

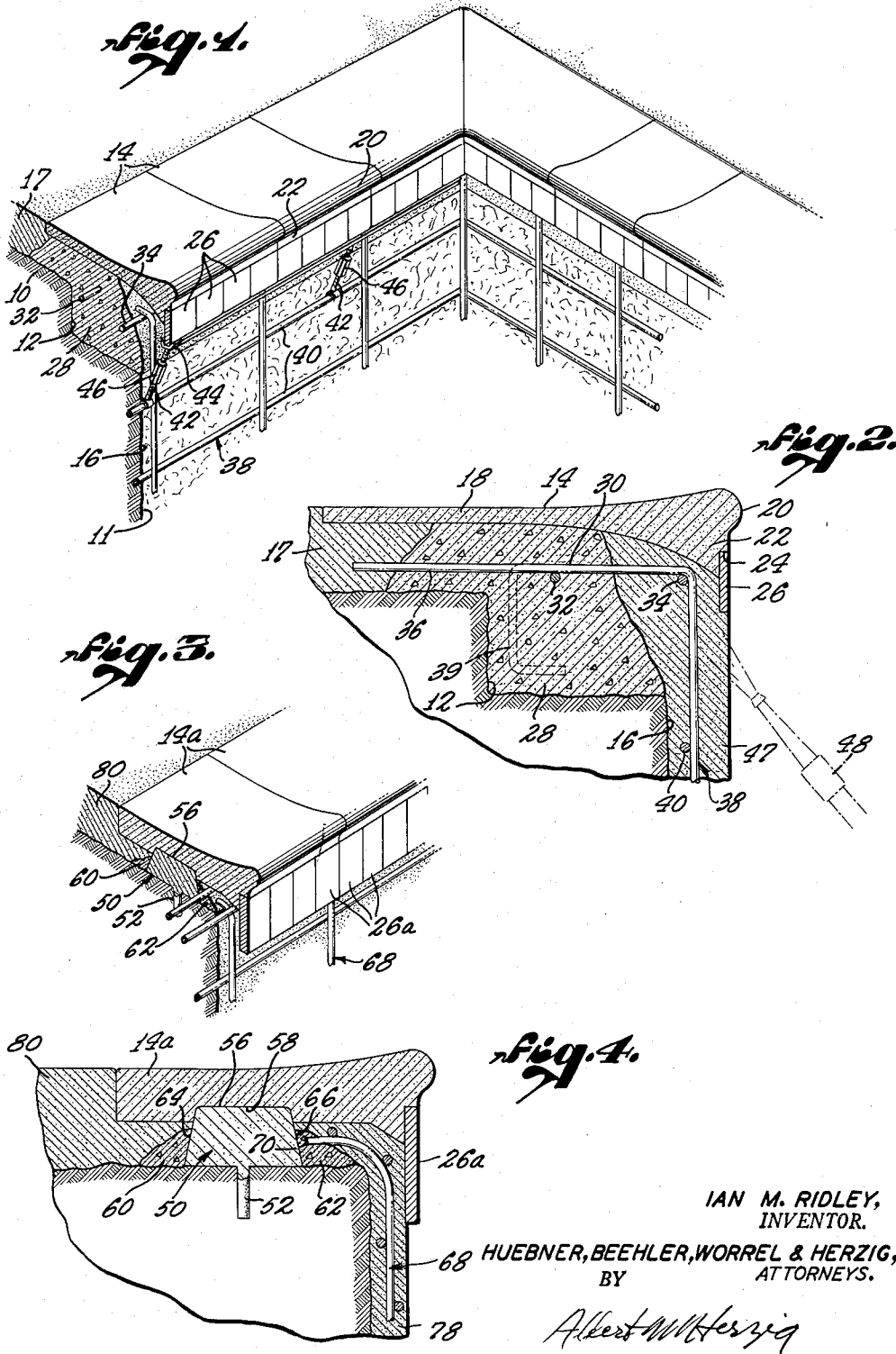
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SWIMMING POOL AND METHOD OF CONSTRUCTION

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1

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SWIMMING POOL AND METHOD OF CONSTRUCTION

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This invention relates to a method of construction of cement, composite cement and tile structures such as swimming pools and the like, and pertains also to the structures thus fabricated.

In general, in constructing a swimming pool, the area outlined is customarily excavated in depth by a bulldozer, skip loader, or the like, operating from the shallow end, the sides are shaped by workmen with mattocks as required, and an upper peripheral ditch or step is excavated by workmen to form a bed for the deck and its supporting bond beam. The bond beam usually prescribed for pools of larger dimension than 8' x 16', is an elongated foundation of concrete extending around the edge of the pool, parallel to the corresponding adjacent sides, and sometimes set back somewhat therefrom. The tile deck slabs which form the horizontal border of the pool are fixedly supported directly on the bond beam.

Since the water forms a perfect level and automatically calls attention to any misalignment of water-line members, the deck and tiles must obviously be exactly aligned along the bond beam. In the past, such alignment was effected manually by workmen for each individual tile and deck slab, the latter being set on the bond beam, or attached with an intervening layer of cement.

By prior methods, the core of the pool is constructed by pouring concrete on the bottom and into complete forms placed along the sides. This, of course, required excavating back beyond the sides of the pool in order to place the forms, and then later filling in this enlarged space after the forms are removed. In addition to the cost of this "form" method, it sometimes created a condition at the corners of the pool and elsewhere which resulted later in cracks in the concrete.

An object of the present invention is to provide a construction method which eliminates these requirements of forming or shaping a larger excavation than necessary, erecting and removing forms, and subsequent backfilling.

Another method in the past was to "dry-pack" the sides by forming the wall with a rather coarse, pea gravel mixture of concrete which was built into a retaining wall by being thrown against the dirt sides by the shovel-full. This eliminated the use of forms but resulted in a thick porous wall which had to depend entirely on a finish coat for waterproofing.

Accordingly, another object of the present invention resides in the provision of an improved non-porous side wall or core which can be formed directly against the earth backing, rapidly and without forms.

There have also been pool cores formed entirely by pneumatically placing concrete directly against the dirt floor and sides. This, however, has proven costly, in part due to the very expert close supervision required to prevent dry pockets and maintain proper thicknesses. In addition, the necessity of setting individual deck slabs and tile has persisted.

Other objects of the invention include the provision of a waterproof core wall which may be constructed both faster and cheaper than hitherto. This is accomplished

2

in my invention, by a combination of pneumatically applied and simultaneously manually thrown or poured concrete.

Still another purpose is to provide new and improved means and methods for aligning a number of deck slabs and associated tile as a unit. This is achieved in part by first laying a bond beam of horizontal width at the top considerably less than that of the deck and spaced back from the water edge thereof, then bonding a row of deck slabs (with attached vertical tiles, if desired) thereto, and subsequently filling in the cavity beneath the unsupported portion of decking by pneumatically placed cement, simultaneously with formation of the upper portion of the pool side wall.

The invention also includes provision of improvements in prior art means and methods heretofore intended to accomplish generally similar purposes.

With these and other objects in view, the invention consists of the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the drawing:

Figure 1 is a perspective view of a corner of a square-type swimming pool in process of construction by my method, showing the deck and water line tiles supported in place between the bond beam and aligning jacks, before the side of the pool has been built over the network of iron reinforcement.

Figure 2 is a vertical sectional view taken through the side of a completed pool and showing in broken lines a spray nozzle in operative position for pneumatically forming the cement side wall of the pool.

Figure 3 is a perspective view, partly cut away, showing a modified form of construction wherein a precast base is located below the deck as a bond beam and the deck slabs formed with a keyway in their under faces are located over the base.

Figure 4 is a transverse sectional view taken through the wall of Figure 3, and showing the same after it has been completed by formation of the side wall of the pool.

Conventionally such pools are constructed with a generally rectangular or oval outline and a sloping bottom, although, of course, they may be any shape desired. The earth 10 is first excavated to form a basin 11. The upper edge of the basin is incut at 12 and disposed to provide a supporting ledge for the cement or foundation material upon which the deck slabs or coping 14 are subsequently laid. The earth is also cut back further from the vertical sides 16 by the approximate extent of such wall 17 which may be desired around or along the pool.

Typically the coping 14 used around the edge of such pools is constructed with a generally horizontal body 18 which progressively thickens in both directions vertically as it approaches the forward edge. This results in a bead 20 of relatively slight elevation from the deck and which likewise projects outward to overhang the pool a small amount.

Below the bead a downwardly extending tongue 22 of the coping is incut at 24 to define a right angle groove within which the water line tiles 26 are mounted. In the past these tiles have been placed along the coping after the latter were carefully set by hand upon the supporting slab. By the present process, however, the required number of water-line tiles can be secured to the adjacent deck slab before the latter are placed in position, and the composite unit then located and aligned by my improved method.

As illustrated, a strong or bed of foundation concrete,

or the like, 28, is poured about the perimeter of the pool within the cutout step 12 to form an abbreviated bond beam, the width of the foundation at the top being much less than that of the coping so that after the latter is located thereon it extends free beyond the foundation for a considerable distance, particularly along the forward or pool edge but also conveniently to the rear as well. Within the bond beam there is anchored—before pouring—a basket-like network of reinforcing metal rods 30 which are spaced from but extend generally parallel to the deck with their free ends embedded in the bond beam, down along the face of the pool, across the floor thereof. The portion of the network or basket 38 disposed over the earth floor of the pool may be supported thereabove a small distance by stones or brick (not shown) so as to locate the same before pouring the concrete floor of the pool.

Along the pool edges, this metal grid may be composed of two or more parallel horizontal rods 32, 34 disposed longitudinally beneath the deck members and fastened to similar transverse rods 36 which extend forward from the rear edge of the deck and are then preferably turned down over the rod 34 so as to define an upright side frame 38 including a series of longitudinal face rods 40, vertically spaced apart and set out as aforesaid a short distance from the adjacent earth wall 16.

Alternate outwardly-penetrating horizontal rod ends (36) may be turned down within the bond beam 28 to form L-shaped or U-shaped termini 39.

A horizontal rail 40 serves as a support for a series of jacks or vertical adjustment members 42, which adjustably support a longitudinal guide member 44 comprising an angle iron, I-beam, wooden plank or the like, preferably having a groove or supporting surface along its upper face adapted to receive the lower edge of the facing tiles 26.

This guide member accordingly serves as a forward guide point or line for leveling a series of the tiles in conjunction with their location or alignment upon the bond beam 28.

For adjustment, the jacks are individually provided with manually-operable collars 46 or other operating means by which the opposing end portions of the guide can act to raise or lower the support strip 44. The adjustment is preferably effected immediately after the individual copings are laid upon the wet cement 28 so that, if necessary, the height of the latter may also be altered as with a trowel to set each successive tile level and in alignment with the others before the supporting cement 28 has hardened.

With such arrangement the several tiles 26 can be previously attached (or formed integral with) the respective deck slabs and the whole aligned as a unit. In this case it will be the lower edge of the tiles (rather than the coping) which is supported on the guide strip 44.

After the concrete of the bond beam 28 has hardened, the jacks 42 and supporting edge 44 can be removed without fear of subsequent misalignment of the deck and tile.

After the deck and tiles have been set, the remaining open space beneath the inner portion of the coping is advantageously and expeditiously filled in at the same time that the side wall 47 is formed. This is done by pneumatically placing concrete as shown by the nozzle 48 of Figure 2. Such placement saves much time and effort, and provides a form due to the preferred setting of the support 28 within which the blown cement is compacted.

The pneumatic nozzle 48 is capable of firmly packing its ejected material as into the cavities formed beneath the deck slabs, and an additional advantage of its use resides in the fact that the water and cement components are forced out under such pressure (by a means not shown) as to pack them tightly in setting location into such a non-porous compact state as to form in effect a

waterproof composition without incorporation or the subsequent addition of waterproofing material.

With respect to the side walls of the pool, the mixture ejected from a handable spray nozzle is comparatively small, and in view of the total volume of concrete to be placed in such side walls, it has been found that deposition can be greatly accelerated without forms and without substantially decreasing the compactness of the mixture, by having one or more men throw shovels full of cement against the wall and at the same time using the force of the sprayed cement to pack and position this loosely-thrown material. Thus one or two men can be engaged in manually casting shovels full of cement at the wall for each nozzle which is used; the operator of the spray gun training his nozzle upon the newly or loosely-thrown material preferably as it hits the wall so as to compact and place it. At the same time additional cement is thrown by the nozzle and intermingled therewith and/or compacted therewith and thereon.

In this manner, the side walls of the pool are formed in a greatly reduced time in comparison with wholly pneumatically laid walls, and at the same time they possess the advantages, such as compactness, of pneumatically-laid structures. Likewise, the necessity for forms and backfill is eliminated. The walk 17 which underlies the coping 14 at their outer edges, as well as the floor of the pool may be laid in this same manner, or may be poured as desired.

The instant-cementing process features, essentially, a new and exclusive means of constructing the basic concrete core of a pool. This process has taken the better parts of all the foregoing methods above referred to, and combined them into a single process which produces the best possible core at the least possible cost. A step-by-step explanation of this process is accordingly elaborated in terms of a typical protocol, as follows:

At the beginning of the job, the equipment for the air-placed concrete is set up and is provided with material composed of approximately one part cement and approximately four parts washed concrete sand in a fairly dry condition.

When the actual shooting is ready to take place, a quantity of ready-mixed concrete is ordered for delivery and should be timed to arrive at the time shooting is to begin. Enough of this mixture should be ordered to completely cover the floor of the pool including the radius corners and should be mixed in a preferred approximate 1-3-3 proportion, and should include sufficient calcium chloride to make the mixture set rapidly. It should be stiff enough to be slow in pouring from the ready-mix truck—too much water in the mixture will cause too much shrinkage as it sets and will also slow the set making it difficult to work on the floor of the pool.

The ready-mixed concrete should be dumped into the pool and quickly spread over the floor and up the sides as far as the radius corners will allow and should just cover the steel which is raised preferably about three inches from the floor. It should be roughly leveled off.

Simultaneously with the spreading of the ready-mixed concrete, the air-placed concrete should be shot directly onto the ready-mixed material under fairly high pressure (e. g. approximately 50 lbs. p. s. i.) so that the effect will be to "vibrate" the material and pack it into place. About a 1½" coat should be quickly shot over the floor of the pool with the thought in mind of getting all the concrete packed into place as quickly as possible.

As soon as this coating has been completed, working preferably from the deep end of the pool to the shallow end, a crew can go into the pool and scrape up and remove the rebound. (This crew may cause foot prints in the floor because the concrete may not have set sufficiently to support their weight.)

Starting at the deep end, another 1½" coating can be placed, levelling and filling all depressions and working up to the shallow end. The angle of the nozzle should

always be slightly towards the deep end so that the rebound will be going to the work that has been finished and will not be mixed into areas not yet shot.

While this work has been proceeding, the ready-mixed concrete containing the calcium chloride will be making its initial set. Until this set is completed to the point where men can walk on the floor, everyone but the nozzle man should stay out of the pool. While waiting for the set, the nozzle man, who has completed the floor and is up in the shallow end, can begin working up the walls preferably in the shallow end only. The small area in which he will have to work can be levelled up later just before he is ready to move back into the deep end to start up the walls.

When ready, say, to start up the walls in the shallow end, a crew of two men will enter the pool with shovels and another crew of, say, two men will mix concrete on the job in the same proportions as the ready-mix concrete used for the floor except that it will not contain calcium chloride. This mixture should be quite stiff. This material may be wheeled in wheelbarrows and dumped into the pool at the shallow end. The men in the pool with shovels will now slam small amounts, preferably half-a-shovelful at a time, of this material onto the walls directly into the path of the nozzle. The nozzle man should point his stream at the job at the spot he wants the mixture thrown and should then catch it and compress it into place with the stream coming from his nozzle. The process should start at the bottom where the floor work ended and should proceed laterally back and forth from one side of the pool to the other building up the walls vertically at the rate of about six inches at a time. Extreme care should be taken to insure that this part of the job goes up steadily and uniformly. The mixture tossed onto the walls should never go up in quantities that will bring it beyond the thickness established by the level of the steel. To do so will bring the gravel too close to the surface for proper screeding and might provide such a large mass that the packing effect of the gun is lost. In extreme cases, the mass may be such that it will sag away from the steel.

By the time the walls in the shallow end have been built up to about bond beam height, the bulk of the floor will have attained a set that will support men walking on it. The gun should be shut down for a few minutes and all hands turn to and remove the rebound from all over the pool floor. Any irregularities may now be scraped down with a trowel and any depressions missed can be marked for filling. When the gun starts up again, that part of the floor in the shallow end that had been disturbed while the walls in the shallow end were being built up can now be repaired, together with any other faults. When this has been completed, scraping and screeding should produce a completely finished floor.

The walls of the deep end are now ready for work and new batches of mixed concrete may be dumped onto the floor of the deep end. Before this is done, however, a little well containing the main drain opening should be cut out, and the well can then be filled with plain dirt which will be easily removed when the job is finished. When the mixed concrete has been dumped onto the floor of the pool at the deep end, the same process for building up the walls can take place as was used at the shallow end. By working back and forth around the walls at the deep end of the pool, these walls will be built up rapidly. It is not necessary at this stage to try to finish the walls as the work proceeds. It is only necessary that the mixture being thrown in be properly set in place. After the wall is built up to bond beam height, an additional inch or so is preferably shot over the entire wall.

At this point one member of the crew in the pool can begin to work at the walls, screeding and cleaning and watching the levels and thicknesses. It is well at times to provide guide wires at the inner edge of the bond beam which will be the final inside dimension. The rod man

can help the nozzle man by advising him where to build up.

The final work will be done at the bond beam. At this point, the mixed material may be shoveled into the beam from wheelbarrows around the edge of the pool. As each shovelful is dropped into place, the nozzle man working from inside the pool, preferably from a scaffolding, can pack it into place. As the bond beam works out to the innermost dimension, it will be found to be advisable to reduce the pressure on the machine so that more of the material will stay on the walls. The top of the beam may be screeded level to the form and the inner wire.

It has been found that the ideal quantity-flow of air-placed concrete to go with the gun-pack process is in the neighborhood of three cubic yards per hour. Such a quantity when coordinated with the ready-mix is quite sufficient to build a swimming pool up to 25' x 50' in one day's time. It will, therefore, be seen that it is not necessary, nor advisable from any standpoint to have the type of air placement equipment which is designed for the larger volumes. The volumes recommended are well within the limits of the capabilities of a normal commercially-available machine.

In the embodiment particularly illustrated in Figures 3 and 4, there is provided precast blocks foundation members 50 of generally rectangular cross section and provided with central dependent pins or guide extensions 52 which project downwardly from their lower faces so as to be secured in the earth. The upper flat faces 56 of the foundations are in turn shaped to be received in a corresponding keyway 58 extending along the lower face of the coping 140. Accordingly, it is only necessary to level this face 56 as with a spirit level, and then permanently set the foundation blocks 50 as by means of cement stringers 60 and 62 poured along the adjacent sides 64, 66 of the block. The coping 14a with its adjacent row of tiles 26a can then be placed over the foundation block 50 without further alignment. If desired, the coping can be extended to provide an integral wall at 17 in the embodiment of any of the forms of the invention.

In the alternative, if the blocks 50 are placed only approximately level, the individual deck slabs 14a can be aligned therealong by means of the supporting member 44 and jacks 42 previously described, and then cemented in place.

At the same time that the inner concrete stringer 62 is laid, the network 68 of reinforcement may be anchored thereto by the ends 70 being embedded in the concrete.

As the next step in the modified method, the side walls 78 and/or the pavement 80 can be placed by means of the combination of pneumatically laid and manually cast concrete as described above.

If desired, an additional smooth-surfacing coat may be applied manually to the face of the pool.

In summary, some of the more notable advantages of my invention may be briefly enumerated as follows:

It will be seen that by means of my process, many difficulties of the prior methods are greatly reduced or eliminated, at the same time that the cost of construction is very appreciably lessened. For example, neither forms for pouring concrete, or consequent backfill after removal of the forms, is necessary. In addition, without increasing the number of pneumatic spray guns, a given wall area can be placed in a fraction of the former time by combination with the manually-thrown concrete, while at the same time achieving a superior final product.

Further, the method of pre-setting multiple units of deck and tiling and then underfilling the same at the same time that the side walls are formed, leads to considerable saving of both time and expense from the most costly and time-consuming conventional operation.

The use of pre-cast bond beam blocks and keyed deck members also offers important advantages.

While the several features of the invention offer improvements per se even when individually or singly incorporated into or used with prior construction methods, their combination as here illustrated results in a still greater over-all advantage in efficiency, economy and superior end product.

In constructing the bond beam alone, prior art steps of preparing forms, shooting and squaring the bond beam to the form, setting of the tiles, setting and levelling the coping and pouring the deck to the coping are combined by the instant corresponding process into the simple operations of setting the coping and shooting cement thereto to form not only the bond beam but also adjacent structure.

While I have herein shown and described my invention in what I have presently conceived to be the most practical and preferred embodiments and methods, it is recognized that departures may be made therefrom within the scope of my invention, which is not to be limited to the details disclosed herein, but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and methods.

What I claim as new and desire to secure by Letters Patent is:

1. In the process of constructing a swimming pool and the like, the improvement comprising: laying a rudimentary concrete bond beam on supporting material about the perimeter of an excavation; locating a network of reinforcing rods within said excavation with their upper free ends embedded in said rudimentary beam; mounting vertically adjustable supporting members on said network, spaced apart toward the pool from said rudimentary beam; horizontally aligning a longitudinal series of deck slabs jointly on said rudimentary beam and supporting members and then fixedly securing the aligned deck slab to the rudimentary beam and removing the supporting members, whereby said deck slabs overlie and project beyond the rudimentary beam and reinforcing rods; and then pneumatically filling the space beneath said overhanging slab with concrete and simultaneously establishing the pool side walls over the reinforcing network adjacent with said filled space.

2. The process of the preceding claim wherein said side walls are formed by loosely thrown concrete which is then compacted by a stream of blown concrete whereby both portions of concrete are united to form a tightly packed, substantially water-impervious structure.

3. The process of claim 1 wherein a row of water-line tiles are affixed along the pool edge of said deck slab before alignment of the slabs, whereby both the slabs and tile are then simultaneously aligned in relation to the bond beam.

4. In the process of constructing a swimming pool and the like, the improvement comprising: laying a pre-cast, segmented rudimentary bond beam on supporting material about the perimeter of an excavation; locating a network of reinforcing rods within said excavation with their upper free ends disposed adjacent said bond beam; laying a concrete stringer along that face of said bond beam which is proximate the excavation so as to fasten together the bond beam, its supporting material and said reinforcing rods; mounting vertically adjustable supporting members on said network, spaced apart toward the pool from said bond beam; horizontally aligning a longitudinal series of deck slabs jointly on said bond beam and supporting members and then fixedly securing the aligned deck slab to the bond beam and removing the supporting members, whereby said deck slabs overlie and project beyond the bond beam, stringer and reinforcing rods; and then pneumatically filling the space beneath said overhanging slab with concrete.

5. The process of the preceding claim wherein said deck slabs are formed with a transverse keyway in their underface within which the bond beam is received.

6. In the construction of swimming pools and the like,

the improvement comprising: providing a plurality of deck slabs; individually permanently locating upon a supporting structure a bond beam which has substantially less horizontal supporting area than said slabs; horizontally aligning a longitudinal series of said slabs atop the bond beam so as to project outward therefrom toward the pool, and permanently affixing the same after alignment; and then pneumatically filling the space beneath the projecting deck slab with concrete so as to form an upright wall.

7. In the construction of swimming pools and the like, the improvement comprising: providing a plurality of deck slabs individually having a row of water line tiles affixed thereto; permanently locating upon a supporting structure a bond beam which has substantially less horizontal supporting area than said slabs; horizontally aligning a longitudinal series of said composite slabs and tiles atop the bond beam, so as to project outward therefrom toward the pool, and permanently affixing the same after alignment; and then pneumatically filling the space beneath the projecting deck slab with concrete so as to form an upright wall substantially continuous with said water line tiles.

8. In the construction of swimming pools and the like, the improvement comprising: providing a plurality of deck slabs having a continuous transverse keyway formed in their underfaces parallel to an edge thereof which is adapted to be disposed adjacent the water of the pool; permanently locating upon a supporting structure a pre-cast segmented bond beam; horizontally aligning a longitudinal series of said slabs along said bond beam with its top received in the keyway thereof, and permanently affixing the aligned slabs in a position projecting outward from the bond beam toward the pool; and then pneumatically filling the space beneath the projecting deck slabs with concrete so as to form an upright wall in general alignment therewith.

9. In swimming pool construction, the combination comprising: a pre-cast segmented bond beam located about the periphery of an excavation; a concrete stringer disposed along the faces of said bond beam which is proximate the excavation; a network of reinforcing rods disposed within the excavation with their ends anchored in said stringer; a longitudinal series of deck slabs horizontally aligned about said periphery and fixedly secured to said bond beam with the forward edges of said slabs overlying and projecting beyond said bond beam, stringer and reinforcing rods; and substantially water impervious tightly packed concrete filling the space beneath the overhanging portion of the deck slabs and extending continuously downward forming the side walls of the pool with said reinforcing rods embedded therein.

10. In swimming pool construction, the combination comprising: a concrete bond beam located about the periphery of an excavation; a network of reinforcing rods disposed within the excavation with their ends anchored in said bond beam; a longitudinal series of deck slabs horizontally aligned about said periphery and fixedly secured to said bond beam with the forward edges of said slabs overlying and projecting beyond said bond beam and reinforcing rods; and substantially water impervious tightly packed concrete filling the space beneath the overhanging portion of the deck slabs and extending continuously downward forming the side walls of the pool with said reinforcing rods embedded therein.

11. In swimming pool construction, the combination comprising: a pre-cast segmented bond beam located about the periphery of an excavation; a concrete stringer disposed along that face of said bond beam which is proximate the excavation; a network of reinforcing rods disposed within the excavation with their ends anchored in said stringer; a longitudinal series of deck slabs having a row of water line tiles secured thereto and horizontally aligned about said periphery fixedly secured to said bond beam with the forward edges of said slabs overlying and

9

projecting beyond said bond beam, stringer and reinforcing rods; and substantially water impervious tightly packed concrete filling the space beneath the overhanging portion of the deck slabs and extending continuously downward forming the side walls of the pool with said reinforcing rods embedded therein.

12. In swimming pool construction, the combination comprising: a concrete bond beam located about the periphery of an excavation; a network of reinforcing rods disposed within the excavation with their ends anchored in said bond beam; a longitudinal series of deck slabs having a row of water line tiles secured thereto and aligned horizontally about said periphery fixedly secured

10

to said bond beam with the forward edges of said slabs overlying and projecting beyond said bond beam, and reinforcing rods; and substantially water impervious tightly packed concrete filling the space beneath the overhanging portion of the deck slabs and extending continuously downward forming the side walls of the pool with said reinforcing rods embedded therein.

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