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(54) **Modular platform**

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Plateforme modulaire

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Description

[0001] The invention relates to temporary building structures, and particularly those of a portable modular nature whose size can be varied depending upon the requirements of the user. The invention describes a modular platform e.g. for use as a temporary (or medium term) solution to car park space shortage. Although the description focuses on its use for parking, it is to be noted that its potential use extends beyond this single idea. For example, the platform may be used to support portable buildings (e.g. portable cabins or offices), such that, for example, both offices and car parking (e.g. under the platform) can be located on the same area of ground. Such a solution is particularly advantageous in situations where there is a shortage of space and is particularly useful if the platform is erected over an existing car park.

[0002] The idea of a portable modular car park is in itself not new. For example, EP0422915 (Erel) teaches a multi-storey structure having pre-fabricated units of a modular construction, and US 5720135 (Paquette) shows a vehicle parking structure having a steel framework with a grid of support beams for holding a number of modular deck panels.

[0003] The problems associated with such structures include the need to strike a balance between portability, ease/speed of construction and structural strength, i.e. the ability of a temporary structure (i.e. one without foundations) to support the weight of a load mounted on it (e.g. a number of parked vehicles). It is known to provide 'quasi-foundations' by embedding at least a portion of a support column in the ground to stabilise the whole construction. However, this clearly defeats the very object of having a temporary and portable structure. Most previous attempts (e.g. Erel and Paquette) provide a grid of columns, where each modular plate which makes up the deck structure is supported on each of its corners. This provides good strength, but it makes the underside of the car park surface difficult to negotiate (e.g. in a car) because there are so many columns. Of course, removing the inner columns weakens the structure - when a load is applied to such a structure, the deck may sag and the legs tend to splay out. This not only looks very unsafe, but could lead to buckling in the columns, and even structural collapse.

[0004] A further solution to the above problem is proposed in GB2350132 (Stern), where the surface of the deck units are corrugated such that the surface itself deforms to support a proportion of the load on it. The disadvantage of this structure, however, is that it takes longer to assemble and is relatively complicated and technically difficult to manufacture.

[0005] Further problems with known structures include the size and/or number of components required to assemble them. These features might make known modular units inefficient to transport because special sized transport e.g. 'wide load' lorries that may require a police escort might be needed. Furthermore, the more components there are to assemble, the longer assembly may take, particularly as every joint will need carefully checking for safety reasons.

FR-A-2642784 discloses a modular car park for automobiles.

[0006] At its most general, the present invention provides a temporary portable platform, suitable for use as a car park, that can be erected over an area (e.g. a ground level car park) to add an extra level e.g. for car parking, locating of portable buildings or the like. The platform clearly has many potential uses, e.g. for storage or large containers or in any application where more space is required but available land is limited. The platform is made of modular units shaped to be both easy to transport and quick to erect. The modular units are shaped and constructed such that the entire platform may need only to be supported along two of its edges. This construction is useful because it allows good access to the underside of the platform and the underside itself does not have any columns which may hinder its use.

[0007] Accordingly, the invention provides a modular platform according to claim 1 and a kit for constructing a modular platform according to claim 44.

[0008] According to some aspects of the present invention the deck surface of each deck module is substantially rectangular, the deck surface having a support space (suitable for supporting a vehicle or a portable building or the like) located at each of the longitudinally opposite ends, and an aisle space between the support spaces suitable for allowing passage of traffic.

[0009] 'Vehicle' may be interpreted to mean a car or van, but of course the invention could also be used with larger vehicles. The present invention thus provides a platform made up of deck modules each of which has more than one car parking space on it. Of course, the spaces need not be used solely for car parking; each car parking space may be used for car or pedestrian management. The deck modules may be the smallest components that make up the surface of the platform. They are prefabricated units, i.e. they are not easily disassembled into further pieces. They are intended as the building blocks of the platform to be used on site. To make them smaller would require a cutting torch or the like. The deck modules may be supported at or near their corners, which means that fewer supporting columns are required than in known constructions. The span of the deck modules may be greater than those in the prior art, thereby allowing the underside of the platform to be used more effectively, including use as a car park. The deck modules may vary in length to include further parking spaces or a wider aisle space. The deck module may be of a size that allows for a standard multi-storey car park layout. The entire platform may be metal (e.g. steel).

[0010] Preferably, the support means include a plurality of legs mounted only on two opposite edges on the platform, such that there are no legs located underneath the surface of the platform. In other words, the legs are located towards the outside edges of the platform like a

simple table (so that they can be accessed easily without the need to go substantially under the platform itself). Preferably, they are mounted on the platform in a location in which they can be positioned by e.g. a crane. Locating the legs on two opposite edges of the platform has two clear advantages. Firstly, as mentioned above, if there are no legs located under the platform, its versatility for use is increased. The second advantage comes in erecting the platform. The legs may be heavy and require machinery to make them upright. If legs were needed under the platform, this machinery (and/or its operator) would need to go underneath the platform to position it. This can be unsafe and time consuming. The above is particularly useful if the platform is to be erected over an existing car park. Known modular structures had columns underneath the deck area which could interfere with the parking spaces below or just simply make it more awkward to move around. The combination of having deck modules larger than those already known and yet only requiring support around the edges of the platform make the present invention easier to use (i.e. it gives the user much more flexibility regarding the underside of the platform) and to construct.

[0011] Preferably, the legs are mounted on the edges defined by the longitudinally opposite ends of the deck modules. Preferably, each leg is attachable to a deck module at or near its corners.

[0012] Preferably, the length of the short side of the deck module is the width of a parking space. This enables the platform to be more easily erected over existing car parks, and it is an efficient way of constructing the platform, because the number of modules corresponding exactly to a discrete number of parking spaces.

[0013] Preferably, the width of the aisle space is two traffic lanes. This allows a two-way traffic flow on the surface of the platform, as well as providing more space for parking manoeuvres.

[0014] The width of the surface may be less than 3 metres. Preferably, it is less than 2.6 metres. It may be more than 2 metres. Preferably, it is more than 2.3 metres. Most preferably, the width of the surface is 2.4 metres (approximately 8 feet).

[0015] The length of the surface may be less than 20 metres. Preferably, it is less than 16.0 metres. It may be more than 15 metres. Preferably, it is more than 15.7 metres. Most preferably, the length of the surface is 15.85 metres (approximately 52 feet).

[0016] The depth of the deck module may be less than 1 metre. Preferably, it is less than 0.75m. Most preferably, it is 0.6m (about 2 feet).

[0017] The official size of car parking bays in the UK is 2.4m x 4.8m, and the width of road space between two opposite car parking spaces may be 6 metres. Thus, the preferred dimensions of the deck module allows for two opposite car parking spaces separated by an aisle space with a width of about 6 metres.

[0018] The dimensions of the deck module may be such that it is loadable on a lorry without exceeding the wide load limit. Preferably, the dimensions of the deck module are such that four modules are loadable on a lorry without exceeding the wide load limit. The deck modules may weigh up to 6 tons, so up to five modules may be stacked on a lorry (the lorry may have an extendable trailer). The wide load limit (i.e. the width of a vehicle which must be notified to the police in the UK and may be subject to time and/or route restrictions is 9 feet 6 inches (about 2.9 metres). The width of the module of the present invention is preferably less than this value, yet preferably more than the required width of a car park space.

[0019] Preferably, the deck module is attachable to further deck modules along the longer side of the surface. Preferably, the deck modules will be held together by nuts and bolts to make the site erection easy. A crane may be used to suspend a deck module over the area it is to cover, whilst the support means are arranged below it and connected to it.

[0020] Preferably each leg is attachable to two deck modules. Thus, when erecting a platform having more than one deck module, the initial deck module will require four legs (one at each corner), whereas each additional deck module will only require two further legs because it can also rest on two of the legs already attached to a deck module that is part of the platform. This improves the efficiency of construction, and of course reduces the number of parts required.

[0021] Preferably, each leg has a support ledge for e.g. temporarily resting the deck module on. This aids the efficiency and speed of construction, as the deck module can be rested (e.g. using the crane) on the support ledge prior to attaching it to the leg, e.g. using nuts and bolts. Indeed, the support ledge may be used for aligning the bolt holes on the deck module with those on the leg.

[0022] Preferably, each leg has a foot for resting on the ground. The foot may rest on an e.g. steel plate to spread the load of the platform. This plate will evenly distribute the weight of the platform over a larger area. This distribution of weight also negates the requirement for foundations if the ground is deemed sound enough.

[0023] Preferably, the attachment between at least one foot and its respective leg allows the leg, when upright, to move relative to the ground as the platform is loaded. It is well known that when a load is applied to a table-like structure, the top surface of the table sags and flexes, thereby pushing the bottom of the legs outward. In fixed buildings, this effect is overcome by increasing the size of the steel section and using foundations, wherein the building columns may be attached to each other underground - loading the building then results in tension in this attachment. However, in table-like structures without foundations, flexing of the surface leads to the legs splaying. Splaying of legs due to loading is not dealt with in detail by known modular car parks. They seem to be avoid the issue by having smaller modules and/or more support or intermediate columns. As discussed above, this means more parts and less efficiency.

The present invention proposes a solution where some or preferably all of the legs on at least one side of the platform are mounted on feet in such a way to allow motion of the leg, so that the leg remains substantially vertical whatever load is on the platform. This clearly maintains the structural strength of the platform better than legs which bend away from the vertical.

[0024] Preferably, all the legs along one edge of the platform are movable relative to the ground as the platform is loaded. It may be possible to make all the legs movable, but the amount of flexing required by e.g. a single deck car park means that the legs on only one side need to be movable to compensate. Thus, the legs attached to the other edge may be fixed (at least horizontally) with respect to their feet.

[0025] Preferably, the foot allowing movement of its respective leg is pivotably attached to the leg. Preferably, the foot has a curved surface for contacting the ground, so that it will rock on this surface as the leg moves relative to the ground. Thus, the legs are capable of automatically adjusting when the platform is loaded and unloaded.

[0026] Preferably, the legs are also length adjustable to enable erection of the platform on uneven ground. The length adjustment may be by means of an integral jacking mechanism. The legs may also be adjusted later in the case of differential settlement.

[0027] Preferably, the modular platform includes access means attached to it for allowing access to its surface. Preferably, the access means includes a ramp having a main path leading up to the surface of the deck module. The ramp is preferably of a length that allows it to be transported in a standard manner on a lorry. The ramps may include kerbs and guard rails to guide traffic and straying pedestrians up or down the ramp.

[0028] Preferably, the access means includes two ramps attached to the platform, one ramp for accessing the surface and one ramp for exiting the surface. The dimensions of these ramps are preferable such that they can both be loaded on a single lorry without exceeding the wide load limit. The or each ramp may have a length of about 18 metres (60 feet). The width of the or each ramp is preferably less than 2.9m (9 feet 6 inches) to enable loading on a lorry without exceeding the wide load limit. The width is preferably about 2.87 metres (9 feet 5 inches).

[0029] Preferably, the ramp(s) are attached to the deck module adjacent the aisle space. Thus, the traffic can drive straight from the ramp into the aisle space for easy access to a parking space.

[0030] Additionally or alternatively, the access means may include a staircase to allow people access to the surface of the deck module.

[0031] The surface of the deck module is cambered. The camber may be for permitting rain run off. The camber may be effected by the deck module including at least one bowed beam (made of e.g. steel) which extends along the entire length of the deck module and supports its surface. The bowed beam may be manufactured from a straight beam. Preferably, the deck module has three bowed beams. Preferably the beams are steel beams. The camber may be less than 1:100. Preferably, it is about 1:150. The surface of the platform may not be waterproof, therefore the camber need not be at the standard camber for rain run off.

[0032] Preferably, the deck module includes a lifting bracket located towards each corner of for facilitating suspension of the deck module using a crane. The lifting bracket may also be used as a locking mechanism to fix the decks together when they are stacked on a lorry during transportation.

[0033] According to some aspects of the present invention, the support means includes a leg having a foot for resting on the ground, the attachment between the foot and the leg allowing the leg, when upright, to move laterally relative to the ground and/or foot as the platform is loaded.

[0034] As discussed above, the leg is movable when the platform is loaded, thereby avoiding buckling. To achieve this, the legs attached to the platform are arranged so that one or more of them can move relative (i.e. towards or away from) the others. The platform may automatically adjust as it is unloaded or loaded due to the movable leg or legs. Thus, the present invention can provide the idea of a modular platform having legs which can move laterally with respect to the ground whilst remaining upright. The joint between the top of the leg and the platform must have a degree of flexibility to allow the leg to remain substantially vertical as the surface flexes. This is allowed by the bolting method of the present invention, although there are of course other ways to achieve it. All the features described above may provided as additional or optional features of such a modular platform.

[0035] In particular, the support means may include a plurality of legs mounted only on two opposite edges on the platform and all the legs along one edge of the platform may be movable relative to the ground as the platform is loaded.

[0036] Embodiments of the present invention will now be described with reference to the appended drawings, in which:

Fig. 1 shows the underside of a deck module for positioning in a platform according to the invention;

Fig. 2 shows a longitudinal side view of the deck module of Fig. 1;

Fig. 3 shows a cross-sectional view of the edge of the deck module of Fig.1;

Fig. 4 shows a lateral side view of the deck module of Fig. 1 being suspended by a crane;

Fig. 5 shows a lateral side view of the deck module of Fig. 1 positioned on legs;

Fig. 6 shows the underside of a deck module for positioning at the end of a platform according to the invention;

Fig. 7 shows a cross-sectional view of the edge of

the deck module of Fig. 6;
Fig. 8 shows a lateral side view of the deck module of Fig. 6 positioned on legs;
Fig. 9 shows a foot for attaching to a leg of a platform according to the present invention;
Figs. 10a and 10b show the positions of the foot of Fig. 9 as a platform is loaded and the leg moves;
Fig. 11 is a cross-sectional longitudinal side view of a platform according to the present invention;
Fig. 12 is a lateral side view of the platform of Fig. 11;
Fig. 13 is a longitudinal side view of the platform of Fig. 11 illustrating the access means;
Fig. 14 shows a plan view of the platform of Fig. 13; and
Figs. 15a and 15b show a side view of the platform of Fig.13 in a partially loaded and unloaded state.

[0037] Fig. 1 shows the underside of a deck module for use in a modular platform according to the present invention. The dimensions of the module as shown in Fig. 1 are 52 feet × 8 feet (15.85 × 2.44 metres). The module has three deck beams 1 extending the entire length of the module. Each deck beam 1 is a bowed e.g. steel beam, as can be seen from Fig. 2. The beam may be initially straight. The steel beam is bowed by heating the centre section while the beam is bent in a hydraulic press. Once the required bend is achieved, the cut is welded up to form a join 9. The bowed beams 1 give the deck module its camber.

[0038] The three deck beams 1 are interconnected by deck cross members 2; each end of each cross member 2 is e.g. welded to a support plate 3, which is e.g. bolted to the deck beam 1. The three deck beams 1 are substantially parallel, and form the backbone of the deck module.

[0039] The side edges of the module are made up of deck side angles 5, each of which is attached to an adjacent deck beam 1 by a deck outrigger 4. There are two deck side angles 5 on each side of the deck module; this means the deck side angles 5 need not be significantly cambered. The attachment between the outermost deck beam 1 and the deck side angle 5 is shown in more detail in Fig. 3. Here it is shown that deck outrigger 4 is e.g. welded to a support plate 3, which e.g. bolted to the deck beam 1. The deck side angle 5 has a number of support angles 11 welded to it to correspond to the positions of the deck outriggers 4 on the deck beam 1. The support angles 11 are bolted to the deck outriggers 4 such that the top edge of deck side angle 5 is at the same level as the top edge of the deck beam 1. Sheet metal 12 (e.g. steel) is bolted to the top edges of the deck beams 1 and deck side angles 5 to create the surface of the deck module. Preferably, anti-slip sheets (e.g. of steel) are used on both the deck module surface and the ramp surface. The upright edges of deck side angles 5 have holes through them which can be aligned with holes on corresponding edges of other deck modules to enable them to be bolted together.

[0040] At the ends of the deck module, the deck beams 1 have deck end angles 6 bolted to them to allow an end plate 7 to be e.g. bolted on. Each deck beam 1 has two deck end angles 6 at each end.

[0041] Each end plate 7 has two lifting brackets 8 bolted to it. Fig. 4 shows how the lifting brackets 8 can be attached to a crane 13 for lifting and positioning the deck module e.g. during erection. The lifting brackets 8 may also be bolted together to form a locking mechanism when the decks are stacked on a lorry during transportation.

[0042] Fig. 2 shows a longitudinal cross section along line A-A on Fig. 1. Here is can be seen that the deck outriggers 4 are in fact angles. This is to improve access for an impact wrench to the bolt holes through the deck side angles 5. Fig. 2 also shows the holes 10 in the deck beam for attaching the deck end angles 6.

[0043] Fig. 5 shows an end view of the deck module positioned in a modular platform (although there are no additional modules shown attached to its longitudinal edges). The bottom edge of the module rests on angled supports 15, which are welded to legs 14. The deck module is bolted to the legs 14 via holes in the legs which correspond to holes in the end plate 7. The legs 14 extend below the deck module to hold it above the ground. They also extend above the surface of the deck module to provide posts to which barriers can be attached. The barriers may include cross bars 17 for preventing people from falling over the edge of the deck module and a crash barrier 16 for stopping e.g. cars from doing likewise.

[0044] The deck module shown in Figs. 1 to 5 is intended to be used with other modules to create a larger area. As such, its longitudinal sides contain no barriers or posts which would restrict the amount of parking space or manoeuvrability on the surface. However, the edge of the composite platform will need to have a barrier, and Fig. 6 shows a deck module that could be positioned at the end of a platform. Parts which are in common with the module shown in Fig. 1 have the same reference numerals. The difference here comes in the outrigger assemblies 20, 21 on one longitudinal side of the deck module. These outrigger assemblies include a thicker deck outrigger 20 which extends beyond the edge of the deck side angle 5 and has an upright port 21 attached to it. Fig. 7 shows the arrangement in more detail. The outrigger 20 is welded to a support plate 33 (which is generally larger than support 3 to cope with the additional load), which is bolted to the deck beam 1. The deck side angle 5 and support angle 11 are connected as before, and upright post 21 is welded to the end of outrigger 20 which extends beyond the side of the deck side angle 5. The central post may have a larger support plate 34. Of course, this post may be omitted to allow access ramp to be mounted in this location (see e.g. Fig. 13).

[0045] The legs shown in Figs. 5 and 8 include pairs of holes located along their length. As shown in Figs. 5 and 8, only one side of these hole parts are needed to attach a deck module and barriers corresponding to that

deck module to a leg. The other holes allow a further deck module (and barriers) to be attached to the other side of the leg. Thus, one leg can be attached to two deck modules. For example, holes 18 in Fig. 5 allow a deck module parallel to the one shown in the drawing to be attached to that leg. Holes 19 are for attaching a diagonal support member 26 (e.g. shown in Fig. 11). Fig. 11 shows a cross-sectional view of a deck module mounted to form a platform. It can be seen that the module is long enough to permit two cars 27a, 27b to park facing inwards whilst leaving enough room (an aisle space) for two lanes of traffic between them. There are no legs 14 under the deck modules for the entire length of the platform, which gives room below the platform e.g. for further parking.

[0046] Fig. 11 also shows the connection between the leg 14 and the ground. This is provided by a foot assembly 35, which includes an ankle member 25 bolted via attachment plates 28 to leg 14, the base of the ankle member being pivotably attached to a foot 22 located on a plate 24. The ankle member 25 may include a jack for adjusting the length of the leg to allow the platform to be erected on uneven ground. The ankle member may be a telescopic landing gear such as the type manufactured by Jost GB Ltd. Such landing gears are usually used in pairs to unhook and support the trailers of articulated lorries. These landing gears are provided with pivotable feet to cater for forward movement of the trailer when air is let out of its suspension systems.

[0047] The pivotable foot 22 is shown in more detail in Fig. 9. The foot has a curved surface 36 for contacting the ground. It also includes two holes 23 for attaching to the ankle member 25 (which may include an integral jacking mechanism) and which define the pivoting axis. The foot 22 is generally mounted on a base plate 24 for spreading the load of the platform over a larger area. This is especially important on softer ground, and means foundations are not required. Foot 22 may rock in its own bracket (not shown) which can then be mounted on a base plate 24.

[0048] Figs. 10a and 10b show the motion of the foot when the leg moves sideways. As explained above, when a load is applied to the platform (e.g. shown in Fig. 11), the surface flexes, which forces apart the supporting legs. For legs that are fixed, this results in tension building up in them as they are bent by the load. This tension and bending can lead to weakness and buckling. In the present invention, the legs on rocking feet are permitted to move, as shown in Fig. 10b. The foot 22 rocks about its axis, the curved surface 36 remaining in contact with the ground the whole time. When the load is removed, the leg will return to its previous position, thus the legs are automatically adjustable to the amount of load on the platform.

[0049] Because the movement is relatively small, only one side of the platform needs to have pivoting feet. Hence, in Fig. 11, the legs along side L of the platform have pivoting feet whereas those along side R are fixed. When the platform is loaded, most compensatory movement takes place on side L.

[0050] Fig. 12 shows three deck modules attached to one another. As mentioned previously, there is only one leg at the junction between the corners of two deck modules. The distance between adjacent legs also enables a vehicle (e.g. a car) to pass through.

[0051] Fig. 13 shows the side view of one end of a modular platform, where part of the barriers have been removed to allow ramps 29 to be attached to the surface of the platform. Two ramps are shown to give separate routes for vehicles entering and exiting the platform. The ramps 29 include kerbs 30 at either side of the trade leading up to the platform surface. These prevent vehicles from accidentally driving off the edge of the ramps. A pedestrian staircase 31 is also mounted to the edge of the deck module. This enables people to gain access to the platform surface without having to use the vehicle ramps 29. Although the ramps are shown attached to the centre of the longitudinal side of the endmost deck module, it is clear that there could equally well be attached at any other point on the platform. The ramps are the same width as the deck modules, so it may even be possible to attach them directly to a lateral end of a deck module. Figs. 11, 12 and 13 also show the jacking, levelling and leg rocking mechanisms of the foot assembly.

[0052] Fig. 14 shows a overall top view of a constructed platform used as a portable car park.

[0053] Figs. 15a and 15b show side views of a constructed platform used as a car park in a partially loaded and unloaded state respectively.

[0054] It will be apparent to the skilled reader that the invention can be achieved by ways other than those described in the examples and the scope of the appended claims should not be unduly limited by the embodiments.

Claims

1. A modular platform suitable for supporting vehicles (27) or portable buildings or the like, the platform having:

   a plurality of deck modules, each deck module being a prefabricated unit for forming a part of the deck of the modular platform, each deck module being attached to at least one other deck module and including a deck surface suitable for vehicle parking on; and
   support means attached to the platform for supporting it above an area at a height to permit vehicles to pass under the platform;

   characterised in that the deck surface of each deck module is cambered for permitting rain run off.

2. A modular platform according to claim 1 wherein the camber is effected by the deck module including at least one bowed beam (1) which extends along the

length of the deck module and supports the deck surface.

3. A modular platform according to claim 1 or 2 wherein the deck module has three bowed beams (1).

4. A modular platform according to any one of claims 1 to 3 wherein the camber is less than 1:100.

5. A modular platform according to any one of claims 1 to 4 wherein the camber is 1:150.

6. A modular platform according to any one of claims 1 to 5 wherein the camber causes the rain to run off to the outside edges of the platform.

7. A modular platform according to any one of claims 1 to 6 wherein the deck surface of each deck module is substantially rectangular, the deck surface having a support space (suitable for supporting a vehicle or a portable building or the like) located at each of the longitudinally opposite ends, and an aisle space between the support spaces suitable for allowing passage of traffic.

8. A modular platform according to claim 7, wherein the support means include a plurality of legs (14) mounted only on two opposite edges on the platform.

9. A modular platform according to claim 8, wherein the legs (14) are mounted on the edges defined by the longitudinally opposite ends of the deck modules.

10. A modular platform according to either one of claims 8 or 9, wherein each leg (14) is attachable to a deck module at or near the module's corners.

11. A modular platform according to any one of claims 8 to 10, wherein one or more of the legs (14) is/are each attachable to two deck modules.

12. A modular platform according to any one of claims 8 to 11, wherein at least one leg (14) has a support surface for resting a deck module on.

13. A modular platform according to any one of claims 8 to 12, wherein each leg (14) has a foot (22) for resting on the ground.

14. A modular platform according to claim 13, wherein at least one foot (22) rests on a plate (24) to spread the load of the platform.

15. A modular platform according to either one of claims 13 or 14, wherein the attachment between at least one foot (22) and its respective leg (14) allows the leg, when upright, to move laterally relative to the ground and/or foot as the platform is loaded.

16. A modular platform according to claims 8 or 9 and 15, wherein all the legs (14) along one edge of the platform are movable laterally relative to the ground as the platform is loaded.

17. A modular platform according to claim 16, wherein the legs attached to the other edge are fixed with respect to their feet (22).

18. A modular platform according to any one of claims 15 to 17, wherein the movable legs (14) remain substantially vertical when moving.

19. A modular platform according to any one of claims 15 to 18, wherein the foot (22) allowing movement of its respective leg (14) is pivotably attached to the leg.

20. A modular platform according to claim 19, wherein the foot (22) has a curved surface (36) for contacting the ground, so that it will rock on this surface as the leg moves relative to the ground.

21. A modular platform according to any one of claims 8 to 20, wherein the legs (14) are length adjustable to enable erection of the platform on uneven ground.

22. A modular platform according to any one of the preceding claims including access means attached to the platform for allowing access to its surface.

23. A modular platform according to claim 22, wherein the access means includes a ramp (29) leading up to the deck of the platform.

24. A modular platform according to any one of the preceding claims, wherein the access means includes two ramps (29) attached to the platform, one ramp for accessing the deck and one ramp for exiting the deck.

25. A modular platform according to either one of claims 23 or 24, wherein the ramp(s) (29) are attached to the platform adjacent the aisle space of the endmost deck module.

26. A modular platform according to any one of claims 22 to 25, wherein the access means includes a staircase to allow people access to the surface of the platform.

27. A modular platform according to any one of the preceding claims, wherein the length of the short side of each deck module is the width of a parking space.

28. A modular platform according to any one of the preceding claims, wherein the width of the aisle space is two traffic lanes.

29. A modular platform according to any one of the preceding claims, wherein the width of the deck surface of each deck module is less than 3 metres.

30. A modular platform according to any one of the preceding claims, wherein the width of the deck surface of each deck module is less than 2.6 metres.

31. A modular platform according to any one of the preceding claims, wherein the width of the deck surface of each deck module is more than 2 metres.

32. A modular platform according to any one of the preceding claims, wherein the width of the deck surface of each deck module is more than 2.3 metres.

33. A modular platform according to any one of the preceding claims, wherein the width of the deck surface of each deck module is 8 feet (approximately 2.4 metres).

34. A modular platform according to any one of the preceding claims, wherein the length of the deck surface of each deck module is less than 20 metres.

35. A modular platform according to any one of the preceding claims, wherein the length of the deck surface of each deck module is less than 16.0 metres.

36. A modular platform according to any one of the preceding claims, wherein the length of the deck surface of each deck module is more than 15 metres.

37. A modular platform according to any one of the preceding claims, wherein the length of the deck surface of each deck module is more than 15.7 metres.

38. A modular platform according to any one of the preceding claims, wherein the length of the deck surface of each deck module is 52 feet (approximately 15.85 metres).

39. A modular platform according to any one of the preceding claims, wherein the dimensions of each deck module are such that it is loadable on a lorry without being deemed a wide load.

40. A modular platform according to any one of the preceding claims, wherein the dimensions of each deck module are such that four modules are loadable on a lorry without being deemed a wide load.

41. A modular platform according to any one of the preceding claims, wherein each deck module includes a lifting bracket (8) located towards each corner of for facilitating suspension of the deck module using a crane.

42. A modular platform according to any one of the preceding claims, wherein the deck modules are substantially identical.

43. A modular platform according to claim 1 wherein the support means includes a leg (14) having a foot (21) for resting on the ground, the attachment between the foot and the leg allowing the leg, when upright, to move laterally relative to the ground and/or foot as the platform is loaded.

44. A kit for constructing a modular platform suitable for supporting vehicles (27) or portable buildings or the like, the kit including:

> one or more deck modules, each deck module being a prefabricated unit for forming a part of the deck of the modular platform, each deck module being attachable to at least one other deck module and including a deck surface suitable for vehicle parking on; and
> support means attachable to the platform for supporting it above an area at a height to permit vehicles to pass under the platform;

characterised in that the deck surface of each module is cambered for permitting rain run off.

Patentansprüche

1. Modulare Plattform, die geeignet ist, um Kraftfahrzeuge (27) oder transportierbare Bauten oder dergleichen zu tragen, wobei die Plattform Folgendes aufweist:

> eine Vielzahl an Stockwerkmodulen, wobei jedes Stockwerkmodul eine vorgefertigte Einheit ist, um einen Teil des Stockwerks der modularen Plattform zu bilden, wobei jedes Stockwerkmodul an zumindest ein anderes Stockwerkmodul angebunden ist und eine Stockwerkoberfläche umfasst, die geeignet ist, um ein Kraftfahrzeug darauf zu parken; und
> Trägermittel, die an der Plattform angebracht sind, um diese oberhalb eines Bereichs in einer Höhe zu tragen, um zu ermöglichen, dass Kraftfahrzeuge unter der Plattform hindurchfahren können;

dadurch gekennzeichnet, dass die Stockwerkoberfläche jedes Stockwerkmoduls gewölbt ist, um Regenwasser ablaufen zu lassen.

2. Modulare Plattform nach Anspruch 1, worin die Wölbung durch das Stockwerkmodul bewirkt wird, das zumindest einen gewölbten Balken (1) aufweist, der sich entlang der Länge des Stockwerkmoduls er-

streckt und die Stockwerkoberfläche trägt.

3. Modulare Plattform nach Anspruch 1 oder 2, worin das Stockwerkmodul drei gewölbte Balken (1) aufweist.

4. Modulare Plattform nach einem der Ansprüche 1 bis 3, worin die Wölbung weniger als 1:100 beträgt.

5. Modulare Plattform nach einem der Ansprüche 1 bis 4, worin die Wölbung 1:150 beträgt.

6. Modulare Plattform nach einem der Ansprüche 1 bis 5, worin die Wölbung bewirkt, dass Regenwasser zu den Außenkanten der Plattform hin abläuft.

7. Modulare Plattform nach einem der Ansprüche 1 bis 6, worin die Stockwerkoberfläche jedes Stockwerkmoduls im Wesentlichen rechteckig ist, wobei die Stockwerkoberfläche einen Trägerbereich (zum Tragen eines Kraftfahrzeugs oder eines transportierbaren Baus oder dergleichen geeignet), der an jedem der einander in Längsrichtung gegenüberliegenden Enden angeordnet ist, und einen Gangbereich zwischen den Trägerbereichen aufweist, der als Durchlass für Verkehr geeignet ist.

8. Modulare Plattform nach Anspruch 7, worin die Trägermittel eine Vielzahl an an nur zwei gegenüberliegenden Kanten der Plattform angebrachten Stützen (14) umfassen.

9. Modulare Plattform nach Anspruch 8, worin die Stützen (14) an den durch die in Längsrichtung verlaufenden gegenüberliegenden Enden der Stockwerkmodule definiert sind.

10. Modulare Plattform nach einem der Ansprüche 8 oder 9, worin jede Stütze (14) an einem Stockwerkmodul an den oder nahe der Ecken des Moduls befestigt werden kann.

11. Modulare Plattform nach einem der Ansprüche 8 bis 10, worin eine oder mehrere Stütze (14) jeweils an zwei Deckmodulen befestigbar ist/sind.

12. Modulare Plattform nach einem der Ansprüche 8 bis 11, worin zumindest eine Stütze (14) eine Trägeroberfläche aufweist, auf der ein Stockwerkmodul aufliegen kann.

13. Modulare Plattform nach einem der Ansprüche 8 bis 12, worin jede Stütze (14) einen Fuß (22) aufweist, der auf dem Boden aufliegt.

14. Modulare Plattform nach Anspruch 13, worin zumindest ein Fuß (22) auf einer Platte (24) aufliegt, um die auf die Plattform wirkende Last zu verteilen.

15. Modulare Plattform nach einem der Ansprüche 13 oder 14, worin die Anbindung zwischen zumindest einem Fuß (22) und der entsprechenden Stütze (14) ermöglicht, dass die Stütze, wenn diese aufrecht ist, in Bezug auf den Boden und/oder den Fuß seitlich bewegt werden kann, wenn die Plattform beladen wird.

16. Modulare Plattform nach Anspruch 8 oder 9 und 15, worin alle Stütze (14) entlang einer Kante der Plattform in Bezug auf den Boden seitlich bewegbar sind, wenn die Plattform beladen wird.

17. Modulare Plattform nach Anspruch 16, worin die an der Außenkante angebrachten Stützen in Bezug auf ihre Füße (22) fixiert sind.

18. Modulare Plattform nach einem der Ansprüche 15 bis 17, worin die bewegbaren Stützen (14) im Wesentlichen vertikal bleiben, wenn sie sich bewegen.

19. Modulare Plattform nach einem der Ansprüche 15 bis 18, worin der Fuß (22), der die Bewegung der entsprechenden Stütze (14) zulässt, schwenkbar an dem Schenkel befestigt ist.

20. Modulare Plattform nach Anspruch 19, worin der Fuß (22) eine gekrümmte Oberfläche (26) aufweist, um den Boden zu berühren, sodass er sich auf dieser Oberfläche wiegt, wenn die Stütze in Bezug auf den Boden bewegt wird.

21. Modulare Plattform nach einem der Ansprüche 8 bis 20, worin die Länge der Stütze (14) anpassbar ist, um das Aufstellen der Plattform auf unebenem Boden zu ermöglichen.

22. Modulare Plattform nach einem der vorangegangenen Ansprüche, umfassend ein an der Plattform angebundenes Zugangsmittel, um den Zugang zur Oberfläche der Plattform zu ermöglichen.

23. Modulare Plattform nach Anspruch 22, worin das Zugangsmittel eine Rampe (29) umfasst, die zu dem Stockwerk der Plattform hinaufführt.

24. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin das Zugangsmittel zwei Rampen (29) umfasst, die an der Plattform befestigt sind, eine Rampe für den Zugang zu dem Stockwerk und eine Rampe für das Verlassen des Stockwerks.

25. Modulare Plattform nach einem der Ansprüche 23 oder 24, worin die Rampe(n) (29) an der Plattform zu dem Gangbereich des am Ende gelegenen Stockwerkmoduls angrenzend angebunden ist/sind.

26. Modulare Plattform nach einem der Ansprüche 22

bis 25, worin das Zugangsmittel einen Treppenaufgang als Zugang für Menschen zu der Plattform umfasst.

27. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Länge der kurzen Seite jedes Stockwerkmoduls der Breite eines Parkplatzes entspricht.

28. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Breite des Gangbereichs zwei Fahrspuren entspricht.

29. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Breite der Stockwerkoberfläche jedes Stockwerkmoduls weniger als 3 m beträgt.

30. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Breite der Stockwerkoberfläche jedes Stockwerkmoduls weniger als 2,6 m beträgt.

31. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Breite der Stockwerkoberfläche jedes Stockwerkmoduls mehr als 2 m beträgt.

32. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Breite der Stockwerkoberfläche jedes Stockwerkmoduls mehr als 2,3 m beträgt.

33. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Breite der Stockwerkoberfläche jedes Stockwerkmoduls 8 Fuß (etwa 2,4 m) beträgt.

34. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Länge der Stockwerkoberfläche jedes Stockwerkmoduls weniger als 20 m beträgt.

35. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Länge der Stockwerkoberfläche jedes Stockwerkmoduls weniger als 16,0 m beträgt.

36. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Länge der Stockwerkoberfläche jedes Stockwerkmoduls mehr als 15 m beträgt.

37. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Länge der Stockwerkoberfläche jedes Stockwerkmoduls mehr als 15,7 m beträgt.

38. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Länge der Stockwerkoberfläche jedes Stockwerkmoduls 52 Fuß (etwa 15,85 m) beträgt.

39. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Dimensionen jedes Stockwerkmoduls so ausgewählt sind, dass es auf einen Lastkraftwagen aufladbar ist, ohne als überbreiter Schwertransport zu gelten.

40. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Dimensionen jedes Stockwerkmoduls so ausgewählt sind, dass vier Module auf einen Lastkraftwagen aufgeladen werden können, ohne als überbreiter Schwertransport zu gelten.

41. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin jedes Stockwerkmodul eine Hebeklammer (8) umfasst, die nahe jeder Ecke angeordnet ist, um das Aufheben des Stockwerkmoduls unter Verwendung eines Krans zu erleichtern.

42. Modulare Plattform nach einem der vorangegangenen Ansprüche, worin die Stockwerkmodule im Wesentlichen ident sind.

43. Modulare Plattform nach Anspruch 1, worin das Trägermittel eine Stütze (14) mit einem Fuß (21) umfasst, um auf dem Boden aufzuliegen, wobei die Verbindung zwischen dem Fuß und der Stütze zulässt, dass die Stütze, wenn diese aufrecht ist, in Bezug auf den Boden und/oder Fuß seitlich bewegt wird, wenn die Plattform beladen wird.

44. Bausatz zum Aufbauen einer modularen Plattform, die zum Tragen von Kraftfahrzeugen (27) oder transportierbaren Bauten oder dergleichen geeignet ist, wobei der Bausatz Folgendes umfasst:

ein oder mehrere Stockwerkmodule, wobei jedes Stockwerkmodul eine vorgefertigte Einheit ist, um einen Teil des Stockwerks der modularen Plattform zu bilden, wobei jedes Stockwerkmodul an zumindest ein anderes Stockwerkmodul anbindbar ist und eine Stockwerkoberfläche umfasst, die geeignet ist, um ein Kraftfahrzeug darauf zu parken; und

Trägermittel, die an der Plattform befestigbar sind, um diese oberhalb eines Bereichs in einer Höhe zu tragen, um zu ermöglichen, dass Kraftfahrzeuge unter der Plattform hindurchfahren können;

dadurch gekennzeichnet, dass die Stockwerkoberfläche jedes Stockwerkmoduls gewölbt ist, um Regenwasser ablaufen zu lassen.

Revendications

1. Plate-forme modulaire apte à supporter des véhicules (27) ou des bâtiments portables ou analogue, la plate-forme comportant:

   une pluralité de modules de plancher, chaque module de plancher étant une unité préfabriquée pour former une partie du plancher de la plate-forme modulaire, chaque module de plancher étant fixé à au moins un autre module de plancher et incluant une surface de plancher qui convient pour le stationnement des véhicules; et des moyens de support fixés à la plate-forme pour la supporter au-dessus d'une zone à une hauteur pour permettre aux véhicules de passer sous la plate-forme;

   caractérisée en ce que la surface de plancher de chaque module de plancher est cambrée pour permettre l'écoulement de l'eau de pluie.

2. Plate-forme modulaire selon la revendication 1, où la cambrure est effectuée par le module de plancher incluant au moins une poutre arquée (1) qui s'étend sur la longueur du module de plancher et supporte la surface de plancher.

3. Plate-forme modulaire selon la revendication 1 ou 2, où le module de plancher possède trois poutres arquées (1).

4. Plate-forme modulaire selon l'une quelconque des revendications 1 à 3, où la cambrure est inférieure à 1:100.

5. Plate-forme modulaire selon l'une quelconque des revendications 1 à 4, où la cambrure est de 1:150.

6. Plate-forme modulaire selon l'une quelconque des revendications 1 à 5, où la cambrure amène l'eau de pluie à s'écouler vers les bords extérieurs de la plate-forme.

7. Plate-forme modulaire selon l'une quelconque des revendications 1 à 6, où la surface de plancher de chaque module de plancher est sensiblement rectangulaire, la surface de plancher ayant un espace de support (qui convient pour supporter un véhicule ou un bâtiment portable ou analogue) situé à chacune des extrémités longitudinalement opposées, et un espace d'allée entre les espaces de support qui conviennent pour permettre le passage du trafic.

8. Plate-forme modulaire selon la revendication 7, où les moyens de support comprennent une pluralité de jambes (14) montées seulement sur deux bords opposés sur la plate-forme.

9. Plate-forme modulaire selon la revendication 8, où les jambes (14) sont montées sur les bords définis par les extrémités longitudinalement opposées des modules de plancher.

10. Plate-forme modulaire selon l'une quelconque des revendications 8 ou 9, où chaque jambe(14) peut être fixée à un module de plancher à ou près des coins du module.

11. Plate-forme modulaire selon l'une quelconque des revendications 8 à 10, où une ou plusieurs des jambes (14) peut/peuvent être fixées à deux modules de planches.

12. Plate-forme modulaire selon l'une quelconque des revendications 8 à 11, où au moins une jambe (14) possède une surface de support pour supporter un module de plancher.

13. Plate-forme modulaire selon l'une quelconque des revendications 8 à 12, où chaque jambe (14) possède un pied (22) pour reposer sur le sol.

14. Plate-forme modulaire selon la revendication 13, où au moins un pied (22) repose sur une plaque (24) pour étaler la charge de la plate-forme.

15. Plate-forme modulaire selon l'une quelconque des revendications 13 ou 14, où la fixation entre au moins un pied (22) et sa jambe respective (14) permet à la jambe, lorsqu'elle est verticale, de se déplacer latéralement relativement au sol et/ou au pied lorsque la plate-forme est chargée.

16. Plate-forme modulaire selon les revendications 8 ou 9 et 15, où toutes les jambes (14) le long d'un bord de la plate-forme sont déplaçables latéralement relativement au sol lorsque la plate-forme est chargée.

17. Plate-forme modulaire selon la revendication 16, où les jambes fixées à l'autre bord sont fixées par rapport à leurs pieds (22).

18. Plate-forme modulaire selon l'une quelconque des revendications 15 à 17, où les jambes mobiles (14) restent sensiblement verticales lorsqu'elles se déplacent.

19. Plate-forme modulaire selon l'une quelconque des revendications 15 à 18, où le pied (22) permettant le déplacement de sa jambe respective (14) est fixé d'une manière pivotante à la jambe.

20. Plate-forme modulaire selon la revendication 19, où le pied (22) possède une surface courbée (36) pour venir en contact avec le sol de sorte qu'il basculera sur cette surface lorsque la jambe se déplace rela-

tivement au sol.

21. Plate-forme modulaire selon l'une quelconque des revendications 8 à 20, où les branches (14) sont ajustables en longueur pour permettre l'érection de la plate-forme sur un sol inégal.

22. Plate-forme modulaire selon l'une quelconque des revendications précédentes, incluant des moyens d'accès fixés à la plate-forme pour permettre l'accès à sa surface.

23. Plate-forme modulaire selon la revendication 22, où les moyens d'accès comprennent une rampe (29) menant au plancher de la plate-forme.

24. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où les moyens d'accès comprennent deux rampes (29) fixées à la plate-forme, une rampe pour accéder au plancher et l'autre rampe pour sortir du plancher.

25. Plate-forme modulaire selon l'une quelconque des revendications 23 ou 24, où la ou les rampes (29) sont fixées à la plate-forme adjacente à l'espace d'allée du module de plancher le plus extrême.

26. Plate-forme modulaire selon l'une quelconque des revendications 22 à 25, où les moyens d'accès comprennent un escalier pour permettre à des gens d'accéder à la surface de la plate-forme.

27. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la longueur du côté court de chaque module de plancher est la largeur d'un espace de stationnement.

28. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la largeur de l'espace d'allée représente deux voies de circulation.

29. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la largeur de la surface de plancher de chaque module de plancher est inférieure à 3 mètres.

30. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la largeur de la surface de plancher de chaque module de plancher est inférieure à 2,6 mètres.

31. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la largeur de la surface de plancher de chaque module de plancher est supérieure à 2 mètres.

32. Plate-forme modulaire selon l'une quelconque des revendications précécentes, où la largeur de la surface de plancher de chaque module de plancher est supérieure à 2,3 mètres.

33. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la largeur de la surface de planche de chaque module de plancher représente 8 pieds (approximativement 2,4 mètres).

34. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la longueur de la surface de plancher de chaque module de plancher est inférieure à 20 mètres.

35. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la longueur de la surface de plancher de chaque module de plancher est inférieure à 16,0 mètres.

36. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la longueur de la surface de plancher de chaque module de plancher est supérieure à 15 mètres.

37. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la longueur de la surface de plancher de chaque module de plancher est supérieure à 15,7 mètres.

38. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où la longueur de la surface de plancher de chaque module de plancher représente 52 pieds (approximativement 15,85 mètres).

39. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où les dimensions de chaque module de plancher sont telles qu'il peut être chargé sur un camion sans être considéré comme une charge exceptionnelle.

40. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où les dimensions de chaque module de plancher sont telles que quatre modules peuvent être chargés sur un camion sans être considérés comme une charge exceptionnelle.

41. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où chaque module de plancher comprend un support de levage (8) situé vers chaque coin pour faciliter la suspension du module de plancher en utilisant une grue.

42. Plate-forme modulaire selon l'une quelconque des revendications précédentes, où les modules de plancher sont sensiblement identiques.

43. Plate-forme modulaire selon la revendication 1, où le moyen de support comprend une jambe (14) ayant

un pied (21) pour reposer sur le sol, la fixation entre le pied et la jambe permettant à la jambe, lorsqu'elle est verticale, de se déplacer latéralement par rapport au sol et/ou au pied lorsque la plate-forme est chargée.

44. Kit pour construire une plate-forme modulaire apte à supporter des véhicules (27) ou des bâtiments portables ou analogue, le kit incluant:

un ou plusieurs modules de plancher, chaque module de plancher étant une unité préfabriquée destinée à faire partie du plancher de la plate-forme modulaire, chaque module de plancher pouvant être fixé à au moins un autre module de plancher et incluant une surface de plancher qui convient pour le stationnement de véhicules; et
des moyens de support pouvant être fixés à la plate-forme pour la supporter au-dessus d'une zone à une hauteur pour permettre aux véhicules de passer sous la plate-forme;

caractérisé en ce que la surface de plancher de chaque module est cambrée pour permettre l'écoulement de l'eau de pluie.

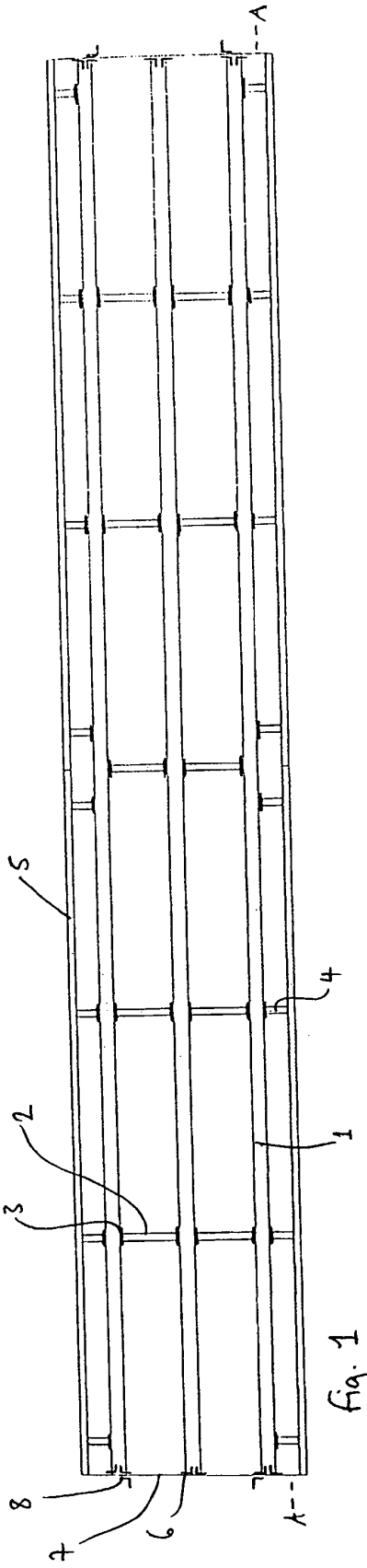


fig. 1

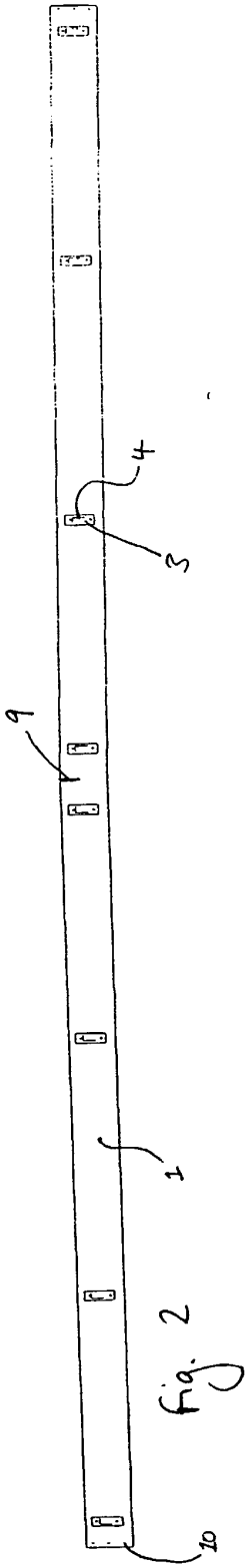


fig. 2

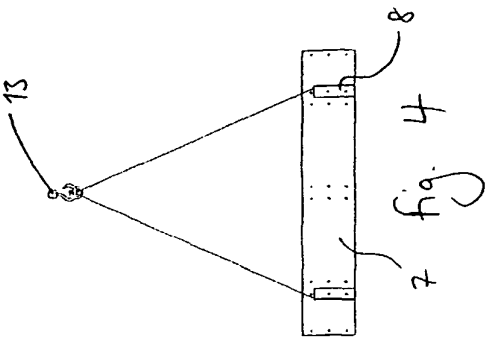


fig. 4

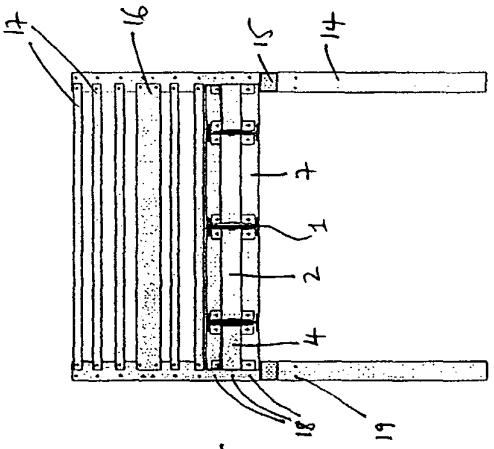


fig. 5

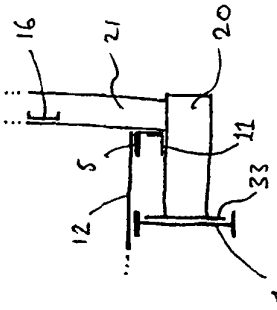


fig. 7

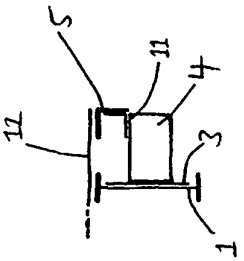


fig. 3

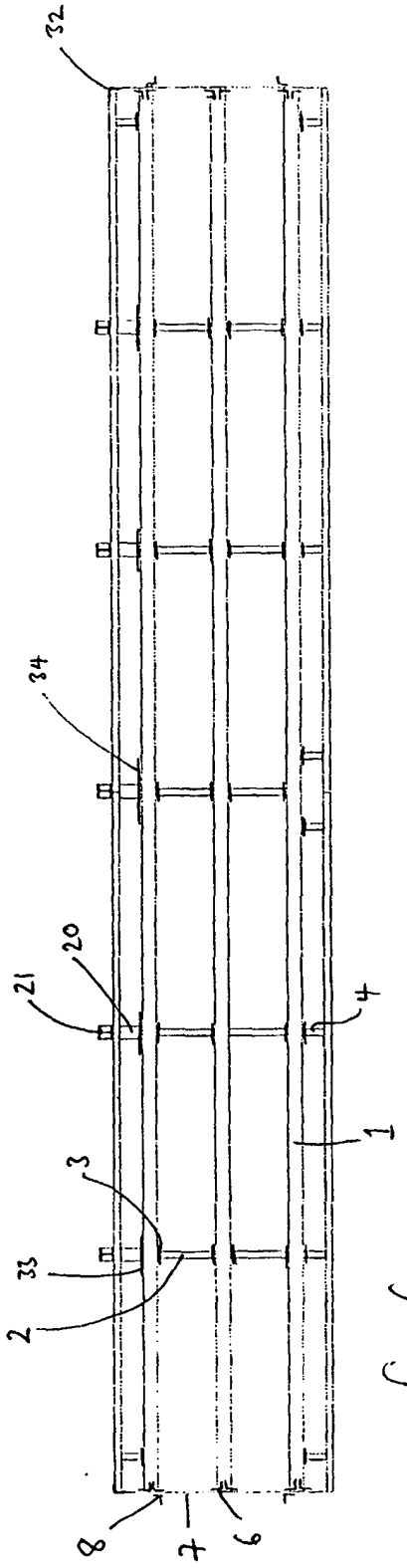


fig. 6

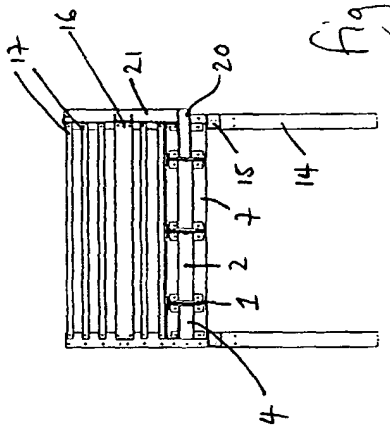


fig. 8

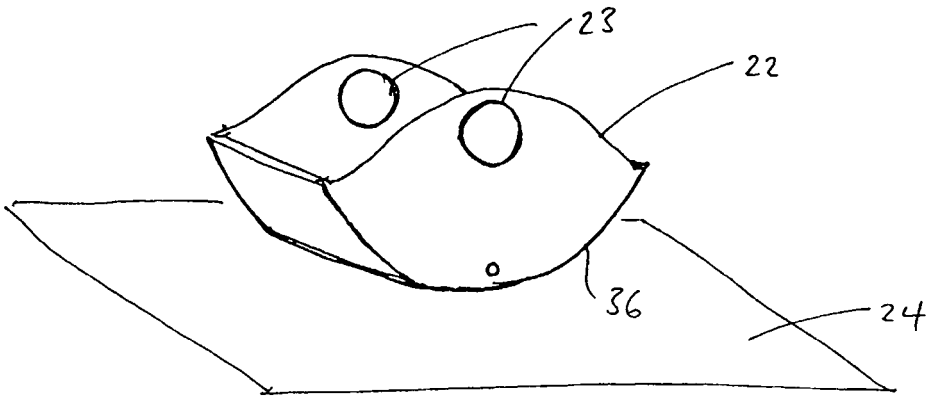


fig. 9

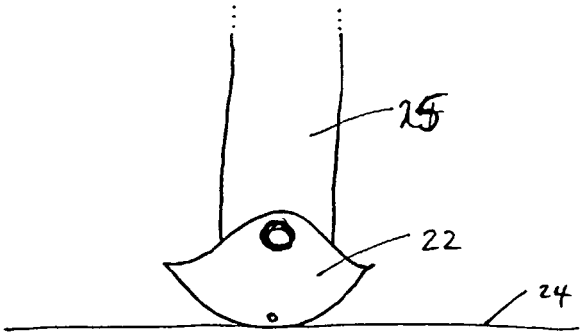


fig. 10a

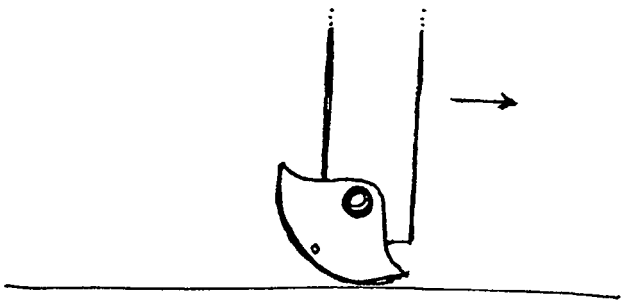


fig. 10b

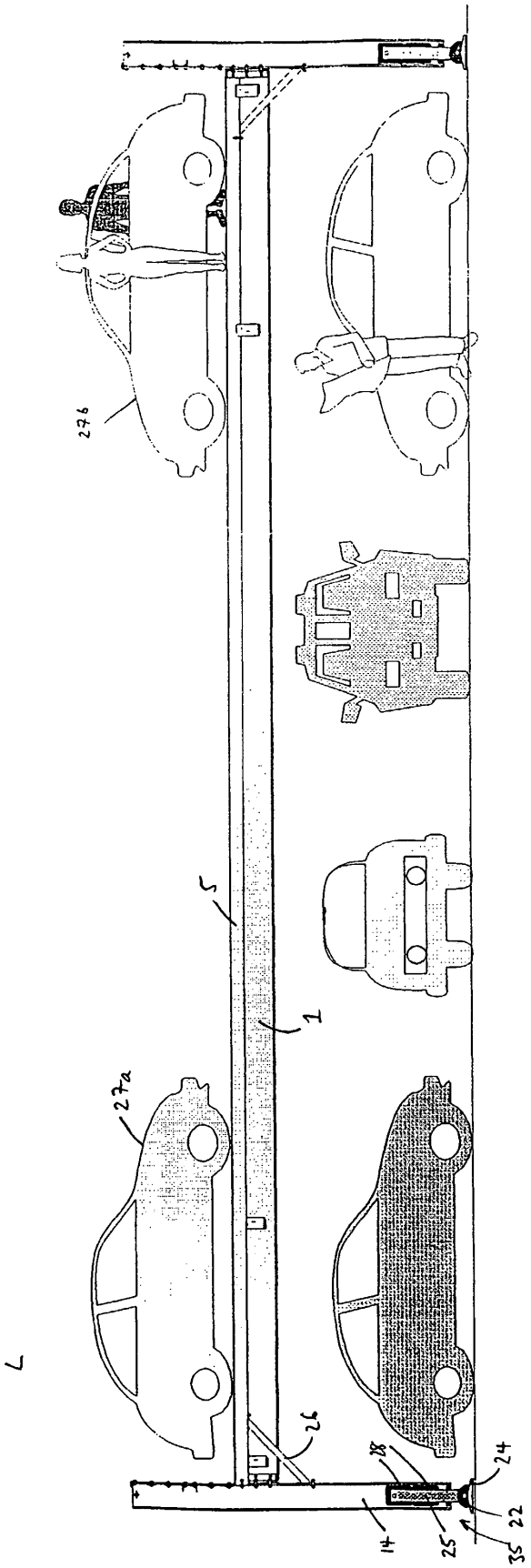


fig. 11

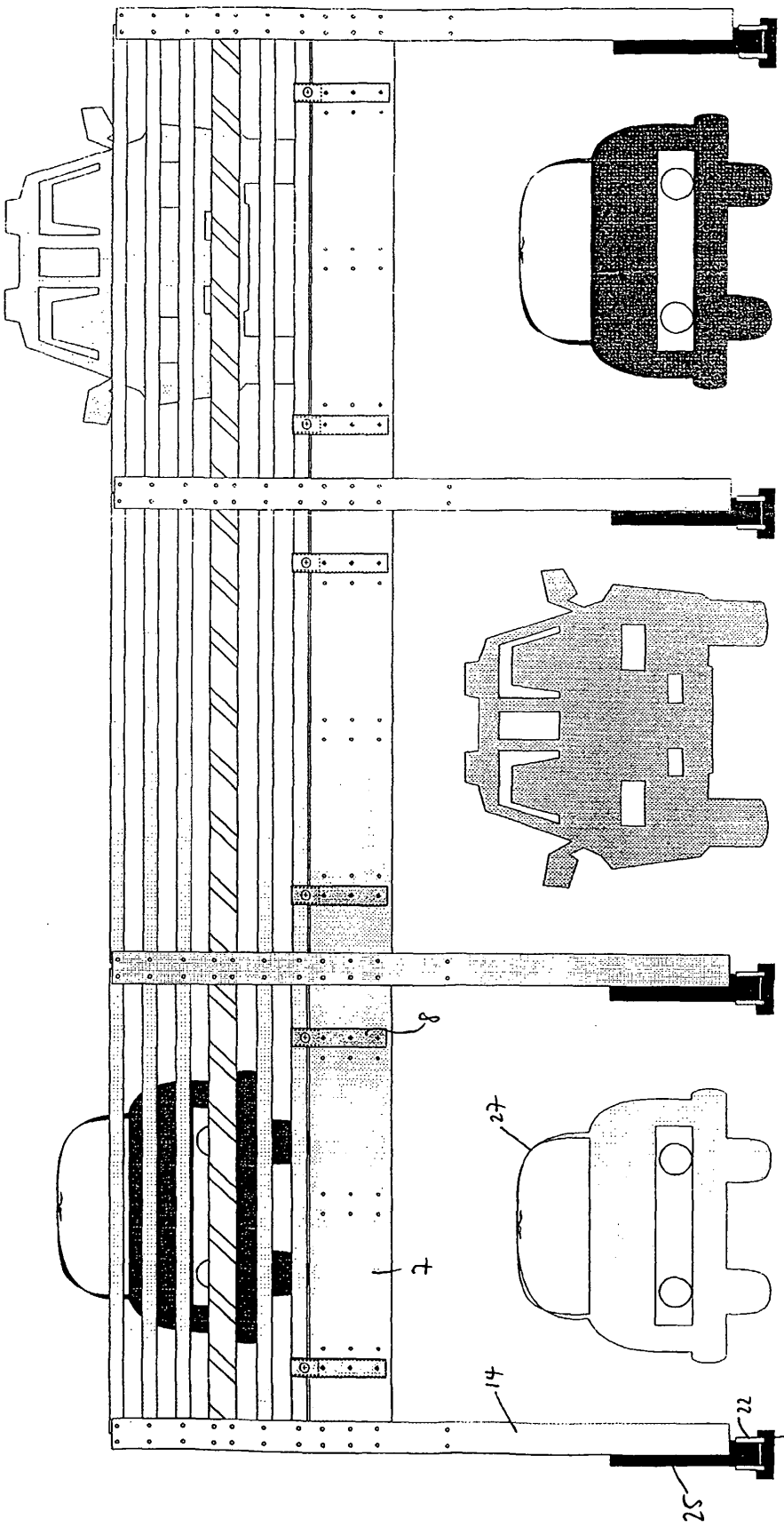


fig. 12

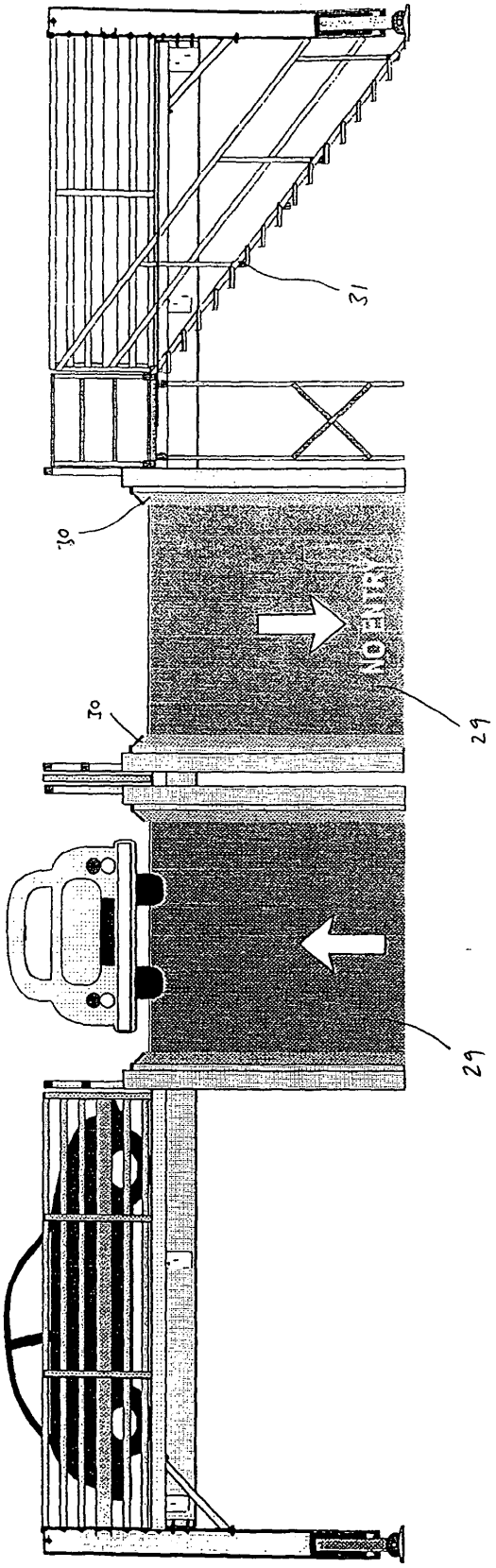


fig. 13

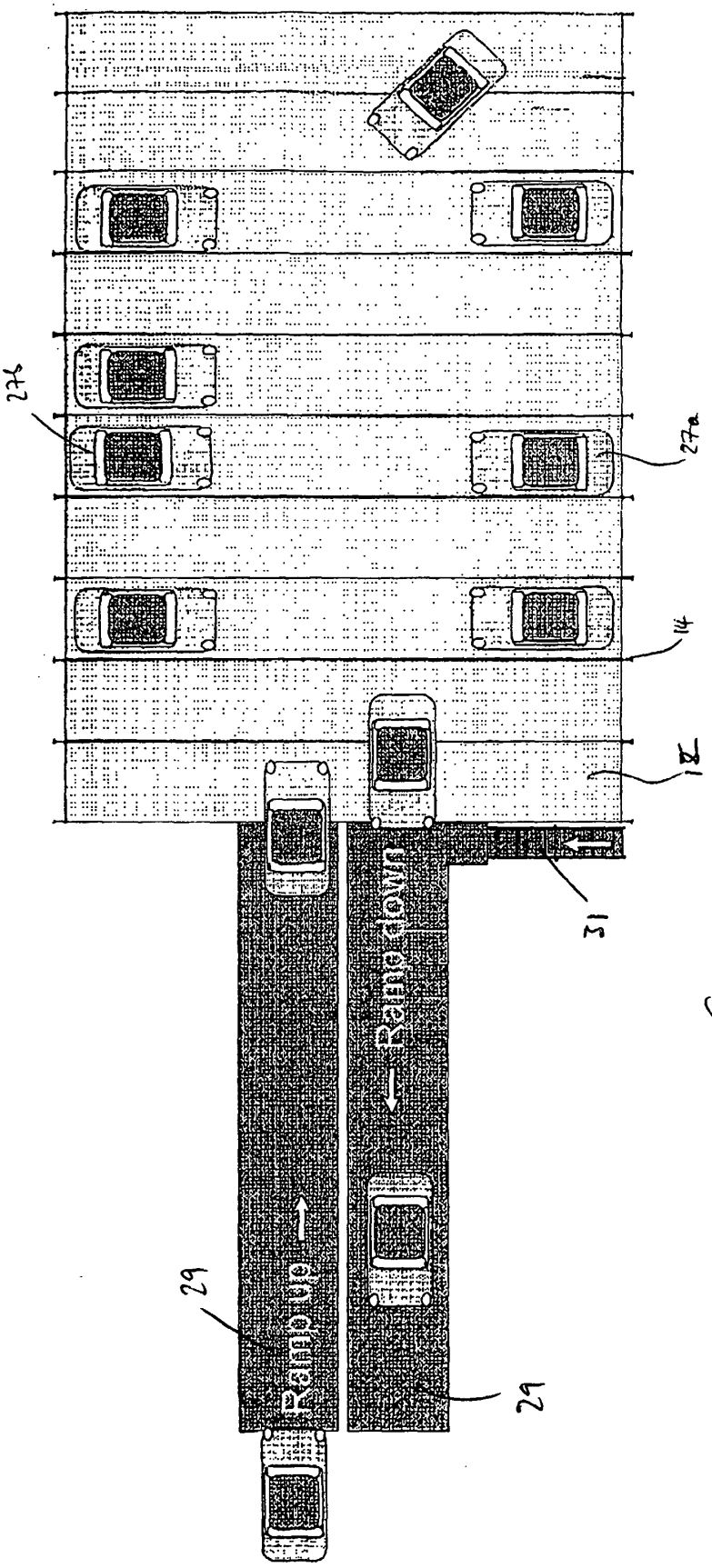


Fig. 14

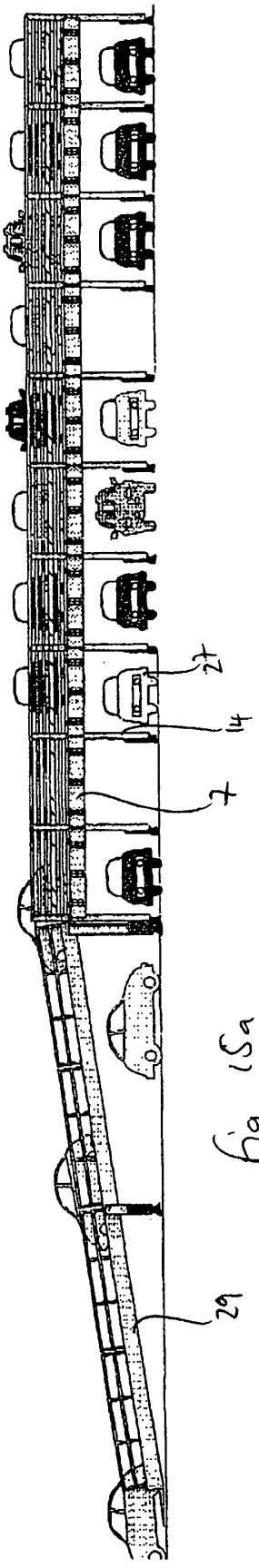


fig. 15a

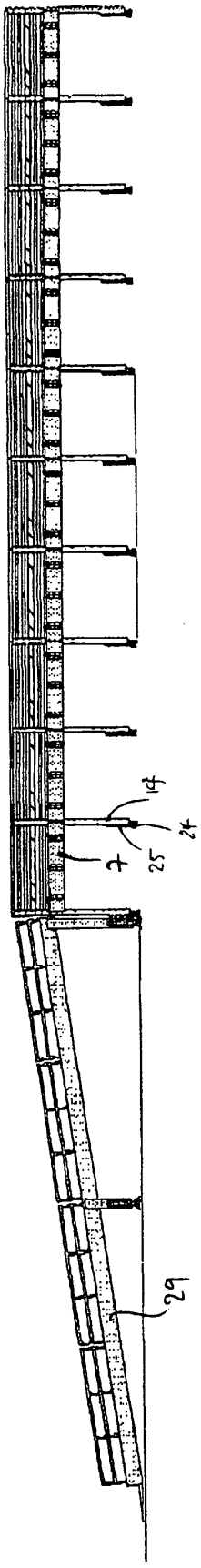


fig. 15b

REFERENCES CITED IN THE DESCRIPTION

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