United States Patent [19]

Klaus

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[54] **GARAGE FOR THE STORAGE OF VEHICLES**

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[21] Appl. No.: **264,843**

Related U.S. Application Data

[62] Division of Ser. No. 883,903, Dec. 10, 1969, Pat. No. 3,688,922.

[52] **U.S. Cl.**..... **214/16.1 ED**, 214/16.1 EC

[51] **Int. Cl.**..... **E04h 6/06**

[58] **Field of Search**..... 214/16.1 R, 16.1 ED, 214/16.1 DA, 16.1 EC

[56] **References Cited**

UNITED STATES PATENTS

2,815,872 12/1957 Graham..... 214/16.1 ED

FOREIGN PATENTS OR APPLICATIONS

299,508 10/1928 Great Britain..... 214/16.1 ED

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Assistant Examiner—R. B. Johnson
Attorney—Dennis O. Kraft

[57] **ABSTRACT**

The garage comprises at least two tilting platforms, each capable of accommodating at least two vehicles end-to-end superposed in spaced relation and linked for tilting in unison to place one end of one platform and the other end of the other platform in communication with fixed run-in and run-off areas of the garage, in one tilted position, and vice versa in the other tilted position. Provision is also made for raising and lowering the interlinked platform structure where there are more than two platforms in a stack.

1 Claim, 11 Drawing Figures

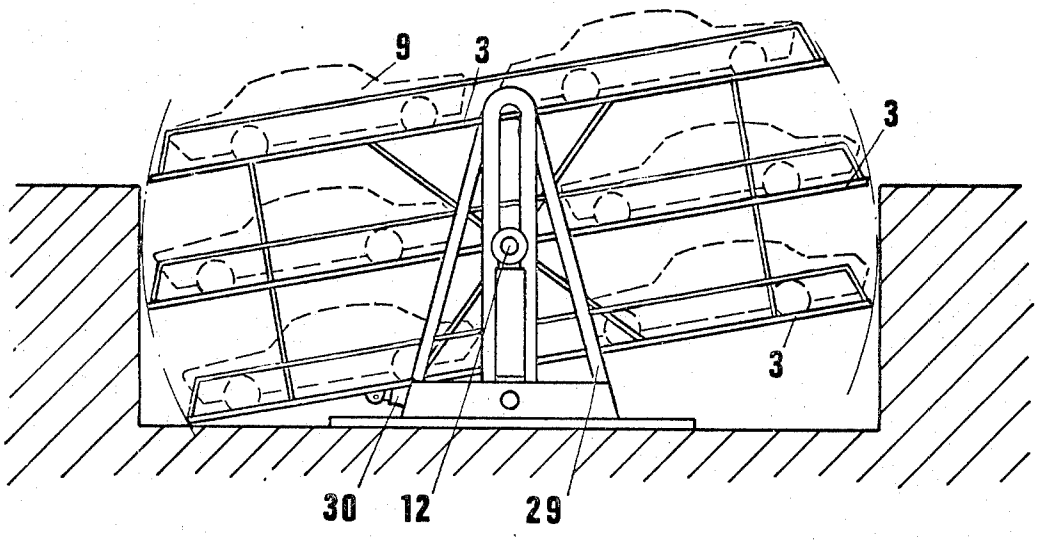


FIG.1

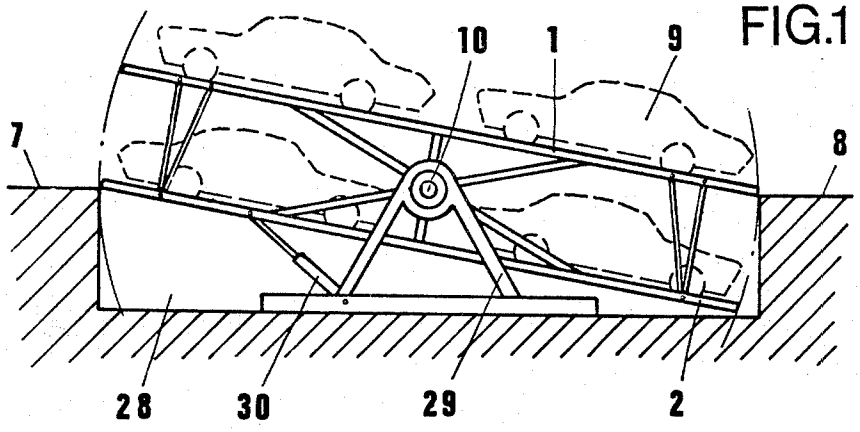


FIG.2

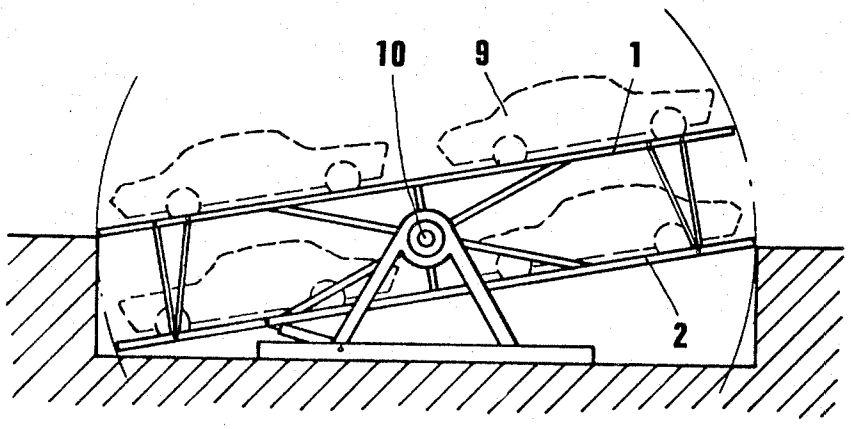


FIG.3

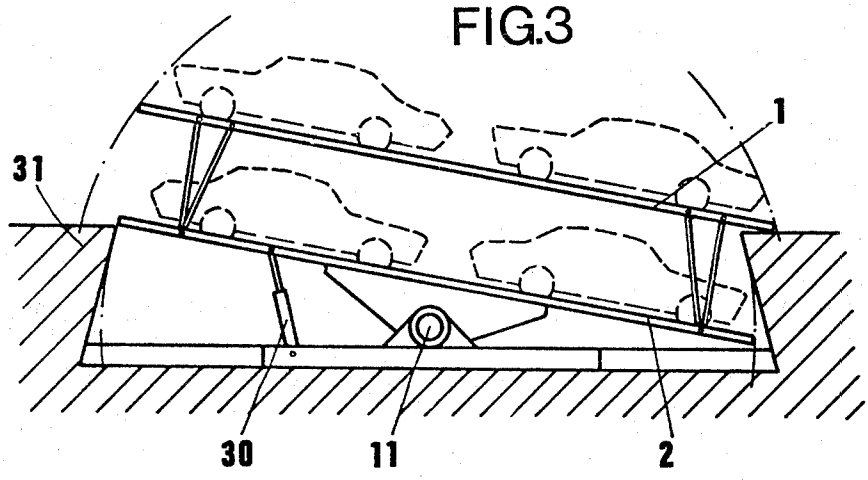


FIG.4

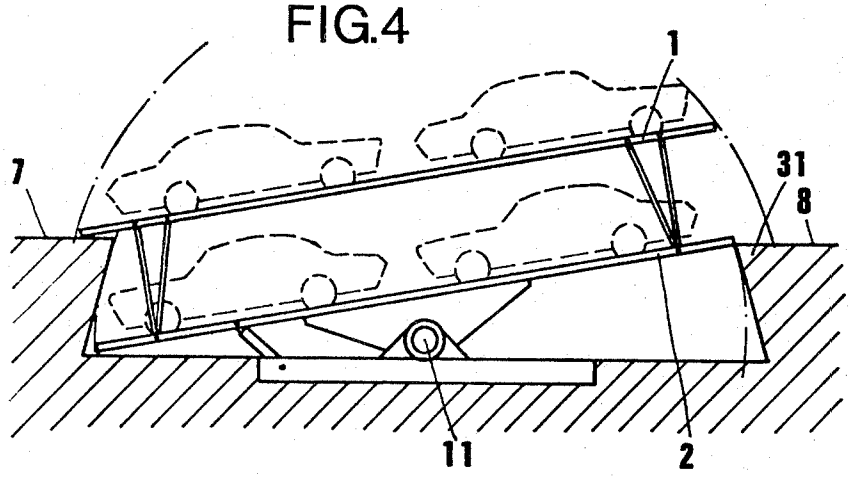


FIG. 5

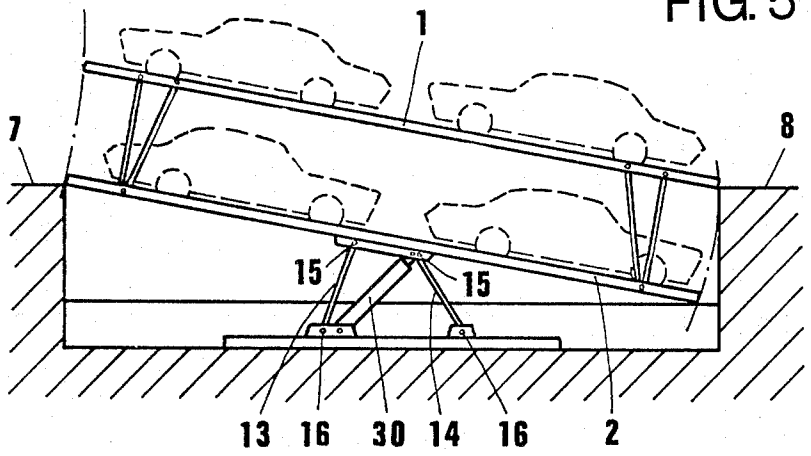


FIG. 6

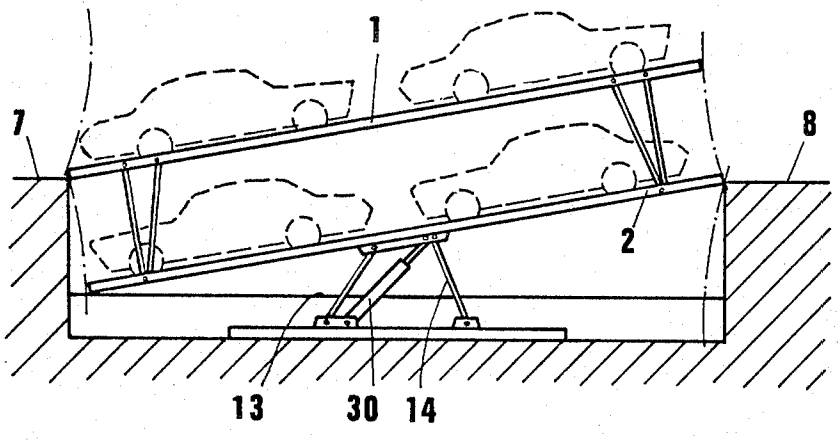


FIG. 7

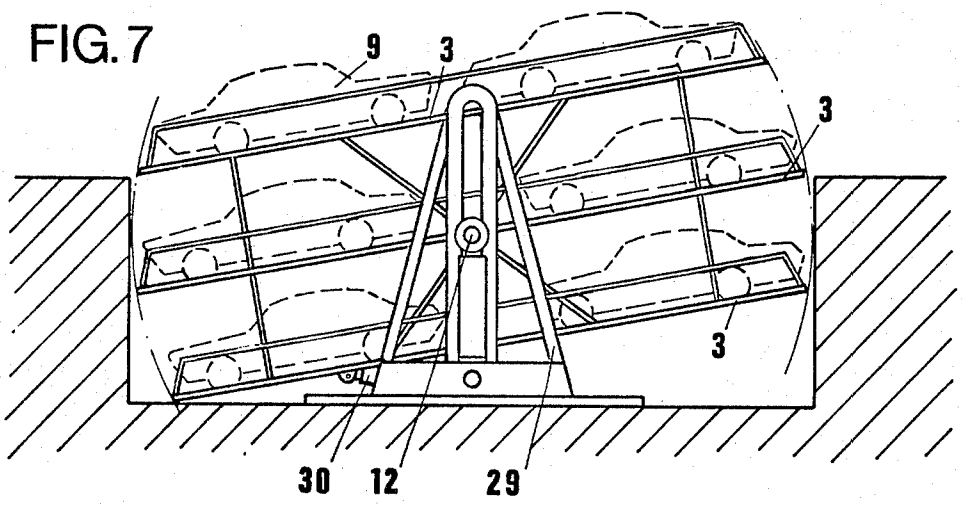


FIG. 8

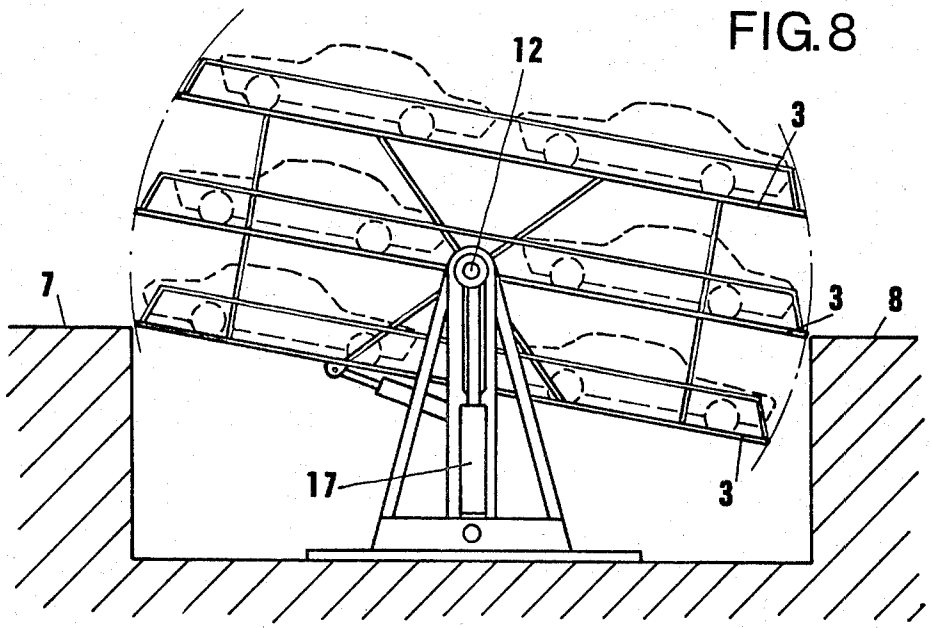


FIG.9

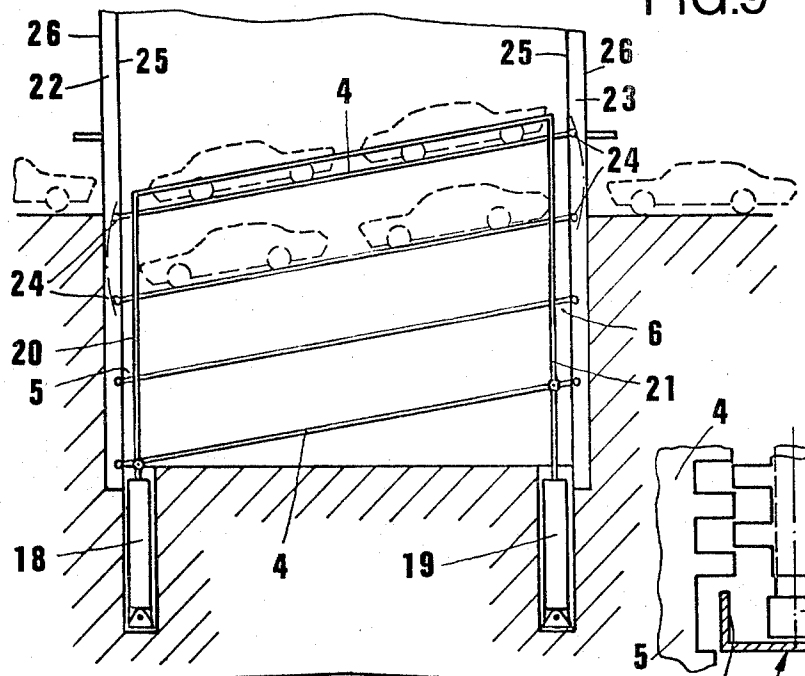


FIG.11

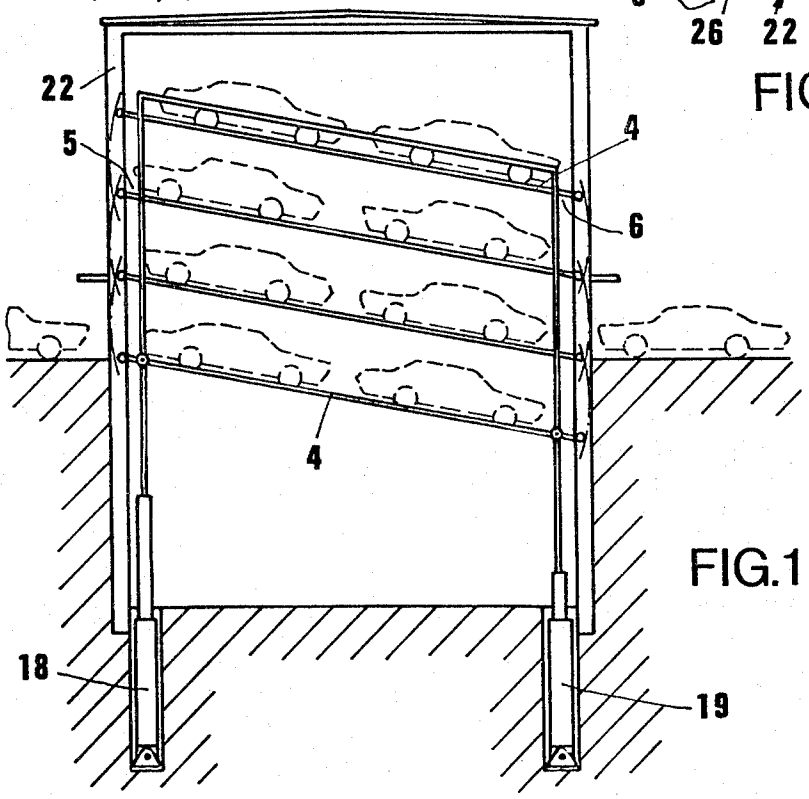


FIG.10

GARAGE FOR THE STORAGE OF VEHICLES

This is a divisional, of application Ser. No. 883,903, filed Dec. 10, 1969 now U.S. Pat. No. **3,688,922** issued Sept. **5, 1972.**

BACKGROUND

1. Field of the Invention

This invention relates to garages for the storage of a multiplicity of vehicles above one another in superimposed or stacked condition, such garages comprising a plurality of superimposed, tiltable and intercoupled platforms which can be alternatively placed in communication with a common run-on or approach area.

2. Description of Prior Art

A garage of this kind is known having two platforms which are coupled by parallel links which are arranged substantially vertically. Each platform affords room for one vehicle, and one platform or the other can be placed in communication with the approach area by raising or lowering the end of the platform nearest this area.

It is clear that where the two platforms have a parallel guide system the inclination of the two platforms into the drive-on position for one of the platforms is determined by the ratio between the clear height and the length of the platform. It is apparent that the inclination of the platforms in this situation is comparatively large. The result of this large inclination of the platforms is that frequently there is a danger that a vehicle will collide with the platform or with the bottom of the approach area when it is being driven on or off.

To avoid this the attempt has been made not to guide the two platforms in parallel fashion but to prescribe arrangements which allows slight lifting and lowering movements to the lower platform at least. The possibilities afforded by this are however limited because account must be taken of differing vehicle dimensions. Moreover such constructions are of increased cost and, in some circumstances, supervision requires particular care and attention which cannot always be counted on.

The object of the invention has been to provide a garage for the purpose stated above which is typified by a particularly simple and practical construction and in which there will be no difficulty involved in driving on to or driving off of the platforms. A further object of the invention lies in devising the arrangement in such a way as to ensure the accessibility of every parked vehicle.

SUMMARY OF THE INVENTION

The invention relates to a garage of the kind stated above and is characterised by the facts that the platforms are each of a length sufficient to accommodate at least two vehicles, that an approach area is provided at each of the two ends of the platforms, and that in one tilted condition of the platforms an upper platform communicates with one approach area and a lower platform with the other approach area, whilst in the other tilted condition the lower platform is in communication with said one approach area and the upper platform with said other approach area.

Whilst in previous constructions of garages of the kind to which this invention relates only one vehicle is provided for on each platform, and an approach area is provided only at one end of the platforms, the present invention caters for at least two vehicles per platform and equips the garage with two approach areas.

To do this, however, the invention does not simply duplicate the basic requirements or dimensions of the garage but provides a simple solution to the problems set forth above in an unexpected way. Thus if a platform is made of a length sufficient to accommodate at least two vehicles end-to-end, a comparatively small amount of tilting will suffice to bring into communication with an approach area a platform located above or below the platform previously in communication with this approach area. There is no drive-on problem. The fact that the invention provides for two approach areas further caters for ready accessibility to any vehicle or to any parking place. Two parking places are directly accessible for every inclination of the platforms and two other parking places for the other tilted position thereof.

The combination of at least four parking places in a garage with a single operating unit and so on further involves a considerable simplification in the amount of construction required, as related to one parking area.

In the invention the platforms can be rigidly connected together, but it is also possible to implement the coupling by a pivotable linkage arrangement. In accordance with a further feature of the invention it is provided that the angle of tilt is arranged substantially symmetrically in relation to the planes of the platforms.

In the case of three platforms arranged one above another the tilt shaft is arranged substantially at the level of the middle platform, and in the case of two superimposed platforms substantially at half the heightwise distance between these platforms.

A particularly favourable construction is achieved by disposing the tilt shaft beneath the lower platform. Instead of a construction having one journal or the like, use may advantageously be made of a double-linkage arrangement, in which the upper ends of the links are at a shorter distance apart than the lower ends. In this way there will be a linkage pole in the area between the platforms and thus similar motions to those produced where a rigid tilt shaft is used.

The invention also proposes further arrangements for raising and lowering the tilt shaft or shafts of the platforms. Even if it is per se possible to provide, for example, three platforms and three different angles of inclination of these platforms to make them all accessible, it is preferable, when there are more than two platforms arranged one above the other, to raise the platforms and the associated tilt shaft or shafts. A favourable arrangement is for example obtained if more than two platforms are rigidly interconnected and the common tilt shaft is arranged to be adjustable heightwise. In an upper position of the tilt shaft the middle and lower platform are accessible at each time, and in the lower position of the tilt shaft the upper and middle platforms are accessible. An arrangement of this sort is particularly suitable in cases where it is required to combine long duration parking places with temporary parking places.

A very advantageous arrangement according to the invention comprises a plurality of platforms which are interconnected by links and are carried by two reciprocable drive units, which latter are used both to produce the tilting and the reciprocating movements. These reciprocable drive units, which may for example comprise piston-cylinder assemblies or even draw cables or chain drives or the like, are preferably arranged in the vicinity of the ends of the platforms.

In accordance with a further feature of the invention guides for the reciprocating and tilting movements are provided in the case of a plurality of interlinked platforms, these guides each comprising a channel section rail in which engages a guide element associated with each platform, which element in the horizontal disposition of the platforms bears against one limb of the rail and, in the maximum permissible inclination of the platforms, bears against the other limb of this rail. The rails are preferably arranged in the vicinity of the ends of the platforms, whilst the guide elements are connected to the platform ends.

An arrangement of the kind described affords the advantage that there is a secure support for the complete assembly despite the provision for heightwise adjustment and tilting of the platforms in each operative position. In particular the maximum permissible inclination of the platforms cannot be exceeded, even should some defect occur, for example in the reciprocable drive means. The guide means prescribed also simplifies the operation of the system. If for example the drive is arrested at one end of the platforms, the drive at the other end can straight away be operated so that the ends of three different platforms can be coupled to the appropriate approach or access area as required.

BRIEF DESCRIPTION OF THE DRAWINGS

A number of embodiments of the invention are illustrated diagrammatically in the accompanying drawings in which:

FIGS. **1** and **2** are side views of two different operative positions of a garage in accordance with the invention,

FIGS. **3** and **4** are side views of two different operative positions of another embodiment of the invention,

FIGS. **5** and **6** are side views of two different operative positions of a garage in accordance with the invention having a linkage arrangement to implement the movement of inclination of the platforms,

FIGS. **7** and **8** are side views of two different operative positions of a garage which can be raised and lowered according to the invention and has three platforms,

FIGS. **9** and **10** are side views of two operative positions of a further example of embodiment of the invention, and

FIG. **11** is an enlarged plan view of a detail of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the garage illustrated in FIG. **1** a bearing block **29** is provided in a pit **28**, this block carrying a shaft **10** which supports two tiltable platforms **1** and **2** rigidly connected to one another. The approach areas are here designated **7** and **8** and the vehicles which are parked on the platforms **1** and **2** are identified at **9**. It is clear that in the situation illustrated in FIG. **1** the righthand parking area is accessible from the upper platform **1** and the left hand parking area from the lower platform **2**.

FIG. **2** shows the situation which is brought about by pivoting the platforms by means of a fluid cylinder **30**, and in which the communication between the platforms and parking areas is reversed.

Whilst in the embodiment illustrated in FIGS. **1** and **2** the tilt shaft is arranged between the two platforms **1** and **2**, in the example illustrated in FIGS. **3** and **4** this shaft **11** is disposed beneath the lower platform.

If, as illustrated in FIGS. **3** and **4**, the platforms **1** and **2** are of the same length it is advisable to provide the approach areas with projecting portions **31** where they fringe the pit **28**.

The modification illustrated in FIGS. **5** and **6** includes a linkage system, comprising links **13** and **14**, disposed beneath platform **2**. The ends **15** of the links which support the two platforms **1** and **2** are at a smaller distance apart than the lower ends **16** of these links.

In the embodiment illustrated in FIGS. **7** and **8** three platforms **3** are arranged one above the other and are rigidly connected together. The tilt shaft is designated **12** and this can be adjusted heightwise by a reciprocable drive unit **17** constituted by a fluid cylinder, so that at any time either the two upper (FIG. **7**) or the two lower (FIG. **8**) platforms are accessible.

The foregoing examples which have been illustrated are concerned with platforms rigidly coupled together, but FIGS. **9** and **10** show platforms **4** which are intercoupled by links **20** and **21** which are pivotally connected to these platforms. Link **20** is supported by the reciprocable drive unit **18** and link **21** by the reciprocable drive unit **19**. By differential heightwise adjustment and variation of the inclinations of the platforms **4**, any desired parking area, that is to say either end **5** or **6** of any of the platforms **4**, can be placed in communication with the approach area **7** or the approach area **8** respectively.

The provision for adjustment of the platforms, both heightwise and in terms of inclination, requires a particular guide system which, in accordance with the invention is constituted by guideways **22** and **23** at the forward and rear ends of the platforms **4**. Each of these guideways comprises a channel-section rail **27** in which elements **24** engage. As can be seen from FIG. **11**, when the inclination is at a maximum the guide element **24** bears against the limb **25** of the rail, whilst in the horizontal disposition of platforms **4** (not shown) the guide element **24** would bear against the other limb **26** of this rail. It will be understood that the distances between the two limbs **25** and **26** must be appropriately chosen in the same way as the mutual association of the two guideways **22** and **23**.

I claim:

1. A garage for storing a multiplicity of vehicles in superimposed condition, said garage comprising an assembly of platforms disposed one above another, means rigidly interconnecting said platforms together so that no articulated movement between said platforms occurs, a common tilt shaft, means supporting said platform assembly about said common tilt shaft so that said assembly, as a whole, is tiltably mounted, means for tilting said means operatively connected to said common tilt shaft and said platform assembly for adjusting the heightwise position of said common shaft and said assembly along a substantially rectilinear path, said platform assembly being adapted to be placed in communication with a common approach area of said garage, each platform being of a length sufficient at least for the accommodation of two vehicles on the platform, a substantially horizontally approach area provided at each of the two ends of said platform assembly, each of said approach areas being located at a substantially common level, said tiltable mounting of

said platform assembly being such that in one tilted condition of the platform assembly, an upper platform registers with one approach area and a lower platform registers with the other approach area, while in the other tilted condition of the assembly, the lower platform registers with said one approach area and an upper platform registers with said other approach area.

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