devices for selectively removing platforms from said up-elevator onto the upper level tracks to which the platforms are assigned, conveyer means associated with each of said upper level tracks and engageable with the platforms thereon to advance the same toward said down-elevator, another pick-off device engageable with the platforms at the bottom of said down-elevator to pull the same onto said lower level track, other conveyer means associated with said lower level track and engageable with the platforms thereon to advance the same toward said up-elevator, and a control circuit having a plurality of switches provided thereon operable to actuate said pick-off devices, conveyer means, and elevators in a predetermined sequence and for a predetermined number of cycles when one of said switches is closed, whereby a platform in a specific position on one of said upper level tracks may be brought down automatically to a loading or unloading station on said lower level track.

7. Apparatus for storing automobiles or the like, comprising a lower level track and a plurality of vertically spaced upper level tracks, said upper level tracks being arranged directly above and parallel to said lower level track, a plurality of mobile platforms adapted to receive automobiles or other loads, said platforms being adapted to travel along said tracks, and each platform being normally assigned to one particular level of said upper level tracks, an up-elevator located at one end of said tracks to receive platforms from said lower level track and to raise the same to said upper level tracks, a down-elevator at the other end of said tracks to receive platforms from said upper level tracks and to lower the same to said lower level tracks, a plurality of pick-off devices for selectively removing platforms from said up-elevator onto the upper level tracks to which the platforms are assigned, independently motor-driven conveyer means associated with each of said upper level tracks and engageable with the platforms thereon to advance the same toward said down-elevator, another pick-off device engageable with the platforms at the bottom of said down-elevator to pull the same onto said lower level track, other conveyor means associated with said lower level track and engageable with the platforms thereon to advance the same toward said up-elevator, and a safety device responsive to the presence of one of said platforms on said down-elevator at one of said upper levels for interrupting the circuit to the motor of said conveyor means for that level, so as to prevent the operation thereof as long as there is a platform on the down-elevator at that level.

8. The apparatus of claim 7, wherein the safety device comprises a photo-electric cell mounted on one side of said down-elevator, and means on the other side of said down-elevator for directing a beam of light toward said photo-electric cell, said cell being operable to interrupt the circuit to the motor of said conveyer means for that level, so as to prevent the operation thereof as long as said beam of light is interrupted by a platform on the down-elevator at that level.

9. Apparatus for storing automobiles or the like, comprising a lower level track and a plurality of vertically spaced upper level tracks, said upper level tracks being arranged directly above and parallel to said lower level track, a plurality of mobile platforms adapted to receive automobiles or other loads, said platforms being adapted to travel along said tracks, and each platform being normally assigned to one particular level of said upper level tracks, an up-elevator located at one end of said tracks to receive platforms from said lower level track and to raise the same to said upper level tracks, a down-elevator at the other end of said tracks to receive platforms from said upper track levels and to lower the same to said lower track level, a plurality of pick-off devices for selectively removing platforms from said up-elevator onto the upper level tracks to which the paltforms are assigned, conveyer means eassociated with each of said upper level tracks and engageable with the platforms thereon to advance the same toward said down-elevator, another pick-off device engageable with the platforms at the bottom end of said down-elevator to pull the same onto said lower level track, other conveyer means associated with said lower level track and engageable with the platforms thereon to advance the same toward said up-elevator, and a selective, automatic control circuit embodying motor-driven means for actuating said pick-off devices, the conveyer means of one selected upper level track, said elevators and said lower level conveyer means in a predetermined sequence and for a predetermined number of cycles, whereby any platform on said upper level tracks can be brought down automatically to a loading or unloading station on said lower level track.

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