Feb. 23, 1971 B. J. KLEIN MEULEKAMP 3,564,622

SWIMMING POOL WITH VERTICALLY ADJUSTABLE BOTTOM

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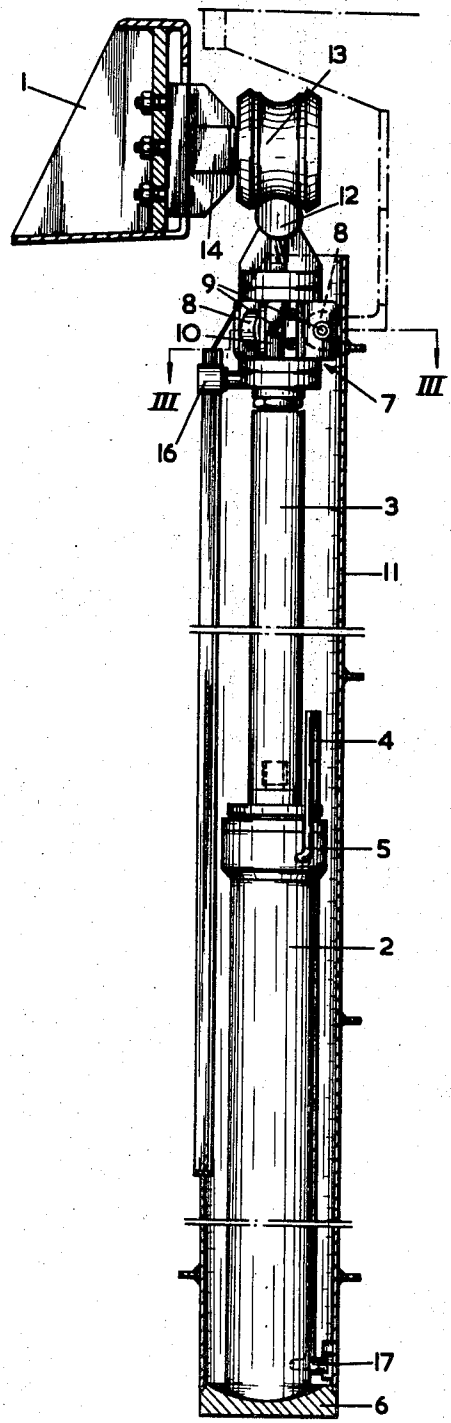


Fig. 1

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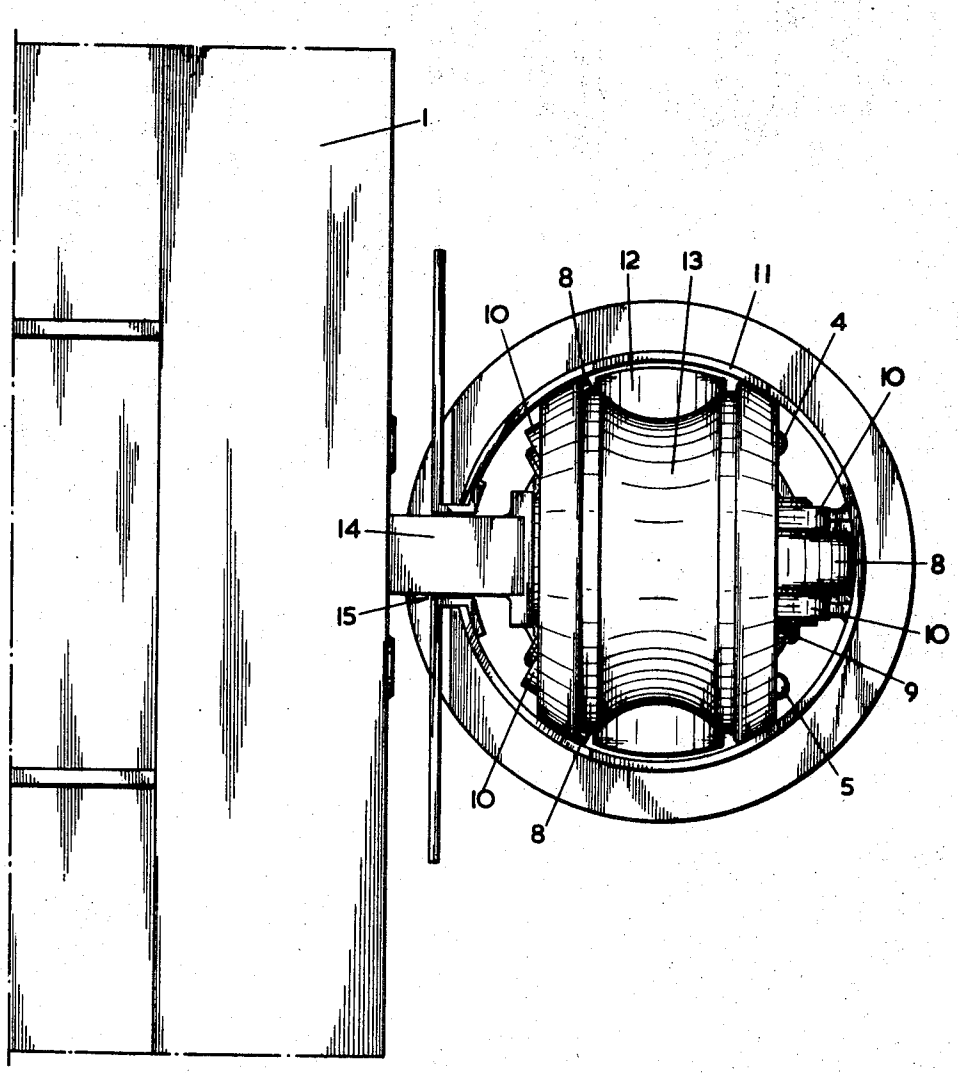
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SWIMMING POOL WITH VERTICALLY ADJUSTABLE BOTTOM

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Fig. 2



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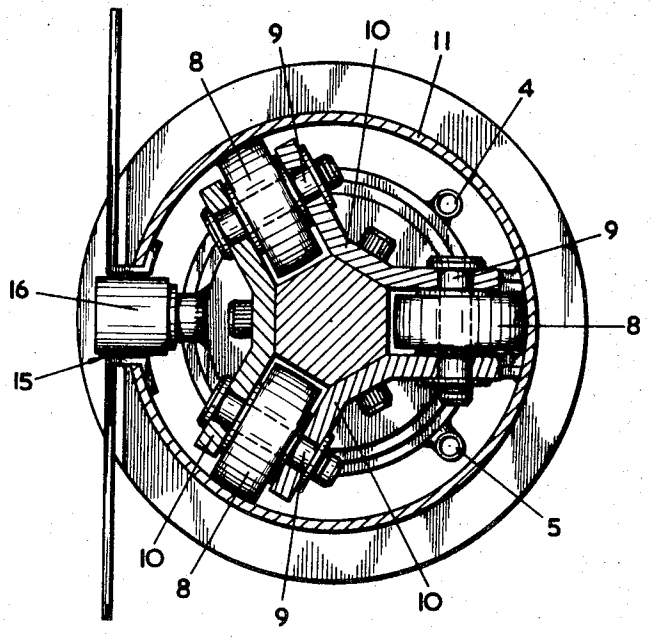
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Fig. 3



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SWIMMING POOL WITH VERTICALLY ADJUSTABLE BOTTOM

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Int. Cl. E04h 3/19
U.S. Cl. 4—172.13 8 Claims

ABSTRACT OF THE DISCLOSURE

A swimming pool has a bottom which is vertically adjustable to regulate the depth of the pool for training and other purposes, by means of hydraulic jacks including guide means for braking the vertical movement of the pool bottom when it tilts.

The present invention relates to swimming pools having vertically adjustable bottoms. The purpose of adjusting the pool bottom vertically is to control the effective depth of the water in the pool. Thus, the pool bottom will be raised to provide an effectively shallow pool for instruction and other puropses, and will be lowered to provide an effectively deeper pool for ordinary swimming or competition.

Known constructions for doing this have relied on screw jacks. But these are unsatisfactory because they are subject to considerable wear and frequent breakdown and are attacked by corrosion.

Accordingly, it is an object of the present invention to provide a swimming pool with a vertically adjustable bottom, which overcomes the disadvantages recited above.

Another object of the present invention is the provision of a swimming pool having a vertically adjustable bottom whose vertical adjustment mechanism also serves as a brake in the event the pool bottom tilts from its desired horizontal position.

Finally, it is an object of the present invention to provide a swimming pool with a vertically adjustable bottom, which will be relatively simple and inexpensive to manufacture and install, easy to operate, maintain and repair, and rugged and durable in use.

Other objects and advantages of the present invention will become apparent from a consideration of the following description, taken in connection with the accompanying drawings, in which:

FIG. 1 is a side view, partly in section, of structure according to the present invention showing one of the hydraulic jacks of the present invention, with the structure distinctive of the present invention in full line and the conventional structure of the swimming pool in phantom line;

FIG. 2 is an enlarged top plan view of structure shown in FIG. 1; and

FIG. 3 is an enlarged cross-sectional view taken on the line III—III of FIG. 1.

Briefly, the objects of the invention are achieved by providing a lift mechanism for the pool bottom, in the form of vertically disposed hydraulic jacks having special drive means and guide means and support means for the pool bottom.

Referring now to the drawings in greater detail, there is shown a swimming pool having a horizontally disposed floor or bottom **1** which is vertically adjustable relative to the fixed swimming pool structure such as the curb and drain shown in phantom line at the upper right of FIG. 1. The mechanism for vertically adjusting bottom **1** is a

plurality of hydraulic jacks, for example four hydraulic jacks disposed in spaced relationship two on each of the opposite sides of bottom **1**. Each hydraulic jack is comprised by a cylinder **2** in which a piston is disposed, the piston having a vertically extending piston rod **3** thereon. Hydraulic oil is supplied to and removed from cylinder **2** by a conduit **4**, by means of a pump which is not shown in the drawing. There is a pump individual to each of the hydraulic jacks, and the pumps of the individual jacks can be operated by one common electric motor (not shown) by which the operator can simultaneously control the operation of all of the jacks to raise or lower bottom **1** while maintaining bottom **1** horizontal. A conduit **5** is also provided for the discharge of foreign substances from cylinder **2**, such as water and oil that accumulate on the upper side of the piston and may interfere with the functioning of the jack.

At its lower end, cylinder **2** rests on a bottom plate **6** on the fixed underfloor of the pool; while at its upper end, piston rod **3** carries a head **7** which is screw-threadedly connected to the upper end of piston rod **3**. Head **7** includes three guide rollers **8** rotatable on horizontal shafts **9** whose ends are carried in openings through plates **10** which are secured to head **7**. The guide rollers **8** are thus disposed with their axes at angles of 120° to each other and are spaced apart 120° peripherally about head **7**, with their axes disposed in a common horizontal plane.

A hollow pipe **11** surrounds the hydraulic jack all the way up to and beyond the highest position of head **7**, which is the position of greatest vertical extension of the hydraulic jack as shown in FIG. 1. The guide rollers **8** roll against the inner surface of pipe **11** as shown in FIG. 3.

At its upper side, head **7** carries a profiled member **12** in the form of a horizontal cylinder whose axis extends parallel to the length of the pool. A roller **13** has an annular concave, that is, a concave-toroidal peripheral surface that bears against and can roll on the upper side of element **12**. Roller **13** is mounted for rotation about a horizontal axis on a support member **14** bolted to the adjacent side of bottom **1** of the pool. As seen in FIG. 2, the outer contours of roller **13** are so formed that roller **13** bears along four lines of bearing contact against the inner surface of pipe **11** when bottom **1** is at an elevation below that shown in FIG. 1.

In order to accommodate vertical movement of bottom **1** with its attached roller **13** below the position shown in FIG. 1, pipe **11** is provided with a vertically extending slot **15** lengthwise thereof, and a horizontal guide roller **16** extends radially from head **7** and is disposed in and rollably rides in slot **15**. Roller **16** is a substantial distance below member **14** and prevents head **7** from rotating relative to the other structure.

In order to prevent cylinder **2** from rotating about its vertical axis, a projection **17** is secured between cylinder **2** and the inner wall of pipe **11**.

Upon the supply or exhaustion of hydraulic fluid to or from the cylinder **2** through conduit **4**, head **7** moves vertically within pipe **11** and with it the supported roller **13** and pool bottom **1**. Member **14** and guide roller **16** ride in slot **15**. If for any reason an individual jack such as that shown in FIG. 1 should move downward while the other jacks do not, the bottom **1** would tend to be canted; and this would impose on head **7** a force having a horizontal component. As a result, the two rollers **8** immediately adjacent and on opposite sides of slot **15**, that is, the two rollers **8** shown at the left of FIG. 3, would bear against the inner wall of pipe **11** with extraordinary force. These rollers **8** are preferably of a resilient material whose freedom to roll is considerably diminished as they deform under pressure. Accordingly, the rollers **8** thus act as a brake on further downward

movement of head 7 under such conditions of tilt of bottom 1, so that excessive tilting of bottom 1 is avoided.

In view of the foregoing disclosure, therefore, it will be evident that all of the initially recited objects of the present invention have been achieved.

Although the present invention invention has been described and illustrated in connection with a preferred embodiment, it is to be understood that modifications and variations may be resorted to without departing from the spirit of the invention, as those skilled in this art will readily understand. Such modifications and variations are considered to be within the purview and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A swimming pool having a bottom, and means for vertically adjusting the position of said bottom, said adjusting means comprising a plurality of hydraulic jacks disposed on opposite sides of said bottom, and means retarding vertical movement of said bottom when said bottom departs substantially from a horizontal position, said retarding means comprising guide elements vertically movable with said bottom, and vertically disposed guide means along and in contact with which said guide elements move so that said guide elements and guide means are pressed more firmly together upon tilting of said bottom from a horizontal position.

2. A swimming pool as claimed in claim 1, each said hydraulic jack comprising an upwardly extending cylinder having a piston rod extending upwardly therefrom and vertically movable relative to said cylinder, said guide means comprising a hollow vertical pipe surrounding said hydraulic jack, said guide elements comprising a head carried by the upper end of said piston rod and supporting said guide elements.

3. A swimming pool as claimed in claim 2, said head comprising a body having circumferentially disposed guide rollers thereon that roll against the inner wall of said pipe.

4. A swimming pool as claimed in claim 1, the pool having drains extending lengthwise of the edges thereof, said convex supporting member being at about the level of said drains when said jacks are fully extended.

5. A swimming pool having a bottom, and means for vertically adjusting the position of said bottom, said adjusting means comprising a plurality of hydraulic jacks disposed on opposite sides of said bottom, and means retarding vertical movement of said bottom when said bottom departs substantially from a horizontal position, each said hydraulic jack comprising a casing and a piston rod extending upwardly from the casing, said piston rod carrying at its upper end a convex supporting member, a concave roller rolling on said convex supporting member and secured to and supporting a portion of the weight of said bottom.

6. A swimming pool as claimed in claim 1, and a separate pump for operating each said jack.

7. A swimming pool as claimed in claim 5, and a separate pump for operating each said jack.

8. A swimming pool as claimed in claim 2, said pipe having a vertically extending slot therethrough on the side adjacent said bottom, and a guide member carried by said head and riding in said slot.

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