Sept. 11, 1962 E. A. T. McCLURE 3,052,893

SWIMMING POOL

Filed Feb. 23, 1961 3 Sheets-Sheet 1

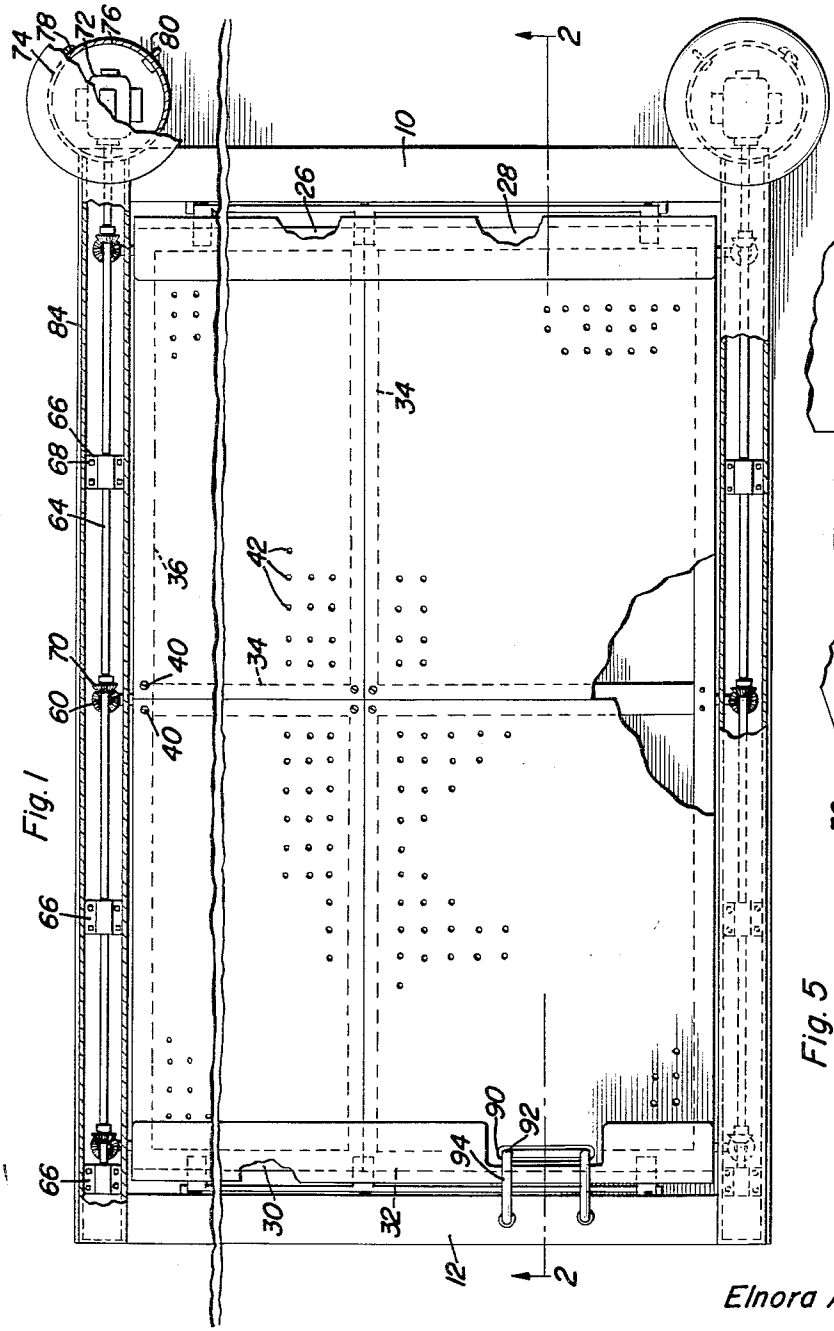


Fig. 1

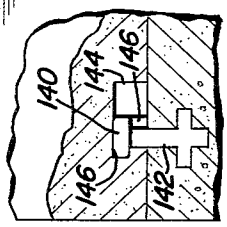


Fig. 9

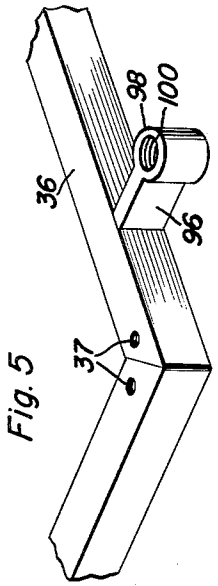


Fig. 5

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SWIMMING POOL

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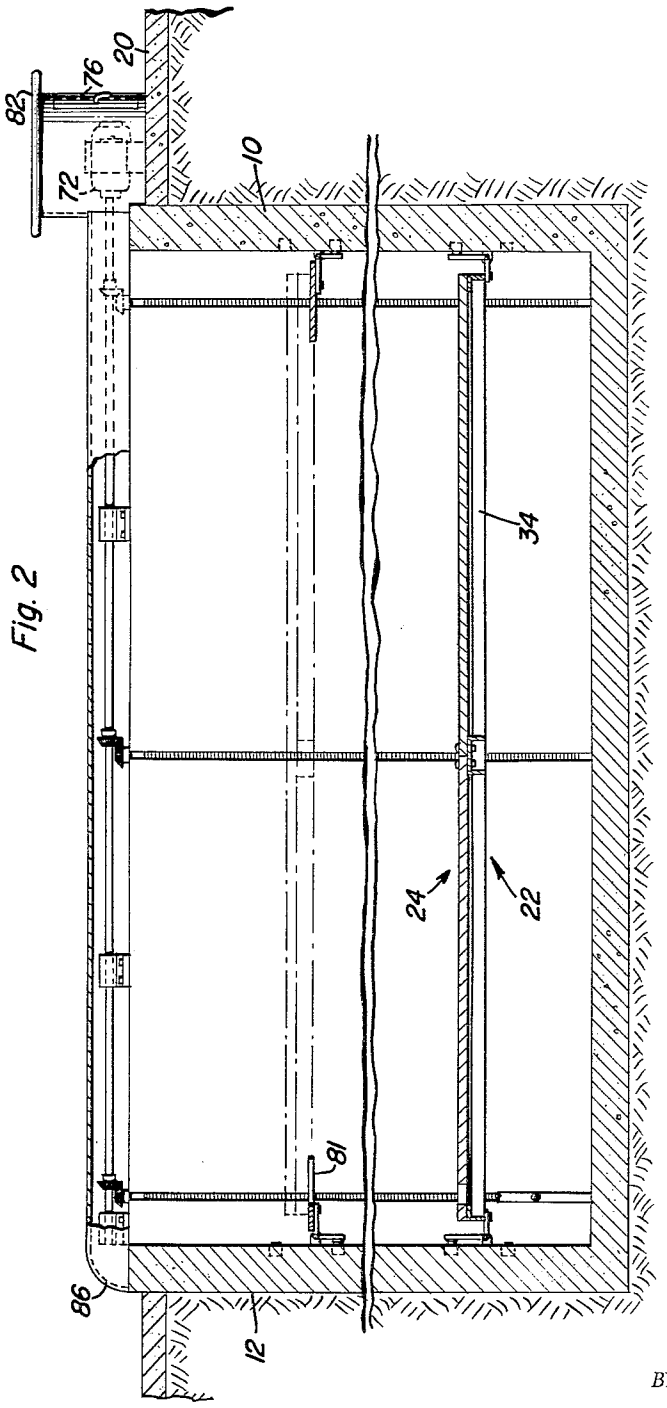


Fig. 2

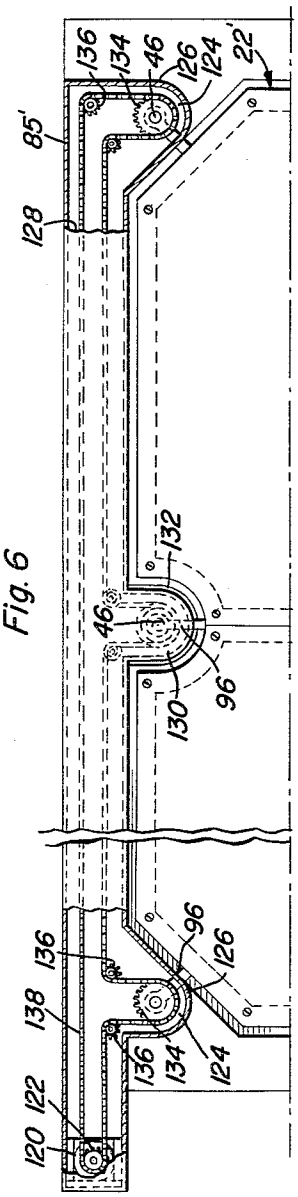


Fig. 6

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SWIMMING POOL

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Fig. 3

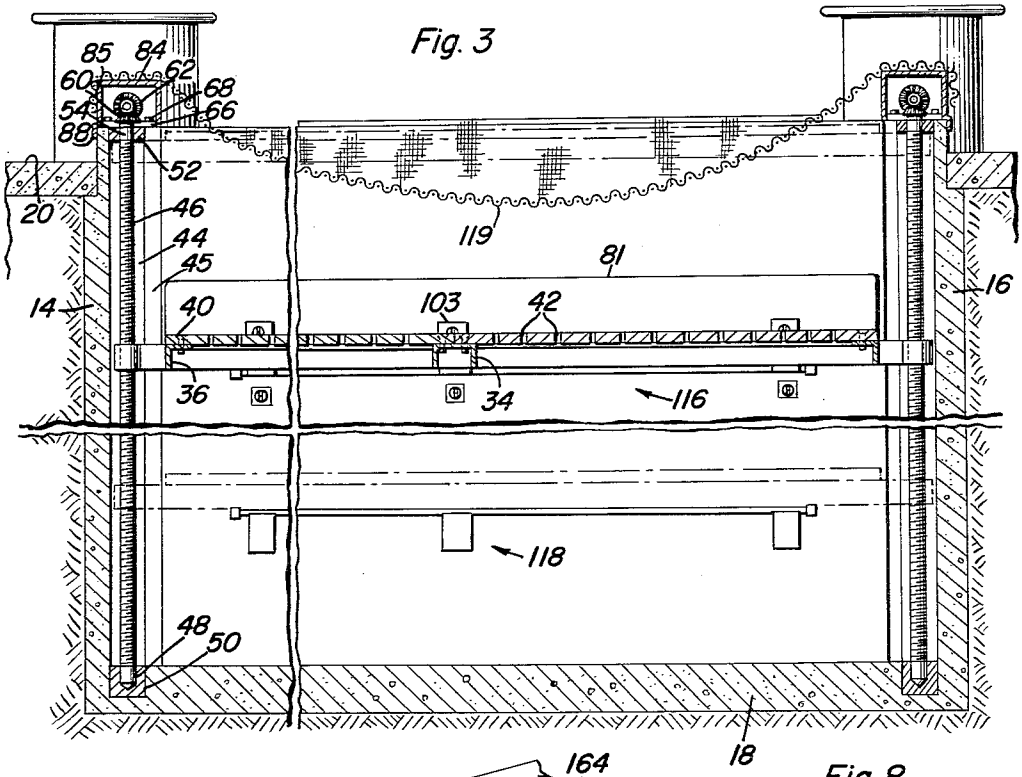


Fig. 7

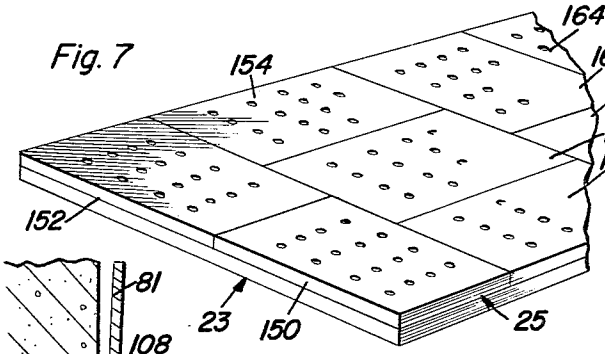


Fig. 8

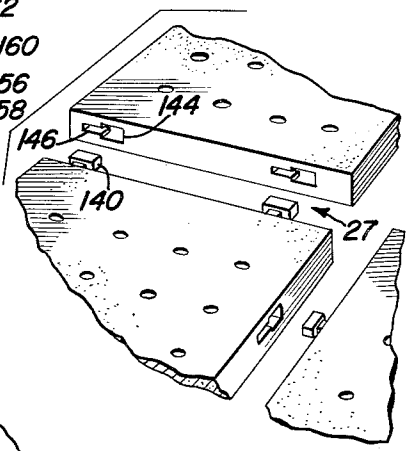


Fig. 4

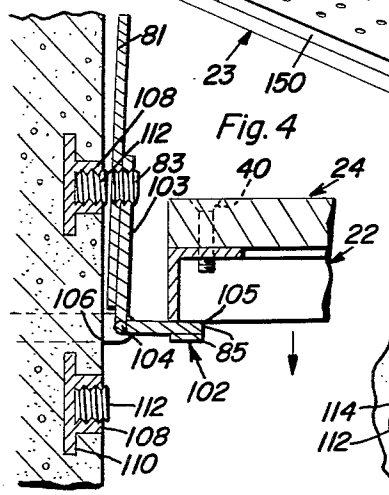
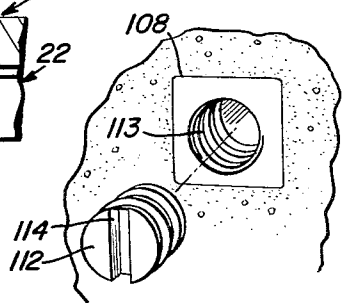


Fig. 10



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SWIMMING POOL

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9 Claims. (Cl. 4—172)

This invention relates to swimming pools and particularly to pools having adjustable bottoms.

It is an object of the invention to provide a pool having an adjustable bottom for varying the effective depth of the water in the pool.

By providing a pool with an adjustable bottom, a safety feature is created thereby eliminating the necessity and expense of installing and maintaining a fence around the swimming area.

It is another object of the invention to provide a floor for a swimming pool which may be adjustable and raised completely to the top level of the pool so that no one can accidentally fall into the pool.

By providing a swimming pool with a bottom adjustable in elevation, many advantages are obtained therefrom. By raising the bottom to within a foot of the surface of the water, a wading pool is provided for children. In winter, the drained pool becomes a storage area for summer out-door furniture and garden tools, with the adjustable bottom at the top level. It may be covered with a tarpaulin afterwards for protection from the weather and dirt. By eliminating the need for a fence, the surrounding area will become more attractive and have more eye appeal and thereby increase the value of the surrounding property.

It is another object of this invention to provide a pool floor which functions as an auxiliary filter and thereby prevents trash from entering the filter system and eliminates valuable time and effort in skimming trash from the pool's surface.

It is still another object of this invention to provide a vertically adjustable pool floor that is very safe, that is automatic in operation and may be controlled by push-buttons, and is very light in weight, non-corrosive, durable in use and therefore requires little up-keep, may be disassembled into sections and stacked in a small space, and be made any size or shape.

It is another object of this invention to provide a pool having means for rapidly and economically adjusting the effective depth of the water therein whereby the pool may be used by various age groups during different periods of the same day without adding or supplying water to the pool.

It is still another object of this invention to provide a pool with a vertically movable bottom and novel magnetic and automatic supporting ledges therefor.

It is still another object of this invention to provide a movable floor for a pool wherein the floor is composed of a plurality of sections with novel interlocking means between the sections whereby they may be disassembled and easily stored.

It is yet another object of the invention to provide a vertically movable pool floor with power operated means for moving the floor, the entire combination being completely safe, economical to manufacture, reliable in operation and durable in use.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a plan view of a pool employing a preferred form of my invention;

FIGURE 2 is an elevational view taken substantially on the plane of line 2—2 in FIGURE 1;

FIGURE 3 is a vertical cross-sectional view taken substantially through the center of FIGURE 2;

FIGURE 4 is an enlarged view of a magnetic supporting ledge for the floor bottom;

FIGURE 5 is an enlarged perspective view showing a portion of the corner of the floor frame;

FIGURE 6 is a plan view of a modification of a power drive for operating the movable pool floor;

FIGURE 7 is a perspective view of a modification of the floor;

FIGURE 8 is a perspective exploded view showing details of the interlocking means between the floor panels;

FIGURE 9 is a cross-sectional view taken on a horizontal plane and extending through the interlocking means between two floor panels; and

FIGURE 10 is an enlarged perspective view of one of the magnets shown in FIGURE 4.

Referring in particular to the form of the invention shown in FIGURES 1 through 3, it can be seen that the pool employing my invention is of a conventional rectangular shape and comprises two vertically extending end walls 10 and 12, two vertically extending side walls 14 and 16 and a bottom wall 18. The pool is composed of conventional material such as cast concrete. The pool is preferably surrounded at its top edge by a paved patio or walk way 20.

My vertically movable floor comprises a framework 22 covered with flooring 24. As shown, the flooring is composed of a plurality of rectangular panels 26, 28, 30 and 32. While four panels are shown in the drawings, it is apparent that more panels would ordinarily be used in the larger size pools. The panels 28 and 32 are normal size panels, however, the panels 26 and 30 have been reduced in size to accommodate the dimensions of the pool. The clearance between the edges of the flooring and the side walls of the pool would normally be approximately one inch between the flooring and the sides of the pool and two inches between the flooring and the ends of the pool. More clearance is required at the ends of the pool because of the latch mechanism employed thereat as shown in FIGURE 4.

The frame 22 of the flooring is composed of a cross-shaped member 34 connected at its ends to a rectangular frame 36. Preferably, the cross-shaped member 34 is formed of a standard U-shaped channel section and the rectangular frame 36 is formed of standard angle members of the same height as the member 34. The entire frame is preferably formed of some non-corrosive metal such as extruded aluminum and all the parts thereof are joined together by a conventional means, such as welding.

The flooring is preferably formed of some economical sheet material which is durable within water and relatively strong such as sheet aluminum or plastic. The flooring panels are detachably secured to the frame 22 by means of threaded screw members 40. All the panels have numerous small openings 42 extending therethrough and preferably arranged in a geometrical pattern, as shown in FIGURE 1. The holes 42 permit the water to easily flow through the floor as it is moved up and down, and they also function as a filter means for filtering trash from the water when the floor is raised to its highest elevation.

The mechanism for raising the flooring 24 includes a plurality of vertically extending bores 44 evenly spaced along each edge of the pool and rotatably receiving elongated screw members 46 which are substantially smaller in diameter than the bores 44. The threaded members 46 extend from the bottom of the pool to the top and are threaded their entire length except for the end portions 48 and 54 which are rotatably received in nylon bearings 50 and 52. These bearings are press fitted in the bores 44 and retained therein by friction. The upper ends of

each of the threaded members 46 has a bevel gear 60 fixed thereto.

Each elongated side edge of the pool has an elongated shaft 64 spaced slightly thereabove in a horizontal position and rotatably supported thereon by journals 66 secured to the top of the pool by means of screws or bolts 68. Secured to each shaft 64 is a plurality of bevel gears 70 spaced therealong so as to properly mesh and mate with the bevel gear 60 on the upper end of the threaded members 46. Each shaft 64 is driven by a motor, preferably an electric motor 72 and which is secured in a conventional manner to the surface of the patio 20.

For safety purposes and for protection of the driving mechanism, the motor 72 is enclosed in a cylinder 74 having a door 76 hinged to the edge of an opening therein at 78 and operated by means of a latch 80. The top of the door 76 is covered by a flat roof 82.

On the side opposite the door 76, the cylinder 74 has a rectangular opening whose edges are connected to a rectangular channel member 84 and which extends over the entire length of the shaft 64 and has a rounded end 86. The cover 84 is secured to the top of the pool edge 14 by conventional means such as longitudinal plates 88 secured to the upper side of the side walls by removable means such as bolts. The plates 88 effectively press the outer side walls of the cover members against the outer edges of the flanges on the journals 66. The journals 66 extend across the entire inner width of the cover 84 and thereby effectively hold it in position.

The panel 32 has an oblong aperture 90 therein for receiving the vertically extending portions of a conventional pool ladder 92 composed of conventional pipes or rods and having semi-circular upper ends 94 connected to the top of the end wall 12.

As shown more clearly in FIGURE 5, the rectangular portion 36 of the floor frame has threaded apertures 37 therein for receiving the threaded screws 40. Rigidly fixed to the frame portion 36 are a plurality of horizontally extending arms 96 having vertically extending sleeves 98 integral therewith. The sleeves 98 have threaded apertures 100 therein.

As shown in FIGURE 3, each of the threaded sleeves 98 on the frame work 36 receive one of the threaded members 46.

Mounted on the end walls 10 and 12 are a plurality of L-shaped supporting members 102 which are rotatably supported on pivot pins 104 extending through the outer ends of support members 106 which are anchored in the concrete of the end wall as shown in FIGURE 4. Also anchored in the end walls are a plurality of threaded blocks 108 having annular flanges 110 at their inner ends. As shown more clearly in FIGURE 10, the blocks 108 have relatively large threads for receiving threaded plug members 112. The plug members 112 comprise powerful permanent magnets and each has a radial slot 114 extending across its outer face for receiving a tool for rotating the same. The blocks 108 are preferably composed of some non-magnetic material such as nylon or aluminum. The L-shaped arm 102 is preferably composed of magnetic material such as iron or steel.

In operation, the motors 72 are energized by a switch located in a remote place not accessible to children. For example, the switch may be located within a house or garage in the vicinity of the pool. Once the motors are energized, they rotate the shafts 64 which in turn rotate the bevel gears 70. The bevel gears 70 thereby turn the threaded members 46 by means of the bevel gears 60. Rotation of the members 46 operating within the threads of the sleeves 98 cause these sleeves and the flooring 24 attached thereto to move vertically. The motors 72 are of the reversible type and operate by reversible switches so that the flooring may be raised or lowered as desired. Arms 96 extend through vertical slots 45.

The friction between the threads on the members 46 and sleeves 98 are normally sufficient to hold the flooring in any set vertical position once the motors have been deenergized. However, as a safety factor two rows of magnetic supports comprising the L-shaped lever 102 shown in FIGURE 4 are provided for supporting the flooring at two elevations. If desired, further rows of these magnetic support devices may be provided. While the magnets are disclosed as being permanent magnets, it is also contemplated that they could be replaced by electromagnets.

As shown in FIGURE 4, the lever 102 is shown approximately as it would normally support the flooring 24 and frame 22. Normally, the arm 103 would be firmly held by the upper magnet 112, the lower arm 105 would support the frame 22. FIGURE 4 actually shows the flooring assembly as it is being moved downwardly by the electric motors and the arm 103 has just broken away from the magnet 112 due to the overcoming power produced by the electric motors. Sufficient clearance is provided between the edging of the floor assembly and the bell crank 102 to permit the bell crank to pivot 90° in a clockwise direction as the floor moves on downwardly. As the flooring moves on downwardly from the row of bell cranks 116 to the lower row 118, the motors are stopped just as the flooring contacts the arms 105 which are extending horizontally in the row of bell cranks 118. However, if desired, the motors 72 may be continued to be operated so that the flooring assembly will strike the horizontally extending arms 105 of the lower row 118 thereby pivoting them in a clockwise direction as viewed in FIGURE 4 so that the arms 103 will become horizontal and the flooring may pass on down below the arms as they rotate in a clockwise direction. When the flooring is raised, it strikes the horizontally extending arms 103 thereby breaking loose the arms 105 from the lower magnets 112 and permitting the bell cranks 102 to rotate counterclockwise as viewed in FIGURE 4 thereby permitting the flooring to rise past the bell cranks as they rotate. As explained above, the magnets 112 in conjunction with the bell cranks 102 function merely as a safety feature for additionally holding the flooring in a horizontal position. Normally, the magnets themselves have sufficient power to hold the flooring with many people thereon in a fixed horizontal position without assistance from the supporting arms 96. The bell cranks 102 can only be rotated by the power created from the motors 72 as geared down through the gearing and threaded connections shown in FIGURES 1 through 6.

As shown in FIGURE 4, the arms 103 of the upper row 116 of bell cranks 102 are rigidly connected by a flat plate or support 81 connected to the arms 103 by threaded plug members 83 maed of magnetic material and in vertical alignment with the magnets 112. When the magnetic plug members 83 engage the outer surfaces of the magnets 112, they effectively hold the plate 81 and arm 103 in a vertical position and the arm 105 in a horizontal position for supporting the floor assembly 24. A magnetic spacer plug 85 is provided on the lower surface of leg 102 and also in vertical alignment with the magnets 112 for engaging the lower magnet when the arm 105 is in a vertical position. The magnetic attraction between the lower magnet 112 and the plug or spacer 85 effectively holds the arm 105 in a vertical position and the arm 103 and plate 81 in a horizontal position. As shown in FIGURE 2, when the floor assembly 24 is at the bottom of the pool. The legs 103 and connecting plate 81 are in a horizontal position. Plate 81 is preferably 15 inches wide and approximately four feet below the surface of the water when the pool is full. The ledge 81 functions as a support on which tired swimmers may stand and rest. Also, the ledge or plate 81 also functions as a safety device in that it affords a haven for exhausted swimmers or a non-swimmer who has inadvertently fallen into the pool or jumped into the pool thinking that the

water therein was shallow. The ledge **81** could be made of metal, solid or perforated sheet, or plastic.

The lower row **118** of the L-shaped support members **102** are identical to those shown in FIGURE 4, except that the ledge **81** and the spacer **85** are omitted and the L-shaped supports are mounted more closely to the magnets **112** by a distance equal to the thickness of the ledge **81**. As shown in FIGURES 3 and 4, when the floor assembly **24** is resting on the arms **105**, the plate **81** lies adjacent and substantially parallel to the rear wall of the pool.

In the fall and winter seasons and during other periods when the pool is not being used, a fiber glass net **119** (similar to curtain material) may be used to cover the top of the pool so as to prevent leaves and other trash from getting into the pool. The net may have its marginal edge portions disposed over and secured to the end walls **10, 12** and the side walls **14, 16** in any convenient manner and its center portion may be supported by the floor assembly **24** when the latter is at its upper vertical position.

During cold weather, the pool may also be used as an ice skating rink. When the pool is employed for this use, the floor assembly **24** may be elevated to within one or two inches or even a fraction of an inch below the surface of the water whereby it supports a very thin sheet of ice so that the pool may be used when the ice would be too thin for supporting the weight of skaters without some support means therebelow. Dut to the support of the floor assembly **24**, the pool may be used for skating when the ice is very thin and under conditions where conventional pools would be unsafe for skating. This permits the pool to be used for skating even during the warmer periods of the winter season during which other pools would be unsafe for skating.

FIGURE 6 is a modified drive means and a modification of my flooring adapted to be installed on a conventional pool without disturbing the wall construction. As shown in FIGURE 6, the pool is also of conventional rectangular shape. However, spaces for the vertically extending threaded shafts **46** are provided within the interior of the pool rather than in the walls thereof as shown in FIGURE 3. At the ends of the pool, are triangular vertically extending spaces **124** are provided by triangular partition members **126** extending from the bottom of the pool up to the horizontally extending flat cover **128**. In the central portion of the pool, a semi-cylindrical chamber **130** is provided by semi-cylindrical U-shaped vertically extending cover member **132** also extending from the bottom of the pool up to the top cover **128**. Extending downwardly from the top cover wall **128** is a vertically extending flange or wall **85'** similar to the wall **85** shown in FIGURE 3.

The flooring **22'** is spaced from the vertically extending walls or partitions **132** and **126** one or two inches and is contoured in shape to follow the outer surfaces of these members and yet provide the proper spacing therewith. The arms **96** which are connected to the threaded collars **98** on the threaded members **46** extend through vertical slots in the cover members **126** and **132**. A conventional electric motor **120** is mounted at the side of the pool in a fixed position and drives a sprocket **122**. The motor **120** extends in a vertical position, and the sprocket **122** is fixed to the upper end of its drive shaft. Sprockets **134** are fixed to the upper ends of each of the threaded shaft members **46**, and a plurality of guide sprockets **136** are journalled on vertically extending shafts mounted on the upper edge of the pool. A link-type chain **138** fits around and engages all the sprockets as shown in FIGURE 6. When the motor **120** is energized, it rotates the drive sprocket **122** which in turn drives the chain **138** which is guided by the idler sprocket **136** to the sprockets **134** which rotate the threaded members **46**. The threaded members **46** operate the floor **22'** in the same manner as explained above in connection with FIGURES 1 through 4.

FIGURE 7 illustrates a modified floor construction comprising framing **23** and floor panels **25**. In this form, the framing **23** is preferably composed of hollow sealed members which may be rectangular as shown or pipe-like construction and which are hermetically sealed for containing a buoyancy gas such as helium for additionally supporting the flooring within the pool. All of the panels **25** are joined by novel connecting means **27** as illustrated in FIGURES 8 and 9. Each of the panels have two sides containing a plurality of projecting blocks **140** supported on arms **142** embedded within the panel. Preferably, the inner ends of the arms are cross-shaped as shown in FIGURE 9 so as to effectively interlock with the material of the panels. Also, the other two sides of each panel have female receptacles for receiving the blocks **140** comprising an L-shaped chamber having arms **144** and **146** which are of sufficient size to receive the block **140**. Extending from the chamber arm **146** is a narrow slot **148** which extends from the chamber arm **146** to the end surface of the floor panel. To connect the panels, the blocks **140** of one panel are first inserted into the chamber arms **144** of the adjacent panels and then the panels are moved laterally with respect to one another until the block **140** is received within the chamber arm **146**. In this position the arm **142** extends through the slot **148** as shown in FIGURE 9, and effectively holds the two panels together. This specific connection permits any desired number of panels to be rapidly assembled and disassembled as desired as illustrated in FIGURES 7 and 8. Panels **25** may be secured to the framing **23** by conventional means such as flanges on the inner side of the framing **23** connected by screws to the flooring panel, not shown.

One method of assembling the panels shown in FIGURE 7 is to first connect the panels **150** and **152**, then connect the panels **153, 156** and **154**, to these two panels in that respective order. Then the panels **160** and **162** are connected end-to-end as are the panels **150** and **152** and then these two panels are connected to the three connected panels **154, 156** and **158**. Then the three panels beginning with the panel **164** are connected to the two panels **160** and **162** in the same manner as three panels **154, 156**, and **158** are connected to the two panels **150, 152**.

To assure that the two motors **72** as shown in FIGURE 1 operate in synchronism, synchronizing device may be connected to the circuit of the motors, or alternatively the two shafts **64** may be geared together so that they both operate at the same speed.

The foregoing is considered as illustrative only if the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A vertically movable floor for a swimming pool comprising generally vertically extending threaded means rotatably mounted on opposite side walls of the pool, a horizontal vertically movable rigid floor extending between said opposite side walls, threaded support means mating with the threads of said threaded means and fixed to said floor, drive means connected to said threaded means for rotating same for vertically moving said floor and maintaining it horizontal, each vertical rod being smooth on its extreme upper and lower ends which are rotatably supported in nylon bearings adapted to be fixed to the pool.

2. A vertically movable floor for a swimming pool comprising generally vertically extending threaded means rotatably mounted on opposite side walls of the pool, a horizontal vertically movable rigid floor extending be-

tween said opposite side walls, threaded support means mating with the threads of said threaded means and fixed to said floor, drive means connected to said threaded means for rotating same for vertically moving said floor, said floor being further supported in a predetermined horizontal position by L-shaped members each pivotally mounted at its apex to the pool wall and maintained in either of two positions by magnet means fixed to the pool adjacent said members.

3. A device as defined in claim 2 wherein each L-shaped member has an upper leg connected to a safety ledge extending generally horizontally along said pool wall, said safety ledge lying in a horizontal plane when the floor is below said L-shaped members.

4. A device as defined in claim 3 including a fiber glass net adapted to be connected to the upper edges of said pool and to be supported at its central portion by said movable floor when it is elevated to its upper position so as to prevent foreign material from entering said pool.

5. A vertically movable floor for a swimming pool comprising a vertically movable rigid floor adapted to extend between opposite side walls of the pool, elevator means connected to said floor so as to move it up and down in the pool, support means for said floor comprising a plurality of L-shaped members, each having a pair of legs and composed of magnetic material, hinge means pivotally connecting the apex of each L-shaped member to a rigid member adapted to be secured to the side walls of the pool, upper and lower magnets for each L-shaped member, means for securing the upper and lower magnets to the side walls of the pool above and below said hinge means and adjacent the legs of an L-shaped member whereby said L-shaped member may pivot 90° between two positions on said hinge means and be maintained in either position by said magnets.

6. A device as defined in claim 5 wherein the upper leg of each L-shaped member is connected to a safety ledge.

7. A vertically movable floor for a swimming pool comprising a vertically movable rigid floor adapted to extend between opposite side walls of the pool, elevator means connected to said floor so as to move it up and down in the pool, said floor including a plurality of panels, the adjacent edges of the panels abutting one another, each pair of abutting edges including one edge with a recess therein and another edge with a projection having a head on its free end, said recess comprising a rear chamber connected to said one edge by side-by-side first and second passages, said first passage adapted to permit passage of said head to said rear chamber, said second passage being of less height than said head and first passage but of sufficient size to receive said lug when said head is inserted into said chamber via said first passage and said panels are moved laterally relative to one another whereby said panels are locked together.

8. A vertically movable floor for a swimming pool comprising a vertically movable rigid floor adapted to extend between opposite side walls of the pool, elevator means connected to said floor so as to move it up and down in the pool, said floor comprising a hollow frame having sealed chamber means filled with a gas lighter than air, said frame being covered with a flat floor secured thereto.

9. A device as defined in claim 8 wherein said gas comprises helium.

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