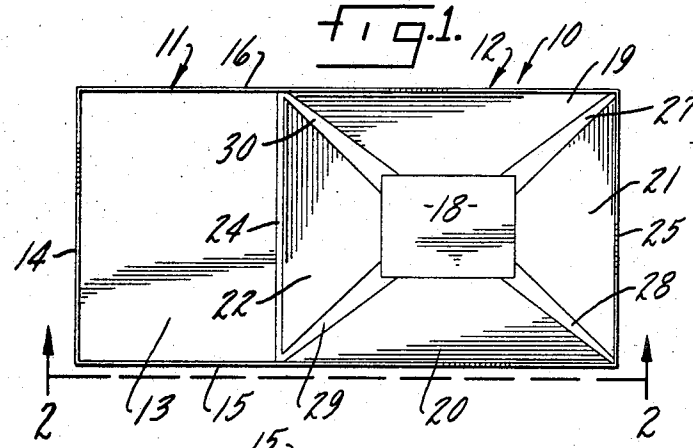
Jan. 7, 1969 M. M. SCHANKLER 3,419,916

LINER TYPE POOL CONSTRUCTION

Filed Oct. 3, 1966

fig.1.



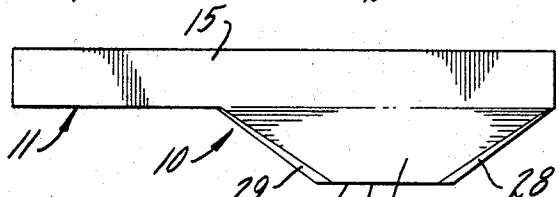


fig.2.

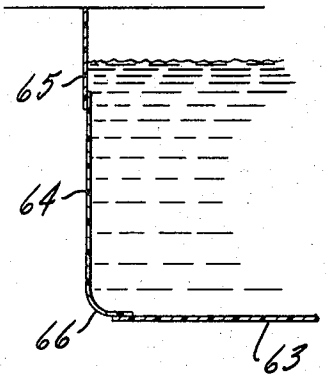


fig.6.

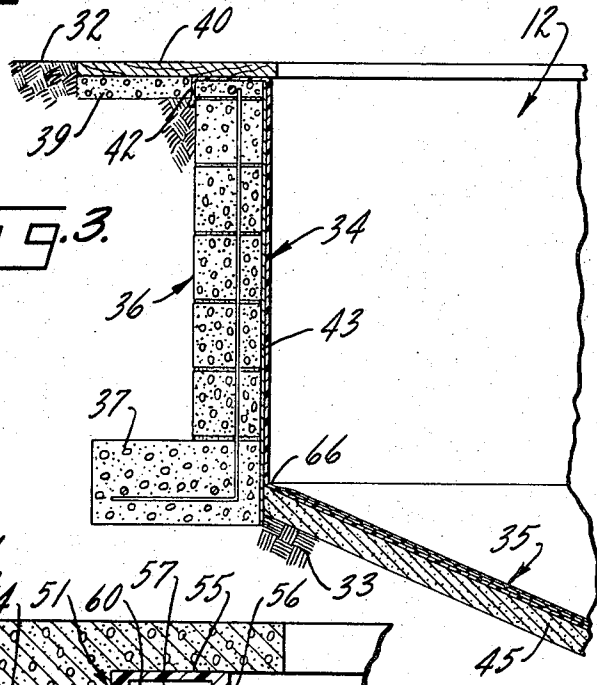


fig.3.

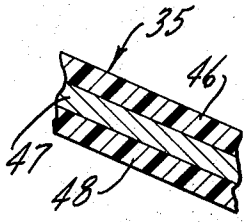
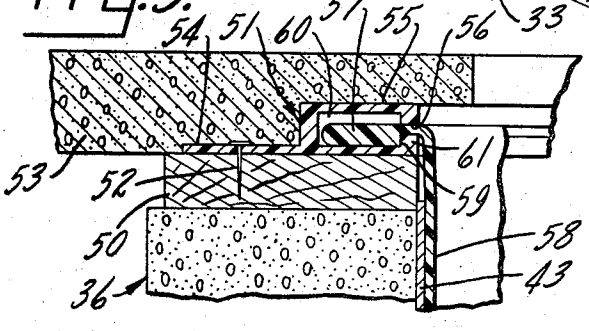


fig.4.

fig.5.



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United States Patent Office 3,419,916 Patented Jan. 7, 1969

3,419,916

LINER TYPE POOL CONSTRUCTION

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Filed Oct. 3, 1966, Ser. No. 583,629
U.S. Cl. 4—172 10 Claims
Int. Cl. E04h 3/16

This invention relates generally to pool constructions and specifically to an improvement in liner type swimming pools.

At least two general types of pool constructions are widely used today. One type has relatively thick, solid walls as typified by the conventional indoor swimming pool. The second type of pool includes a relatively thin liner member which, though impervious to water passage, does not have the strength and regidity of the solid wall swimming pool and consequently requires a supporting structure.

Liner type pools are generally of two types. A very popular type is the above ground pool which usually consists of a flexible sheet supported by a framework. A second type is the below ground pool which, though solid walled in the sense that a solid backing exists about the liner, is of a much less expensive construction than the conventional solid wall, indoor type pool. In a liner type ground pool a side wall, which may be formed from any suitable building material such as concrete blocks, is laid up and a bottom prepared. The bottom may be formed by a solid type building material, such as concrete blocks, but more often it is merely a layer of sand, preferably about three inches thick which has been smoothed as carefully as possible to prevent any lumps or irregularities in the soil from projecting upward and causing a rough or bumpy bottom when the flexible liner is laid on it.

Although the liner ground pool has many advantages, such as economy and ease of installation it also hase several disadvantages.

Present flexible liner constructions permit shifting of the sand under the bottom liner due to the action of the swimmers. Thus dents or footprints which appear in the bottom surface of the pool produce rough looking and lumpy bottoms, and this occurs even when the bottom has been smoothly tamped and troweled under the liner. Furthermore the ground under the liner must be carefully sifted in order to eliminate any stones or other hard or sharp objects which might cut the liner.

Further, present liners allow imperfections in compacting and/or troweling of the sand bottom liner to show through the liner under the pressure of the pool water. These imperfections or irregularities in the pool bottom are dirt catchers, and such bottoms are much more difficult to clean than smooth bottoms. Furthermore, underwater lighting which is normally a dramatic and pleasing pool feature only serves to emphasize the bottom irregularities.

In addition, existing liners frequently sag and stretch unevenly during installation, bunching up and wrinkling and thereby making filling a slow process. Much tugging on the liner is required in an effort to pull wrinkles out of the side walls as the water rises. Furthermore stretching in the wall sections of the liner makes it impossible to cut holes in a liner for lights, returns and skimmers until the pool is virtually full of water. Once the pool is full of water and the holes cut, emptying and refilling poses special problems of wrinkling, sagging and extra stresses on the liner around the openings.

And, finally, the above water areas of the liner type pool are particularly susceptible to damage by sharp toys or implements.

Accordingly, an important object of this invention is to provide a liner type swimming pool which cannot be

dented on the bottom, thereby eliminating the unsightly and hard to clean bottom which is so characteristic of present liner type ground pools.

Another object is to provide a liner type ground pool which does not require careful sifting of the ground under the liner to eliminate stones or other sharp objects in the region beneath the bottom of the liner.

Another object is to provide a liner type ground pool in which the sagging unwrinkling, and stretching problems encountered in the filling of conventional liner type ground pools are eliminated.

Another object is to provide a liner type ground pool in which holes in the side walls for lights, returns, skimmers and other beautifying or operating equipment may be preformed, and the problems of wrinkling, sagging and excessive stresses in the areas of the openings are eliminated.

Yet another object is to provide a liner type ground pool in which the probability of damage to the liner in the above water areas by sharp toys or implements is drastically reduced.

These and other objects of the invention will be apparent to those skilled in the art from a reading of the following description of the invention.

The invention is illustrated more or less diagrammatically in the accompanying drawing wherein:

FIGURE 1 is a top plan view of an exemplary form of the invention;

FIGURE 2 is a side elevation view taken substantially along the line **2—2** of FIGURE 1;

FIGURE 3 is a detail view to an enlarged scale through one type of wall construction employed in the invention;

FIGURE 4 is a detail view to an enlarged scale of an exemplary form of liner construction;

FIGURE 5 is a detail view of another form of wall construction employed in the invention; and

FIGURE 6 is a diagrammatic view of a further embodiment of the invention.

Like reference numerals will be used to refer to like parts throughout the following description of the figures.

The improved liner type ground pool of this invention is indicated generally at **10** in FIGURES 1 and 2. The pool consists of a shallow section **11** and a deep or diving section **12** as is common in the art. Shallow section **11** is formed by a bottom portion **13** which may, if desired, be actually sloped toward the diving section, end wall **14** and the left end portions of side walls **15** and **16**. The diving section consists of a central, bottom portion **18** and four downwardly sloping bottom sections **19, 20, 21** and **22**. Each of the downwardly sloping body sections is formed roughly in the shape of a truncated pyramid. The upper end of section **22** is connected by a flexible hinge **24** to bottom **13** of the shallow section. The upper edges of bottom sections **19, 20** and **21** are connected by similar flexible hinge means which will later be described in detail to the lower edges of side walls **16, 15** and end wall **25** respectively. Each of bottom sections **19–22** is hinge connected by any suitable means to the horizontal bottom section **18**.

Bottom sections **19–22** are connected to one another by flexible hinge means indicated at **27, 28, 29** and **30** and it is to these hinge means and the particular construction of the side and bottom walls with which this invention is particularly concerned.

An exemplary construction is illustrated in FIGURE 3. Ground level is indicated at **32** and undisturbed earth beneath the pool is indicated at **33**. The pool consists essentially of flexible side wall means, indicated generally at **34**, and rigid bottom means, indicated generally at **35**. The side wall means **34** in this instance is illustrated as a single sheet of flexible water impervious material such as polyvinyl chloride, commonly referred to as vinyl.

Although polyvinyl chloride is a preferred material any material which has good resistance to water chemicals and ultraviolet light may be utilized such as polyethylene, polypropylene and polyvinyl fluoride, which is of a Teflon type plastic sold under the trade name Tedlar by the Du Pont Company. All of the above named materials have good resistance to water chemicals such as chloride and algaecides, acids and soda ash alkalies. Other sources of supply at the present time are the B. F. Goodrich Company, The Goodyear Tire and Rubber Company and The Union Carbide Corporation. The thickness of the sheet may vary within wide limits. Twenty gauge vinyl material has been successfully employed although material anywhere from two to thirty gauge can be employed with only minor modifications or adaptations.

A concrete block wall is indicated generally at **36**, the wall in this instance consisting of five courses of 8 inch concrete blocks laid up with suitable mortar joints in a manner well known in the building trade. The concrete block wall rests upon footing **37** and suitable reinforcing rods are embedded in and carried by the concrete block wall and footing.

A concrete cap is indicated at **39** and a coping at **40**. It will be noted that in this instance the upper edge of the flexible side wall **34** has been brought back as at **42** and embedded in the concrete cap. In this instance a layer of building paper **43** has been interposed between the flexible side wall liner **34** and concrete block wall **36**. The building paper **43** decreases the transmittal of irregularities in the concrete blocks to the liner **34** and acts as a buffer between the blocks and the liner, thereby reducing the danger of cuts and abrasion to the liner. The additional smoothness further facilitates cleaning.

A layer of sand is indicated at **45** between bottom **35** and the undisturbed ground **33**. The sand layer **45** need not be specially sifted and prepared as in former constructions because bottom **35** is itself rigid in nature. Referring to FIGURE 4 for example it will be noted that bottom **35** is a laminated structure consisting of an inner pool water contacting layer **46** of flexible material, a layer **47** of substantially rigid material and an outer layer **48**, also of flexible material. The rigid material **47** may be cardboard or any inexpensive plastic material such as polystyrene. In a preferred form polyvinyl chloride in hard sheet form and of about ten gauge thickness is employed. It will be understood that the term "hard" and "rigid" is used in the sense of resistance to impressions made from impacts such as would be encountered in the normal use of a pool. Thus, a swimmer whose feet strike against the bottom of the pool will not form a depression in the bottom **35** as they would in a flexible bottom. As is well known in the art the various above mentioned materials, in particularly polyvinyl chloride, may be purchased from a number of sources in a range of gauges and flexibilities.

An alternative construction is illustrated in FIGURE 5. In this instance a wood cap such as a 2 x 8 redwood plank has been placed on top of retainer wall **36** and aligned with its inner edge. A special bracket is indicated as **51**, said bracket being secured to the wood cap **50** any suitable fastener such as nail **52**. A concrete coping is indicated as **53**. Bracket **51** includes a flange **54** by which the bracket may be secured to the underlying structure, and a housing or channel section **55**. The inward side of the housing **55** has an opening **56** of a width substantially narrower than the width of the bead portion **57** at the upper edge of flexible liner **58**. The inner edge of the bead **57** has an abutment surface **59** so that the bead, once in place within the chamber **60**, cannot be removed because the shoulder **59** abuts against the inside wall of lip **61**. Bead **57** is composed of a deformable material which can be physically deformed to pass through the opening **56** during installation.

FIGURE 6 illustrates another embodiment in which the pool bottom is formed by a single rigid sheet **63**. The sheet is sealed about its outer peripheral edges to a flexible liner **64** which forms a flexible hinge. The upper end of flexible liner **64** is sealed to a rigid panel **65** which may be bonded or otherwise secured to the upper edge of the retainer wall by any suitable means. The rigid panel **65** extends from a point just below to a point substantially above the water level, and serves to eliminate or reduce liner damage in the water level area. The liner further serves as a feature strip within which windows, lights or other sanitation or aesthetic equipment may be mounted.

The use, function and operation of the invention is as follows:

To construct a swimming pool in accordance with this invention a hole is excavated in the usual manner and the retainer wall **36** is laid up. It is preferred that the bottom consist of a layer of sand **45** on top of the undisturbed earth **33** but it is not essential that the layer **45** be carefully sifted sand as it is in the conventional construction. After preparation of the bottom and retainer wall the flexible pool of this invention is laid in place and filling water admitted.

Each of the bottom sections **18–22** is substantially rigid in nature and is joined by a flexible hinge to its adjacent sections. Thus, each of the bottom sections may be a laminated structure as illustrated in detail in FIGURE 4 or a single thickness structure as shown in FIGURE 6. Alternately, a double thickness construction may be employed, this construction using a thin flexible sheet disposed either above or beneath a rigid sheet. In any event the rigid sheet is sealed about its periphery to the flexible sheet. If the plastic materials may be susceptible to heat sealing, such a seal may be quite adequate. Otherwise the sheets may be cemented one to the other.

At the junction between adjacent pool sections, such as between adjacent bottom sections or between a bottom section and a side wall section, a thin flexible hinge indicated best at **66** is employed. The hinge may be a continuation of the flexible sheet which forms either the side or bottom section, or both, or it may be a separate piece, as when the adjoining side and bottom sections are made of a single rigid laminate sheet. In any event the joints are always of a flexible material to facilitate shipment and installation.

The side walls may consist of a single layer of flexible material, as indicated in FIGURES 3 and 5 or, if desired, a laminate structure as illustrated in FIGURE 4 may be employed. If a solid retainer wall of the type illustrated in FIGURES 3 and 5 is employed the single flexible sheet may be quite sufficient, especially if a layer of building paper **43** is interposed between the rough surface of the retainer wall and the exterior surface of the flexible sheet.

Any suitable means may be used for securing and tightly holding the flexible liner in place prior to filling, as illustrated by the semi-permanent installation of FIGURE 3 or the semi-permanent, mechanical interlock arrangement of FIGURE 5.

Although several embodiments of the invention have been illustrated and described it will at once be apparent to those skilled in the art that modifications may be made within the scope of the invention. Accordingly, it is intended that the scope of the invention is limited not by the foregoing exemplary description but solely by the hereafter amended claims when interpreted in light of the pertinent prior art.

I claim:

1. In a liner type pool,

generally vertically upwardly extending side wall means, and

bottom means,

said bottom means including a plurality of bottom sections,

each bottom section including a rigid, generally sheet-like member,

first flexible hinge means between adjacent bottom sections,

said first flexible hinge means including a layer of moisture resistant, flexible sheet-like material which forms a barrier to water passage between adjacent bottom sections,

second flexible hinge means between each bottom section and its associated adjoining side wall means,

said second flexible hinge means including a layer of moisture resistant, flexible sheet-like material which forms a barrier to water passage between the side wall means and the bottom means.

2. The liner type pool of claim **1** further characterized in that the flexible sheet-like material of the first and second hinge means is continuously sealed to the rigid sheet-like material in the peripheral area of the rigid sheet-like material.

3. The liner type pool of claim **2** further characterized in that the rigid sheet-like material underlies the flexible sheet-like material.

4. The liner type pool of claim **2** further characterized in that the flexible sheet-like material overlies the entire area of the rigid sheet-like material.

5. The liner type pool of claim **4** further characterized by and including

an auxiliary layer of thin, flexible sheet-like material which underlies the rigid sheet-like member.

6. The liner type pool of claim **5** further characterized in that the rigid sheet-like material is bonded over at least one of its surfaces to the abutting flexible sheet-like material.

7. The liner type pool of claim **1** further characterized by and including

a layer of non-sifted earth beneath the generally rigid bottom sections.

8. The liner type pool of claim **1** further characterized in that

the generally vertically upwardly extending side wall means includes a rigid restraining structure,

generally upwardly extending flexible sheet means disposed peripherally within the restraining structure, and

a sheet of depression smoothing material disposed between at least a portion of the area of the restraining structure which is co-extensive with the generally upwardly extending flexible sheet means.

9. The liner type pool of claim **1** further characterized in that the generally vertically upwardly extending side wall means includes

a rigid restraining structure,

generally upwardly extending flexible sheet means disposed peripherally within the restraining structure,

said upwardly extending flexible sheet means terminating below the upper edge of the restraining structure, and

an upwardly extending substantially rigid sheet-like member,

said upwardly extending sheet-like member being sealed along its lower edge portion to the upwardly extending flexible sheet means, and terminating at its upper end portion adjacent the upper edge of the restrain- structure.

10. The liner type pool of claim **1** further characterized in that the

side wall means includes a generally upwardly extending flexible sheet means which terminates, at its upper edge, in a sealing rib,

said sealing rib being received in a ground supported receptacle located at the upper end of the side wall means.

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