ABSTRACT OF THE DISCLOSURE

A portable multiple deck parking structure having a framework of columns, and horizontal as well as inclined beams and precast concrete slabs for placement on the horizontal and inclined beams to form deck surfaces as well as ramps connecting the deck surfaces, the columns and beams being of standard sizes and bolted together, and the concrete slabs having connectors embedded therein so that the entire structure may be readily assembled at one site, then, when desired, may be as readily disassembled for transportation and reassembly at another site.

This invention is a continuation-in-part of my previous application entitled: Separable Deck Structures, filed Dec. 2, 1966, Ser. No. 598,809 now abandoned.

BACKGROUND OF THE INVENTION

Increasing numbers of motor vehicles combined with decreasing space in which to park them has necessitated increasing use of multiple deck parking structures. Here-tofore these have been permanent structures and cannot be built quickly. During the construction time, the parking space is, of course, unavailable. More particularly, however, many parking areas have not been available for multiple deck parking because they are used only temporarily, pending, for example, the erection of office or apartment buildings.

SUMMARY OF THE INVENTION

The objects of this invention include:
First, to provide a multiple deck parking structure which may be readily and quickly assembled or disassembled so that, if a space is only temporarily available, the parking structure may be assembled thereon.
Second, to provide a portable parking structure having a framework of columns and horizontal beams as well as inclined beams and precast concrete slabs for placement thereon to form decks and ramps connecting the decks, the columns and beams being of standard sizes and bolted together for ready assembly and disassembly, and the concrete slabs having fastening elements cast therein for ready attachment to the horizontal and inclined beams and ready removal therefrom.
Third, to provide a portable parking structure as outlined in the preceding objects, which on reassembly, need not be dimensioned the same as the preceding structure; that is, columns, beams and slabs may be added or removed to change the area of the completed structure.
Fourth, to provide a deck structure comprising a plurality of preformed concrete slabs, each slab incorporating novel separable connectors embedded in its margins, the connectors not only serving to secure the slabs, but also serving to suspend the slab so that the slab may be lifted and maneuvered into place by a crane.

DESCRIPTION OF THE FIGURES

FIGURE 1 is a fragmentary plan view of the deck structure showing several removable concrete slabs in place thereon, and showing a portion of a ramp.

FIGURE 2 is an enlarged fragmentary plan view, taken within circle 2 of FIGURE 1, with a portion of a slab broken away to show one of the mounting means.

FIGURE 3 is a further enlarged fragmentary sectional view, taken through 3-3 of FIGURE 2.

FIGURE 4 is an enlarged fragmentary sectional view taken through 4-4 of FIGURE 1 showing a typical connection between horizontal beams as well as a supporting column.

FIGURE 5 is an enlarged fragmentary sectional view taken through 5-5 of FIGURE 1, showing the juncture between a ramp and a deck.

FIGURE 6 is an enlarged fragmentary sectional view taken through 6-6 of FIGURE 1 showing a side margin of a ramp.

The portable parking structure is erected on a concrete floor 1 having suitably located footings 2 from which extend sets of anchor bolts 3. A column member 4 of 1 cross section is provided with a bottom plate 5 secured to each set of bolts 3. The columns are arranged in a rectangular pattern and are provided with top plates 6 which support longitudinal beams 7 of 1 cross section extending over several plates and secured thereto by bolts 8. The beams 7 are joined together between their points of support on the columns by cross beams 9 also of 1 cross section.

The pattern of column members 4 is such that the cross beams 9 have a greater span than the beams 7, hence, the cross beams are of greater depth. Each cross beam is provided at each end with a pair of angle brackets 10. The crossbeams are arranged in line and the angle brackets of the pairs of cross beams are contiguous on opposite sides of the beams 7 and above the column members 4. The contiguous angle brackets 10 are joined by bolts 11.

The beams 7 and 9 form a plurality of rectangular bays 12. The upper sides of the beams 7 and 9 provide mounting flanges 13 to support the margins of preformed concrete slabs 14.

Each slab 15 is rectangular in form, and includes appropriate reinforcing 15. The margins of each slab are provided at spaced intervals with angle reinforcing members 16; each member including a vertical flange 17 flush with the side of the slab, and a horizontal flange 18, flush with the bottom of the slab.

A mounting and suspending sleeve 19 is provided for each angle reinforcing member. The horizontal flange 18 of each reinforcing member is provided with an aperture which receives the lower end of a sleeve 19. The sleeve is secured in an upright position to the horizontal flange 18 by a weld 20. Internally, the sleeve 19 is provided with upper internal screwthreads 21, and lower internal screwthreads 22.

The sleeves 19 may be employed as drill guides for the purpose of forming bolt holes 23 in the mounting flanges 13 of the beams 7 and 9, or these holes may be preformed. In either case, the slabs are secured in place by bolts 24, which extend upwardly through the flanges 13, and into engagement with the lower internal screwthreads 22.

In addition to the reinforcing member 16, each sleeve 19 is joined to a laterally extending anchor bar 25 by a weld 26. The extremity of each anchor bar 25 is provided with a head 27.

The slabs are dimensioned so that when positioned on the steel frames forming the bays 12, they are separated a predetermined distance, as indicated best in FIGURE 3. The space 28, thus formed, receives a tubular seal support 29. The seal support may be a normally circular plastic tube, which is forced between the slabs, to a depth slightly below the top surface thereof. A suitable sealant 30,
preferably in an initially liquid or semi-liquid state, is applied within the space above the seal support 29.

In order to provide communication between decks, selected bays 12 are omitted and ramp side beams 31, also preferably 1 beams, are provided between the corresponding column members 4. The ramp side beams 31 are provided with lateral extensions 32 which are secured to the column members by bolts 33 and to the ramp side beams 31 by bolts 34.

The ramp side beams 31 are joined by cross beams 35 so as to form therewith rectangular bays similar to the bays 12. The ramp bays receive precast slabs 36 similar to the slabs 14, except that they are slightly less in length to fit between the columns, as shown in FIGURE 6. The end margins of the ramp slabs forming the sides of the ramp are provided with guard rails 37 of precast reinforced concrete and secured thereto by bolts 38 which may utilize the sleeves 19. Additional sleeves may be provided, if needed.

The ramp slabs 36 are preferably of greater thickness than the deck slabs 14. Also, the margin of the slab at the top of the ramp is notched, as indicated by 39, in FIGURE 5, so that its end confronting a deck slab 14 is identical thereto.

Erection of a deck structure, utilizing this invention, is as follows:

After a concrete floor 1 with suitable footings 2 is poured and set, the columns 4 are erected and the beams 7 are mounted thereon. The cross beams 9 are bolted in place and the ramp beams 31 and their cross beams 35 are also placed.

The slabs 14 and ramp slabs 36, which have been precast, are manipulated into position by a crane, using the upper screwthreads 21 as elements of separable connectors for attachment to the suspension line of the crane. Once the slabs are in place, bolts 24 are inserted through preformed holes 23 in the beams 7 and 9, or the sleeves 19 are used as drill guides or templates to bore the holes, and thereafter the bolts are inserted to secure the slabs.

After the slabs are in place, the tubular seal supports 29 are forced into the spaces 28 between the slabs, and thereafter the sealant 30 is applied. A sealant is chosen which does not bond tightly to the concrete slabs so that in the event it is desirable to dismantle the deck structure, and remove it to another location, the slabs may be readily removed once the bolts 24 are removed. The slabs are lifted free of the deck by separable securing means reinserted in the upper screwthreads 21.

It will be noted that all of the frame structure including the columns 4, beams 7 and 9, and ramp beams 31 and 35 are linear members which are easily packed in a compact space for storage and transportation, and that they may be of standard lengths; that is, the column members are all the same length, as are the longitudinal beams 7 and the cross beams 9. While they are fewer in number, this may also be true of the ramp side beams 31 and the ramp cross beams 35.

Similarly, the concrete slabs 14 are identical in size and the ramp slabs 36 may also be identical. Thus, the slabs are easily stacked for storage or transportation.

By reason of the standard dimensions of all components, portable parking structures of different areas may be erected.

While a particular embodiment of this invention has been shown and described, it is not intended to limit the same to the details of the construction set forth, but instead, the invention embraces such changes, modifications and equivalents of the various parts and their relationships as come within the purview of the appended claims.

1. A portable parking structure, comprising:
   (a) a plurality of column members, each adapted to receive removable fastening elements at its lower end for attachment to a foundation footing;
   (b) a plurality of longitudinal beams mounted on said columns and joined to said columns by removable fastening elements;
   (c) a plurality of cross beams each having means at its extremities to receive removable fastening elements, said cross beams arranged in pairs having confronting ends disposed at opposite sides of said longitudinal beams, and adapted to be joined together by removable fastening means extending through said longitudinal beams;
   (d) said longitudinal and cross beams forming a plurality of rectangular bays;
   (e) and a rectangular precast concrete slab for each bay having margins resting on said beams;
   (f) a plurality of angle members disposed around the margins of each slab, each angle member including a bottom flange flush with the bottom of said slab and a side flange flush with the side of said slab;
   (g) a vertical tube welded to the bottom flange of each angle member and extending upwardly through said slab, said mounting tubes being internally screw-threaded at least adjacent their extremities, the lower ends of said mounting tubes overlying said deck frame, said deck frame and said bottom flange being in alignment with said mounting tubes;
   (h) an anchor bar fixed relative to each angle member and tube, extending horizontally into said slab and terminating in a head;
   (i) and screwthreaded removable fastening means joining said mounting tubes to said deck frame thereby to removably secure deck slabs to said deck frame;
   (j) the upper screwthreads in said mounting tubes forming means for attaching the corresponding slab to suspension means, thereby to facilitate placement of said slab on said deck frame and removal of said slab therefrom.

2. A structure as defined in claim 1 including removable sealing means between adjacent edges of adjacent slabs.

3. A structure as defined in claim 1 including curb members extending along side edges of certain said slabs; and releasable fastening means extending through said curb members and into said tubes.

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