MODULAR MAUSOLEUM CRYPT SYSTEM

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Filed: Apr. 9, 1974

Appl. No.: 459,299

U.S. Cl. 52/134; 52/79; 52/136; 52/236

Int. Cl. E04h 13/00

Field of Search 52/73, 79, 134, 136, 236

References Cited

UNITED STATES PATENTS
2,525,017 10/1950 Check et al. 52/136
2,853,870 9/1958 Sinner et al. 52/509 X
3,287,865 11/1966 Lockman 52/136
3,468,081 9/1969 Saarinen 52/79
3,635,354 1/1972 Martin 52/79 X
3,642,339 2/1972 Ruderfer 52/134 X

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ABSTRACT

An above-ground mausoleum construction formed of a plurality of interlocking, precast, monolithic modular units forming crypts arranged in tiers, is disclosed. A single tier includes a right end, intermediate, and left end modular unit, each of which includes at least two upstanding walls, an upper horizontal portion and a rear wall, the spacing of each of the walls being uniformly predetermined so as to receive a casket therein. Each module is designed to be interfitted and sealed with non-shrinking grout with a next adjacent module forming non-aligned horizontal and vertical lap joints. In this manner, a substantially monolithic structure is obtained. Each of the upstanding side wall portions merges with the horizontal slab portion at an expanded haunch portion which is provided with anchors for supporting a removable face plate. Each crypt is readily sealed with a closure plate sealingly positioned at the open end of the crypt within recess provided along the perimeter thereof. By this construction, a highly stable, rigid, self-supporting, interlocking structure is achieved, capable of withstanding external stresses without damage. An economically desirable system is also provided.

9 Claims, 3 Drawing Figures
MODULAR MAUSOLEUM CRYPT SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an improved, above-ground, multi-level mausoleum construction. More particularly, the invention relates to a mausoleum construction comprising a plurality of tiered, interlocking, precast modules, which, when assembled, yields a substantially monolithic structure with improved stability and rigidity characteristics and which is capable of withstanding external forces without damage.

2. Description of the Prior Art

In recent years there has been increasing emphasis placed on the efficient utilization of land, especially for burial purposes, in areas where the population growth has been significant. One particular pressing problem which has received attention for at least the past two decades is the use of above-ground mausoleums, similar in concept to highrise apartments. The advantages of above-ground, multi-level mausoleums are readily seen since this concept permits a more efficient utilization of land and has the added advantage of permitting visitors to be indoors while paying respects to the deceased, where lobby-like facilities are provided.

Heretofore, a variety of construction techniques have been employed to construct multi-level, above-ground mausoleums. One such technique utilizes the "poured-in-place" technique used in apartment construction. Thus, concrete is poured in forms on the site, level by level, until the entire structure is completed. In this manner, a multi-story mausoleum can be fabricated according to design. This approach yields a highly satisfactory product but is economically undesirable by virtue of the slot and relatively expensive fabrication technique employed.

In an effort to reduce costs, attempts have been made to utilize precast sections for one or more portions of the mausoleum structure. One such approach is described in U.S. Pat. No. 2,525,017 (issued on Oct. 20, 1950) which describes a mausoleum formed of precast sections comprising a unitary open-ended crypt unit which can apparently be positioned in spaced relationship, the space between units forming another cavity which can also be separately enclosed. Although the precast units are generally rigid, nevertheless the cavity portions between the precast units require an undue amount of effort to ready them for crypt use. Moreover, the assembled structure described in U.S. Pat. No. 2,525,017 does not possess the required rigidity and stability necessary to resist external forces.

Another technique which utilizes precast sections for mausoleum construction is disclosed in U.S. Pat. No. 3,287,865 (issued on Nov. 29, 1966). Here a tiered structure made of abutting precast sections is described. On its face, this construction appears to avoid the difficulties noted in U.S. Pat. No. 2,525,017. However, a careful analysis of this construction reveals that the horizontal and vertical joints formed by the abutting walls of adjacent sections are in an aligned orientation. Since the alignment plane is vertical, extending from the lowermost tier to the uppermost tier, it is clear that this represents a cleavage plane which can cause serious problems when subjected to external stress. Moreover, the alignment plane is substantially equidistant between adjacent vertical walls, and therefore has little, if any, underlying support.

Up until the present invention, there still existed a need for an improved mausoleum construction combining the structural qualities of the poured-in-place construction with the desirable attributes of precast sections.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a mausoleum construction which is substantially comparable in performance to poured-in-place construction but without the associated drawback of high cost and lengthy construction time.

It is another object of the present invention to provide an improved mausoleum construction, of the character aforementioned, comprising precast concrete modules adapted to horizontally and vertically interlock with one another when placed in side-by-side relationship, to form a substantially monolithic structure capable of resisting external stresses without cracking and the like.

It is still another object of the present invention to provide an improved mausoleum construction, of the character aforementioned, wherein the precast modules are provided with upright side walls merging at their upper portion at a horizontal slab, and at their rear wall portion at a rear wall, the front and bottom portions of the module being open permitting interment during transport thereof.

These and other objects are accomplished by providing a mausoleum construction comprising a plurality of tiered crypts formed from modular, monolithic, precast concrete modules, each of the tiers including a left end, intermediate, and right end module, positioned in horizontal side-by-side abutting relationship with next adjacent sections, and interlocking with one another to form unitary structure, after assembly. The intermediate modular section includes an upper, horizontally disposed slab, a pair of spaced vertical or upstanding side walls having respective longitudinal axes and depending from the horizontal slab, and a rear wall. The spacing between the upstanding side walls is of a predetermined width, preferably uniform, to form a crypt cavity. The horizontal slab includes one edge terminating adjacent one of the upstanding side walls forming a ledge therein, and an opposite edge projecting beyond the longitudinal axis of the next adjacent upstanding side wall for a predetermined distance, in cantilevered fashion. A rear wall is provided which extends substantially from the longitudinal axis of one of the vertical walls to beyond the free edges of the cantilevered horizontal slab portion. Ledges are provided in the next adjacent module for receiving the free edges of both the cantilevered portions of the horizontal slab and the projecting portions of the rear wall for interlocking purposes.

For reasons which become more apparent hereinafter, it should be emphasized that the inventive concepts of the improved mausoleum construction of the present invention do not reside in the particular number of tiers and/or crypts, as illustrated in the drawing, but can be varied to accommodate the number of crypts desired for any particular installation. Moreover, although each tier is illustrated to be identical with respect to the modular unit employed therein, when compared to the remaining tiers, this arrangement can also be varied such that left and right end modular units of adjacent tiers can be different to further displace the non-
aligned horizontal and vertical joints formed by the interlocking modules. In other words, in one tier, the left end modular unit can include a single crypt, whereas in the overlying tier, the left end modular section can be larger, e.g., two crypts, this arrangement being repeated, depending on the number of tiers provided. A similar alternating arrangement can be provided at the right end modular section of each tier. This non-symmetrical construction provides additional structural rigidity and stability for only a slight increase in overall erection expense.

It should also be mentioned that each of the upstanding side and rear walls of each modular unit tapers downwardly so as to be received and grouted in grooves provided in the upper surface of the modular unit positioned in the tier directly below. Each modular unit is in a secured position during assembly to effect proper alignment of the sections. A non-shrinking grout is employed to form fluid-tight joints for interengaging units.

From the aforementioned, and the description which follows, it will become apparent that the mausoleum construction of the present invention offers considerable structural and cost advantages over prior techniques. When completed, the mausoleum construction of the present invention is a substantially monolithic structure which is self-supporting. No additional supporting walls are required, further reducing construction costs. Construction versatility is another feature of the present invention, with as few as three crypts to twenty thousand or more crypts per installation, erected. The precast concrete modular units can be readily fabricated in a plant under carefully controlled conditions and shipped to the construction site for assembly, using a minimum of skilled labor. Structurally, the mausoleum construction of the present invention has a high degree of stability by virtue of non-aligned, interlocking lap joints. It has been demonstrated that the mausoleum construction of the present invention is capable of withstanding external forces, e.g., high wind loadings, climatic changes, and the like, without damage to its fluid-tight joints. By such improved construction the egress of odors emanating from within the crypt, as well as the entry of rain water and the like, is precluded.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a pictorial representation of an illustrative embodiment of a mausoleum construction according to the present invention, with portions removed to show certain internal features.

FIG. 2 is a pictorial representation of a modular unit in interlocking relationship with a next adjacent modular unit shown in phantom, with particular emphasis on the horizontally and vertically disposed lap joints at the abutting upper and rear walls.

FIG. 3 is a pictorial illustration, in exploded view, of the preferred modular units employed in forming a single tier of the mausoleum construction of the present invention, with alternative right end modular units being shown.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring now to the drawings wherein like numerals indicate like elements throughout the several views, there is shown an above-ground or garden-type mausoleum construction according to the present invention. The mausoleum construction of the present invention, as shown in perspective in FIG. 1, is a four tier structure, each tier represented by the symbols I, II, III and IV, from bottom to top, respectively. The four tier mausoleum is supported by a concrete base 10. Each of the tiers, I-IV, includes a plurality of precast modular units, preferably of reinforced concrete, permanently bonded to each other by cement to form a unitary structure. For purposes of clarity, the precast modular units employed for one or more crypts are best seen in the exploded view of FIG. 3 where the letters A, B, C, D are used for each different type of unit. These modular units are exemplary of the inventive concepts described herein, and can be readily modified to expand or reduce the number of crypts per tier. In FIG. 3, module A is a left end unit, module B an intermediate or central unit, modules C and D are alternative right end units. Generally, each tier includes, in side-by-side relation, at least a left end modular unit A, an intermediate modular unit B, and either right end modular unit C or D, depending on whether an odd or even number of crypts per tier are desired.

Again, for purposes of clarity, only the intermediate modular unit B will be fully described, it being understood that the other modular units include substantially identical features, except where otherwise noted. As best seen in FIGS. 2 and 3, the intermediate modular unit B includes a pair of spaced, upstanding side walls 11, 12, the spacing between the side walls being of predetermined width, to form a crypt cavity 13. Modular unit B further includes an upper, horizontally disposed slab 14 which is integrally formed with side walls 11 and 12. The upper slab 14 extends laterally beyond the side wall 11 in cantilevered fashion with the cantilevered portion being identified as 15, and terminates at a free edge 16. In the exploded view, FIG. 3, either of the right end modular units C or D can be used, as represented by the broken arrows, depending on whether an odd or even number of crypts per tier is desired. In either case, a ledge 17 is provided on modular units C and D to receive the cantilevered slab portion 15 forming a lap joint 18 having horizontal and vertical components 18a, 18b, respectively.

Intermediate modular unit B also is provided with an integrally formed rear wall 20 which extends laterally from the longitudinal axis of the side wall 12 to beyond the free edge 16 of the cantilevered portion 15 of the horizontal slab 14 covering cavity 13 and cavity 13' and terminates at a free edge 21. Rear wall 20 extends vertically from the bottom of the side walls 11 and 12 to the top surface 22 of the upper slabs 14 and 15. The rear wall free edge 21 forms a lap joint 24 with the vertically extending ledge 25 (see FIG. 2) formed in the rear wall portion of the next adjacent right end modular units C and D. The lap joint 24 has a transverse and vertical component 24a, 24b, respectively, which provides interlocking means for the portion of the rear wall extending beyond the terminal edge 16 of the upper slab 14. The interlocking distance is shown in FIG. 2 at X and is equal to the distance between the terminal edge 16 of the upper slab 14 and the longitudinal axis of side wall 12. Although not shown, the intermediate modular unit B also includes a similar ledge 25 at its rear wall 20 running vertically from the longitudinal axis of the upstanding wall 12 to the left for receiving
the projecting rear wall portion 21 of left end modular unit A therein.

An important feature of the present invention resides in the fact that the horizontally disposed lap joint 18 between abutting horizontal slabs 22, and the vertically disposed lap joints 24 between adjacent rear walls are in non-aligned orientation in three planes. By such a construction, cracks which may appear along any of the joints are isolated and will not be transmitted to the other joints due to the discontinuous nature of the various joints involved.

The side walls 11, 12 are generally tapered with their lowermost portion being narrower than the intermediate portion 30 or their enlarged portion or haunch 31. The haunch 31 is integrally formed with the upper slab 14 and includes anchor means (not shown) for securing brackets 32 (see FIG. 2) for reasons which will become more apparent hereinafter. The enlarged portion or haunch 31 of the side walls 11, 12 provides the necessary support for the cantilevered portion of the next adjacent upper slab 14. Additionally, haunch 31 provides the necessary mass to receive and hold anchor bolts therein. Each of the end portions of modular units A, C, D includes an outermost side wall 11', which does not include ledges 17, 25 therein. Moreover, since side wall 11' is substantially planar and constitutes the outer wall of the assembled mausoleum, it can be left unfinished or can be finished with an appropriate decorative facing material 35, as shown in FIG. 1.

The upper slab 14 of modular unit B includes grooves 36 formed along the front and rear edges of the slab 14, and extending adjacent the free edge 16 of cantilevered portion 15. Essentially, the groove 36 is of a width and spacing so as to securely receive the side walls 11, 12 of superposed modular unit B to form a next tier. Preferably, each of the rear walls 20 is tapered similarly to the side walls 11, 12 to fit the groove 36. Similar grooves are also provided in the base 10 to secure and rear walls of the first tier 1 of modular units A-C or D.

In FIG. 1 the assembly is shown with crypts 13 both in open and sealed condition. For sealing purposes each crypt is formed with a recess 40 at its entry, extending the entire perimeter, including the top surface of the crypt directly below. A sealing or closure plate 41, preferably of an asbestos-cementitious material, e.g., Transite (a product of Johns-Manville Company, Mansville, N.J.) is fitted within the recess 40 after a casket is placed in the crypt 13, whereby completing the entombment of the deceased. Any conventionally known suitable sealant can be employed for this purpose.

A conventional cover or face plate 42, such as marble or the like, is generally positioned in front of each crypt by means of the brackets 32 to identify the entombed deceased. Although only pairs of brackets 32 are shown in the drawing, it will be apparent that any suitable cover plate bracket can be employed, as for example, as described in U.S. Pat. Nos. 2,853,870, 2,618,145, and others.

Ventilation means (not shown) can also be provided to exhaust odors which emanate from each sealed crypt through opening 43 optionally provided at the rear wall of each crypt. A plenum chamber would be provided to communicate with openings in each crypt whereby odors could be drawn out to be externally vented.

To assemble the modular mausoleum crypt system according to the present invention, a concrete base 10 is initially provided with appropriate footings, only partially shown in FIG. 1. Thereafter, the assembly of precast modular units begins, preferably with the initial positioning of right end unit C or D with grooves provided in the base 10. Each of the modular units is capable of being lifted by a crane by hooks temporarily affixed to the modular unit. Before the precast unit is positioned, a cementitious, settable grout is dispensed within the grooves which, after setting, permanently seals the precast unit to its underlying support base 10. After modular unit C or D is positioned, one or more intermediate modular units B is brought into abutting interlocking position with modular unit C or D. Prior to positioning each of the modular units, the grouting composition is dispensed within the ledges 17 and 25 to insure a properly sealed joint. The left end modular unit A is thereafter placed in interlocking abutting position with respect to already positioned intermediate unit B to complete tier 1. The process is repeated for each of the next three tiers, or more if necessary, until the structure is finished. The finishing roof, and a suitable facing material 35 is then applied to complete the structure. In some installations, the crypts' cover plates confront an enclosed lobby where visitors can gather.

One suitable grout formulation useful for effecting fluid-tight joints includes a cement glue admixed with approximately 100 pounds of cement, 200 pounds of sand, and a sufficient quantity of water to provide acceptable and well known workability. The cement glue can be an organic glue, e.g., CRYSTAL CEMENT GLUE, manufactured by Wurdack Chemical Company, 4977 Fyler Avenue, St. Louis, Mo.

It should be appreciated that the present invention is not to be construed as being limited by the illustrative embodiments. It is possible to introduce other embodiments without departing from the inventive concepts herein disclosed. Such embodiments are within the ability of one skilled in the art. It is claimed:

1. A modular mausoleum crypt system comprising one or more tiers of crypts, each tier including at least two precast monolithic modular structures:
   A. a first modules including
      1. an upper, horizontally disposed slab;
      2. a pair of spaced side walls having respective longitudinal axes and depending from said upper slab, the spacing between said side walls being of a predetermined width to receive a casket therein;
      3. said upper slab extending laterally from about the longitudinal axis of one of said side walls to beyond the longitudinal axis of another of said side walls for a predetermined distance in cantilevered fashion and terminating at a free edge;
      4. a rear wall extending substantially from about the longitudinal axis of said one of said side walls to beyond said free cantilevered edge of said upper slab, the rear wall portion extending beyond said free cantilevered edge forming a rear wall projecting portion; and
      5. said cantilevered and projecting portions of said upper slab and rear wall adapted to be received in ledges formed in a next adjacent precast modular unit to form respective lap joints;
B. a next adjacent module including ledges for receiving said cantilevered and projecting portions of the upper slab and rear wall of said first named module.

2. The system according to claim 1 wherein each tier includes a right end, intermediate, and left end module, each module being interlocked with the next adjacent module.

3. The system according to claim 2 wherein said intermediate module includes features (1) through (5) as recited in claim 1, and further includes a first horizontal ledge provided at one end of said upper slab extending laterally the length of said upper slab, and a second ledge provided at one end of said rear wall adjacent to the longitudinal axis of said side wall and extending vertically the height of said rear wall.

4. The system according to claim 1 wherein each of said side walls includes an enlarged portion of its upper end extending transversely towards said rear wall for securingly receiving anchor bolts therein.

5. The system according to claim 1 wherein each of said side walls tapers downwardly to a wall thickness less than the width of groove means provided in a module positioned therebelow.

6. The system according to claim 4 wherein said horizontal ledge in said upper slab is bounded by the enlarged portion of said side wall and one end of said upper slab, said cantilevered portion of said next adjacent module being supported directly by said ledge of said enlarged portion of said upper slab.

7. The system according to claim 4 wherein said side walls include an anchor embedded in said enlarged portion, and a bracket secured to said anchor for removably positioning a cover plate at a predetermined distance from said crypt opening.

8. The system according to claim 1 including a base support having groove means for receiving a first tier therein.

9. The system according to claim 1 wherein each crypt includes a recess adjacent the opening and extending the perimeter thereof to receive a sealing plate.