

PARKING FACILITY

The invention relates to an automated parking facility for motor vehicles, said parking facility being made up of grids and comprising at least two storage grids and at least two transport grids, wherein motor vehicles are capable of being moved along a first direction of movement in each of the transport grids by a transport device and wherein storage-grid storage locations for storing motor vehicles positioned on storage devices exist in the storage grids, which storage devices are associated with the storage-grid storage locations, and wherein the storage devices are capable of being moved from the respective storage-grid storage locations into at least one transport grid in a second direction of movement oriented transversely to the first direction of movement and vice versa, in which transport grid motor vehicles are capable of being transferred from the respective transport device to the respective storage device and vice versa by mutual passing.

In such a parking facility, in which, in particular, storage locations of a respective storage grid are arranged one above the other, the procedure for storing a motor vehicle is as follows: after a user has positioned his/her motor vehicle on a transport device of a transport grid and has left the motor vehicle, the motor vehicle is transported in the transport grid along the first direction of movement in a direction towards the designated storage-grid storage location. Typically, this takes place in a direction of height of the parking facility, the transport device being a raising and lowering device. Using a drive, the storage device associated with the designated storage-grid storage location is displaced transversely to the first direction of movement and thus, in particular, in a horizontal plane into the transport grid, namely to a point of intersection of the transport grid with the horizontal storage level defined by the storage-grid storage location. The transport device passes the storage device along the first direction of movement in a direction from top to bottom and in doing so transfers the motor vehicle to the storage device. This is made

possible by the fact that the cross-sections of the transport device and the storage device in the transport grid do not overlap with each other, but they do in each case partially overlap with the motor vehicle and specifically with the cross-section of its wheels. Typically, to this end the transport device and the storage device comprise interengaging comb-shaped or fork-shaped support elements for the motor vehicle. This is why this technique of the parking facility is also referred to as a "comb technique" or "fork technique". Subsequently, the storage device can be moved along the second direction of movement into the designated storage-grid storage location and the motor vehicle can be stored therein. The transport device can for example remain in situ or be moved to a rest position.

In order to move the transport devices and the storage devices, the parking facility comprises drives, each known per se, which can be controlled by a control unit.

As used herein, positional and directional terms, such as "above", "below", "horizontal" and the like, are to be understood to relate to an operating condition of the parking facility in which storage-grid storage locations are generally arranged one above the other in the respective storage grid and each storage grid comprises storage-grid storage locations in at least one vertical plane.

It is an object of the present invention to improve a generic parking facility such that an increased number of motor vehicles can be stored therein.

In accordance with the invention, this object is achieved in a generic parking facility by the number of storage devices being greater than the number of the storage-grid storage locations and by the excess storage devices being associated with transport-grid storage locations existing in the transport grids.

In the parking facility constructed in accordance with the invention, motor vehicles can also be stored in transport-grid storage locations existing in the

transport grids. To this end, excess storage devices are provided that can be stored in the excess storage locations. The excess transport-grid storage locations are formed at points of intersection of the respective transport grid with the storage levels. An increased number of motor vehicles can thereby be stored in the parking facility. With the parking facility comprising at least two transport grids and at least two storage grids, each of the transport grids can be cleared of storage devices when a motor vehicle is to be moved in the transport grid by the respective transport device. Vacating a transport grid is accomplished by displacing a storage device stored in a transport-grid storage location into an adjacent grid which may be a storage grid or another transport grid. If said adjacent grid already has another storage device stored in it, this can first be moved into a next-but-one grid - which may again be a storage grid or a transport grid - relative to the transport grid to be vacated, etc. This makes it possible to remove, at each storage level of the parking facility, storage devices from the transport grid to be cleared so that the respective transport device can be moved therein for performing storage and retrieval operations.

As further shown in the above description, a storage device can be associated with more than one storage location. In particular, storage devices are each associated with at least one storage-grid storage location and at least one transport-grid storage location and can be shuttled between at least these two storage locations.

It is advantageous for the maximum number of storage devices to be such that at least one transport grid is capable of being cleared of storage devices so that there is no need for empty locations to exist in the storage grids for temporary parking and manoeuvring of storage devices. As mentioned earlier, clearing a transport grid of storage devices is accomplished by use of the drives controlled by the control unit of the storage device in order to displace the storage devices back and forth between the grids.

Preferably, the number of storage devices is such that exactly one transport grid is capable of being cleared of storage devices. It is thus possible to maximize the number of motor vehicles that can be stored by the parking facility.

As mentioned, the parking facility can comprise a control unit for controlling the drives of the storage and transport devices. It is advantageous for the control unit, when not processing transactions of storing or retrieving motor vehicles, to move the storage devices into the storage-grid storage locations and transport-grid storage locations in such a way that at least one, in particular exactly one, transport grid is free of storage devices. If at least one transport grid is kept free of storage devices during a stand-by mode of the parking facility in which no storage or retrieval operations are performed, then the average storage or retrieval time can be kept as short as possible. For example, the control unit can be configured and programmed such that a particular transport grid is defined as the transport grid to be kept free of storage devices, and short-term parkers are parked in storage grids adjacent to that transport grid. Long-term parkers, on the other hand, can be parked in a different transport grid or in storage grids that are more remote from the transport grid that is kept free.

Advantageously, the parking facility has alternating storage grids and transport grids in order to minimize average access time and maximize the number of motor vehicles that can be stored therein.

It is advantageous for the number of the storage grids to be greater than the number of the transport grids in order to increase the number of motor vehicles that can be stored.

In particular in the last-mentioned embodiment of the parking facility, it is advantageous for storage grids to be provided at the outer sides of the parking facility.

As mentioned earlier, the parking facility constructed in accordance with the invention typically stores motor vehicles in storage levels that lie one above the other, there being provided at least two storage levels. It is advantageous for the parking facility to comprise shielding devices for protecting motor vehicles that are arranged below storage locations - which may be storage-grid storage locations and/or transport-grid storage locations - and/or below storage devices. It is thereby possible for the motor vehicles arranged therebelow to be protected from dripping water, snow, snow slush, dirt, loose chippings etc. that become detached from motor vehicles arranged above.

It is advantageous for the shielding devices each to comprise at least one planar shielding element, for example of plate-shaped or trough-shaped form, which is advantageously free of openings or cutouts so that especially water can be reliably retained therein and effective protection of the motor vehicles arranged therebelow can be achieved. The shielding element is for example made of metal or plastics material. It is further conceivable to use a shielding element that is configured as a tarpaulin which may for example be dimensionally stabilized by use of keder and/or a frame and may be fabricated from a plastics material or cloth.

Preferably, at least part of and in particular all of the storage-grid storage locations and/or transport-grid storage locations have arranged thereat shielding devices at least partially covering said storage locations at the bottom side thereof in order to protect the motor vehicles arranged therebelow.

It is advantageous for at least part of and in particular all of the storage-grid storage locations to have arranged thereat shielding devices that are fixedly attached to the storage grid. This allows the parking facility to be constructed using simple and cost-effective design. Converting a conventional parking facility which is upgraded to a parking facility constructed in accordance with the invention can also be accomplished in a simple and cost-effective manner.

The fixedly attached shielding devices in particular completely or substantially completely cover the respective storage locations at their bottom sides.

In a different embodiment of the parking facility constructed in accordance with the invention, provision may be made for storage-grid storage locations of a storage grid arranged between two transport grids not to have fixedly attached shielding devices arranged thereat. By way of example, this can be provided in those instances in which the storage devices themselves comprise shielding devices, as mentioned below. It is then possible to dispense with the fixedly attached shielding devices, which saves costs.

Movable shielding devices may also be provided, said movable shielding devices being capable of being moved from an open position for the transport device to a shielding position for at least partially covering a motor vehicle at the bottom side thereof, and vice versa.

For example, in order to provide for protection of motor vehicles stored in the transport grid, it is advantageous for at least part of the transport-grid storage locations to have arranged thereat movable shielding devices that are capable of being moved from an open position in which the cross-section of the respective transport grid is opened up to at least the extent of the transport device movable therein to a shielding position in which the cross-section of the transport grid is reduced relative to the open position, and vice versa. In particular, a movable shielding device may exist at each of the transport-grid storage locations. In the open position, at least the cross-section for the transport device movable in the transport grid is opened up so that the transport device can pass the storage devices associated with the transport-grid storage locations for performing motor vehicle storage and retrieval operations without coming into conflict with the respective shielding device. On the other hand, in the respective shielding position the cross-section of the transport grid is reduced in order to protect the motor vehicles.

To move the shielding devices, drives of any type may be provided, such as a rack-and-pinion drive, a rope drive, a belt drive, a friction roller drive, a chain drive etc. The drives of the shielding devices are capable of being controlled by the control unit of the parking facility in order to move the shielding device from the open position to the shielding position and vice versa.

Provision may be made for the cross-section of the transport grid to be substantially open in the open position of the respective movable shielding device so that a conflict between the transport device moving in the transport grid and the shielding devices can be avoided.

It is advantageous for the cross-section of the transport grid to be substantially closed off in the shielding position of the respective movable shielding device in order to protect the motor vehicles arranged below the respective transport-grid storage locations in an effective manner.

In a different embodiment of the parking facility it is advantageous for the respective movable shielding device in the shielding position to in each case close off about one-quarter to one-third of the cross-section of the transport grid in a transverse direction of the transport-grid storage location, but to leave a residual cross-section of about one-half to one-third in the centre of the transport grid. The longitudinal direction of the respective transport-grid storage location coincides with the longitudinal direction of the storage devices and the motor vehicles positioned thereon. In this embodiment, it is possible to close off the transport grid laterally so that motor vehicles positioned on the storage devices can be shielded in the lateral portions of the cross-section of the transport grid, particularly underneath the wheels. A free residual cross-section remains at the centre of the transport grid which can be closed off for example by a cover arranged at the respective storage device so that, on the whole, a substantially complete covering of a motor vehicle positioned on the storage device results. In addition, this provides a way of keeping the material usage for the movable shielding devices and their actuation distance from the open position to the shielding position as low as possible. This ensures that the

parking facility can be constructed using simple and cost-effective design and reduces the average access time to motor vehicles.

Advantageously, the movable shielding devices are each capable of being displaced along the second direction of movement transverse to the respective transport grid. The overall height required for the shielding devices can thereby be kept as low as possible and the parking facility can be built in a compact form. Furthermore, it is possible to ensure that during movement between the shielding position and the open position, any water collected by the shielding device is prevented from spilling and distributing across motor vehicles arranged therebelow.

In a different embodiment of the parking facility, provision may be made for the movable shielding devices to be pivotally supported on the grids.

In a configuration of the parking facility that is a particularly simple design, it is advantageous for the respective movable shielding device to be movably and in particular displaceably supported on at least one fixedly attached shielding device of a storage grid adjacent to the transport grid. This allows the parking facility to be configured using simple design, and retrofitting conventional parking facilities can also be accomplished in a simple and cost-effective manner.

In a different embodiment, provision may be made for the respective movable shielding device to be movably supported on a grid of the parking facility itself. For example, the shielding devices can be attached to and movably supported on a storage rack of the parking facility that forms the grids and is constructed from vertical and horizontal members.

Preferably, the movable shielding device is arranged above the fixedly attached shielding device. This facilitates draining a movable shielding device into the fixedly arranged shielding device.

It is advantageous for the respective shielding device to comprise two shielding elements which, when moved from the open position to the shielding position, are capable of being introduced into the transport grid from opposite sides thereof. Providing two shielding elements makes it possible for the shielding device to be moved quickly from the open position to the shielding position and vice versa. Advantageously, each of the shielding elements is movably, in particular displaceably, supported on a fixedly attached shielding device of a storage grid adjacent to the transport grid. Introducing the shielding element into the transport grid enables the latter's cross-section to be reduced, while removing it from the transport grid opens up the latter's cross-section so that the associated transport device can be moved unhindered within the transport grid.

Provision may be made for the respective movable shielding device to be capable of being coupled, or to be coupled, to a storage device for its movement from the open position to the shielding position and vice versa. The necessity of a drive for the movable shielding device can thereby be obviated. For example, a storage device can be coupled to the shielding device when being stored in a transport-grid storage location. This makes it possible for both the storage device and the shielding device to be moved into the transport grid under the action of a drive for the storage device in order to store the storage device therein and shield, at the bottom side, a motor vehicle positioned on the storage device. Conversely, it is possible for the storage device and the shielding device to be displaced from the transport-grid storage location into a storage grid, thereby moving the shielding device from the shielding position to the open position. The transport grid is thereby opened up so that the transport device can be moved therein. In a configuration of simple design, coupling between the storage device and the shielding device can be accomplished mechanically, for example by cooperating coupling elements, for example in the form of catch stops. Magnetic coupling is also conceivable. Provision may be made for the coupling to be released in order to simplify storage and retrieval of a motor vehicle positioned on the storage device. To this end, provision may be made for a

coupling element coupling the storage device to the shielding device to be moved from a coupling position, in which the storage device and the shielding device are coupled together, to a decoupling position, in which the coupling is released. For example, a coupling element in the form of a catch stop can be electromagnetically moved from the coupling position to the decoupling position and/or vice versa. With the coupling element in the decoupling position, the storage device alone can be moved into the transport grid, whereas the shielding device remains in the open position in order to ensure mobility of the transport device within the transport grid.

It has already been mentioned that the storage devices can also comprise shielding devices. It is advantageous for at least part of and in particular all of the storage devices to each comprise a movable shielding device which is capable of being moved from an open position to a shielding position, wherein the shielding device in the shielding position covers, at the bottom side, a motor vehicle positioned on the respective storage device to a proportion that is larger than that in the open position and wherein the shielding device in the open position, when arranged in a transport-grid storage location, opens up the cross-section of the transport grid to at least the extent of the transport device movable therein. Analogously to what has been described above for the case of the movable shielding devices that are arranged at the transport-grid storage locations, the provision of movable shielding devices at the storage devices allows a motor vehicle positioned on a storage device to be covered at its bottom side. This is possible whether the respective storage device is located in a transport-grid storage location or in a storage-grid storage location. Also, this makes it possible to dispense with fixedly attached shielding devices.

In an embodiment of simple design, provision may be made for each of the storage devices to comprise at least one support part on which the respective shielding device is supported for displacement in a transverse direction of the storage devices in order to move it between the open position and the shielding position.

In a further embodiment of the parking facility, provision may be made for the respective shielding device to be pivotally supported on the at least one support part.

A compact configuration of the parking facility can be achieved by the movable shielding device being arranged below the at least one support part.

It is advantageous for the at least one support part in each case to be arranged centrally in a transverse direction of the respective storage device and for the respective movable shielding device to comprise two shielding elements which are capable of being moved in opposite directions from the open position to the shielding position and vice versa, starting from the at least one support part. The motor vehicle positioned on the storage device can thereby be shielded in particular laterally, underneath the wheels.

Furthermore, provision may be made for the at least one support part to also comprise a cover that shields the motor vehicle centrally so that the motor vehicle can be substantially completely covered at the bottom side thereof.

Advantageously, the shielding elements are arranged one above the other because this allows the storage devices and hence the parking facility to be built in a compact form.

In an advantageous embodiment of the parking facility, provision may be made for the respective movable shielding device in the shielding position to in each case close off about one-quarter to one-third of the cross-section of the transport grid in a transverse direction of the transport-grid storage location. In particular, the shielding device can in each case close off one-quarter to one-third of the cross-section of the transport grid laterally with one shielding element each. The at least one support part can close off about one-half to one-third of the transport grid centrally with a cover. Practice shows that material usage can thereby be kept as low as possible and the design of the

parking facility is simplified. In addition, the actuation distance of the shielding device, particularly of the shielding elements, is kept as short as possible.

The parking facility may comprise the above-mentioned control unit which moves movable shielding devices to the shielding position only when the storage device has a motor vehicle positioned thereon. For example, it can thus be ensured that, within a transport grid, the transport device can pass a storage device arranged in a transport-grid storage location if the movable shielding device of that storage location occupies its open position. As a result, the average access time of the parking facility can thereby be kept as short as possible.

Preferably, the parking facility comprises at least one drain device for draining liquid off the shielding devices. The in particular trough-shaped shielding elements can thereby be drained, providing better protection for the motor vehicles arranged therebelow.

Advantageously, movable shielding devices are in fluid communication with fixedly attached shielding devices via liquid pipes so that movable shielding devices can be drained into shielding devices that are fixedly attached to the storage grids. The last-named shielding devices can for example be connected to and drained via a downpipe.

In a different advantageous embodiment of the parking facility constructed in accordance with the invention, it is advantageous for at least part of the storage devices and in particular all of the storage devices to have associated with them pallets that are capable of being releasably positioned thereon for the reception of motor vehicles, said pallets being capable of being transferred within the transport grid from the respective storage device to the respective transport device and vice versa by mutual passing. In this case, the cross-section of the respective transport device and the cross-section of the respective storage device overlap at least partially with the pallet. As described at the outset, this provides the possibility of transferring, at a point

of intersection of the transport grid with the storage levels, the pallet and hence a motor vehicle from the transport device to the storage device and vice versa. The provision of pallets associated with the storage devices has a number of advantages: for example, the pallets can cover, at the bottom side, motor vehicles positioned thereon and shield motor vehicles arranged therebelow against water, snow, snow slush, dirt, loose chippings or the like. As a result, the need for shielding devices may be eliminated and the drives for movable shielding devices may also be dispensed with. Control of the parking facility is thereby simplified. For a user, the process of driving into the parking facility is made more pleasant when he/she can park his/her motor vehicle on a pallet rather than having to drive onto the comb prongs or fork prongs of the transport device. For the case that the parking facility is installed in a pit and entrance is provided on the upper side thereof, the risk of a user's dropped objects, such as a bunch of keys, falling into the transport grid is reduced.

Of course, it is conceivable for the storage devices of existing parking facilities which are upgraded to a parking facility constructed in accordance with the invention to be associated with pallets.

It is advantageous for the pallets to be free of openings or cutouts, as this improves shielding of the motor vehicles positioned below the respective storage device. However, provision may be made for the pallets to comprise a drain opening for draining purposes.

It is advantageous for the pallets and the storage devices each to comprise cooperating alignment elements for alignment relative to each other in at least one spatial direction and/or for the pallets and the transport devices each to comprise cooperating alignment elements for alignment relative to each other in at least one spatial direction. This allows the pallets to be reliably positioned on the storage devices and/or transport devices in each case. The respective alignment elements cooperate for example in a positively-locking manner. Their alignment relative to each other is in particular accomplished in

horizontal planes perpendicular to the first direction of movement, i.e. in the storage levels and levels parallel thereto.

Preferably, the parking facility comprises a control unit which causes the pallet to be transported to the respective storage device associated with it when there is no motor vehicle positioned on the pallet. For example, after a motor vehicle has been retrieved the control unit can control the drives of the transport device and the respective storage device such that the now empty pallet is transported back to and positioned on the storage device associated with it. This saves the need to hold a store of empty platforms and the space required therefor so that, in addition, the parking facility can be built in a more compact form.

Of course, provision may be made for the parking facility to use both pallets associated with at least part of the storage devices and fixed and/or movable shielding devices.

The following description of preferred embodiments of the invention serves to explain the invention in greater detail in conjunction with the drawings. In the drawings:

- Figure 1 is a schematic side view of a first preferred embodiment of a parking facility constructed in accordance with the invention, with motor vehicles stored therein;
- Figure 2 is a view taken along line 2-2 in Figure 1, with the motor vehicles omitted;
- Figure 3 is an enlarged view in accordance with detail A of Figure 2;
- Figure 4 is a view corresponding to Figure 3 of a variant of the parking facility from Figure 1;

Figures 5a

and 5b are in each case simplified perspective views of a storage device for motor vehicles for a second preferred embodiment of a parking facility constructed in accordance with the invention, wherein the storage device comprises a shielding device which is shown in Figure 5a as occupying an open position and in Figure 5b as occupying a shielding position;

Figure 6 is a view corresponding to Figure 2 of the second preferred embodiment of the parking facility constructed in accordance with the invention;

Figure 7 is a view in accordance with detail B of Figure 6;

Figure 8 shows a simplified exploded perspective view of a transport device, a storage device and a pallet of a third preferred embodiment of a parking facility constructed in accordance with the invention; and

Figure 9 is a view in accordance with Figure 2 of a third preferred embodiment of the parking facility constructed in accordance with the invention.

Figure 1 shows a schematic side view of a first preferred embodiment of a parking facility constructed in accordance with the invention, designated by the reference numeral 10. The parking facility 10 comprises a storage rack 12 fixed standing upright on a ground surface 14. The storage rack 12 is constructed in a manner known per se from vertical members 16 and horizontal members 18 (transverse members) and 19 (longitudinal members) that are connected together crosswise.

Functionally, the parking facility 10 is constructed from a plurality of grids, namely five grids arranged one next to the other. Starting from the right side

in Figure 1, the parking facility 10 comprises a first storage grid 20, a first transport grid 22, a second storage grid 24, a second transport grid 26 and finally a third storage grid 28, with the meaning of "storage grid" and "transport grid" being explained subsequently. Thus, the parking facility has more storage grids 20, 24 and 28 than transport grids 22 and 26 and has the two storage grids designated 20 and 28 provided at the outer sides thereof.

Motor vehicles 30, only shown in Figure 1, are capable of being stored inside the parking rack 12 in a plurality of storage levels, namely seven storage levels, with each storage level being horizontally oriented and arranged one above the other. To this end, each storage grid 20, 24 and 28 has existing therein seven storage-grid storage locations - hence the name - that are designated by the reference numeral 32, which are arranged vertically one above the other in the respective storage grid 20, 24 or 28. Whenever used hereinafter, the term storage location 32 should be understood to mean a storage-grid storage location 32.

The transport grids 22 and 26 also have existing therein storage locations for motor vehicles 30, namely seven transport-grid storage locations each, which are likewise arranged vertically one above the other and are designated by the reference numeral 34. Any reference to storage locations 34 made hereinafter should be understood to refer to transport-grid storage locations 34. In the current configuration of the parking facility 10 as depicted in Figure 1, only the storage locations 34 of the first transport grid 22 are occupied by motor vehicles 30. In contrast, the storage locations 34 of the second transport grid 26 are completely free of motor vehicles 30.

The parking facility 10 further comprises two entrances and two exits 36 and 38 respectively which are arranged at the transport grids 20 and 26 respectively at the bottom side thereof; users can drop off their motor vehicle 30 at the parking facility 10 and pick it up from here.

As mentioned earlier, the parking facility 10 is a parking facility standing upright on the ground surface 14. In a variant of the parking facility, provision could also be made for the parking facility to be wholly or at least partially arranged in a pit located below the ground surface 14. Furthermore, the parking facility only comprises grids 20 to 28 in a vertical plane oriented perpendicularly to the ground surface 14 (drawing plane in Figure 1). In a variant of the parking facility 10 it is, however, also conceivable for the grids 20 to 28 to extend in at least one further vertical plane parallel to the above-mentioned vertical plane (perpendicular to the drawing plane in Figure 1) and for motor vehicles 30 to be capable of being also stored in any one of these additional vertical planes.

As will be apparent hereinafter, in particular from Figures 1 and 2, the parking facility 10 comprises transport devices 40 and 42, hereinafter referred to as lifters 44 and 46 respectively, for transporting motor vehicles 30 in the transport grids 22 and 26. For clarity of illustration, the lifter 44 is shown only in Figure 1 and omitted from Figures 2 to 4. The lifters 44 and 46 are each capable of being moved in a vertical direction in the transport grids 22 and 26 respectively by schematically shown drives 48 and 50 respectively. The drives 48 and 50 are for example chain drives known per se that can be controlled by an electronic control unit 52 via control lines not shown in the drawing.

The lifters 44 and 46 are of identical configuration, each comprising in a manner known per se two longitudinal members 54 movably supported on vertical members 16. Each of the longitudinal members 54 has, in a direction towards the other one of the longitudinal members 54, protruding therefrom a first group of support elements 56 spaced apart from one another and, spaced at a distance therefrom, a second group of support elements 58 spaced apart from one another. Five support elements 56 and ten support elements 58 are shown as an example. The support elements 56 serve to receive a front wheel of a motor vehicle 30, and the support elements 58 serve to receive a back wheel thereof. The support elements 56 and 58 may each be regarded as the "prongs" of a fork or comb, which is why this storage and retrieval technique

employed in the parking facility 10 is also called a "comb technique" or "fork technique".

To store motor vehicles 30 in the storage locations 32 and 34, the parking facility 10 comprises storage devices 60, in the following referred to as platforms 62, each of identical configuration. The platforms 62 each comprise two longitudinal members 64 spaced apart from one another and extending between the horizontal members 18 and forming support parts of the platform 62. The longitudinal members 64 are connected together on both sides at the end faces thereof facing towards the horizontal members 18 by transverse members 66.

The transverse members 66 are supported on the horizontal members 18 for displacement thereon in a horizontal direction and therefore transverse to the transport direction of the lifters 44 and 46 in the transport grids 22 and 26. This allows the platform 62 to be displaced from the storage grids 20, 24 and 28 into the transport grids 22 and 26 and vice versa. In order to displace the platform 62, each of the storage locations 32 and 34 has existing thereat a drive 68, each of which is operatively connected to the control unit 52 via a control line not shown in the drawing. The drive 68 is for example a belt drive or a friction-wheel drive, known per se.

The respective longitudinal members 64 of a platform 62 are covered on the upper side thereof by a cover 70 which closes off about one-half to about one-third of the respective grid 19 in a strip-shaped manner in a direction transverse to the longitudinal direction, the cover 70 extending almost completely from the front to the rear transverse member 66.

Extending from each of the longitudinal members 64 in a direction towards an adjacent grid are a first group of support elements 72 spaced apart from one another and, spaced at a distance therefrom, a second group of support elements 74 spaced apart from one another. Four support elements 72 and nine support elements 74 are shown by way of example. The support elements

72 and 74 are in each case of prong-like formation and can interdigitate with some clearance with the support elements 56 and 58 of the lifters 44 and 46 respectively. Furthermore, when one of the platforms 62 is arranged in a transport grid 22 and 26, there is no overlap in the cross-sections of the lifters 44 and 46 respectively and the platforms 62. This makes it possible for the lifters 44 and 46 to be, in a sense, "moved through the platforms 62" in a vertical direction. In this way, motor vehicles 30 can be transferred between the lifters 44 and 46 and the platforms 62. The transfer takes place at one of the points of intersection between one of the transport grids 22 and 26 and one of the storage levels. Thus, motor vehicles in the parking facility 10 are transported vertically in the transport grids 22 and 26 by use of the lifters 44 and 46 respectively and are transported horizontally in the respective storage level by use of the platforms 62 and drives 68.

The platforms 62 are associated with the respective storage locations 32 and 34, wherein "associated" in the present case means that a particular one of the platforms 62 and a motor vehicle positioned on that platform 62 can be stored in a particular one of the respective storage locations 32 and 34. As shown for example in Figure 1, the platforms 62 in the storage grid 20 are associated with the storage locations 32 and 34 in the storage grid 20 and in the first transport grid 22, in each case on the same storage level. The platforms 62 shown in the first transport grid 22 are associated with storage locations 32 and 34 in the first transport grid 22 and in the second storage grid 24. The platforms 62 shown in the second storage grid 24 are associated with the storage locations 32 and 34 in the second storage grid 24 and in the second transport grid 26. Finally, the platforms 62 shown in Figure 1 as being arranged in the third storage grid 28 are associated with the storage locations 32 and 34 in the third storage grid 28 and in the second transport grid 26. These associations are in each case within the same storage level.

The above description shows that in the present case, in accordance with the invention, the number of platforms 62 of the parking facility 10 is greater than the number of storage locations 32 in the storage grids 20, 24 and 28. This

makes it possible for platforms 62 and motor vehicles 30 positioned thereon to be stored not only in the storage grids 20, 24 and 28 but also in the transport grids 22 and 26. To this end, the latter comprise precisely the transport-grid storage locations 34.

In particular, the number of platforms 62 provided in the parking facility 10 is just such that, by use of the control unit 52 and the drives 68, exactly one transport grid 22 or 26 is capable of being cleared of platforms 62, which in the configuration depicted in Figure 1 is represented by the second transport grid 26. On the one hand, this ensures that no empty locations need exist in the storage grids 20, 24 and 28 for temporary parking and manoeuvring of platforms 62. On the other hand, the average access time of the parking facility 10 can be kept as short as possible because the number of transverse displacement moves of platforms 62 can be reduced. For example, provision could be made for the control unit 52 to be configured and programmed such that the storage grids 24 and 28 are occupied by motor vehicles 30 of short-term parkers, whereas the transport grid 22 and the storage grid 20 are preferably occupied by motor vehicles 30 of long-term parkers. If the control unit 52 is configured and programmed to keep the transport grid 26 free, as shown in Figure 1, then the motor vehicles 30 stored in the storage grids 24 and 28 can be stored and retrieved in a particularly expeditious manner. To this end, these motor vehicles 30 can each be transferred by the lifter 46 from one of the points of intersection of the transport grid 26 with one of the storage levels to the respective platform 62 and vice versa.

On the other hand, if it is desired to retrieve one of the motor vehicles 30 arranged in the transport grid 22, first at least the platforms 62 in the storage grid 24 that are arranged below the motor vehicle 30 to be retrieved are to be displaced into the transport grid 26 and the platforms 62 of the transport grid 22 are to be displaced into the storage grid 24. Subsequently, the motor vehicle 30 to be retrieved can be retrieved in a manner known per se by use of the lifter 44.

When one of the motor vehicles 30 stored in the storage grid 20 is to be retrieved, first at least the platforms 62 in the grids 22 and 24 that are arranged below and on the same storage level as the motor vehicle 30 to be retrieved are to be displaced into the grids 24 and 26 respectively. Thereafter, the motor vehicle 30 to be retrieved can be displaced on its associated platform 62 into the transport grid 22 and can be retrieved in a manner known per se by use of the lifter 44.

If, as explained above, a plurality of platforms 62 are to be moved in order to vacate a transport grid 22 or 26, provision may be made for these platforms to be displaced simultaneously in order to keep the average access time as short as possible. However, the requirements for the parking facility 10 in terms of electrical power and mechanical stability can be relaxed by displacing the platforms 62 and hence the masses successively, thereby increasing the average access time. Provision may be made for a combination form to be used involving simultaneous and successive displacements of platforms 62.

For storing motor vehicles 30 in the parking facility 10, the above sequence is for example reversed. Of course, provision may also be made for keeping preferably the transport grid 22 free of platforms 62.

In the parking facility constructed in accordance with the invention, it is thus possible by the provision of excess platforms 62, the number of which is greater than the number of the storage locations 32, to store an increased number of motor vehicles 30. Yet, as practice shows, the average access time to a motor vehicle 30 can still be kept sufficiently short.

In order to protect motor vehicles 30, the parking facility 10 comprises shielding devices, as will be described in more detail hereinafter. Thus, each of the storage locations 32 of the storage grids 20, 24 and 28 has fixedly attached shielding devices 76 arranged thereat, namely immediately below the respective storage locations 32. The fixedly attached shielding devices 76 each comprise a planar or trough-shaped shielding element 78 that is fixedly

connected, at the bottom side, to the horizontal transverse members 18 of the storage rack 12 by use of holding elements 80 schematically shown in Figure 3. This is also schematically shown in Figure 1 for the lowermost storage level. The holding elements 80 are for example conventional mounting brackets, screwed together with the shielding elements 78 and the horizontal members 18.

The shielding elements 78, in the present case configured as troughs 82, are free of openings or cutouts. This makes it possible for motor vehicles 30 positioned below the respective trough 82 in one of the storage locations 32 of the storage grids 20, 24 and 28 to be protected from water, snow, snow slush, dirt, loose chippings or the like that have become detached from a motor vehicle 30 above the respective trough 82. To this end, the troughs 82 in each case substantially completely close off the cross-section of the storage grids 20, 24 and 28 (Figures 2 and 3).

However, referring to Figure 3, each of the troughs 82 can be connected via a liquid pipe 86 to at least one downpipe 84 in order to drain the trough 82. The downpipes 84 and the liquid pipes 86 together form a drain device 88 of the parking facility 10.

Each of the transport-grid storage locations 34 has movable shielding devices 90 associated therewith comprising two planar or trough-shaped closed shielding elements 92 of identical configuration and arranged symmetrically with respect to one another at the storage rack 12. In the present case, the shielding elements 92 are configured as troughs 94. The troughs 94 are each supported for displacement in a horizontal direction on one of the fixedly attached troughs 82, which are attached to the storage rack 12 at storage grids 20 and 24 and storage grids 24 and 28 on opposite sides of the transport grids 22 and 26 respectively. To this end, each trough 94 comprises two horizontally oriented holding elements 96 which are guided for displacement in groove-shaped guides 98 of the troughs 82 that are shaped complementary thereto. In a longitudinal direction of the troughs 82

and 94, the holding elements 96 and the guides 98 are arranged forward of the support elements 72 and rearward of the support elements 74 respectively.

In order to displace the troughs 94 transversely, each holding element 96 has a drive 100 associated with it, said drive 100 being also fixedly attached to the trough 82. The drive 100 is for example a rack-and-pinion drive, a belt drive, a friction roller drive or a rope or chain drive. The drives 100 are operatively connected to the control unit 52 via control lines, not shown, so that they are capable of being controlled thereby.

It is also conceivable for the movable troughs 94 to be movably supported on the storage rack 12, for example on the horizontal members 18, which can have the guides 98 and drives 100 attached thereto for that purpose.

In a longitudinal direction of the storage locations 34 and platforms 62 stored therein, the dimensions of the troughs 94 are just such that the space between the transverse members 66 is substantially completely closed off. In a transverse direction of the storage locations 34, the troughs 94 are dimensioned such that they in each case close off about one-quarter to about one-third of the cross-section of the transport grids 22 and 26 laterally. This substantially corresponds to the residual free cross-section of the transport grids 22 and 26 with platforms 62 arranged in the respective storage locations 34 (Figure 3).

The movable shielding device 90 is capable of being moved from an open position to a shielding position and vice versa, with the drives 100 being correspondingly controlled by the control unit 52. In the open position, the troughs 94 are arranged outside of the cross-section of the transport grids 22 and 26, namely on opposite sides of the storage grids 20 and 24 and 24 and 28 adjacent to the respective transport grid 22, 26. Therefore, the free cross-section of the respective transport grid 22, 26 is completely free in the open position so that the lifters 44 and 46 respectively can be moved therein.

For moving the troughs 94 to the shielding position, the drives 100 are activated in order to displace the holding elements 96 in a horizontal direction within the guides 98. The troughs 94 of a shielding device 90 are thereby displaced from opposite sides into the respective transport grid 22, 26. They are displaced so far that the troughs 94, seen in the projection of the transport grids 22 and 26, reach the longitudinal members 64 of platforms 62 stored in the respective storage location 34. As a result, the cross-section of the transport grids 22, 26 is reduced in the shielding position of the shielding devices 90.

In combination of the shielding device 90 with a platform 62 stored in a storage location 34, the cross-section of the transport grids 22, 26 is capable of being substantially completely closed off. Of this, as mentioned above, approximately one-half to approximately two-thirds are closed off laterally by the troughs 94 and approximately one-half to approximately one-third is closed-off centrally by the cover 70, in a transverse direction of the storage location. This allows a motor vehicle 30 positioned in a storage location 34 to be substantially completely covered at its bottom side. Motor vehicles 30 that are stored below the respective motor vehicle 30 in the transport grid 22, 26 are thereby protected effectively against water, snow, snow slush, dirt, loose chippings or the like.

It is understood that for leaving a transport grid 22, 26 vacant, the shielding devices 90 associated with the respective storage locations 34 are also to be moved to the open position in order for the lifters 44 and 46 respectively to be movable therein. In particular, provision may be made for shielding devices 90 associated with the storage locations 34 to be moved to the shielding position only when a platform 62 is stored in the storage location 34 and a motor vehicle 30 is positioned thereon. Otherwise, the respective shielding device 90 can remain in the open position in order to reduce the average access time.

For draining the troughs 94, the drain device 88 comprises liquid pipes 102, each trough 94 being capable of being drained via a liquid pipe 102 into one of the fixed troughs 82 on which it is supported. To this end, it is advantageous for the troughs 94 to be arranged above the troughs 82.

A variant of the parking facility 10 and further preferred embodiments of the parking facility constructed in accordance with the invention are discussed in the following. The same reference numerals are used for features that are identical to or functionally equivalent to those of the parking facility 10. The advantages that can be achieved with the parking facility 10 can also be achieved with the parking facilities that are described hereinafter, and only the essential differences will be discussed.

In a variant of the parking facility 10, of which only a detail is shown in Figure 4 in a view corresponding to that of Figure 3, the movable shielding device 90 only comprises a single closed shielding element 104 which is of a planar or trough-shaped form. The shielding element 104 in the present case is a trough 106 that is supported for horizontal displacement on one of the fixed troughs 82 of the fixed shielding devices 76 by use of the holding elements 96, guides 98 and drives 100. Preferably, the troughs 106 that are displaceable into the transport grid 22 are supported for displacement on the troughs 82 of the storage grid 20 and the troughs 106 that are displaceable into the transport grid 26 are supported for displacement on the troughs 82 of the storage grid 28.

It is, however, also conceivable for the movable troughs 106 to be movably supported on the storage rack 12, for example on the horizontal members 18, which can have the guides 98 and drives 100 attached thereto for that purpose.

The troughs 106 are dimensioned such that they in each case substantially completely close off the cross-section of the transport grids 22, 26 when in the shielding position. In this case, they substantially completely cover, at the

bottom side, the platforms 62 arranged in the storage locations 34 in order to shield motor vehicles 30 arranged therebelow effectively. In the respective open position, the troughs 106 open up the cross-section of the transport grids 22, 26 and are arranged completely above the fixed troughs 82 on which they are supported in each case (not shown).

In a further variant of the parking facility 10, not shown in the drawing, which exhibits similarities to the variant of the parking facility 10 depicted in Figure 4, the movable shielding device 90 has none of the drives 100 associated with it. Instead, the shielding devices 90, each of which comprises a trough 106 as in Figure 4, are capable of being coupled to the platforms 62 and are capable of being moved from the open position to the shielding position and vice versa by making use of the drives 68 of said platforms 62.

For example, two troughs 106 are supported, one above the other, for displacement in a horizontal direction on the storage rack 12, for example on the horizontal members 18, below each storage location 34 of the storage grid 24. Out of these two troughs 106, one in each case is capable of being displaced into the transport grid 22, while the other one is capable of being displaced into the transport grid 26. The first-mentioned trough is capable of being coupled to the platform 62 that is shown to be arranged in the transport grid 22 in the configuration of the parking facility 10 illustrated in Figure 1. The last-named trough 106 is capable of being coupled to the platform 62 that is shown to be arranged in the storage grid 24 in the configuration illustrated in Figure 1.

The coupling between the troughs 106 and the platforms 62 can be accomplished by cooperating coupling elements, for example in the form of catch stops. Electromagnetic coupling is also conceivable. The coupling, for example by catch stops, can be released for example by moving the respective coupling element from a coupling position to a decoupling position. To this end, it may be provided for electromagnets capable of being controlled by the control unit 52 to exist at the platforms 62 in order to move the coupling

elements from the coupling position to the decoupling position and/or vice versa.

For example, if the motor vehicles 30 shown in Figure 1 as being stored in the storage grid 24 are to be intermediately stored in the transport grid 26, the platforms 62 can be coupled to the respective troughs 106 so that both the platforms 62 and the troughs 106 are moved into the transport grid 26 under the action of the drives 68, whereby the troughs 106 are moved to the shielding position. Conversely, the platforms 62 and the troughs 106 can be removed from the transport grid 26 under the action of the drives 68, whereby the troughs 106 are moved to the open position.

When one of the motor vehicles 30 shown as being arranged in the storage grid 24 is to be retrieved, the corresponding platform can be decoupled from its associated trough 106 by moving the respective coupling element to the decoupling position. This makes it possible to move the platform 62 together with the motor vehicle 30 into the transport grid 26 where the motor vehicle 30 can be transferred to the lifter 46. Due to the decoupling action, the trough 106 remains in the storage grid 24 so that the lifter 46 can be moved unhindered within the transport grid 26. This applies analogously to the platforms 62 shown in Figure 1 as being arranged in the transport grid 22 and to the troughs 106 that are capable of being coupled thereto.

In this variant of the parking facility 10, it is even possible to dispense with the shielding devices 76 that are fixedly attached at the storage grid 24.

Figures 6 and 7 show a detail of a second preferred embodiment of a parking facility, designated by the reference numeral 110, in a view corresponding to that of Figures 2 and 3. While the parking facility 110 uses the fixed shielding devices 76, it does not use the movable shielding devices 90. Instead, movable shielding devices 112 are provided for bottom-side covering of motor vehicles 30 in the transport grids 22, 26.

Each shielding device 112 is comprised by a platform 62, is arranged at the bottom side thereof and has two closed shielding elements 114 of planar or trough-shaped configuration. The shielding elements 114 in the present case are configured in the form of troughs 116 which in terms of their dimensions substantially correspond to the troughs 94 of the shielding devices 90 and are arranged one above the other in a space-efficient manner. The troughs 116 are supported on the transverse members 66 for displacement in a horizontal direction within corresponding guides 118. For their drive, the platforms 62 comprise drives 120 (schematically shown in Figure 7) which are configured for example as rack-and-pinion drives, belt drives, friction roller drives or chain drives. The drives 120 are connected to the control unit 52 and thus capable of being controlled thereby.

The movable shielding devices 112 can adopt an open position in which the troughs 116 are in each case arranged below the longitudinal members 64 and the cover 70 (Figure 5a). In the open position, the cross-section of a platform 62 arranged in a storage location 34 has no overlap with the cross-section of the respective lifter 44 or 46 so that the same can be moved in the transport grid 22 and 26 respectively. By control through the control unit 52, the troughs 116 can be moved by the drives 120 to a shielding position in which they are displaced horizontally in opposite directions along the guides 118, starting from the longitudinal members 64. In the shielding position, the troughs 116 in combination with the cover 70 substantially completely close off the cross-section of the transport grids 22 and 26 both in a longitudinal and a transverse direction, as is the case in the parking facility 10 with the troughs 94 in the shielding position. Reliable shielding of motor vehicles 30 arranged below the respective platform 62 can thereby be ensured.

In particular, provision is made for the control unit 52 to move the movable shielding device 112 to the respective shielding position only when the respective platform 62 has a motor vehicle 30 positioned thereon. Further, in the parking facility 110, provision may be made for the fixed shielding

devices 76 to be eliminated partially or entirely. For example, it lends itself to omitting the fixed shielding elements 78 in the central storage grid 24. The platforms 62 arranged in the grids 22 and 24 may each comprise movable shielding devices 112 in order to permit shielding in the transport grids 22, 26 and in the storage grid 24. On the other hand, the storage grids 20 and 28 may be provided with platforms 62 with no movable shielding devices 112, but with fixed shielding devices 76 instead. It is, however, also possible for each of the platforms 62 to comprise a movable shielding device 112, in which case fixed shielding devices 76 are no longer a necessity.

The shielding elements 78, 92, 104 and 114 in the present case are for example partially or completely made of a metal and/or a plastics material. The shielding elements 78, 92, 104 and 114 can be of plate-shaped configuration instead of being configured as troughs 89, 94, 106 and 116 respectively. The use of shielding elements configured as tarpaulins is also conceivable.

Figure 9 shows a third preferred embodiment of a parking facility constructed in accordance with the invention, designated by the reference numeral 130, in a view corresponding to that of Figure 2. In the parking facility 130, instead of the transport devices 40 and 42, transport devices are provided of which only one transport device 132 is shown in the transport grid 26, hereinafter referred to as lifter 134 (refer also to Figure 8). The lifter 134 comprises two longitudinal members 136 that are constructed symmetrically with respect to each other and are each movably supported at their ends on the vertical members 16 and are capable of being vertically moved by the drives 48 and 50. Each longitudinal member 136 has, in a direction towards the other one of the longitudinal members 136, a plurality of supporting elements 138 protruding therefrom in a castellated manner. By way of example, four supporting elements 138 of rectangular cross-section are provided in each case. Each supporting element 138 has an alignment element 140 protruding therefrom in a vertical direction, said alignment element 140 in the present case having a disk-shaped configuration.

Storage devices 142, hereinafter platforms 144, are provided in lieu of the storage devices 60. The platforms 144 each comprise two longitudinal members 146 extending parallel to one another and joined on both sides at the ends thereof by cross members 148. The longitudinal members 146 and the cross members 148 serve the same purpose as the longitudinal members 64 and the transverse members 66 of the platforms 62. The cross-sections of the platforms 144 and the lifter 134 in the respective transport grid 22, 26 do not overlap so that the transfer of motor vehicles at the points of intersection between the transport grids 22, 26 and the storage levels can likewise be accomplished as described above.

Furthermore, the parking facility 130 comprises pallets 150, each platform 144 having exactly one pallet 150 associated with it. The pallet 150 is closed and thus free from openings or cutouts and serves to accommodate motor vehicles 30. To this end, it comprises, in the conventional manner, wheel recesses 152 extending parallel to one another in a longitudinal direction. The pallets 150 are double-folded in the transition region from the wheel recesses 152 to a central section 154. In a transverse direction of the pallet 150, the central section 154 is in each case dimensioned such that it can cover the longitudinal members 156 of the pallets 150 in a positively-locking manner. This enables the pallet 150 to be aligned and fixed relative to the platform 154 in a horizontal plane.

Furthermore, alignment elements 156 in the form of cylindrical recesses 158 are provided at the bottom side of the pallet 150. The alignment elements 140 of the lifter 134 can engage in the recesses 158 in a positively-locking manner. This ensures alignment and fixing of the pallet 150 relative to the lifter 134 in a horizontal plane.

Instead of two times four supporting elements 138 and alignment elements 140 and 156, more or less supporting elements and alignment elements may be provided, in particular two times two supporting elements and alignment

elements. Instead of the alignment elements 140 and 156, alignment elements of different type may be provided, for example alignment elements in the form of centring mandrels, which may for example have a conical shape, and associated recesses, also having a conical shape. Cooperating alignment brackets at the longitudinal members 136 and the pallets 150 are also conceivable.

In the parking facility 130, the pallets 150 serve to transport motor vehicles positioned thereon for storing and retrieving the same. Due to the fact that in the transport grids 22, 26, the cross-section of the pallets 150 in each case overlaps with the cross-section of the platforms 144 and the cross-section of the lifter 134, the pallets 150 with motor vehicles 30 positioned thereon are transferred at the points of intersection of the transport grids 22, 26 with the storage levels.

Furthermore, the pallets 150 allow the motor vehicles 30 arranged therebelow to be shielded from water, snow, snow slush, dirt, loose chippings or the like. Therefore, the shielding devices 76, 90 and/or 112 may be omitted in the parking facility 130, although provision may of course be made for them to be also utilized in the parking facility 130. The use of combination forms of the parking facilities 10, 110 and/or 130 in which both pallets 150 and shielding devices 76, 90 and/or 112 may be used is also conceivable.

By eliminating the need for shielding devices 76, 90 and/or 112, it is also possible to eliminate the necessity for the drives 100 and 120 associated with them, thereby simplifying control of the parking facility 130. Users benefit from the pallets 150 in that driving into the parking facility 130 and onto the pallets 150 can be a significantly more pleasant experience than driving onto the spaced-apart support elements 56 and 58 of the lifters 44 and 46.

In the control of the parking facility 130, it is in particular provided for the pallets 150 to be transported back to the platform 144 associated therewith once the motor vehicle has been retrieved. This eliminates the necessity of

vacant spaces for pallets 150 which would otherwise have to be provided for holding them in store. This allows the parking facility 130 to be built in a compact form.

PATENT CLAIMS

1. Automated parking facility (10; 110; 130) for motor vehicles (30), said parking facility (10; 110; 130) being made up of grids and comprising at least two storage grids (20, 24, 28) and at least two transport grids (22, 26), wherein motor vehicles (30) are movable along a first direction of movement in each of the transport grids (22, 26) by a transport device (40, 42; 132) and wherein storage-grid storage locations (32) for storing motor vehicles (30) positioned on storage devices (60; 142) exist in the storage grids (20, 24, 28), which storage devices (60; 142) are associated with the storage-grid storage locations (32), and wherein the storage devices (60; 142) are movable from the respective storage-grid storage locations (32) into at least one transport grid (22, 26) in a second direction of movement oriented transversely to the first direction of movement and vice versa, in which transport grid (22, 26) motor vehicles (30) are transferable from the respective transport device (40, 42; 132) to the respective storage device (60; 142) and vice versa by mutual passing, characterized in that the number of storage devices (60; 142) is greater than the number of the storage-grid storage locations (32) and in that the excess storage devices (60; 142) are associated with transport-grid storage locations (34) existing in the transport grids (22, 26).
2. Parking facility in accordance with claim 1, characterized in that the maximum number of storage devices (60; 142) is such that at least one transport grid (22, 26) is clearable of storage devices (60; 142).
3. Parking facility in accordance with claim 2, characterized in that the number of storage devices (60; 142) is such that exactly one transport grid (22, 26) is clearable of storage devices (60; 142).
4. Parking facility in accordance with any one of the preceding claims, characterized in that the parking facility (10) comprises a control

unit (52) which, when not processing transactions of storing or retrieving motor vehicles (30), moves the storage devices (60; 142) into the storage-grid storage locations (32) and transport-grid storage locations (34) in such a way that at least one, in particular exactly one, transport grid (22, 26) is free of storage devices (60; 142).

5. Parking facility in accordance with any one of the preceding claims, characterized in that the parking facility (10) comprises shielding devices (76, 90; 112) for protecting motor vehicles (30) that are arranged below storage locations (32, 34) and/or storage devices (60; 142).
6. Parking facility in accordance with claim 5, characterized in that the shielding devices (76, 90; 112) each comprise at least one shielding element (78, 92, 104; 114) of planar or trough-shaped configuration.
7. Parking facility in accordance with claim 5 or 6, characterized in that at least part of the storage-grid storage locations (32) and/or transport-grid storage locations (34) have arranged thereat shielding devices (76, 90; 112) at least partially covering said storage locations (32, 34) at the bottom side thereof.
8. Parking facility in accordance with claim 7, characterized in that at least part of the storage-grid storage locations (32) have arranged thereat shielding devices (76) that are fixedly attached to the storage grid (20, 24, 28).
9. Parking facility in accordance with claim 8, characterized in that storage-grid storage locations (32) of a storage grid (24) arranged between two transport grids (22, 26) do not have fixedly attached shielding devices (76) arranged thereat.

10. Parking facility in accordance with any one of claims 7 to 9, characterized in that at least part of the transport-grid storage locations (34) have arranged thereat movable shielding devices (90) that are movable from an open position in which the cross-section of the respective transport grid (22, 26) is opened up to at least the extent of the transport device (40, 42; 132) movable therein to a shielding position in which the cross-section of the transport grid (22, 26) is reduced relative to the open position, and vice versa.
11. Parking facility in accordance with claim 10, characterized in that the respective movable shielding device (90) in the shielding position in each case closes off about one-quarter to one-third of the cross-section of the transport grid (22, 26) in a transverse direction of the transport-grid storage location (34), but leaves a residual cross-section of about one-half to one-third in the centre of the transport grid (22, 26).
12. Parking facility in accordance with claim 10 or 11, characterized in that the movable shielding devices (90) are each displaceable along the second direction of movement transverse to the respective transport grid (22, 26).
13. Parking facility in accordance with any one of claims 10 to 12, characterized in that the respective movable shielding device (90) is movably supported on at least one fixedly attached shielding device (76) of a storage grid (20, 24, 28) adjacent to the transport grid (22, 26).
14. Parking facility in accordance with claim 13, characterized in that the movable shielding device (90) is arranged above the fixedly attached shielding device (76).
15. Parking facility in accordance with any one of claims 10 to 14, characterized in that the respective movable shielding device (90)

comprises two shielding elements (92) which, when moved from the open position to the shielding position, are introduceable into the transport grid (22, 26) from opposite sides thereof.

16. Parking facility in accordance with any one of claims 10 to 15, characterized in that the respective movable shielding device (90) is couplable, or is coupled, to a storage device (60; 142) for its movement from the open position to the shielding position and vice versa.
17. Parking facility in accordance with any one of claims 5 to 16, characterized in that at least part of the storage devices (60; 142) in each case comprise a movable shielding device (112) which is movable from an open position to a shielding position, wherein the shielding device (112) in the shielding position covers, at the bottom side, a motor vehicle (30) positioned on the respective storage device (60; 142) to a proportion that is larger than that in the open position and wherein the shielding device in the open position, when arranged in a transport-grid storage location (34), opens up the cross-section of the transport grid (22, 26) to at least the extent of the transport device (40, 42; 132) movable therein.
18. Parking facility in accordance with claim 17, characterized in that the storage devices (60; 142) each comprise at least one support part (64; 136) on which the respective shielding device (112) is supported for displacement in a transverse direction of the storage device (60; 142).
19. Parking facility in accordance with claim 18, characterized in that the at least one support part (64; 136) in each case is arranged centrally in a transverse direction of the respective storage device (60; 142) and the respective movable shielding device (112) comprises two shielding elements (114) which are movable in opposite directions from the open

position to the shielding position and vice versa, starting from the at least one support part (61; 136).

20. Parking facility in accordance with claim 19, characterized in that the shielding elements (114) are arranged one above the other.
21. Parking facility in accordance with any one of claims 17 to 20, characterized in that the respective movable shielding device (112) in the shielding position in each case closes off about one-quarter to one-third of the cross-section of the transport grid (22, 26) in a transverse direction of the transport-grid storage location (34).
22. Parking facility in accordance with any one of claims 5 to 21, characterized in that the parking facility (10) comprises at least one drain device (88) for draining liquid off the shielding devices (60; 142).
23. Parking facility in accordance with any one of the preceding claims, characterized in that at least part of the storage devices (60; 142) have associated with them pallets (150) that are releasably positionable thereon for the reception of motor vehicles (30), said pallets (150) being transferable within the transport grid (22, 26) from the respective storage device (60; 142) to the respective transport device (40, 42; 132) and vice versa by mutual passing.
24. Parking facility in accordance with claim 23, characterized in that the pallets (150) are each free of openings.
25. Parking facility in accordance with claim 23 or 24, characterized in that the pallets (150) and the storage devices (60; 142) each comprise cooperating alignment elements for alignment relative to each other in at least one spatial direction and/or in that the pallets (150) and the transport devices (40, 42; 132) each comprise cooperating alignment

elements (140, 156) for alignment relative to each other in at least one spatial direction.

26. Parking facility in accordance with any one of claims 23 to 25, characterized in that the parking facility (10; 110; 130) comprises a control unit (52) which causes the respective pallet (150) to be transported to the storage device (60; 142) associated with it when there is no motor vehicle (30) positioned on the pallet (150).