Aug. 13, 1968 J. A. LANKHEET 3,396,500

SWIMMING POOL CONSTRUCTION

Filed Feb. 3, 1966 2 Sheets-Sheet 1

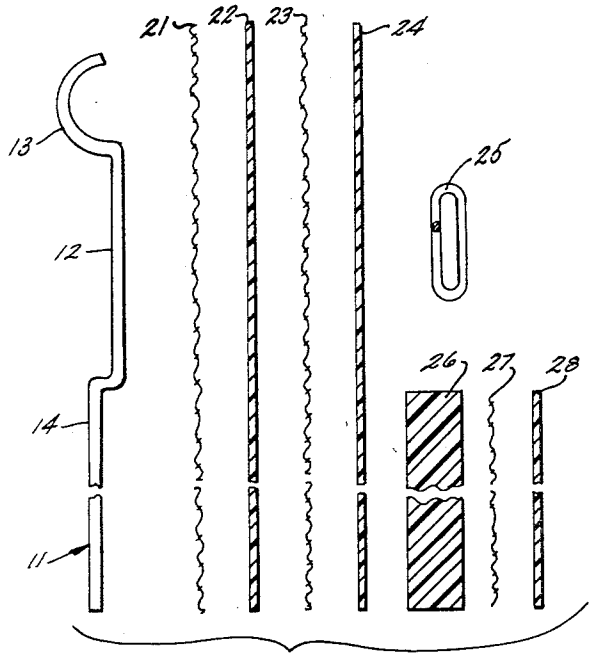

FIG. 1.

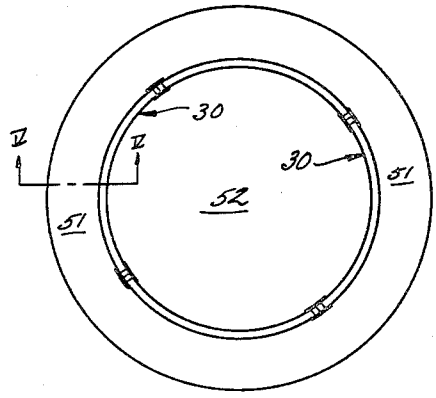

FIG. 4.

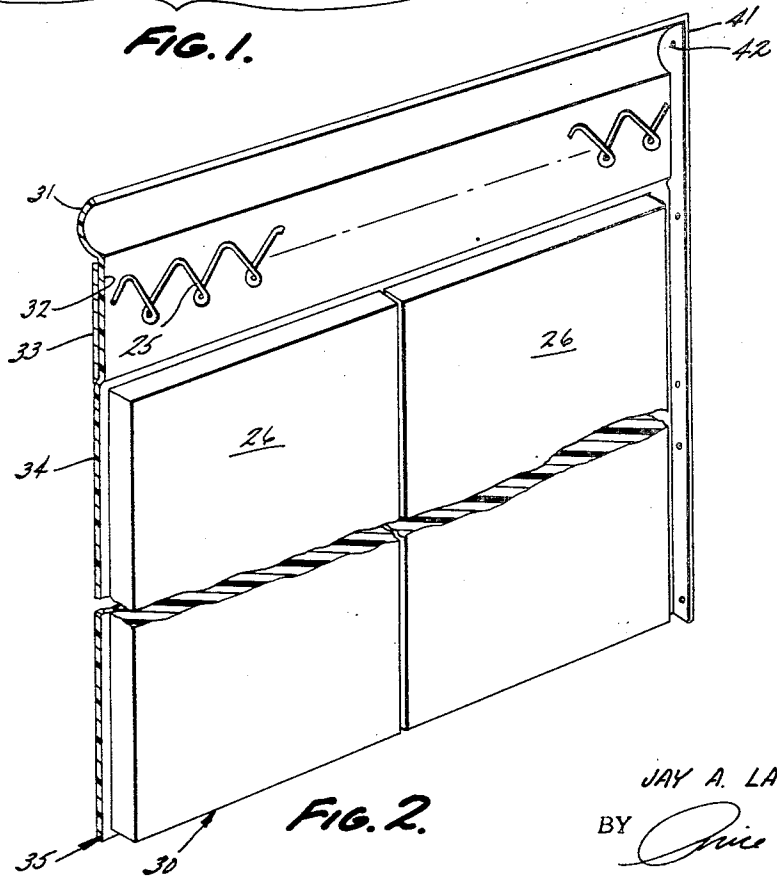

FIG. 2.

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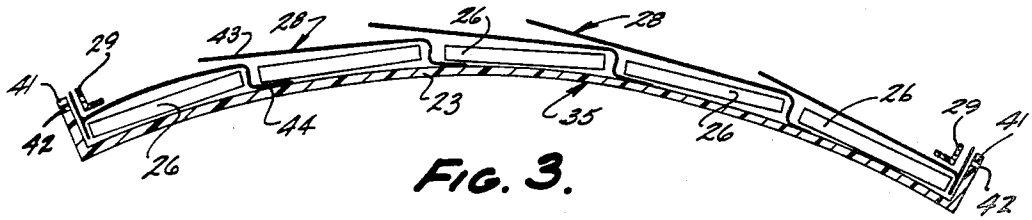

FIG. 3.

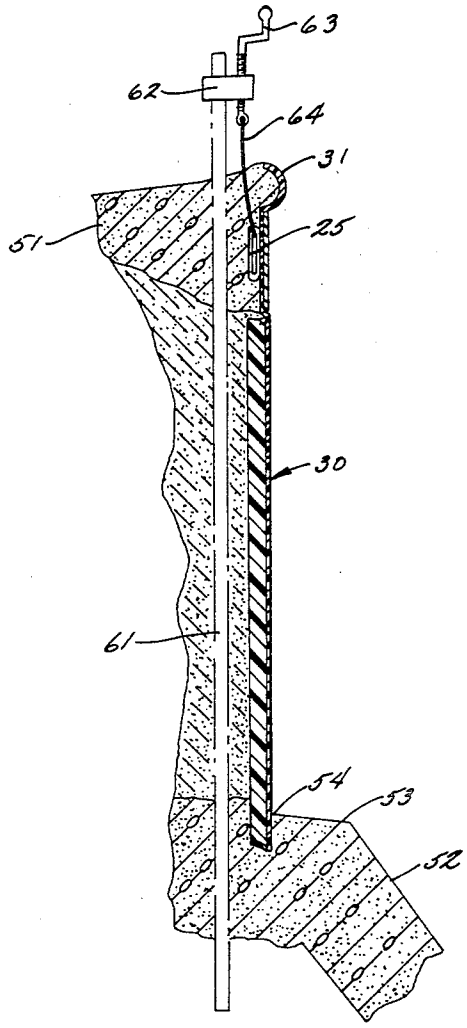

FIG. 5.

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SWIMMING POOL CONSTRUCTION

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17 Claims. (Cl. 52—169)

ABSTRACT OF THE DISCLOSURE

A prefabricated panel having a facial section formed from a plurality of suitably bonded glass fiber mats and being affixed to a reinforcing and insulating layer of rigid polymeric foam. The facial section includes an integrally formed coping and tile recess for use in swimming pool construction.

This invention relates to prefabricated panels and, more particularly, to prefabricated panels for use in constructing swimming pools.

The current technique for constructing swimming pools necessitates an initial excavation which is a good deal larger than the swimming pool to be placed therein. After the sides and bottom are in place, the remaining sections of the excavation are back-filled with sand or pea gravel and a cement walkway and coping is poured thereover. The coping lends structural support to the side walls of the pool and prevents water from splashing out. The walkway is both decorative and functional in an obvious manner.

It is also customary to utilize prefabricated side panels since such panels provide a more even and decorative surface and eliminate the necessity for hand finishing large concrete areas. This elimination, of course, results in a considerable saving insofar as the initial expense of installing a swimming pool is concerned. Several types of prefabricated swimming pool side panels are currently available. These panels generally take the form of planar sheets similar to those utilized on interior and exterior walls and have means provided at their edges for securing them together.

Presently, the floor of the swimming pool is poured and finished initially. A sufficient number of panels to completely enclose the pool are placed upright on the ledge of the floor and reinforced concrete is poured in behind the panels in order to stabilize them in upright positions. Where light steel panels or glass fiber panels are utilized, it is necessary that the pool sides be braced at closely spaced intervals in order to prevent their leaning over and deforming as the concrete is poured in behind them. If desired, the panels may be founded directly in the floor for added stability. After the reinforcing concrete has been poured behind the panels, the braces are removed and a back-fill of sand or pea gravel is placed behind the concrete reinforced panels. The concrete coping is poured and hand shaped to provide a curved edge along the upper periphery of the pool.

Because of the rather larger variations in temperatures which are experienced in many localities, it is desirable that the side panels be as flexible as possible in order to prevent their cracking and pulling away from one another as the ground around them expands and contracts.

Even where proper techniques and materials have been utilized, the pool panels often separate or crack during severe weather. This cracking and separating is caused primarily by the different expansion constants of the pool panel and the reinforced concrete backing, and also because of the lack of insulation between the surrounding fill and the panel.

It is an object of this invention to provide a prefabricated panel for use in swimming pool and like construction which will maintain itself in upright position without the use of a large number of braces during the installation process.

More particularly, it is an object of this invention to provide a prefabricated panel having a rigid structural member already attached thereto which, although capable of rigidifying the panel, also serves to insulate it and prevent it from cracking when it is subjected to extreme temperatures.

It is an object of this invention to provide a prefabricated panel incorporating one or a plurality of structural reinforcing members which members may be of a common shape regardless of the curvature of the particular panel to which they are attached.

It is an object of this invention to provide a unique and useful method for affixing the structural supports to the rear of prefabricated panels in such a manner that the differing expansion constants between the reinforcing member and the facial section of the panel will not cause the panel to crack or to separate from an adjacent panel during extreme temperature conditions.

It is an object of this invention to provide a prefabricated swimming pool panel which has a preformed coping incorporated into it, thus requiring little or no hand cement finishing in order to achieve a uniform and eye-appealing coping around the upper periphery of the finished swimming pool.

It is still another object of this invention, to provide a preformed panel for utilization in swimming pool construction which has a tile recess placed in it during the fabrication procedure, and in which recess may be inserted a tile strip of appropriate color either before or after the panels have been installed.

These and other objects of this invention will be readily understood by reference to the following specification and accompanying figures in which:

FIG. 1 is an exploded view showing the fabrication procedure for the preformed panels which are the subject of this invention;

FIG. 2 is a perspective view of the swimming pool wall panel from its rear surface;

FIG. 3 is an exploded view showing the method for affixing the support and insulation sheets to the rear of the prefabricated panel;

FIG. 4 is a plan view of a swimming pool incorporating the wall panels which are the subject of this invention; and

FIG. 5 is a cross-sectional view taken along line V—V of FIG. 4 which additionally indicates a preferred mode for holding the panels upright during installation.

Briefly, the prefabricated panel which is the subject of this invention comprises a glass fiber facial section which may conveniently be formed in almost any desired curvature and which has incorporated therein during fabrication a coping and a tile recess. Outwardly extending lips project from each side of the panel whereby adjacent panels may be bolted or riveted together when placed side by side around the swimming pool. The facial section of the panel preferably comprises two glass fiber mats bonded together by means of any well known type of adhesive resin. Conveniently, the innermost mat surface may be prefinished in the color and design desired.

Each of the glass fiber facial sections has a plurality of reinforcing and insulating layers of rigid polymeric foam affixed to the rear surface thereof. Preferably, a

closed cell urethane plastic in preformed sections approximately one to two feet wide is utilized for this purpose. The reinforcing sheets are affixed to the rear face of the panel by means of a plurality of glass fiber mats, one or a number of such mats being associated with each sheet of reinforcing material. The glass fiber mats pass over two adjacent sheets and between the rear surface of the facial section and the succeeding sheet of reinforcing material. This process is repeated successively for each reinforcing sheet until the end of a particular panel is reached. The glass fiber mats are bonded to the rear surface of the facial section by means of any well known adhesive resin. Conveniently, the resin may also be spread between the reinforcing sheet and the rear of the facial section of the panel.

Preferably, the reinforcing sheet terminates short of the point on the panel where the tile recess and coping begin and a wire netting or reinforcing rod is affixed to the rear of the facial section above that point by means of the same resinous adhesive. The wire reinforcing rod or netting serves to securely clamp the panel from lateral movement once the walkway has been poured around the swimming pool.

Referring now to the figures a preferred embodiment of this invention will be described in detail. In FIG. 1, there is shown a steel form indicated generally by the reference numeral **11**. The plan view of this form may be of any desired curvature and the prefabricated wall panels which form the subject of this invention may be selectively chosen to form a pool of any desired shape. The steel form **11** has a tile recess forming section **12**, a coping forming section **13** and a side wall forming section **14**. In order to fabricate the wall panel, a sheet of glass fiber **21**, preferably having a finished surface on the side abutting the form, is molded into the form **11**. A layer of resinous adhesive **22** is applied to the rear of glass fiber mat **21**. A second layer of glass fiber mat **23** is then placed over the form and molded thereinto and another layer of resinous adhesive **24** is applied to the rear of mat **23**. Next, a reinforcing and insulating layer of rigid polymeric foam **26** is placed on the form. Preferably, as shown in FIG. 1, this sheet extends only to the lower edge of the tile recess such that room is provided for affixing a concrete reinforcing and grasping wire or rod **25** to the back of the tile recess.

The rigid polymeric foam layer **26** is preferably manufactured from closed-cell urethane. One suitable material is available from Tiffin Enterprises, Inc., and is marketed under the trade name Thermathane. The reinforcing sheet **26** is bonded to the rear of the facial sheet formed by layers **21**, **22**, **23** and **24** in a manner to be described in detail hereinafter. At this point, it is sufficient to note that another layer of resinous adhesive **27** and another glass fiber mat **28** are utilized for this purpose.

Once the resinous adhesive has set up, the edges may by trimmed and the finished wall panel removed from the steel form **11**. Such a panel is shown in FIG. 2. The front surface of panel **30** (not visible) is that surface of the fibrous mat **21** which was finished prior to being molded into steel form **11** and thus the major part of the finishing work is accomplished during the fabrication process. The finished panel **30** comprises the coping **31** which curves inwardly from and back toward the plane defined generally by side wall **34**, a tile recess **32** into which a strip of ceramic tile **33** may be placed either before or after installation in the swimming pool and side wall **34**. The reinforcing wire **25** extends outwardly from the back of tile recess **32** so as to engage to cement walkway when poured. The support or insulating sheets **26** run from the bottom of the panel to the lower edge of the tile recess. Thus, the facial sheet **35** of the panel is formed from layers **21**, **22**, **23** and **24** (see FIG. 1) and the reinforcing layers **26** are bonded to the rear surface thereof.

A preferred mode for affixing the supporting and insulating sheets **26** to the rear of facial section **35** is illustrated in FIG. 3. To compensate for the differential coefficients of expansion of the facial section **35** and the reinforcing and support sheets **26**, and also to allow a universally shaped support sheet to be utilized regardless of the curvature of the particular panel being fabricated, a plurality of reinforcing and insulating sheets **26** are utilized behind each wall panel. If, for example, the panels are ten feet in length the insulating and support sheets **26** should be between one and two feet in length.

The sheets **26** are affixed to the rear of facial section **35** by means of glass fiber mats **28**. One or a plurality of such mats are utilized for each of the separate sheets **26**. As viewed in FIG. 3, a heavy layer of resin is first spread over that portion of the rear of the facial section to which the support and insulating sheets are to be affixed. The sheets are then sequentially placed on the rear surface of the facial section **35** beginning at one end. As each sheet is placed down a glass fiber mat **28** is placed thereover. Section **44** of each of the glass fiber mats is bonded to the rear of the facial plate beneath the location of the succeeding sheet **26**, and section **43** of each of the glass fiber mats **28** overlaps the preceding section as shown in FIG. 3. The pattern must be varied, of course, at each end but this may be accomplished without any great degree of difficulty. The outer edges of sheets **26** should abut lips **41** so these lips must be sufficiently deep to allow connecting apertures **42** to clear the sheets. Consequently, glass fiber reinforcing layers **28** may be bonded to the assembly at these points.

Thus, one of the glass fiber mats **28** extends over each sheet **26**, over the preceding sheet and its Fiberglass mat, and between the rear surface of the facial plate and the succeeding reinforcing and insulating sheet **26**. While FIG. 3 shows the insulating and support sheets spaced an appreciable distance from one another in an exploded manner, it will be apparent that in actual practice they are butted together, to the rear of the panel wall, and to the lips **41**. The configuration of FIG. 3 has been adopted merely to facilitate the illustration of the bonding procedure. Conveniently, the upper and lower edges of mats **28** may extend over the upper and lower panel edges and be secured to the rear of facial section **35**. In actual practice, it is preferable to fabricate the entire assembly at one time. Thus, sheets **26** will be affixed to the rear of facial section **35** while it is still in the form and before the resin has solidified.

Since sheets **26** are rectangular in cross-section, a slight gap will appear at each edge thereof because of the curvature of plate **35**. This gap, in reality, adds to the load bearing capabilities of the finished panel as it provides room for relative movement between the sheet **26** and face plate **35**. Of course, this gap will be partially or wholly filled with resin during fabrication of the panel but the resin is sufficiently flexible so as not to destroy this differential movement capability.

Another, and perhaps more important, feature of the rectangular sheet is that it makes it possible to utilize one standard shape sheet regardless of the curvature of the panel to which the sheets are to be bonded. This obviously results in a savings in initial expense while still providing a thoroughly satisfactory structure.

The form from which facial plate **35** is fabricated conveniently may incorporate rearwardly extending lips **41**. After the facial section has solidified, a plurality of apertures **42** are drilled in each of the lips, thus furnishing a means whereby adjacent panels may be affixed to one another when installed.

FIGS. 4 and 5 show a pool which has been constructed utilizing the prefabricated panels which are the subject of this invention. As illustrated, the pool is circular in form but it will be understood that by utilizing differently shaped steel forms and combining variously shaped panels almost any desired configuration can be achieved. After the excavation has been completed, a plurality of stand

pipes **61** are positioned just outwardly or rearwardly from the desired vertical location of the wall panels. The stand pipes **61** have an arm **62** extending therefrom through which is threaded a crank-shaped lifter **63**. A wire **64** extends from the lower extremity of the crank-shaped lifter which is affixed to the reinforcing and grasping rod **25** on the rear surface of the panel. One or two such stand pipes are utilized to vertically position each of the panels. The panels are then bolted or riveted together at apertures **42** in the rearwardly extending lips **41** of the adjacent panel sections and the entire side panel installation is leveled by selectively adjusting lifters **63**. The floor of the pool **52** is poured and hand shaped. A horizontal, or relatively horizontal, ledge **53** is provided around the outer periphery of the pool in the vicinity of the lower extremity of the wall panels **30**. This ledge extends sufficiently above the lower extremity **54** of the wall panels to seal them in position. As the concrete begins to solidify, stand pipes **61** are withdrawn.

Once the floor has hardened, the remainder of the excavation is filled with sand or gravel to a height approximately equal to that of the reinforcing and grasping wire **25**. The concrete coping filler and the walkway **51** are then poured as indicated generally in FIG. 5 to provide a walkway of desired dimensions. Because of the coping **31** incorporated within the wall panel, it is not necessary to hand finish the rounded surface of walkway **51**. Rather, it is necessary only that the concrete be brushed back to form a smooth walkway. This, of course, results in the saving of a great deal of time and expense.

Once the pool has been finished, the effect of sharp variations in temperature will be greatly suppressed by the insulating abilities of the reinforcing and insulating sheet **26**, and by the separate sheets' ability to slide and deform with respect to both one another and the facial section **35** of the panel. Pools constructed utilizing the panels shown and described in this application require little if any bracing during the pouring of the floor section, thus resulting in an added saving of time and expense. Once the pool has been completed, the ceramic tile, if it has not already been inserted in the individual panels, may be placed in the tile recess **32**.

While a preferred embodiment of this invention has been illustrated in detail, it will be apparent to those skilled in the art that many modifications are possible without departing from the scope and spirit of this invention. Such modifications are to be considered as included in the following claims unless these claims, by their language, expressly state otherwise.

I claim:

1. A side panel for utilization in the construction of swimming pools, said panel comprising:

a curved glass fiber facial section; and

a reinforcing and insulating layer of rigid polymeric foam affixed to the rear of said facial section, said layer being formed from a plurality of abutting planar sheets of said foam affixed to said facial section by a plurality of securing glass fiber mats, each of said securing mats being passed over the exposed surface of a preceding sheet, over the exposed surface of the sheet to be secured, and between said facial section and the abutting side of the succeeding sheet, said securing mat being bonded by means of a resinous adhesive.

2. The combination as set forth in claim **1** wherein said facial section comprises a plurality of glass fiber mats bonded together by a resinous adhesive.

3. The combination as set forth in claim **1** which further comprises a reinforcing and support member, said member being bonded to the rear of said facial section above said reinforcing and insulating layer and jutting outwardly therefrom at selected points.

4. The combination as set forth in claim **3** wherein said facial section includes a recessed portion for receiving a decorative tile strip.

5. The combination as set forth in claim **1** wherein said facial section includes an upper coping portion, said coping portion initially curving away from and then back toward the plane defined by said reinforcing and insulating layer.

6. The combination as set forth in claim **1** wherein said rigid polymeric foam comprises closed cell urethane.

7. A panel comprising:

a relatively non-rigid facial section;

a plurality of sheets of rigid polymeric foam positioned on the rearward side of said facial section;

a fibrous glass mat associated with each said sheet, said mat passing over said sheet, over the preceding sheet, and between the rearward surface of said facial section and the succeeding section; and

means for bonding said sheets and said mats to said facial section whereby said facial section is rigidly reinforced.

8. The combination as set forth in claim **7** wherein said rigid polymeric foam comprises closed cell urethane.

9. The combination as set forth in claim **7** wherein said facial section is curved and said sheet are planar.

10. A swimming pool construction, comprising: a plurality of prefabricated panels arranged laterally adjacent one another to define the peripheral shape of the pool; each of said panels having a rear side mounted against and buttressed by concrete, earth fill or like solid construction materials; said panels each having a generally vertically-extending portion near the bottom thereof, and each defining an integral tile recess disposed above such bottom portion; each of said panels further defining an integral rounded coping portion disposed above said tile recess and near the top of the panel, said coping forming a concavity at the rear side of the panel; said solid construction materials forming an apron at the top of said panels and filling said coping concavity; at least some of said panels having a structurally reinforcing and insulating layer of rigid polymeric foam secured to their rear side; and a generally stiff reinforcing structure rigidly secured to the rear side of at least some of said panels and extending peripherally of said pool, said structure having portions projecting rearwardly of said rear panel side and being embedded in said solid construction material buttressing the rear side of said panel, to structurally reinforce said pool construction.

11. The swimming pool construction of claim **10**, wherein said reinforcing structure is located near the upper extremity of said panels and in proximity to said coping portion thereof, said structure being embedded in said material forming said apron.

12. The swimming pool construction of claim **11**, wherein said structure comprises an elongated wire rod member.

13. The swimming pool construction of claim **12**, wherein said member is generally helically-shaped.

14. The swimming pool construction of claim **10**, wherein said layer of rigid form has an upper extremity located near the bottom of said tile recess.

15. The swimming pool construction of claim **10**, wherein said layer of rigid foam comprises at least one pre-formed generally flat block of the same adhesively secured to said rear side of said panels.

16. The swimming pool construction of claim **14**, wherein said reinforcing structure is located near the upper extremity of said panels and in proximity to said coping portion thereof, said structure being embedded in said material forming said apron.

17. A swimming pool construction, comprising: a plurality of prefabricated self-supporting panels arranged laterally adjacent one another to define the peripheral shape of the pool; each of said panels having a rear side mounted against and buttressed by concrete, earth fill or like solid construction materials; said panels each having a generally vertically-extending portion near the bottom

thereof, and each defining an integral tile recess disposed above such bottom portion; tile located and bonded within said tile recess; each of said panels further defining an integral rounded coping portion disposed above said tile recess and near the top of the panel, said coping forming a concavity at the rear side of the panel; said solid construction materials forming an apron at the top of said panels and filling said coping concavity; at least some of said panels having a structurally reinforcing means secured to their rear side; and a generally stiff reinforcing structure rigidly secured to the rear side of at least some of said panels and extending peripherally of said pool, said structure having portions spaced rearwardly of said rear panel side and being embedded in said solid construction material buttressing the rear side of paid panel, to structurally reinforce said pool construction.

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