SPECIFICATION

Lift Type Car Park

The invention concerns lift-type car parks.

Lift-type car parks are known which have a lift and parking places for motor vehicles disposed above and next to one another in storeys, in which the vehicles are moved horizontally, rolling on their own wheels, with the aid of a telescopic transporting arrangement that is disposed with powering means on a lift platform and can be extended and retracted sideways relative to the vehicle in the plane of the vehicle's wheels and in the longitudinal direction of the platform.

Such a lift-type car park is shown for example in West German Auslegerschrift 11 30 994 and West German Patentschrift 17 09 343. In these lift-type car parks the vehicles are moved from the lift to the parking place (and vice-versa) with the aid of a shunting car, which is equipped with lateral drive rollers enabling one wheel of the vehicle to be grasped from outside so that that vehicle can be moved horizontally—rolling on its own wheels. In addition to the shunting car, the parking place on ground level that may serve as an entrance or an exit is provided with a revolving belt or chain, that may be moved in either direction, in the area of the "tow-path" to pick up the rear wheel of a motor vehicle to be parked end standing on the belt or chain. The revolving belt or chain carries two drive rollers or support elements that may be lowered in any desired order and raised to bear against a rear wheel.

Such conveying systems are relatively costly and have to be disposed so that they can be lowered in the parking places which can serve as entrance or exit.

Furthermore, special driving systems are necessary, which have to be coupled electrically to the entire system and need to be designed to be controlled electronically. Since these transporting systems must operate in areas accessible by the vehicle's occupants, they need to be made safe or must be operated only when the occupants of a vehicle have vacated the vehicle and area of the parking place (when parking a vehicle) or (when a vehicle is being collected) such that the vehicles' occupants only have access to the parking place when the transporting device has delivered the vehicle and is in its secure retracted position again.

These requirements not only makes the entire installation more expensive than would otherwise be the case but also slows down parking and collection operations. The time delay in parking and collection operations alone makes itself very apparent, in a particularly disadvantageous fashion, at hours of peak usage.

Objects of the invention include the alleviation or meeting of these shortcomings, the simplification of the installation as a whole, and the speeding up of the installations operation.

According to the invention there is provided a lift-type car park with a lift and parking places for motor vehicles which places are located above and next to one another in storeys, in which car park vehicles are moved horizontally by rolling on their own wheels with the aid of a telescopic transporting arrangement located on a lift platform to move a vehicle from or to a transfer point or parking place on to or off the platform, and in which the telescopic transporting arrangement is extendable and retractable into a tunnel at the transfer point extending in the longitudinal direction of the platform and having a longitudinally extending slot-shaped aperture aligned with the side of the vehicle and an opening at its end adjacent the lift enabling the extension and retraction of the telescopic transporting arrangement. Due to the provision of this feature, the telescopic transporting arrangement may be retractsd into the tunnel at any time when the vehicle occupants may still be inside the vehicle (during the parking operation for example). The telescopic transporting arrangement, the operation of which is controlled from the lift platform, may be extended immediately the lift platform has reached the level of the transfer point without the vehicle occupants or other persons being endangered.

The telescopic transporting arrangement may have gripping and guiding means which can be swung out or retracted sideways in the direction of the vehicle to be moved. These have, for example, at least two driving rollers which, when the telescopic transporting arrangement is extended are designed so that they can be swung out of their resting attitude (in which they lie parallel to the longitudinal axis of the vehicle) through about 90°—in opposite directions—until they meet the tread of a vehicle wheel, grasping the vehicle wheel at a level below its axis or rotation. For transportation into the lift-type car park, the motor vehicle is first parked close to the tunnel—to ensure the vehicle is correctly positioned, special markings may be provided, for instance flat guide rails with shallow recesses in the ground into which a wheel may be driven. When parking a vehicle close to the tunnel the telescopic transporting arrangement may already be in the tunnel, the drive rollers remaining in their resting attitude. Once the vehicle has reached its transfer point, the operation of running out the driving rollers to grasp one wheel of the vehicle can take place with the aid of a control signal.

At the transfer point the tunnel is provided with an opening in its front end facing the lift for extension and retraction of the telescopic transporting arrangement. All the openings in the tunnel are preferably fitted with suitable flaps or shutters for automatic closure and opening. This measure prevents the ingress of dirt or, in winter, snow and ice into the tunnel so that this precludes any hindrance to movement of the telescopic transporting arrangement.

The outer surface of the tunnel, in an extension of the invention, is formed as a standing area for the occupants of the vehicle to get in and out, and this can be covered with a non-slip surface. These

features increase the safety of the occupants of the vehicle.

Since the vehicle occupants can get in or out at any time regardless of the attitude of the telescopic transporting arrangement, the time taken to process a vehicle and thus the vehicle turnover as a whole is appreciable improved in such a lift-type car park. But the measures in accordance with the invention also simplify the transporting arrangements so that the entire installation also becomes less expensive.

An embodiment of the invention will now be described with reference to the accompanying drawings in which:—

Figure 1 shows a cross-section through a lift-type car park with a lift level with a transfer point;

Figure 2 shows a plan elevation of a lift as in Figure 1, and

Figure 3 shows a cross-section through a telescopic transporting arrangement in the transporting attitude.

In Figure 1 the lift platform 6 is shown to be level with the floor 7 of a transfer point 3, and the telescopic transporting arrangement 1 is illustrated in its extended state. The lift platform 6 is carried by a lift framework 8 which can be raised and lowered by a hydraulic cylinder 9 by means of a hydraulic system (now shown in detail). A motor vehicle 2 is in the transfer position and the telescopic transporting arrangement is in the tunnel 5. The tunnel 5 is provided with a lateral opening 4 so that gripping and guiding means 10 and 11 can be run out from the telescopic transporting arrangement.

Figure 2 shows a plan view of the lift platform 6 in a position corresponding to that shown in Figure 1. The telescopic transporting arrangement 1 can be extended and retracted in the longitudinal direction to the platform 6 so that a vehicle can be picked up from the transfer point 3, for example, and, at the end of the parking period, delivered automatically to a transfer point 12 on the exit side of the installation.

In Figure 2 a motor vehicle in the transfer position as indicated by wheels 13 and 14. To facilitate positioning the motor vehicle, there is a wheel guide 15 near the tunnel 5, the upper part 16 of which guide (see Figure 3) may be provided with a rubber cover or the like to prevent damage to the wheels of the motor vehicle and facilitate guidance thereof.

In Figure 2 the gripping and guiding devices of the telescopic transporting arrangement are shown in their extended state, the arrows 17 indicating the directions of movement.

A transfer operation for parking a motor vehicle proceeds as follows. A motor vehicle is left at the transfer point 3 (in the position shown in Figure 2) with its brakes off and its transmission in neutral. The vehicle occupants then leave the vehicle via the doors on either side of it. The platform 6 is brought level with the floor 7 of the transfer point 3 by an automatic control system and the door 18 of the lift-type car park is opened. The telescopic transporting arrangement immediately retracts into tunnel 5 until it reaches stop 19. When a corresponding signal is given (which may be effected by means of sensors or photoelectric cells for example) the presence of a motor vehicle at the transfer point 3 is verified. If this signal is affirmative, the gripping and guiding devices 10 and 11, formed as drive rollers in the described embodiment are swung out until they rest against the surface of a wheel 14 of the motor vehicle (as shown in Figure 2). Then the telescopic transporting arrangement is set in motion and draws the motor vehicle onto the lift platform 6. Once the vehicle is on platform 6 door 18 closes and the lift platform 6 seeks a parking space under automatic control. This space may be located in front of or behind the platform (see Figure 1) since the telescopic transporting arrangement is designed to move in either direction. After the vehicle has been rolled off the platform 6 with the aid of the telescopic transporting arrangement, the gripping and guiding devices 10 and 11 retract to their resting attitude and the telescopic transporting arrangement 1 retracts onto the lift platform 6. A parked vehicle is moved from its parking place onto the lift platform and transported to a transfer point 3 or 12 for collection in an essentially similar fashion.

As only the Lift Car Park operating staff can gain access to the parking places in the lift-type car park, it is not necessary to provide tunnels for guidance of the telescopic transporting arrangement therein.

Preferably the tunnel 5 is of steel plate, as is the wheel guide 15 disposed parallel with the tunnel. Naturally the wheel guide 15 may be made of concrete or a similar material and can be made very low as shown in Figure 3.

Depending upon local conditions, the tunnel 5 may be open at its side all the time, however, to prevent dirt, ice or snow getting in, it is expedient to make it closable, for example by shutters or flaps which are opened before the gripping and guiding devices 10 and 11 are run out and closed after they have been retracted.

The tunnel 5 may be provided as a step onto which the vehicle occupants may alight from the vehicle, or enter the vehicle. In these circumstances it may be desirable that the outer surface of the tunnel is provided with a non-slip surface, for example a rubber tread.

Claims

1. A lift-type car park with a lift and parking places for motor vehicles which places are located above and next to one another in storeys, in which car park vehicles can be moved horizontally by rolling on their own wheels with the aid of a telescopic transporting arrangement located on a lift platform to move a vehicle from or to a transfer point or parking place on to or off the platform, and in which the telescopic transporting arrangement is extendable and retractable into a tunnel at the transfer point extending in the longitudinal direction of the

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platform and having a longitudinally extending slot-shaped aperture aligned with the side of the vehicle and an opening at its end adjacent the lift enabling the extension and retraction of the telescopic transporting arrangement.

2. A lift-type car park according to claim 1, wherein the telescopic transport arrangement has gripping and guiding means that can be extended and retracted laterally of the longitudinal axis of a vehicle to be moved.

3. A lift-type car park according to claim 2, wherein the gripping and guiding means have at least two drive rollers which, when the telescopic transport arrangement is extended, may be swung out from a resting attitude in which the rollers lie parallel to the longitudinal axis of the vehicle, through substantially 90° and in opposite senses until they meet the tread of a vehicle wheel and grasp the vehicle wheel at a level below its axis of rotation.

4. A lift-type car park according to any one of the preceding claims, wherein said aperture of the tunnel is automatically openable and closeable.

5. A lift-type car park according to any one of the preceding claims, wherein the outer surface of the tunnel is formed as a standing area for the vehicle occupants to get in and out of the vehicle.

6. A lift-type car park according to Claim 5, wherein the said standing area is covered with a non-slip surface.

7. A lift-type car park substantially as herein described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained