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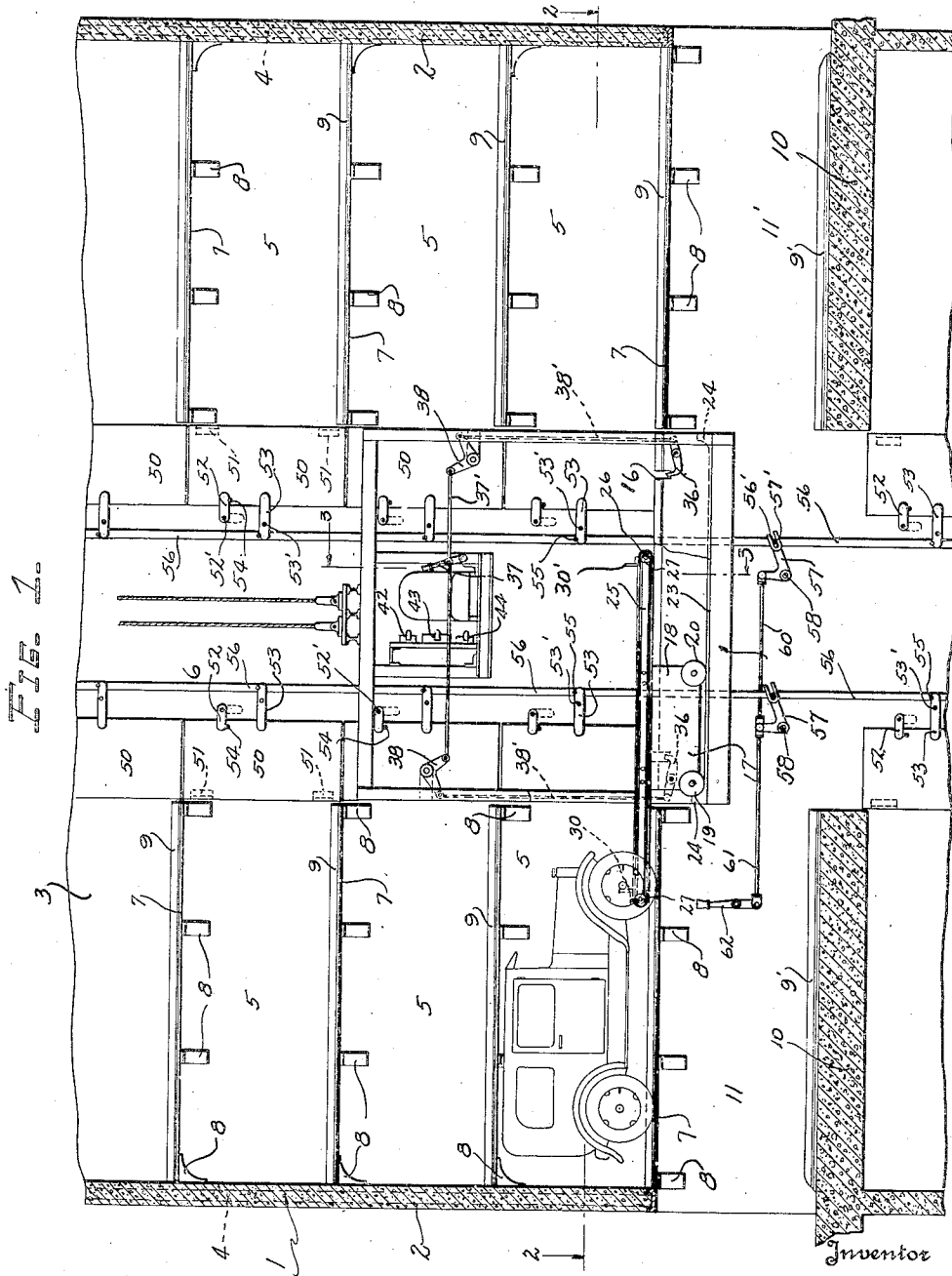
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1,828,307

APPARATUS FOR HANDLING AND STORING

Filed May 6, 1929

4 Sheets-Sheet 1



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Oct. 20, 1931.

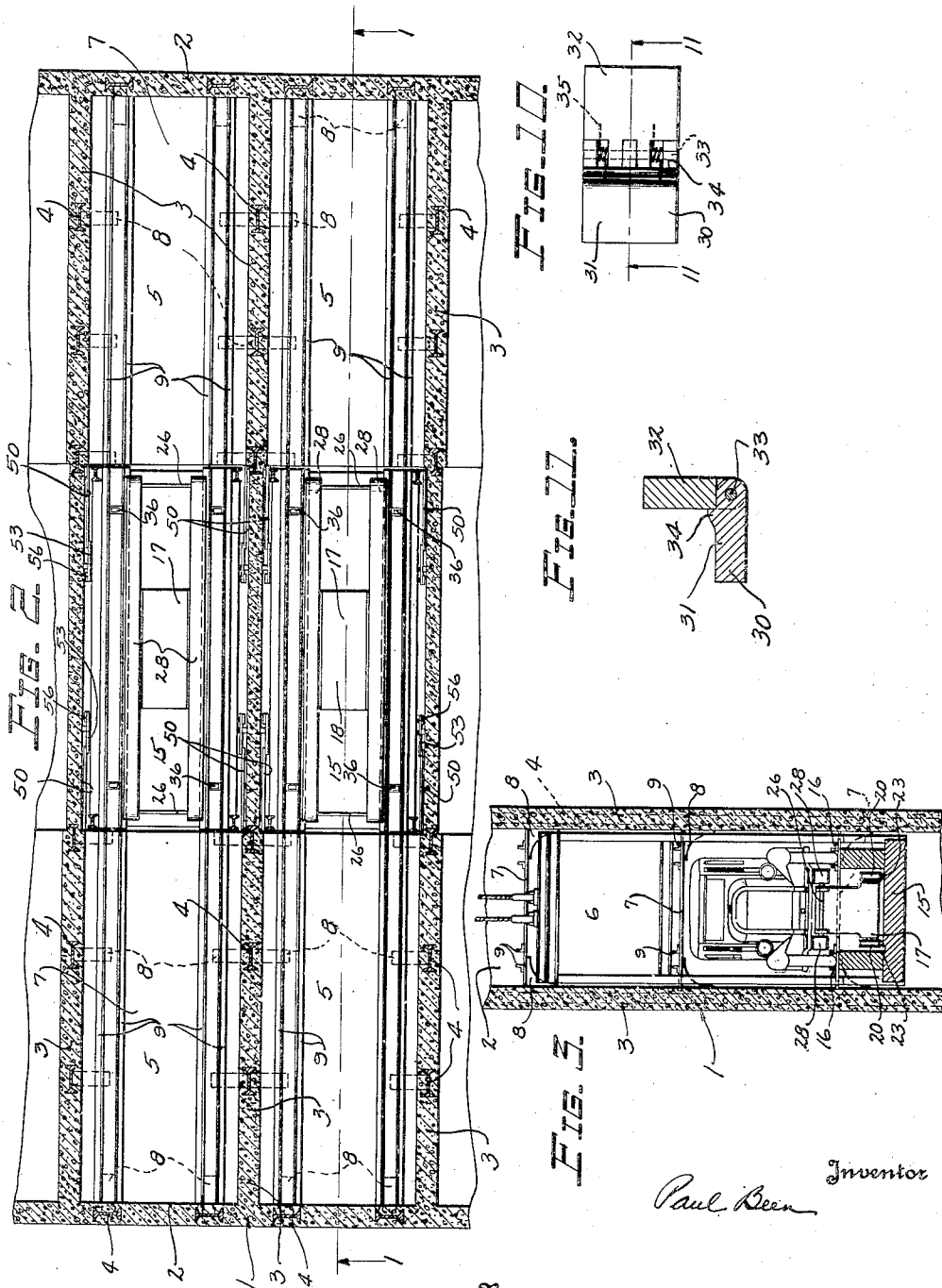
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Filed May 6, 1929

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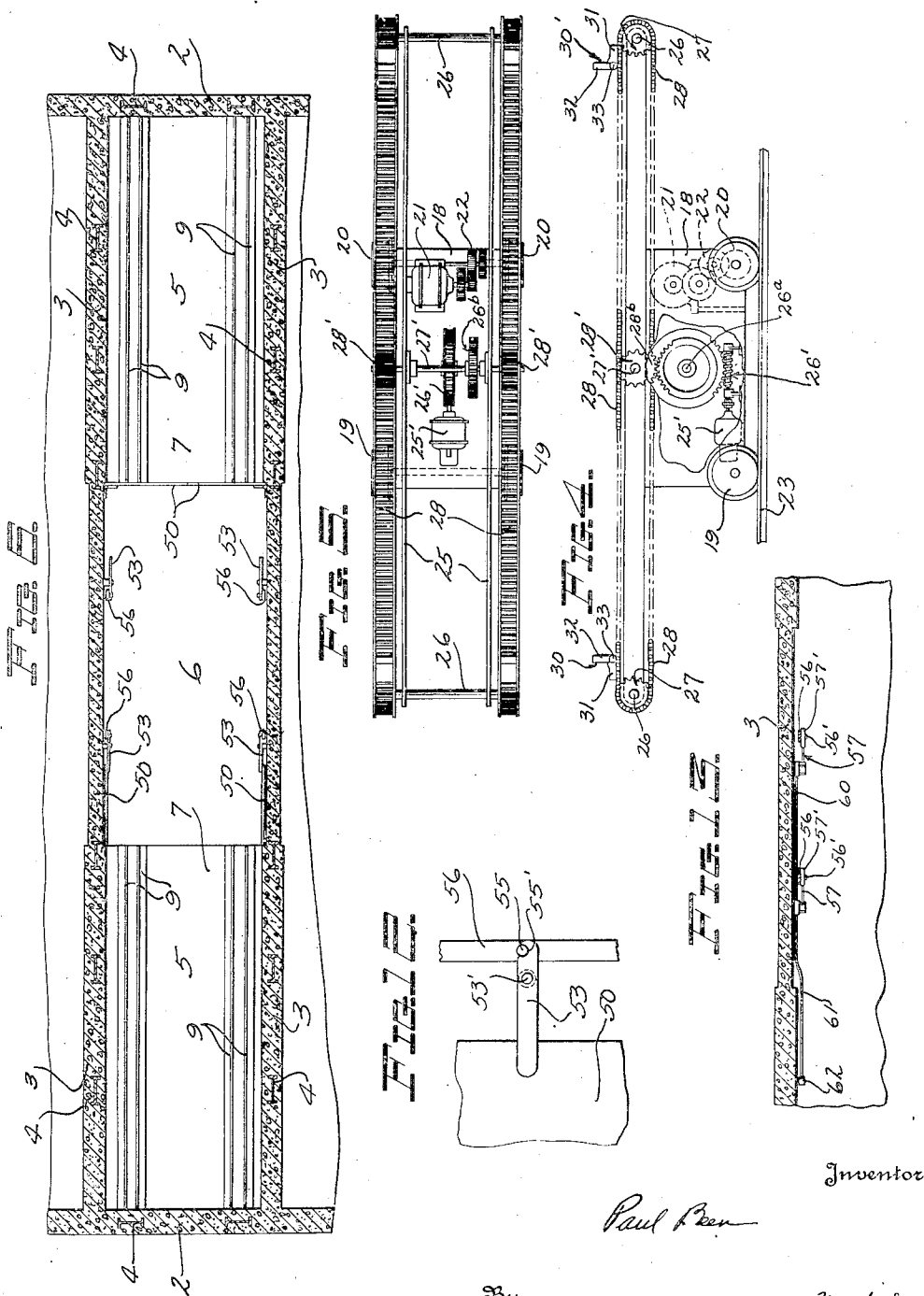
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1,828,307

APPARATUS FOR HANDLING AND STORING

Filed May 6, 1929

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Oct. 20, 1931.

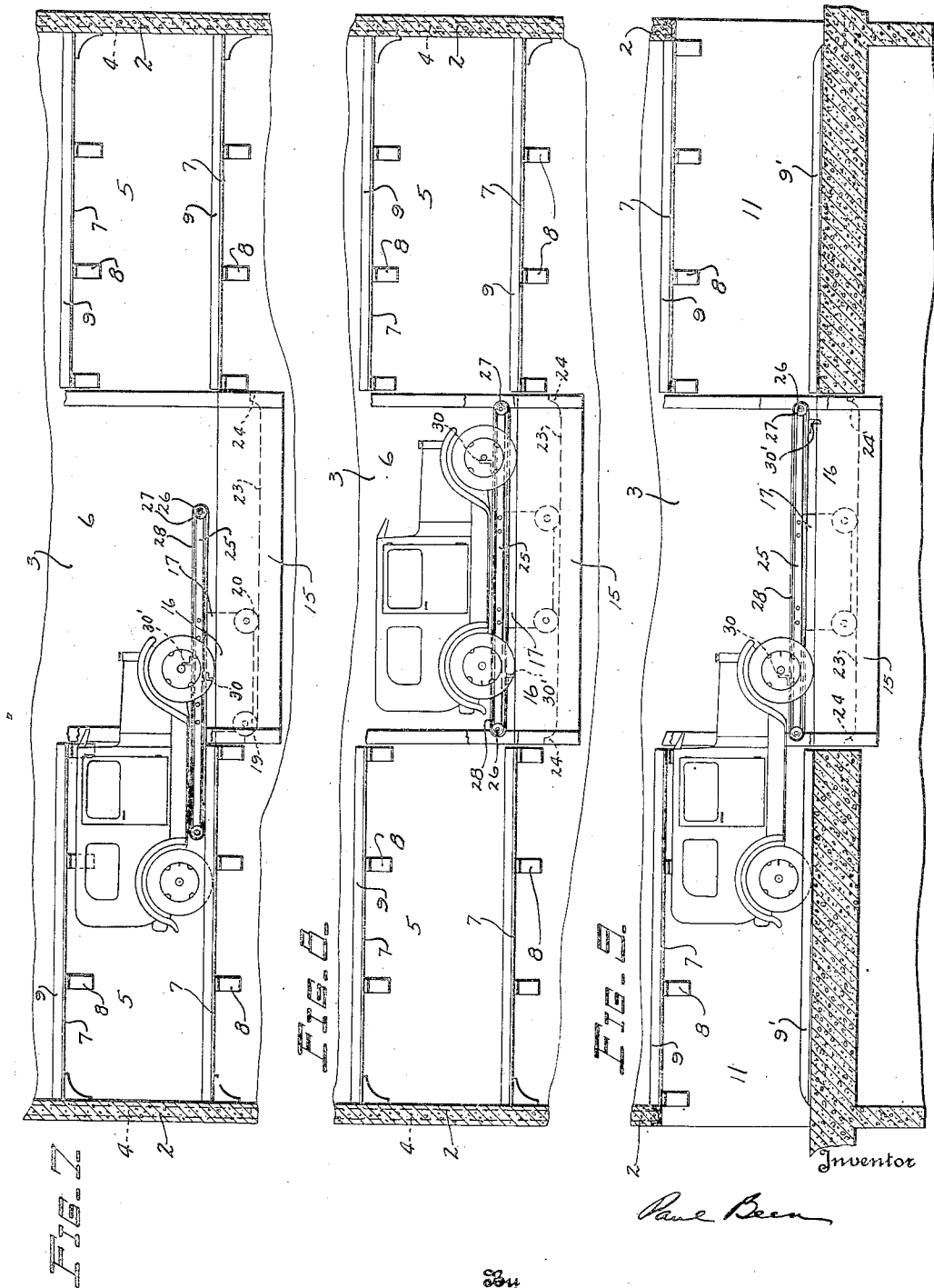
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1,828,307

APPARATUS FOR HANDLING AND STORING

Filed May 6, 1929

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APPARATUS FOR HANDLING AND STORING

Application filed May 6, 1929. Serial No. 360,622.

This invention relates to an apparatus for handling and storing vehicles and is particularly designed and adapted for use in the storing or automatic parking of automobiles.

One of the principal objects of the invention is to provide a storage apparatus of this character which realizes the maximum of economy in the utilization of the entire space within the garage building embodying the apparatus and which has this advantage alone with a simple and comparatively inexpensive construction. Further, the nature of the garage construction and of the transferring or handling means for the automobiles is such that a minimum of time is required for the placing of an automobile within or the removal of an automobile from any stall or storage compartment of the garage. Not only is the first cost of the apparatus unusually low but its operating costs are extremely low whereby the cost to the public of adequate parking facilities is rendered entirely moderate and reasonable. Further, the invention lends itself to embodiment in a fire proof construction containing provision for the individual isolation and protection of each car. To sum up outstanding advantages, the system has high volumetrical efficiency, high transferring speeds, low first cost and low operating costs.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, and in which:

Figure 1 is a view in transverse vertical section taken on line 1—1 of Figure 2 and illustrating a portion of a garage building embodying the present invention, parts being shown in elevation for the sake of simplicity in illustration;

Figure 2 is a fragmentary view in horizontal section taken on line 2—2 of Figure 1;

Figure 3 is a fragmentary view in longitudinal vertical section taken on line 3—3 of Figure 1, parts being omitted and parts be-

ing shown in section for the sake of illustration;

Figure 4 is a detail view in side elevation showing the conveyor and dolly employed;

Figure 5 is a view in top plan of the parts shown in Figure 4;

Figure 6 is a fragmentary sectional view similar to Figure 2 but omitting the elevator and showing one set of fire doors closed and one set open;

Figures 7, 8 and 9 are fragmentary views in section taken in the same plane as Figure 1 and illustrating the action of the transfer device by showing various positions thereof;

Figure 10 is a detail view in top plan of one of the vehicle engaging lugs on the conveyor;

Figure 11 is a detail sectional view taken on line 11—11 of Figure 10;

Figure 12 is a fragmentary detail view showing one of the releasable latches with which each fire door is equipped; and

Figure 13 is a fragmentary plan view of a portion of the control mechanism for the fire doors.

Referring to the drawings, the numeral 1 designates generally a building construction embodying outside walls 2 and any suitable member of fire proof or partition walls 3. The walls 2 and 3 may have any known form of load sustaining structure incorporated therein and for the sake of illustration the load sustaining structure is shown as including the vertical columns 4. As illustrated in Figures 1 and 2, the fire proof partitions 3 extend for the full width of the building, that is, from one side wall 2 to the other, and the space between each adjacent pair of partitions 3 is divided up to provide vertical tiers of storage stalls or compartments 5 separated by an intervening elevator well or shaft 6. In other words, the building construction provides a plurality of storage units, each made up of two vertical tiers of storage stalls 5 spaced by the intervening elevator well 6. Any number of these units may be provided and as they are all of identical construction a single description will serve for all.

Referring now to Figures 1, 2 and 3, it will be seen that the storage stalls 5 are defined by the vertical partition walls 3 of the stor-

age unit and by vertically spaced horizontally disposed plates 7, each plate constituting the bottom of one storage and the top of the underlying storage stall. The plates 7 are supported on the load sustaining structure of the building by means of angle brackets 8 directly fastened in any suitable manner to the load sustaining structure and underlying and secured to the plates 7 along each side thereof. To provide runways in each stall adapted to receive the wheels of the vehicle, pairs of angle irons 9 are fastened to the plates 7 immediately above the braces 8, the angle irons 9 extending lengthwise of the stall and being spaced to receive properly the wheels of the automobile, as illustrated in Figure 3. The above description of the stall structure applies to all of the floors above or below the ground level. At the ground level the floor 10 coacts with the partitions 3 to provide entrance-way 11 and an exit way 11' and on the floor angle irons 9' are secured to provide runways for the wheels of the vehicles in the entrance and exit ways. Suitably positioned at or adjacent the inner ends of the runways vehicle wheel engaging chocks (not shown) are provided and serve to prevent the automobile from colliding with the inner end wall of its compartment.

A high speed elevator 15 operates in the well 6 and is designed and adapted to serve the storage stalls of both vertical tiers of its storage unit. The floor or platform of the elevator 15 is provided with vehicle runways 16 extending transversely thereof but spaced somewhat above the floor. When the elevator is properly leveled with any two horizontally alined storage stalls of the vertical tiers, the runways 16 are registered or alined with the runways. In between the runways 16 of the elevator a transfer carrier or dolly 17 is provided and consists of a frame 18 supported on wheels 19 and 20, the wheels 20 at least being driven from a reversible electric motor 21 by means of suitable gearing 22. The wheels 19 and 20 run along rails 23 provided on the elevator platform. At both ends of each rail 23 stops 24 are provided to prevent the dolly from running off of the platform. As shown to advantage in Figure 3, the dolly 17 operates in between the runways 16. At each side of the frame 18 of the dolly frame extensions or conveyor supporting bars 25 are provided, the bars 25 being secured to and supported upon the frame of the dolly and projecting beyond the ends of the dolly frame, as clearly shown in Figure 1. At the ends of the bars 25, transverse shafts 26 are rotatably mounted and each shaft 26 carries two sprocket wheels or pulleys 27 adjacent its ends. Over the longitudinally alined sprocket wheels or pulleys 27, endless conveyor belts or sprocket chains 28 are trained. If the elements 27 are in the form of sprocket wheels then the endless conveyor members 28 are

sprocket chains and on the other hand, if the elements 27 are pulleys, then, of course, the endless conveyor members 28 are belts. The particular construction of a conveyor thus constituted may be varied widely and yet its function in the present invention accomplished to advantage. For the purpose of the present invention it is merely necessary to provide a conveyor supported on the dolly and projecting beyond both ends thereof. Any suitable means may be provided for driving the conveyor and preferably consists of a reversible electric motor 25' carried by the frame of the dolly and acting through worm gearing 26' to drive a shaft 26^a geared as at 26^b to a shaft 27' (see Figures 4 and 5) having driving elements such as sprocket wheels 28' fixed thereto and meshed with the upper and lower runs of the chains 28. The electric motors 20 and 25' employed for driving the dolly and the conveyor are preferably equipped with conventional electromagnetic brakes. These brakes are widely used and need no detail illustration here but it should be noted that they serve to hold the dolly and also the conveyor against movement except when their respective motors are driving the same. As is well known, such brakes include a drum fixed to the armature shaft of their motor and with which a brake band or brake shoes coact. Suitable spring or weight biased means forces the band or shoes into engagement with the drum and an electromagnet automatically energized whenever the motor is operated, releases the brake band or shoes.

As shown in Figures 1, 4 and 5, each endless conveyor member 28 is provided with two vehicle engaging lugs designated generally at 30 and 30', the lugs 30 being spaced along the conveyor belt a distance approximately equal to the spacing of the shafts 26 and being of identical construction although reversely arranged.

The vehicle engaging lugs 30 and 30' are shown to advantage in Figures 4, 10 and 11 and each has an attaching portion 31 securely fastened to the endless conveyor member on which the lug is mounted and also has a vehicle engaging member 32 pivotally connected as at 33 to the attaching member 31 and designed to engage the front or rear axle or any other suitable part of the vehicle. A shoulder 34 is integrally formed with the attaching member 31 and is engageable with the vehicle engaging member 32 to limit the pivotal movement thereof in one direction, as will be understood from Figure 11. As shown in Figure 10, springs 35 are provided to bias the member 32 to a vertical position wherein it is engaged with the shoulder 34.

Adjacent the ends of each vehicle wheel receiving runway 16 of the elevator, adjustable pivoted stops 36 are provided and when

projected into operative position are adapted to engage the wheels of the vehicle to prevent it from running off of the elevator platform. When retracted, the stops 36 leave the runways 16 unobstructed. The stops 36 are rockable about fixed axes 36' under the control of a hand lever 37 connected by a rod 37' to bell cranks 38, the latter being connected by rods 38' to the stop 36. If desired, each stop may be independently controlled by providing a separate control lever and a separate linkage between each control lever and its stop.

In order to keep the transverse dimensions of the elevator down to the very minimum, the control station for the operator is provided in the upper and preferably the central portion of the elevator cage and is designated at 40. At this control station an elevator control switch 41 is provided and in addition control switches 42 and 43 are provided for controlling respectively the operation of the motors 21 and 25'. The hand lever 37 is also provided at the control station 40. From the control station the operator has a full and clear view of the stalls on both sides of the elevator well.

In operation, the automobiles are driven or otherwise conveniently positioned in the runways 9' of the entrance-way 11. Obviously the automobiles may be run into these runways 9' under their own power or they may be deposited therein by a conveyor or in any other suitable way. An automobile positioned in the runways 9' of the entrance-way 11 is transferred to the elevator by running the dolly 17 to the left as viewed in Figure 1 as far as it may be, that is, until it engages the stops 24 located at the left end (see Figure 1) of the rails 23. This positions the lug 30 behind the front axle of the automobile when the automobile is run head in to the entrance-way 11. The dolly 17 is now run back to its central position on the elevator and carries the automobile with it. The conveyor is now located entirely within the confines of the elevator platform. The conveyor belts are now driven whereupon the lugs 30, due to their engagement with the front axle of the automobile, propel it toward the right as viewed in Figure 9 until it is located entirely within the confines of the elevator platform, at which time its wheels are received in the runways 16. Obviously, instead of first moving the dolly back to its central position on the elevator and then driving the conveyor, the conveyor may be driven first and the dolly moved afterwards, or the dolly and conveyor may be simultaneously driven. But, with the automobile properly positioned on the elevator, the elevator is then raised until it is leveled with the stall in which the automobile is to be parked or stored. If the automobile is to be parked in a stall on the left hand side of the elevator well, as viewed

in Figure 7, the conveyor drive is reversed to bring the lugs 30' into engagement with the front axle, the dolly 17 is then driven to the left to the position shown in Figure 7 and the conveyor is driven until the lugs 30' have fully and properly positioned the automobile in the stall. The runways of the storage stall may be angled inwardly and downwardly slightly to prevent the automobiles from accidentally rolling out of the stalls, or any suitable releasable locking means may be provided for retaining the automobiles in position in the stalls. If an automobile is to be parked in one of the storage stalls located on the right hand side (Figures 1, and 7 to 9), it is first positioned on the elevator platform in the manner described and as shown in Figure 8. After the elevator has been leveled with the selected stall, the dolly 17 is driven to the right as viewed in Figure 8 and the conveyor is driven to cause the lugs 30 to move to the right in Figure 8 thereby propelling the automobile into the stall. If this combined drive, exerted by the lugs 30 against the front axle by both the dolly and the conveyor, is not sufficient to properly position the automobile in its stall, the drive of the conveyor is continued until the lugs 30 come into engagement with the rear axle and exert a drive on the vehicle by virtue of such engagement. By reversing the process the automobiles may be retrieved or taken out of any stall in which they are parked and then carried down to the ground level and transferred to one of the entrance or exit ways 11 or 11'. Thus, if an automobile is parked in one of the stalls located on the right hand side of Figure 1 the dolly 17 is moved to the right until the lugs 30' snap behind the rear axle of the automobile. The dolly is then returned to its central position on the carriage and the conveyor belts are driven to move the lugs 30' to the left as viewed in Figure 1 until the automobile is properly positioned on the elevator. The elevator is then lowered until it is at the ground level whereupon the direction of drive of the conveyor belts are reversed to bring the lug 30 into engagement with the rear axle. The dolly is then moved to the right to push the automobile partly into the exit way 11' and this transfer of the automobile to the exit way 11' is completed by continuing to drive the conveyor so as to continue to move the lugs 30 to the right as viewed in Figure 1. While the operation has been described as contemplating successive movements of the dolly and conveyor obviously these movements may be effected simultaneously and the time required for the transfer operation further reduced.

As shown in Figures 1, 2 and 6, a pair of fire doors 50 is provided for the entrance to each stall or compartment, each fire door 50 being mounted on spring hinges 51 which

bias the doors to closed position, wherein they completely block the entrance to their stall and isolate the stall and the car therein from fire. Latches 52 and 53 are provided for normally holding the doors in open position wherein they are disposed flush up against the partition walls 3 and out of the way of the elevator. Latches 52 are utilized for temporarily securing the doors 50 in open position. Thus, in setting the doors open, an operator stands on top of the elevator and successively opens the doors at each level and secures each door in open position by properly positioning the latches 52. Each latch 52 is pivoted at one end as at 52' to a partition wall 3 and in latching position overlaps its door and engages a stop 54 provided therefor in its door 50. Each latch 53 is pivotally supported adjacent one end on a partition wall 3 as indicated at 53' and has a long relatively heavy arm adapted to overlap its door to hold same open and a short relatively light arm provided with a notch 55' adapted to receive a pin 55 secured to and projecting laterally from a control rod 56. There are four control rods 56 for the fire doors of each storage unit, the control rods extending for the full height of the elevator well and each control rod serving to control the latches of all of the fire doors to which it is adjacent. As shown in Figure 1, the notches 55' are on the upper edges of the short arms of the latches 53 and the pins 55 engage in these notches to control the position of the latches. After the fire doors 50 have been temporarily secured in open position by the latches 52, the control rods 56 are shifted to the position shown in Figure 1, thereby swinging the latches 53 into securing engagement with the fire doors 50. The latches 52 may then be released. The shifting mechanism for the control rods 56 may comprise a bell crank lever 57 for each rod 56. Each bell crank lever is rockably supported as at 58 on a partition wall 3 and has a forked arm 57' coacting with a pin 56' on its control rod to provide an operative connection between the bell crank lever and its control rod. The bell crank levers 57 adjacent each partition wall may be interconnected by a connecting rod 60 which is also connected by a rod 61 to a hand controlled lever 62. By moving the hand lever 62 in a clockwise direction, as viewed in Figure 1, the control rods 56 are pulled downwardly and the latches 53 are all swung in a clockwise direction and disengaged from the fire doors 50 thereby permitting the doors to be swung to closed position by their spring hinges 51. By providing a pin and notch connection between the control rods and the latches 53, any latch 53 may be moved to release its fire door without disturbing the position of the other fire doors.

With a garage construction of this character the entire cubical contents of the build-

ing are effectively utilized. The storage stalls may be made to just properly contain the automobile in that the automobiles are moved in and out of the stalls without any lifting or tilting, which, of course, would require extra clearance. The partitioning structure is of minimum dimensions in that it functions merely as fire proofing and as a protective closure for the automobiles. The load of the vehicles is transmitted directly to the load sustaining structure of the building.

With an elevator having high acceleration and high speed the lifting and lowering of a car to the level of any of the storage compartments requires very little time and with the transfer means shown very little time is required to deposit an automobile in or taking an automobile from any storage stall and to transfer the automobiles from the elevator to the entrance and exit ways or vice versa. The construction of the storage stalls not only effects economy in the use of the cubical content of the building but keeps the cost of construction at the very minimum, as a storage stall requires, in addition to the outside walls and fire proofing partitions, merely the use of a plate and a few angles and braces or brackets and rivets.

The invention claimed is:

1. An automobile storage apparatus including spaced vertical tiers of storage stalls and an intervening elevator well, an elevator operating in the well, a transfer carriage mounted on the elevator and movable transversely thereof, and a conveyor mounted on the transfer carriage and projecting beyond the ends of the same and having vehicle engaging means.

2. An automobile storage apparatus including a building construction having opposed vertical tiers of storage stalls and an intervening elevator well, an elevator operating in said well, a motor driven transfer carriage movable across the elevator, means for limiting the movement of the transfer carriage in either direction and operating to prevent the transfer carriage from moving off of the elevator and a conveyor mounted on the transfer carriage and projecting beyond the ends of the same and adapted to project into a storage stall when the transfer carriage is moved to either extreme position and spaced vehicle engaging means carried by the conveyor.

3. An automobile storage apparatus including a building construction having opposed vertical tiers of storage stalls and an intervening elevator well, an elevator operating in said well, a motor driven transfer carriage movable across the elevator, means for limiting the movement of the transfer carriage in either direction and operating to prevent the transfer carriage from moving off of the elevator and a conveyor mounted on the transfer carriage and projecting beyond

the ends of the same and adapted to project into a storage stall when the transfer carriage is moved to either extreme position and spaced vehicle engaging lugs carried by the conveyor, each lug including a member attached to the conveyor and a vehicle engaging member pivoted to the attaching member and limited in its pivotal movement in one direction.

4. An automobile storage apparatus including vertical tiers of storage stalls, an elevator operating adjacent said stalls and adapted to be leveled with any stall, a transfer device mounted on the elevator and movable across the same and a conveyor mounted on the transfer device and projecting beyond the same and adapted to be projected into the stalls, said conveyor having vehicle engaging means so that the transfer device and conveyor may be moved to effect the transfer of an automobile from the elevator to a storage stall and vice versa.

5. An automobile storage apparatus including vertical tiers of storage compartments, an elevator operating adjacent said compartments and adapted to be leveled with any of said compartments, a dolly mounted on said elevator and movable across the same, a frame carried by the dolly and projecting beyond the ends of the same, a motor driven endless member mounted on said frame, and vehicle engaging means carried by said endless member so that the dolly and endless member when moved, may effect the transfer of an automobile from the elevator to a storage compartment and vice versa.

6. An automobile storage apparatus including vertical tiers of storage compartments, an elevator operating adjacent said compartments and adapted to be leveled with any of said compartments, a dolly mounted on said elevator and movable across the same, a frame carried by the dolly and projecting beyond the ends of the same, a motor driven endless member mounted on said frame, and spaced vehicle engaging lugs carried by the endless member and adapted for engagement with a part of the vehicle, each lug being yieldable in one direction but rigid in the other direction, said lugs being reversely arranged so that one lug has effective engagement with the vehicle when the endless member and dolly are moved in one direction and the other lug has effective engagement with the vehicle when the endless member and dolly are moved in the opposite direction.

7. An automobile storage apparatus including a vertical tier of storage stalls, an elevator operating adjacent said stalls, vehicle receiving runways on the elevator and in the storage stalls, a motor driven transfer device mounted on the elevator between its runways and movable lengthwise of the runways, an endless member carried by the transfer device and projecting beyond the same, said end-

less member having a run movable in a direction lengthwise of the transfer device and vehicle engaging means carried by said endless member.

8. An automobile storage apparatus including a vertical tier of storage stalls, an elevator operating adjacent said stalls, vehicle wheel receiving runways on the elevator and in the storage stalls, a track on the elevator between its runways, a motor driven transfer carriage having wheels running on the track of the elevator, means for preventing the transfer carriage from running off of the ends of its track, an endless member mounted on the transfer carriage and projecting beyond the same, and vehicle engaging means carried by the endless member.

9. In a vehicle storage apparatus of the character described, transfer means including a dolly, an endless member carried by the dolly and projecting beyond the same, means for driving the endless member and vehicle engaging means carried by the endless member.

10. In a vehicle storage apparatus of the character described, transfer means including a motor driven dolly, a motor driven conveyor carried by the dolly and projecting beyond the same, and vehicle engaging means carried by the conveyor.

11. In an automobile storage apparatus, transfer means including a motor driven transfer carriage, and endless member mounted on the transfer carriage and projecting beyond the ends of the same, means for driving the endless member in either direction, and vehicle engaging means carried by the endless member.

12. A garage construction including outside walls and fire proofing partitions in which the load sustaining structure of the building is incorporated, said outside walls and fire proofing partitions dividing the building up into storage units, each storage unit having means providing vertical tiers of storage stalls and an elevator well between said tiers of storage stalls, each storage stall having a pair of vehicle wheel receiving runways supported on the load sustaining structure of the building, an elevator operating in said well and adapted to be leveled with any of the storage stalls, transfer means mounted on the elevator and movable transversely thereof and operable to transfer an automobile from the elevator to a storage stall and vice versa, a pair of fire doors for each storage stall, each fire door being hingedly supported and being disposed flush up against a partition wall when in inoperative position, means for biasing the fire doors to closed position, means for releasably holding the fire doors in open position, and a release for said last named means operable from a control station whereby all of said fire doors may be permitted to simultaneously close.

13. An automobile storage apparatus including vertical tiers of storage stalls, an elevator adjacent said stalls and adapted to be leveled with any of the stalls, a dolly movable across the elevator, vehicle engageable means carried by the dolly and engageable with an automobile for propelling the automobile on its own wheels, said vehicle engaging means being movable with the dolly for propelling an automobile on its own wheels and also being movable relative to the dolly for imparting additional propelling movement to the automobile on its own wheels whereby the automobile may be transferred from the elevator to a storage stall and vice versa.

14. An automobile storage apparatus including a vertical tier of storage stalls, an elevator operating adjacent said stalls and adapted to be leveled with any stall, vehicle receiving runways on the elevator, vehicle receiving runways in each storage stall, a motor driven transfer device mounted on the elevator between its runways and movable lengthwise of the runways, and vehicle engaging means carried by the transfer device and movable with the transfer device and engageable with the vehicle whereby the movement of the transfer device is transmitted to the vehicle to propel the same on its own wheels, said vehicle engaging means also being movable relative to the transfer device for imparting movement to the vehicle while the vehicle is supported on its own wheels.

15. In a vehicle storage apparatus, a transfer device adapted to be positioned beneath the vehicle and having vehicle engaging means for transmitting the motion of the transfer device to the vehicle to propel the vehicle on its own wheels, said vehicle engaging means also being movable relative to the transfer device to propel the vehicle on its own wheels.

In witness whereof, I hereto affix my signature.

PAUL BEEN.

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