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THREE DIMENSIONAL PARKING STRUCTURE

The present invention relates to an assembly for constructing the framework of a three dimensional parking structure.

Various three dimensional parking structures are known which have the object of improving parking efficiency by effectively utilizing a limited parking space. One such structure is known having a framework forming the vehicle housing compartment which is constructed by assembling steel members vertically and horizontally. Such a structure is shown in Fig. 1.

This parking structure is constructed by assembling a framework to form multi-tiered vehicle housing compartments 3 on both the left and right sides of a lift 2. The lift moves a pallet 1 for carrying a vehicle between tiers of the assembly. On the lift 2 and in each vehicle housing compartment 3 there are two pairs of rails 4 and 5, one at the front and the other at the back. In use, the lift is brought into position next to a compartment. This brings the rails on the lift and in the compartment into alignment with each other and facilitates the movement of the pallet 1 carrying the vehicle freely between the lift 2 the vehicle housing compartment 3. In this way, vehicles may be parked in the compartments.

The framework of such a three dimensional parking structure as described above is constructed by transporting steel members of various lengths such as pillars for parking structure post frames, crossbeam and girders for spanning between the pillars, or oblique crossbeams, etc, to the construction site, and constructing the structure by assembling these steel members and securely joining them on site.

Therefore, not only is there the inconvenience of

transporting numerous steel members, but there is also the disadvantage that construction of the framework is troublesome and time-consuming.

In order to solve the aforementioned problems, the present invention provides a three dimensional vehicle parking structure having a framework construction formed of a plurality of discrete frame units, the frame units each comprising a plurality of steel members joined together to form a planar unit, wherein the frame units are directly inter-connected to form a box-like shape capable of housing vehicles.

The invention also provides a method of constructing a three dimensional vehicle parking structure, comprising the steps of joining steel members together to form a plurality of discrete planar frame units, and subsequently directly inter-connecting the frame units to form a box-like shape capable of housing vehicles.

Preferably, each frame unit can be made as a rectangular rigid frame structure.

Thus, at least in its preferred forms, the present invention provides an apparatus which is unlike conventional constructions. Instead of building the parking structure framework in the known manner by assembling many individual steel members at the construction site, these materials are first made into planar units by welding or the like at a plant and then they are connected into a box shape on site. The parking structure framework can be constructed at the construction site by merely joining the frame units to each other. That is, the units from which the parking structure framework are constructed are changed from individual pieces of steel to frame units.

Consequently, in contrast to the prior systems, there is no need to handle a large number of steel members at the construction site. In addition, because compared to heretofore there are fewer parts to be

joined, the construction of the framework can be implemented easily and accurately.

Also, compared to transporting a lot of steel members, it is easier to transport such frame units.

Furthermore, in the event that each of the frame unit is made as a rectangular rigid frame structure, the framework will be strongly constructed because each frame unit will be securely made, and in addition oblique crossbeams will not be required.

An embodiment of the invention will now be described by way of example only with reference to the drawings, wherein:-

Fig. 1 is a perspective view showing an outline of a three dimensional parking structure using a conventional framework construction using the oblique crossbeam mentioned above;

Fig. 2 is a disassembled perspective view of an embodiment of the invention showing the framework structure;

The present invention can be applied to any kind of construction in which a parking structure is made by constructing a box shaped framework by assembling steel members.

As shown in Fig. 2, the framework of the parking structure is formed by connecting a multiple of frame units 10 and 11 in a box shape.

Each frame unit 10,11 is formed by welding or the like, for example, four hollow steel rectangular pipes together at the plant to form rectangularly shaped planar units. Thus, the units are very easily manufactured.

Each frame unit 10,11 is formed with a suitable shape and size corresponding to the scale of the parking structure that is to be constructed, and several kinds of frame units can be made for one parking structure if necessary. However, for the parking structure of the illustrated embodiment, the space of the vehicle housing

compartment 3 formed by the frameworks is the size of the pallet 1 on which a passenger car can be stably placed and is generally constant. Therefore not many kinds of frame units 10,11 are required. Consequently, said frame units 10 and 11 can be produced to a uniform design for each job.

Furthermore, all the joints A of the frame units 10 and 11 are strongly welded together to form rectangular rigid frame structures. For this reason each of the frame units 10 and 11 are sufficiently strong and do not require any reinforcing measures such as oblique crossbeams.

Each of the frame units 10,11 formed as described above are transported from the plant to the parking apparatus construction site and assembled thereat.

In the illustrated embodiment, a pair of vertically elongate frame units 11 forming a post frame are erected. Sandwiched between them are horizontally elongate frame units 10 forming a side frame, and these frame units 10,11 are securely inter-connected by connecting means 14 consisting of a connecting plate 12, bolts 13 and nuts 15 or the like to form the framework. In this way a multi-tiered vehicle housing compartment 3 (3 tiers above ground in the drawing) is formed.

To use the structures, vehicles are raised to the vehicle housing compartment 3 by means of, for example, a lift 2 (see Fig. 1) and then the vehicles are moved into the compartment. In this manner it is possible to park many vehicles in a small space.

According to the construction of the present invention, because the minimum units of the parking structure framework are the units 10,11, the parking structure framework is completed by merely connecting suitably each unit 10 and 11 at the construction site and assembling them. Therefore, it is possible to construct the framework very easily and quickly.

Also, because each of frame units 10,11 are made

into rectangular rigid frame structures, as long as all frame units 10,11 are connected together securely by means of the connecting means 14, the complete parking structure thereby constructed will be very strong constructed and safe.

Moreover, transportation of the components will also be easy compared to the conventional construction systems, in which many steel members must be transported to the site.



Claims

1. A three dimensional vehicle parking structure having a framework construction formed of a plurality of discrete frame units, the frame units each comprising a plurality of steel members joined together to form a planar unit, wherein the frame units are directly inter-connected to form a box-like shape capable of housing vehicles.
2. A structure as claimed in claim 1, wherein each of the frame units is a rectangular rigid frame structure.
3. A structure as claimed in claim 1 or 2, wherein the frame units are inter-connected by means of connecting plates.
4. A method of constructing a three dimensional vehicle parking structure, comprising the steps of joining steel members together to form a plurality of discrete planar frame units, and subsequently directly inter-connecting the frame units to form a box-like shape capable of housing vehicles.
5. A method of constructing a structure as claimed in claim 4, wherein each of the frame units is a rectangular rigid frame structure.
6. A method of constructing a structure as claimed in claim 4 or 5, wherein the frame units are inter-connected by means of connecting plates.
7. A three dimensional parking structure substantially as hereinbefore described with reference to Figure 2 of the accompanying drawings.
8. A method of constructing a three dimensional



parking structure, substantially as hereinbefore
described with reference to Figure 2 of the accompanying
drawings.