Feb. 24, 1953

O. J. OLSON

2,629,507

CAR PARKING MECHANISM

Filed July 29, 1946

2 SHEETS—SHEET 1

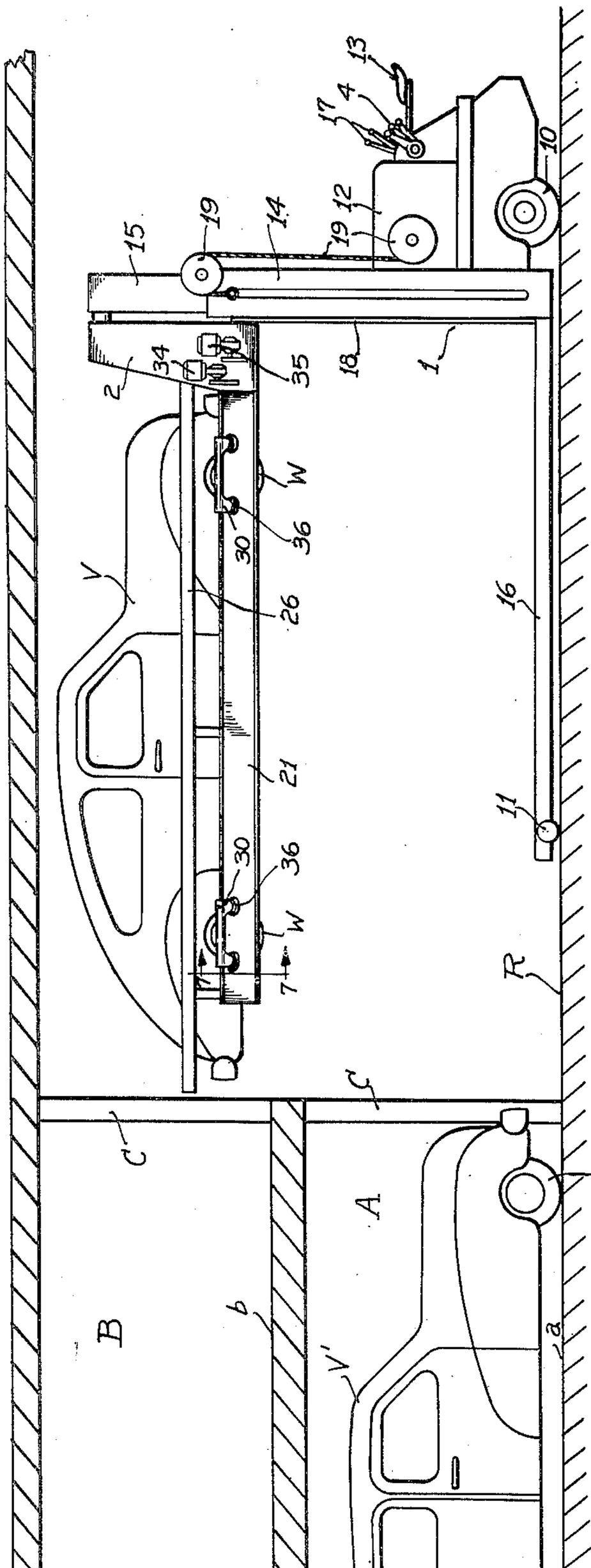

FIG. 1

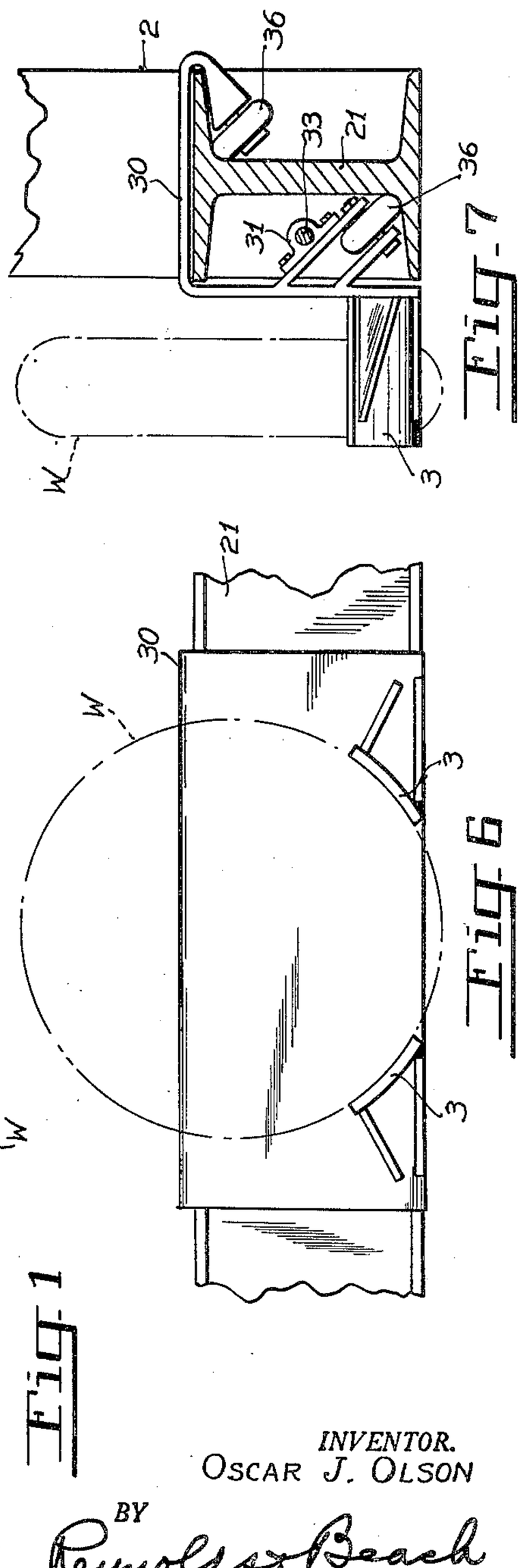

FIG. 7

FIG. 6

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2 SHEETS—SHEET 2

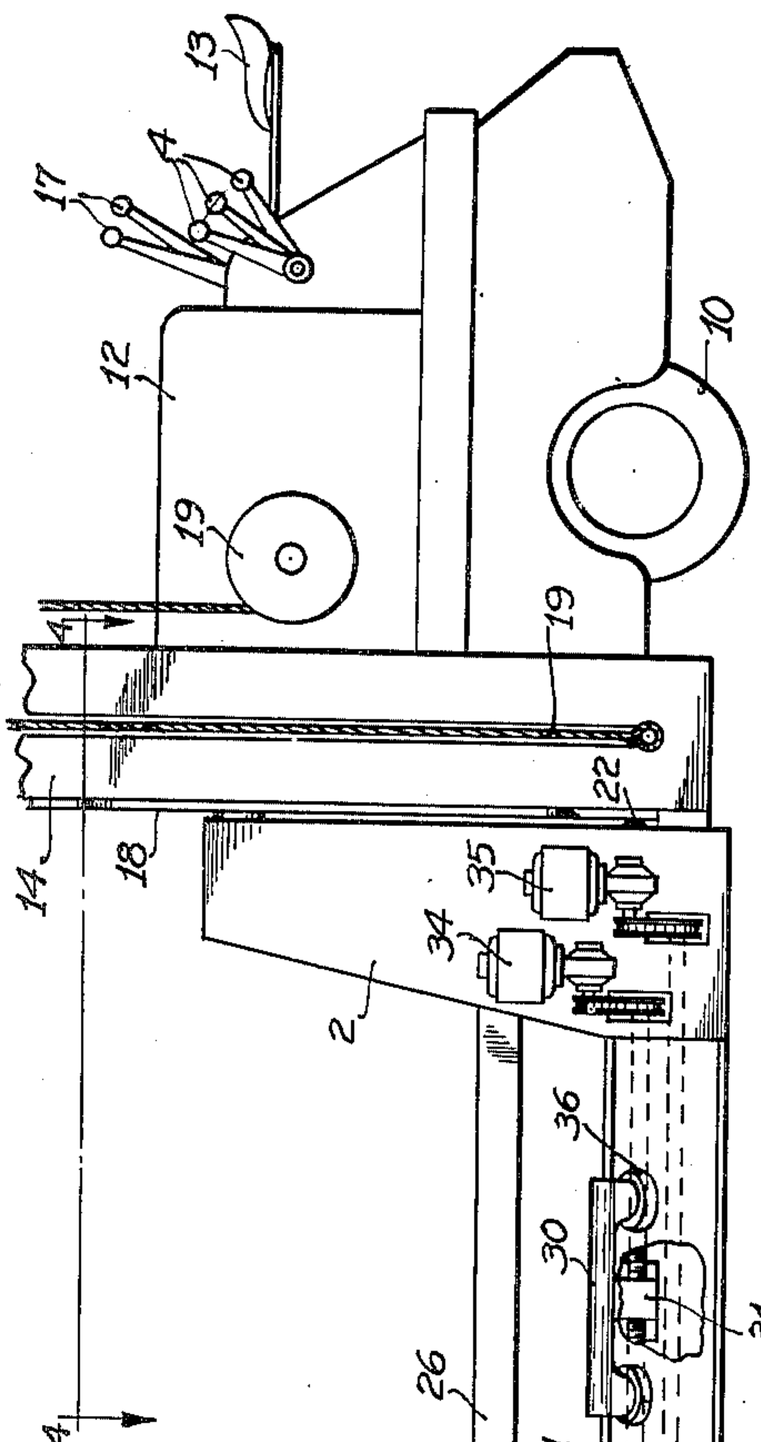

Fig. 2

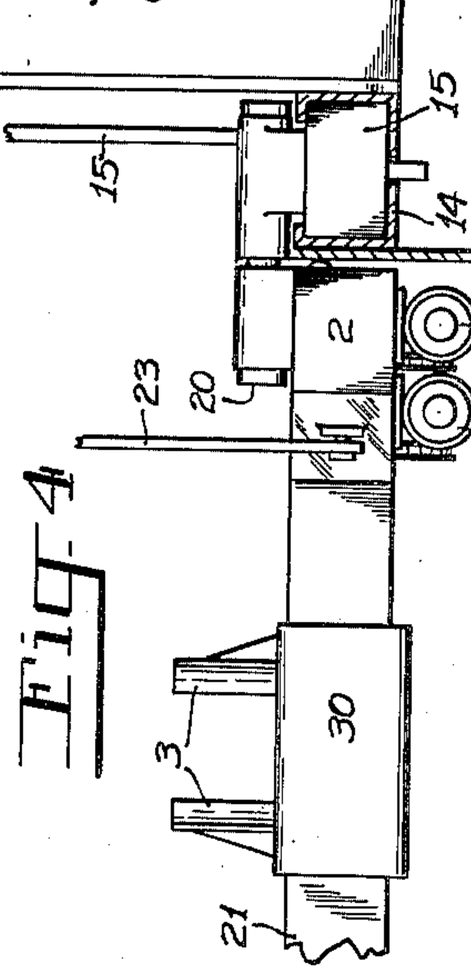

Fig. 4

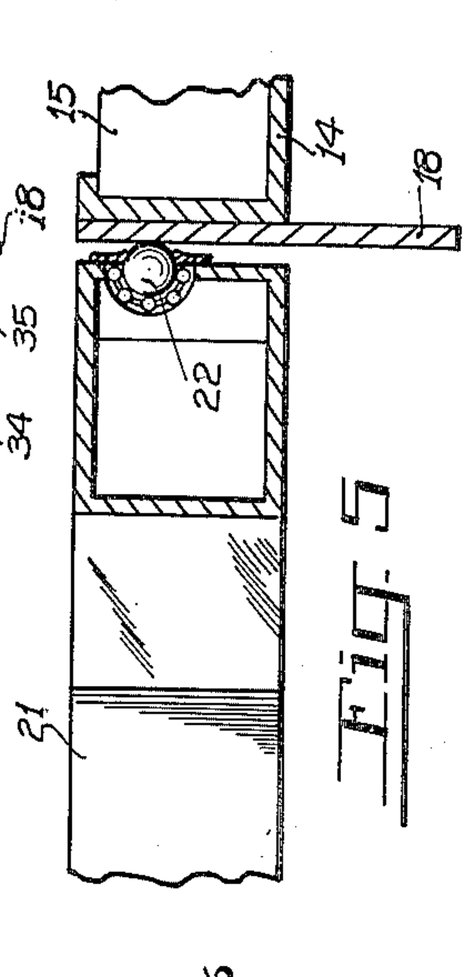

Fig. 5

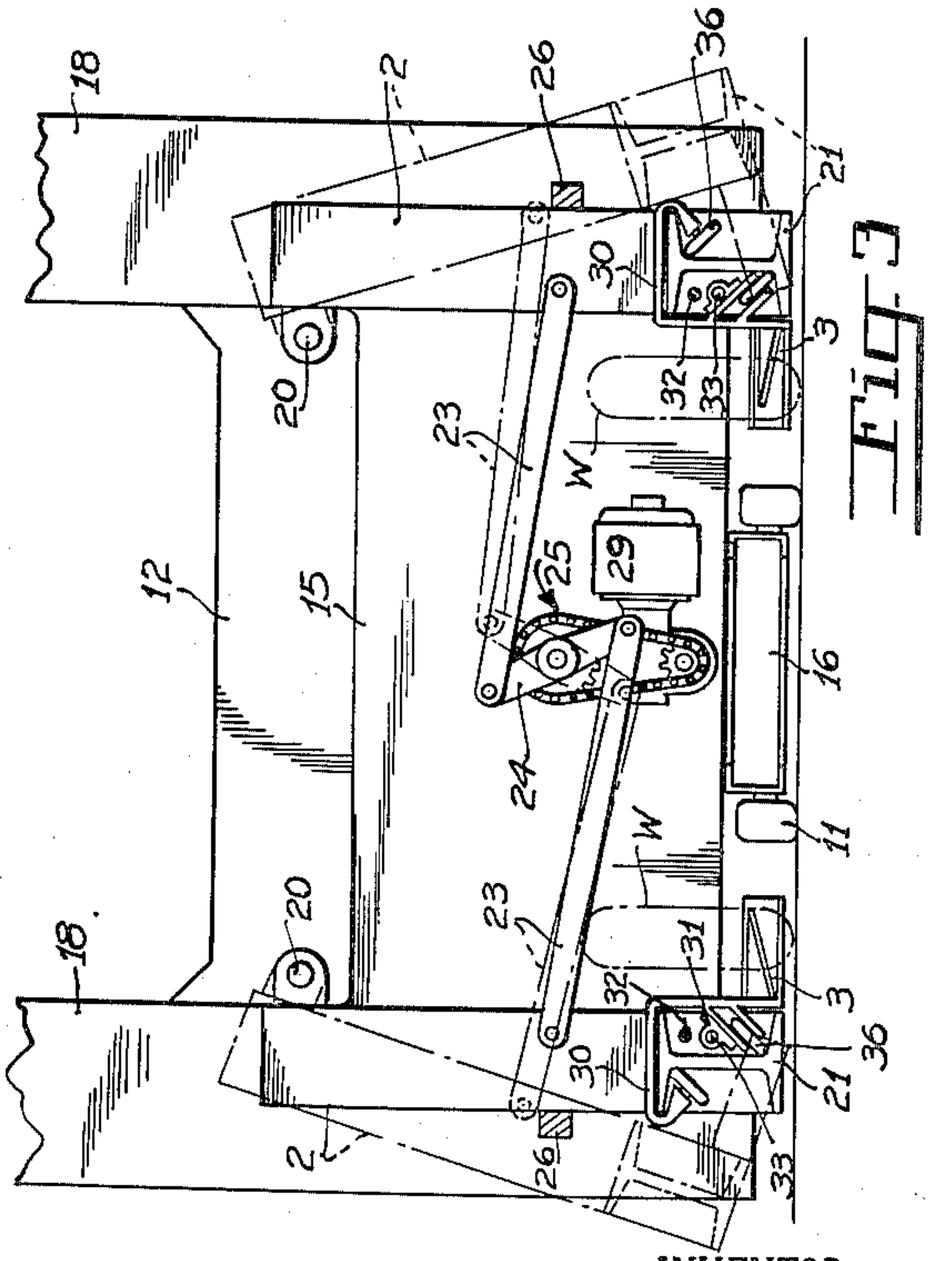

Fig. 3

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CAR PARKING MECHANISM

Oscar Jelmer Olson, Seattle, Wash.

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16 Claims. (Cl. 214—390)

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Parking of automobiles and the efficient utilization of ground area available for parking, particularly without the necessity of constructing expensive types of building structures, is an increasingly serious urban problem. In addition, many persons do not like to deliver their cars to the attendant at parking garages or parking lots, having learned from experience that some attendants are careless in the handling of the cars, or in occasional instances are dishonest and will pilfer articles left within the car, or may damage an unlocked car, as by running down the battery by playing the radio.

It is one of the objects of the present invention to provide means whereby a vehicle, such as a private car, can be driven into a parking establishment, the motor can be turned off, the ignition key removed and the doors locked by the owner, and the car can thereafter be picked up by the parking attendant, transported to a parking spot or cubicle, and can be there deposited, awaiting return of the driver. Thereupon the vehicle may be again lifted by the parking attendant, set upon the driveway, and only then, when the owner is ready to drive it away, is it necessary to unlock and open the doors, and restart the engine. During all the time the vehicle was in storage it remained locked, and its engine was off.

Moreover, it is a still further object to provide mechanism whereby such a system may become effective, whereby cars may be stored in cubicles which may be tiered to any reasonable height, and which are spaced along a driveway.

Likewise it is an object to provide a lift truck for use in such a storage system, having means whereby a car may be lifted, may be transported from place to place, though not under its own power, may be elevated, if necessary, to an upper tier, and then may be deposited within a storage cubicle, whereupon the lift truck is freed for use in handling another car.

Since cars have not all the same wheel base or tread width, it is also an object to provide such a lift truck in which the lifting elements are adjustable to engage properly cars of different wheel base or length, or even of different tread width.

With the above objects in mind, and with others such as pertain more specifically to the mechanical arrangements of the lift truck, the present invention comprises the novel lift truck as shown in the accompanying drawings, as will be hereinafter described more fully, and as is set forth in greater or lesser detail in the claims at the end of this specification.

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The present application is directed to the lift truck, while the system and the process involved are claimed in my divisional application Serial No. 709,215, filed November 12, 1946, and now abandoned.

Figure 1 is a general sectional view through such a storage structure, showing the manner of employing the lift truck in conjunction therewith.

Figure 2 is a general side elevation, with parts broken away, showing the lift truck.

Figures 3 and 4 are, in general, views taken from viewpoints indicated by the lines 3—3 and 4—4 of Figure 2.

Figure 5 is a transverse section on a horizontal plane, showing the manner of supporting the swinging side frames for movement with respect to the fixed frame or elevator of the lift truck.

Figure 6 is a side elevation of one of the pairs of lifting fingers, showing its relationship to a wheel of the car, and Figure 7 is a similar view, the viewpoint being indicated at 7—7 of Figure 1.

The preferred procedure, according to the present invention, is to provide a number of cubicles or compartments adjoining a runway, these compartments being multiple tiered, preferably but not necessarily, and when a car is driven into the runway it may be locked and left with the ignition turned off. The parking attendant then approaches with a lift truck, which has members that engage beneath the vehicle, preferably beneath the lower portion of each of the four wheels, and thereby the vehicle is lifted off the runway, and is transported by the lift truck along the runway into a position in front of a vacant cubicle, the greater maneuverability of the lift truck enabling such positioning in even a narrow runway. If this cubicle is at the runway level, no further elevation of the vehicle is required. If the vacant cubicle is in an upper tier, the vehicle is then lifted further by the lift truck into registry with the vacant cubicle, and then, in either case, the lift truck advances to insert the lifted vehicle into the cubicle, and there deposits it upon its own wheels upon a suitable floor or support. The lift truck then withdraws, and is available for handling the next vehicle. Whenever the stored car is desired, the operation is reversed; it is lifted off its wheels and out of the cubicle, lowered to runway level, and the lift truck withdraws, leaving the vehicle standing upon its own wheels on the runway, and then the stored vehicle can be unlocked and driven away.

The storage structure, as shown, consists of

the cubicles A and B, one above the other, including the floors *a* and *b*, with suitable columns C, but preferably with a minimum of other structure. The runway is at R, and the structure may or may not be provided with a roof. The lift truck, which will be described in detail later, is shown in Figure 1 with a vehicle V elevated into position for insertion within the cubicle B, and with a second vehicle V' already stored in the compartment or cubicle A.

The lift truck **1** in its general aspects need not differ widely from any conventional industrial lift truck. It comprises the ground wheels **10** and **11**, the hooded motor **12**, the operator's station **13**, the vertical framework or elevator guide **14**, the extension frame or elevator **15**, and certain load-engaging elements which are carried by the elevator, and which project forwardly from the operator's station, parallel to each other and elevatable with the elevator **15**, and when lowered lying alongside the forward extension or chassis **16**. The conventional truck controls are shown at **17**, and additional controls, to be described later, are provided for controlling movement of the elevator and the load-engaging lifting devices. The extension mechanism for effecting lifting or extension of the extension frame **15** has been suggested at **19**, but any conventional or known device for this purpose can be used.

It may be noted that the forwardly projecting chassis **16** is of sufficiently narrow width and low height that it will fit between the wheels W of a vehicle, and beneath the vehicle's axles. Thus the truck may be driven in effect underneath any vehicle, preparatory to lifting it, or for the purpose of inserting another vehicle in or retrieving it from an overhead cubicle.

Hingedly mounted at **20** to the elevator **15** are side frames **2**. The hinge mounting at **20** is well above the runway level with the elevator fully lowered, and is displaced far enough inwardly towards the longitudinal center line of the lift truck that all outward swinging movement of the side frames causes almost wholly upward and outward movement of lifting fingers **3**, to be described later, whereby they clear the floor, and, conversely, any load on these lifting fingers **3** produces a tendency to swing the side frames inwardly and downwardly into load-supporting position, thereby inherently counteracting any tendency to spread the side frames apart, and requiring no positive force to prevent their spreading. These side frames **2** include forward extensions **21** in the form of I-beams or the like. The longitudinal downward moment effected by the weight of the extensions **21** and of the vehicle which is to be lifted thereby is resisted by suitable means, such as the ball **22** bearing against an extension plate **18** on the elevator guide **14**. The two side frames are preferably controlled for simultaneous outward or inward movement about their pivots at **20** by any suitable means, such as the links **23** joined to opposite ends of a common lever **24**, and acted upon by a chain and sprocket wheel arrangement shown at **25**, activated by a motor **29** carried by the elevator framework. Preferably these side frames support also bumper elements **26**, which serve to fend off contact between the supported vehicle and the columns C.

Projecting inwardly from the extensions **21** of the side frames are load-supporting fingers or elements, such as the paired fingers **3** projecting inwardly from carriages **30** which move lengthwise of the I-beams **21** by means of rollers **36**.

Four such pairs of fingers are ordinarily provided, spaced apart to engage beneath the lower half of each wheel W of the vehicle. Since some vehicles are of greater length or wheel base than others, provision must be made for adjustment of the spacing of these pairs of fingers, to which end a nut **31** is incorporated in such of the carriages as require adjustment, particularly the two outermost ones, or all the carriages **30**, and a jack screw **32** or **33**, rotated by motors **34** and **35**, respectively, carried upon the swinging side frames **2**, regulates the movement of the respective carriages **30** lengthwise of the I-beams **21**.

The controls at **4**, conveniently to the driver's station **13**, control the inward and outward swinging of the side frames **2**, and the longitudinal adjustment of the paired carriages **30** on each side of the truck. The elevation and lowering of the elevator **15** is accomplished through one of the controls **17**, as is normally the case in industrial lift trucks.

When a vehicle is to be lifted, the truck approaches it from one end or the other, running the chassis extension **16** between the vehicle's wheels W and beneath the vehicle's axles. Before the truck's approach the side frames are swung outwardly, as shown in dot-dash lines in Figure 3. The pairs of fingers **3** are now adjusted lengthwise to register with the wheels of the particular vehicle to be lifted, and then the side frames are permitted to swing inwardly, to such extent as is necessary to dispose the fingers **3** beneath the respective wheels of the vehicle, but straddling each wheel's point of ground support. The lift trucks will be used almost exclusively with vehicles having a standard tread width, but for narrow tread vehicles the side frames may swing a little farther inwardly than for normal or wide tread vehicles. Now the elevator is caused to operate, to lift the wheels of the vehicle off the runway and to support it instead upon its wheels as they are cradled individually in the pairs of fingers **3**. Now the truck is operated to transport the lifted vehicle to the proper storage cubicle, and it is inserted into this cubicle by inward bodily movement of the truck **1**. Should there be a car V' within a lower cubicle, it is only necessary to run the chassis portion **16** of the lift truck, with the elevator lifted to the proper height to register with the overhead cubicle B, beneath the axles and between the wheels of the vehicle V', whereupon the vehicle V can be deposited in the cubicle B. The vehicle is lowered until its wheels rest upon the floor *a* or *b*, as the case may be, whereupon the side frames are swung outwardly, depositing the vehicle, and the lift truck is withdrawn. The reverse operation is obvious.

While the inward movement of the fingers **3** into load-engaging position, as described above, is accomplished by inward swinging of the frames **2** whereon they are supported, it is obvious that these fingers might be mounted for movement laterally relative to fixed side frames. Indeed, if the elevator were to include a member projecting forwardly between, instead of outside the wheels, the lifting fingers might project outwardly therefrom for load engagement. Again, the engagement might be with the axles, instead of with the wheels. It is desired to emphasize that the mechanical structure shown is merely one of several that might be used satisfactorily for engaging the vehicle to lift it and to deposit it after transportation into or out of a cubicle, and to elevate or lower it as needed. Any other

equivalent mechanical arrangement would suffice, so far as concerns the broad principles of this invention, and such equivalent arrangements are intended to be included in the broad claims.

I claim as my invention:

1. A lift truck for wheeled vehicles comprising a mobile chassis which includes a stabilizing projection of width and height to fit between the wheels and beneath the axles of such a wheeled vehicle, two longitudinally extending frames supported indirectly from the chassis and spaced apart for disposition at opposite sides of the vehicle to be lifted, load-engaging elements carried by and spaced lengthwise of each of said frames, directed inwardly therefrom in load-engaging position, means for moving said load-engaging elements between inwardly projected load-engaging position and outwardly withdrawn released position, and means mounted on the chassis, and itself supporting said frames, for lifting and lowering said load-engaging elements.

2. A lift truck for wheeled vehicles comprising a mobile chassis of width and height for disposition between the wheels and beneath the axles of a vehicle to be lifted, and mounting an operator's control station, two side frames pivotally mounted on longitudinal axes well above said chassis, spaced apart for disposition at opposite sides of the vehicle to be lifted, an elevator mounted upon said chassis, and supporting said frames, fingers projecting inwardly from said frames for engagement beneath the vehicle, and means operable from the operator's station for swinging said frames outwardly to withdraw said fingers from beneath the vehicle, and inwardly to locate the fingers in vehicle-engaging position, and to elevate and lower said elevator and the frames supported thereby.

3. A lift truck as in claim 2, including mounting means for said fingers mounted for adjustment lengthwise of the respective frames, and further means operable from the operator's station for so adjusting the spacing of said fingers.

4. A lift truck for wheeled vehicles comprising a mobile chassis which includes a stabilizing projection therefrom of width and height to fit between the wheels and beneath the axles of such a wheeled vehicle, two frames extending longitudinally of and supported from the chassis, load-engaging elements supported from said frames and spaced lengthwise of said chassis, in positions adjacent the wheels of a vehicle between which wheels said projection is fitted, means for moving said frames and their load-engaging elements laterally with respect to the projection between load-engaging and withdrawn position, and means for lifting and lowering said frames and their load-engaging elements.

5. A lift truck as in claim 4, including means to adjust the spacing between the load-engaging elements lengthwise of the chassis, to dispose them operatively with relation to the wheels of vehicles of different wheel-base.

6. A lift truck as in claim 5, including control means on the chassis, adjacent the operator's station, for controlling, independently, the lateral movement of the load-engaging elements, the lifting and lowering thereof, and their lengthwise relative adjustment.

7. A freely mobile lift truck for automobiles comprising a chassis provided with ground wheels for its support from, movement over, and steering with respect to, pavement, and including a prime mover arranged to drive certain of said ground wheels, and an operator's control station,

a plurality of load-engaging elements, disposed at the opposite sides of said chassis, spaced lengthwise of the chassis from one another at each side, and directed inwardly towards the corresponding elements at the opposite side at a level above the pavement but low enough to engage beneath an automobile's wheels, means carried by the chassis and mounting said elements for variation of the said lengthwise spacing between said elements, to correspond to the wheel base of the automobile to be lifted, for their inward engaging and outward releasing movement, and for their elevation and lowering, prime movers for said elements, means operatively connecting the prime movers to said elements, and means at the control station to control each such movement of the load-engaging elements, relative to the chassis and to the automobile to be lifted.

8. A freely mobile lift truck for automobiles comprising a chassis provided with ground wheels for its support from, movement over, and steering with respect to, pavement, and including a prime mover arranged to drive certain of said ground wheels, and an operator's control station; a plurality of load-engaging elements, disposed at the opposite sides of said chassis, spaced lengthwise of the chassis from one another at each side, and which are located for movement transversely of the chassis above the pavement into and from engagement beneath an automobile's wheels, means carried by the chassis mounting and guiding said elements for variation of their said lengthwise spacing, to correspond to the wheel base of an automobile to be lifted, for their transverse engaging and disengaging movement, and for their elevation and lowering, prime movers for said elements and means operatively connecting the prime movers to said elements, and means at the control station to control each such movement of the load-engaging elements, relative to the chassis and to the automobile to be lifted.

9. A freely mobile lift truck for automobiles comprising a chassis provided with ground wheels for its support from, movement over, and steering with respect to, pavement, and including a prime mover arranged to drive certain of said ground wheels, and an operator's control station; a plurality of load-engaging elements disposed at the opposite sides of said chassis, spaced lengthwise of the chassis and from one another at each side by a spacing which corresponds to the wheel base of an automobile to be lifted, and which are located for movement transversely of the chassis above the pavement level into and from engagement beneath the wheels of such an automobile; means carried by the chassis mounting and guiding said elements for their transverse engaging and disengaging movement, and for their elevation and lowering; prime movers for said elements; and means operatively connecting the prime movers to said elements, and means at the control station to control such movements of the load-engaging elements, relative to the chassis and to the automobile to be lifted.

10. A lift truck for automobiles, as in claim 8, wherein each load-engaging element comprises two fingers directed transversely of the chassis and slightly spaced apart to engage beneath opposite lower quadrants of a wheel of the automobile to be lifted, and wherein the mounting and guiding means include means constraining said fingers to move in a generally transverse path between engaged and disengaged positions.

11. A lift truck as in claim 9, wherein the

chassis includes a main portion and a stabilizing projection therefrom, of a width and height to fit between the wheels and beneath the axles of the automobile to be lifted, certain of the ground wheels being carried by and serving for the mobile support of said projection.

12. A lift truck for automobiles comprising a freely mobile chassis, elevator means supported upon and guided from said chassis for movement up and down with respect to the chassis, two frames extending longitudinally of the chassis and supported from said elevator means and spaced apart for disposition at opposite sides of the automobile to be lifted, load-engaging elements carried by and spaced lengthwise of each of said frames, directed inwardly therefrom in load-engaging position, means to effect movement of said load-engaging elements, relative to the chassis, inwardly to supportingly engage the automobile, and outwardly to disengage the same, and means reacting from the chassis to lift or to lower said elevator means, and with it said frames, load-engaging elements, and the automobile engaged by the latter.

13. A lift truck for automobiles as in claim 12, wherein the load-engaging elements are formed as pairs of fingers movably supported from and projecting inwardly from the respective side frames, the fingers of each pair being spaced apart and located to engage beneath opposite lower quadrants of the respective wheels of the automobile to be lifted, and means to move each side frame, with its fingers, bodily inwardly and outwardly relative to the chassis, constituting the means to effect the inward and outward movement of said fingers.

14. A lift truck for automobiles as in claim 13, wherein certain pairs of fingers are supported from the respective frames for movement lengthwise thereof, and means so to adjust the position of such fingers relative to the other fingers

on the same frames, to engage automobiles of different wheel-base.

15. A lift truck for automobiles as in claim 12, wherein each frame is pivotally mounted from the elevator means upon respective longitudinal axes located well above the pavement level, at each side of the automobile to be lifted, and including means to swing the lower portions of said frames, with their load-engaging elements, inwardly and outwardly, relative to the chassis, constitute the means to effect the engagement and disengagement of such load-engaging elements.

16. A lift truck for automobiles as in claim 15, wherein each frame's pivot axis is located substantially directly above the points of support of the corresponding load-engaging elements.

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