AUTOMATIC VEHICLE EJECTION DEVICE

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The present invention relates to improvements in automatic vehicle ejection devices and more particularly to the type employed with an elevator type parking garage, covered by an application filed jointly by me and K. K. Newsom, Serial No. 58,924 under date of November 8, 1948, entitled Machine for Parking Motor Vehicles.

Hitherto it has been customary in the art to provide devices for removing vehicles from the elevator which consisted of components situated both on the elevator platform and within the vehicle stall. It will be readily appreciated that where there are a great number of vehicle stalls, the cost of such a system is most expensive.

The present invention advances a device in which a single member is provided to service many vehicle berths.

The present invention also permits the construction of an ejection device which does not necessitate the elevator operators starting the engine of the vehicle to drive it into the stall thereby increasing the time necessary to park the vehicle. In addition to this feature this type of ejection device eliminates carbon monoxide and its toxic fumes from permeating the building and thereby reducing the expense necessary in providing a multiplicity of exhaust ventilation fans from the building.

According to the present invention the vehicle operator need not enter the vehicle nor start the engine thereof at any time during the ejection or retrieving phase of the operation.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

The drawings, wherein like symbols refer to like or corresponding parts throughout the several views.

Figure 1 is a longitudinal vertical section with parts broken away showing the elevator platform with the device installed thereon.

Figure 2 is a fragmentary top plan view showing the alignment of the vehicle stalls with the elevator platform.

Figure 3 is a vertical longitudinal section of the elevator platform and the ejection device with parts broken away and parts shown in section.

Figure 4 is a view similar to Figure 3 with the primary longitudinal carrier and the secondary longitudinal carrier shown in the most extended position.

Figure 5 is a top plan view with parts broken away and parts shown in section of the ejection device in the position illustrated in Figure 3.

Figure 6 is a fragmentary horizontal vertical section of the elevator platform taken on a magnified scale showing the pusher arm and secondary longitudinal drive member.

Figure 7 is a transverse vertical section of a machine embodying the present invention and adapted for the handling and storing of vehicles.

Figure 8 is a fragmentary side elevational view of the pusher arm carried by the block on the worm shaft.

Figure 9 is a schematic electrical wiring diagram for the two motor drive circuits.

Referring more particularly to the drawings, 10 and 11 designate two spaced apart structures for receiving motor vehicles situated at opposite sides of a horizontally travelling elevator shaft. An elevator 13 is provided for carrying two vehicles for deposit in vehicle receiving berths in the structure. Referring to Figure 3, a vertical longitudinal section through the elevator platform is shown in which the ejection device may be more clearly seen as consisting of a primary longitudinal carrier, being longitudinal with respect to the axis of displacement along which the vehicle is to be ejected and having at opposite ends thereof upstanding members 15 and 16 for rotatably supporting therebetween a worm shaft 17 which carries thereon a worm block 18. Hingedly carried by an upper portion of the worm block 18 is a pusher arm 19, the details of which will be described more fully hereinafter. The worm shaft 17 is compelled to rotate and drive therealong the worm block 18 by an electric motor 20 carried by the primary longitudinal carrier 14.

A secondary longitudinal carrier 21 is provided for supporting therein the primary longitudinal carrier 14. This secondary carrier consists of a base member 23 and upstanding side flanges 23. Rotatably journeled in the side flanges 23 are guide rollers 24 and a driving gear 25 driven by an electric motor 26. The drive gear 25 meshes with teeth 27 of a gear rack 28 at one end of the primary longitudinal carrier 14. Limit switches 29 and 30 are carried by the primary longitudinal carrier 14 and are so positioned to be actuated by the worm block 18 to limit travel of the worm block 18 along the worm shaft 17.

A complementary pair of limit switches 29a and 30a are carried by the elevator platform and are so positioned to be actuated by and limit the horizontal travel of the secondary longitudinal carrier 21 in order that the drive gear 25 not be driven off the gear rack 28.

The elevator platform is preferably of the two car type but may be of the single vehicle type in which grooves 31 are provided in the floor 32 of the elevator for receiving and guiding the wheels of the vehicle to be ejected. The vehicle stalls are provided with complementary grooves 33 in the floors 34 thereof. The vehicle receiving stall is also provided with a recess 35 for receiving therewithin the primary longitudinal carrier 14 in its extended position.

Referring to Figures 6 and 8, the pusher arm 19 described hereinabove is hingedly carried by a raised boss 36 on the worm block 18 as by a pivot pin 37. Carried at the free end of the arm 19 is a horizontal plate 38 having at its opposite free end a pair of electro-magnets 39 and 40. The height of the arm 19 and position of the horizontal plate 38 is such as to contact the medial portion of the standard motor vehicle bumper 50 when the vehicle is resting upon the elevator platform with its tires in the grooves 31. The electro-magnets 39 and 40 receive their power from a supply bus 41 carried on brackets 42 and insulated from the primary longitudinal carrier 14.

The worm block 18 carries insulated therefrom a contact shoe 43. This shoe is connected to the electro-magnets 39 and 40 as by a power cable 44. In order that the pusher arm 19 be raised and lowered in order to permit the passage thereover of a motor vehicle, a locking pawl 45 is pivoted to the arm 19 and is provided at its free end with a tooth 46 engageable in a socket 47 within a projection 48 on the boss 36 on the worm block 18. It will be understood that conventional power supply panels may be provided for both elevator motors 20.
and 26 for selectively energizing and driving same in either a forward or reverse direction. The drive gear 25 is situated intermediate the gear rack 23 when the device is housed within the confines of the elevator platform in order that the same may be driven into the vehicle stalls in either a forward or rearward direction while still maintaining a driving engagement between the drive and driven members. The elevator floor 32 is provided with a slot 49 for permitting the passage of the pusher arm 19 along the longitudinal dimension of the elevator floor.

In operation the ejection mechanism functions as follows: Upon the elevator 13 arriving in horizontal registry with the desired vehicle stall and upon the grooves 33 in the vehicle stalls coming into registry with the grooves 31 in the elevator floor the elevator motor 20 is energized thereby compelling the worm shaft 17 to rotate and drive the worm block 18 longitudinally therealong. This longitudinal driving movement causes the pusher arm 19 and its associated members 39 and 40 to impinge against the front or rear bumper 50 of the vehicle to be deposited in the stall thereby compelling same to drive horizontally along the elevator floor and into the vehicle stall, being guided by the grooves, thereby eliminating the necessity of a driver at the wheel of the vehicle. Upon the worm block 18 contacting either of the two limit switches 29 or 30 the motor 20 is thereby deenergized and the motor 26 is cut in, driving gear 25 meshing with teeth 27 on the gear rack 23, which compels the primary longitudinal carrier 14 to extend beyond the elevator platform and to enter the recess 35 in the medial portion of the vehicle stall lying between the two grooves 35 in the floor 34, as shown in Figure 4.

When the vehicle has been sufficiently pushed into the stall the direction of rotation of the motor 26 is reversed and the motor energized thereby retracting the primary carrier 14 from within the recess 35 and returning same to within the confines of the elevator platform. The elevator may then drop down to any other desired cubicle to remove a vehicle from a cubicle in which event the following takes place.

Upon the elevator platform arriving in horizontal and vertical registry with the desired vehicle stall the pusher arm 19 is then driven longitudinally along the primary carrier 14 until the motor 20 is deenergized by the limit switch 29 at which time the motor 26 drives the gear 25 in registry with the gear rack 23 compelling the primary longitudinal carrier to be driven beyond the elevator platform into the cubicle entering same within the confines of recess 35 in the vehicle stall. This driving takes place until the electro-magnets 39 and 49 come into registry with either the front or rear bumper of the vehicle at which time the electro-magnets are energized causing a great attraction between the magnet, pusher arm and vehicle bumper whereby, upon the reversal of the motor 26 and driving of its mechanical train, the pusher arm 19 is withdrawn from the vehicle stall back onto the elevator and pulls therewith the motor vehicle by reason of the magnetic couple existing between the vehicle bumper 50 and the electro-magnets 39 and 49. Upon clearance of the longitudinal carrier from the vehicle stall the limit switches 29 and 30 and 29a are bypassed and the motor 20 is reversed and energized thereby compelling the worm shaft to drive the worm block and pusher arm, which in the instant action becomes the puller arm, along the longitudinal dimensions of the elevator platform until the vehicle being removed from the stall is completely housed within the confines of the elevator platform at which time the electro-magnets and motors are all deenergized. If the electro-magnets 39 and 49 had compelled the forward bumper of the vehicle to couple with the pusher arm 19, it will be necessary to drop the pusher arm 19 beneath the vehicle in order that the vehicle may be driven from the elevator platform.

This is accomplished by placing a hook beneath the locking pawl 45 removing the tooth 46 from the socket 47, thereby permitting the pusher arm 19 to pivot about the pin 37 in the boss 36 of the worm block 18.

It will be appreciated that the motors 20 and 26 will be provided with conventional controls and switch panels located on the elevator platform accessible to the elevator operator.

The electro-magnets will be energized by the vehicle operator from a conventional snap type on-off switch. It will be appreciated from the above that it is not necessary to provide the vehicle stalls with a multiplicity of mechanical devices for controlling such a mechanical device on the elevator. When the vehicle stall floors are poured, the form employed will consist of a depression for the formation of the center recess 35 and formations for the complementary tire grooves 33 for guiding the vehicle into the stall. The maximum depth of the grooves should be of from one and one-half to two and one-half inches which will be of sufficient depth to guide the vehicle without the necessity of the vehicle operator manipulating the steering wheel thereof.

Referring more particularly to Figure 9, a circuit diagram of the two motors is shown. This circuit lends itself to two types of operation, namely parallel or sequential. When it is desired to operate both motors at the same time, the main line switches, being gang operated, are closed thereby driving both the worm shaft and primary longitudinal carrier 14 simultaneously. The limit switches in the two circuits will upon reaching a predetermined position open the armature circuits to the respective motors, when each has traveled through its maximum period of the ejection cycle. To reverse the direction of rotation of the first and second drive motors, it will be necessary to bypass the limit switches in order to complete the armature circuit. Gang operated limit switch bypass switches are so provided in circuit for this operation.

For driving the worm shaft and causing the pusher arm 19 to be driven its maximum distance on the primary longitudinal carrier and thence energizing the second drive motor causing the primary longitudinal carrier to be driven into the recess 35 in the vehicle receiving stall floors 34, a signal circuit is provided in which the limit switch when opening closes a switch in the signal circuit thereby energizing a coil actuating or closing a contact in the second drive motor armature circuit completing same. When the device is in the position shown in Figure 5 and it is desired to return same to the position of Figure 4, the gang operated opening switches are reversed and the limit switch bypass switch closed. This then completes the electrical circuit for the restoration of the device to the position shown in Figure 4.

I claim:

1. For use with a vehicle receiving elevator platform having grooves therein and adapted to be brought into vertical and horizontal registry with a vehicle receiving berth having complementary vehicle tire receiving grooves and a central recess in the floor of the vehicle receiving berth; a vehicle ejection device comprising a primary longitudinal carrier on said elevator platform within the confines of said platform, a worm shaft rotatably journaled in said primary longitudinal carrier, a worm block positioned to be driven by said worm shaft, a vehicle pusher member carried by said worm block and movable therewith, driving means for rotating said worm shaft thereby compelling said worm block and vehicle pusher member to move longitudinally therealong, a secondary longitudinal carrier member for supporting said primary longitudinal carrier member on said elevator platform, said driving means being carried by said primary longitudinal carrier, drive means carried by said secondary longitudinal carrier, and control means carried by both said primary and secondary longitudinal carriers for causing said primary longitudinal carrier to be driven longitudi-
nally along said secondary longitudinal carrier thereby causing said primary longitudinal carrier to extend beyond the confines of said elevator platform and to enter the central recess in said vehicle receiving stall beneath the vehicle receiving surface a predetermined distance while said worm block and vehicle pusher member are being driven along the worm shaft carried by said primary longitudinal member thereby depositing a vehicle in the vehicle receiving stall, reversing means for said primary and secondary drive means, and electro-magnetic means carried by said vehicle pusher member positioned to contact the bumper of the vehicle and upon actuating said reversing means to then withdraw the vehicle from the vehicle receiving stall pulling same onto the elevator platform.

2. A device as claimed in claim 1 wherein said vehicle pusher arm is pivotally carried by said worm block and held in an erect position by a pawl carried pivotally by said pusher arm and engageable in a boss on said worm block.

3. For use with a vehicle receiving elevator platform having grooves therein and adapted to be brought into vertical and horizontal registry with a vehicle receiving berth having complementary vehicle tire receiving grooves and a central recess in the floor of the vehicle receiving berth; a vehicle ejection device comprising a primary longitudinal carrier means on said elevator platform within the confines of said platform, a first drive means associated with said primary longitudinal carrier means, a first driven means positioned to be driven by said first drive means, a vehicle pusher member carried by said first driven means and movable therewith, driving means for actuating said first drive means thereby compelling said first driven means and vehicle pusher member to move longitudinally therealong, a secondary longitudinal means for supporting said primary longitudinal carrier means, said driving means being carried by said primary longitudinal carrier means, second drive means carried by said secondary longitudinal means, control means carried by both said primary and secondary longitudinal means and positioned therewith to cause said primary longitudinal carrier means to be driven longitudinally along said secondary longitudinal means thereby causing said primary longitudinal carrier means to extend beyond confines of said elevator platform and to enter the central recess in said vehicle receiving stall beneath the vehicle receiving surface a predetermined distance after said first driven means and pusher arm has stopped, said movement of said primary longitudinal carrier means being initiated upon said first driven means and pusher member actuating an element of said control means at its limit of travel, reversing means for said primary and secondary drive means, and electromagnetic means carried by said vehicle pusher member positioned to contact the bumper of the vehicle and upon actuating said reversing means to then withdraw the vehicle from the vehicle receiving stall pulling same onto the elevator platform.

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