United States Patent [19]

Troiano

[11] **3,813,704**

[45] **June 4, 1974**

[54] **FLOATABLE SAFETY COVER FOR SWIMMING POOLS**

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[22] Filed: **June 19, 1972**

[21] Appl. No.: **264,386**

[52] **U.S. Cl.** **4/172.13**

[51] **Int. Cl.** **E04h 3/16**, E04h 3/18

[58] **Field of Search** 4/172, 172.11, 172.12, 4/172.13, 172.14

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Primary Examiner—Henry K. Artis

Attorney, Agent, or Firm—Lilling & Siegel

[57] **ABSTRACT**

A platform of perforated, semi-rigid sheet material is supported on a frame of rigid, pressure-tight tubing. The shape of the platform corresponds to the perimeter of the water surface in the protected pool. The platform, in its operating position, is supported by a number of inflatable floatation pillows whose displacement is varied by the control of the pressure level of compressed air entrapped therein. The tubular frame serves as distribution manifold for the compressed air and is connected to a pressure-sensitive alarm device. The alarm device provides an audible warning signal whenever the excess buoyancy of the platform drops below the weight of a person accidentally stepping thereon.

15 Claims, 18 Drawing Figures

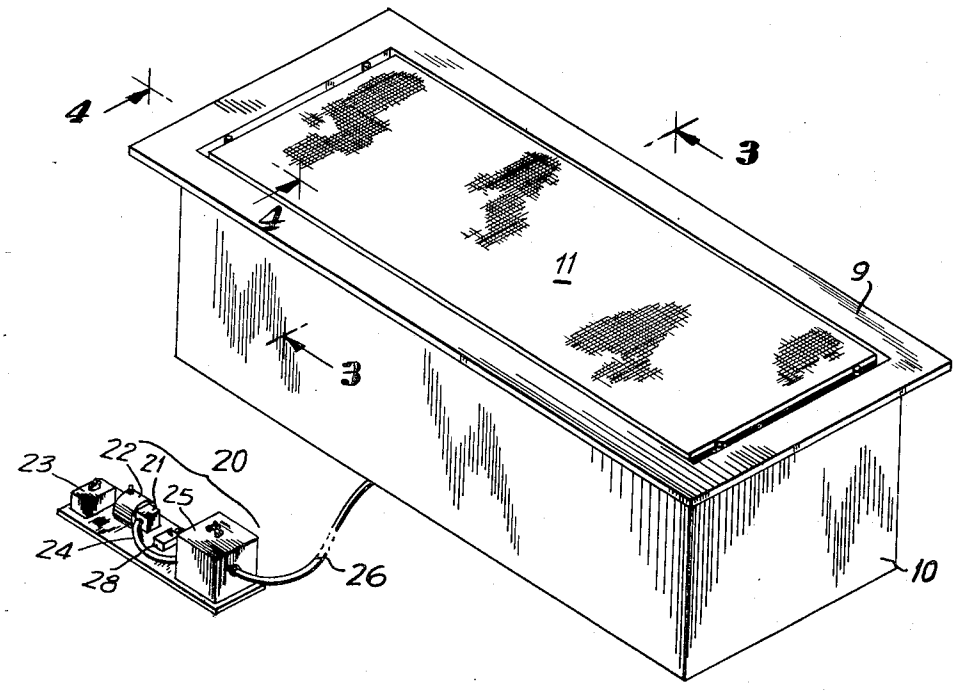
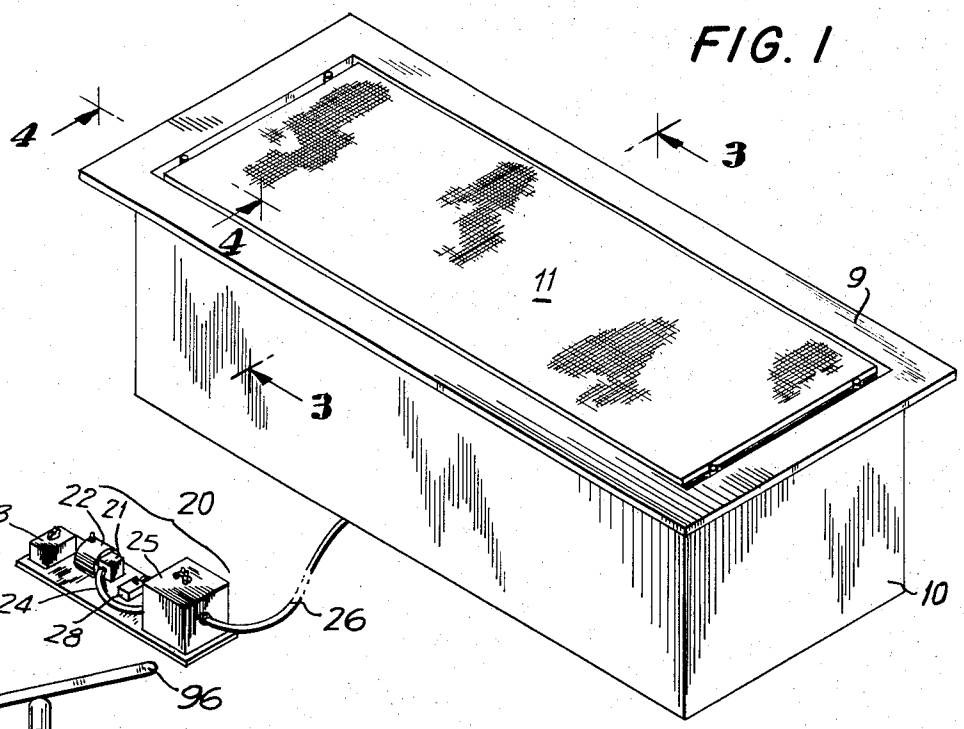


FIG. 1



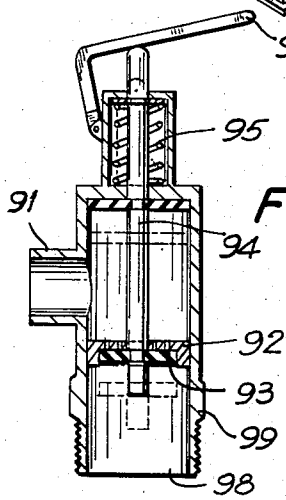


FIG. 18

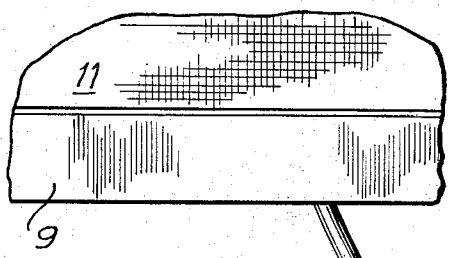


FIG. 2

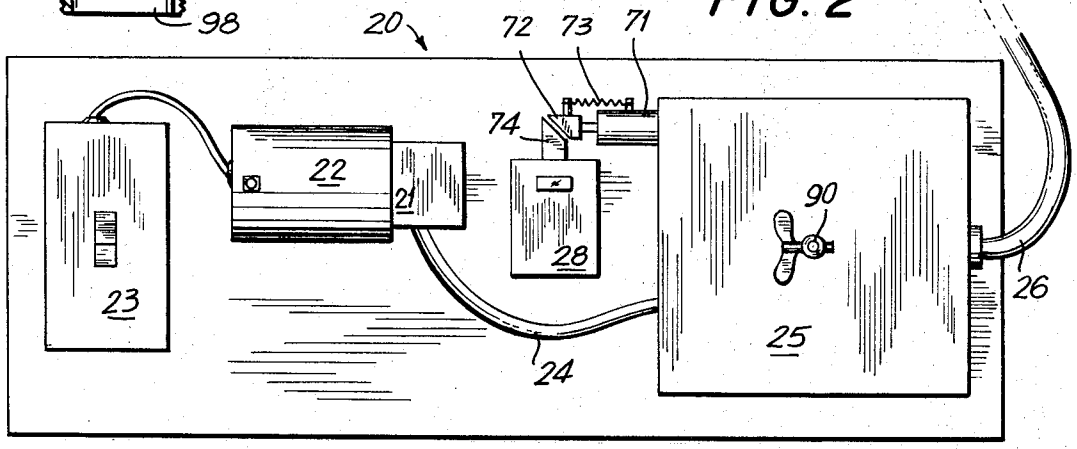
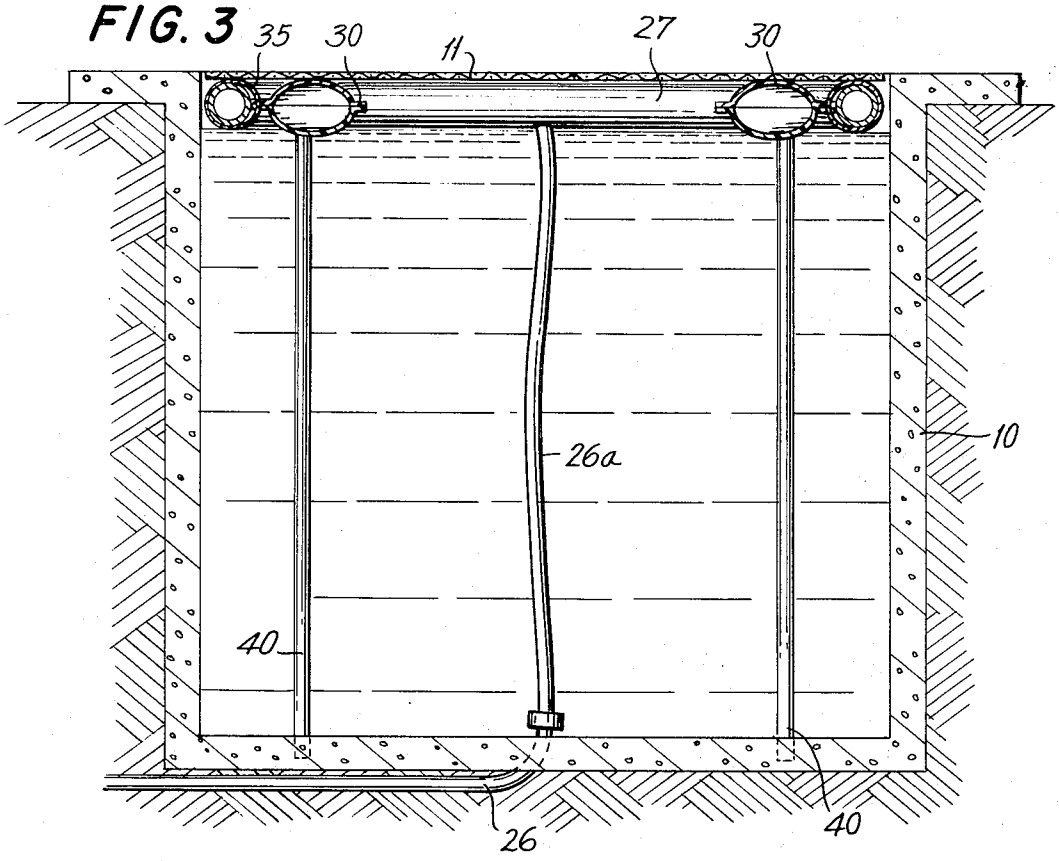


FIG. 3



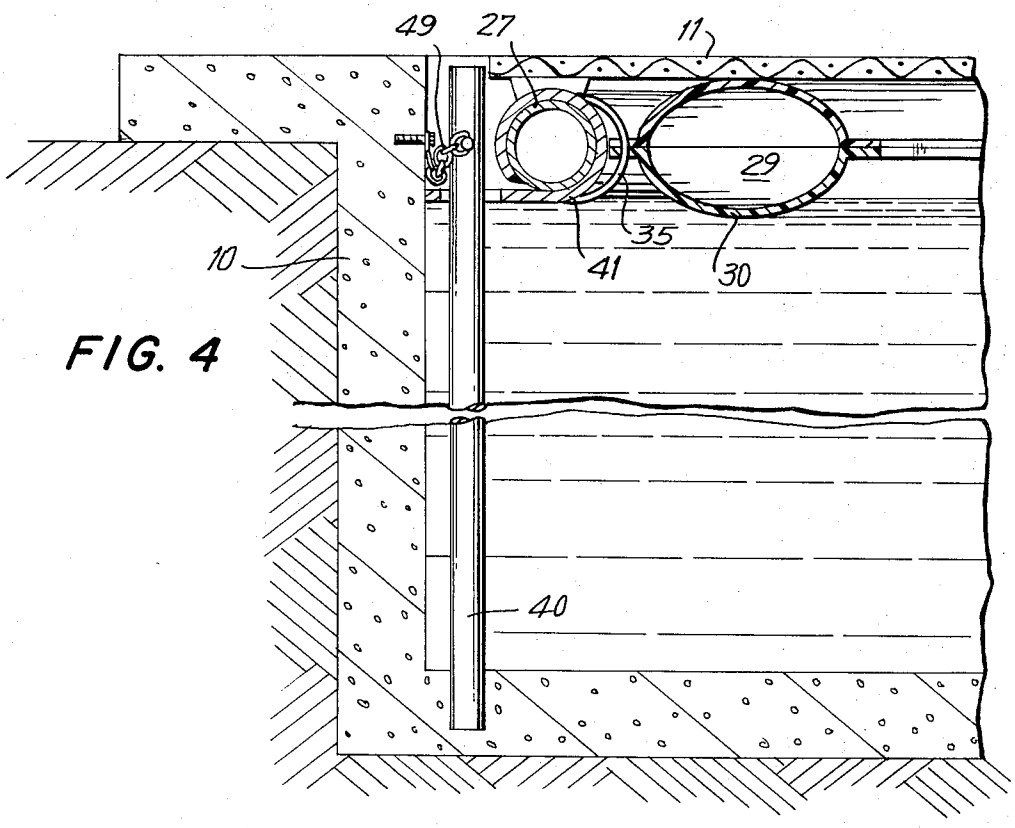


FIG. 4

FIG. 5

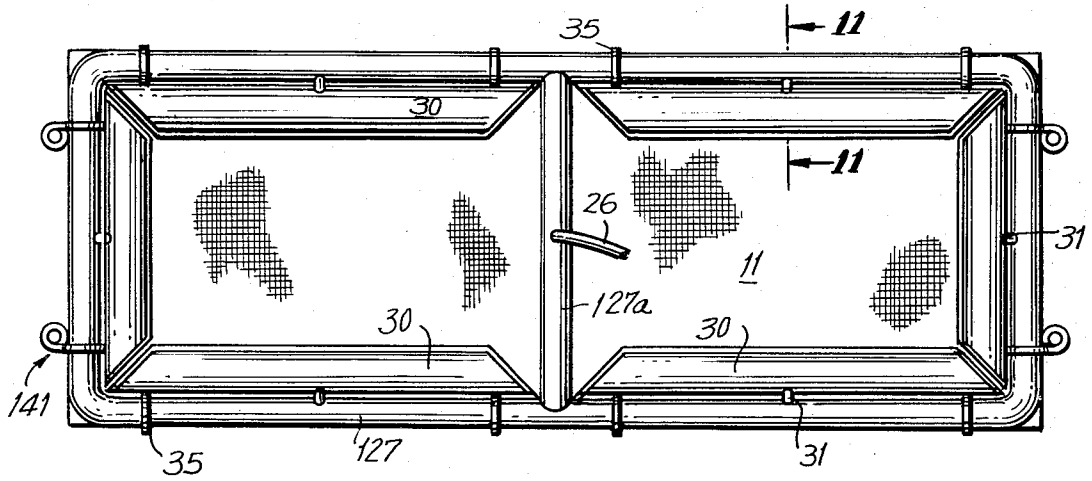


FIG. 6

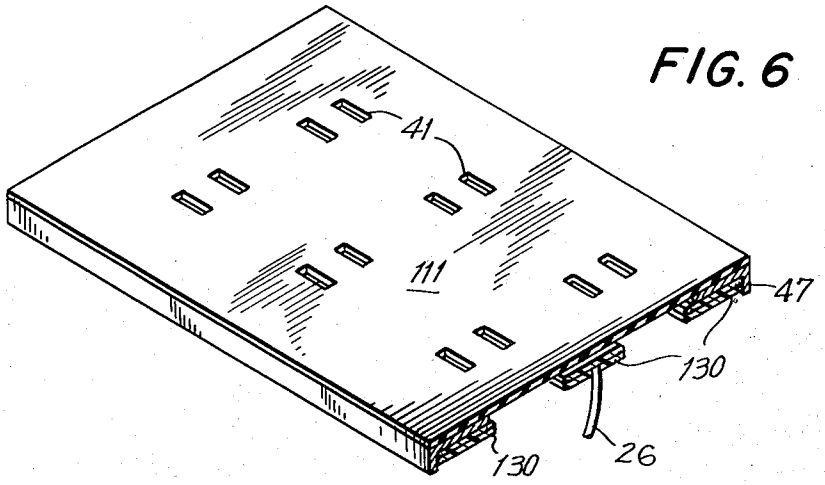


FIG. 7

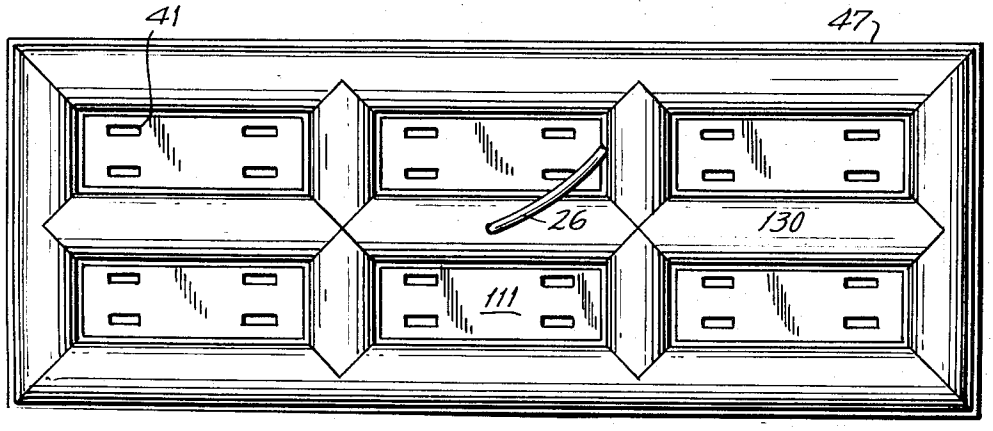


FIG. 8

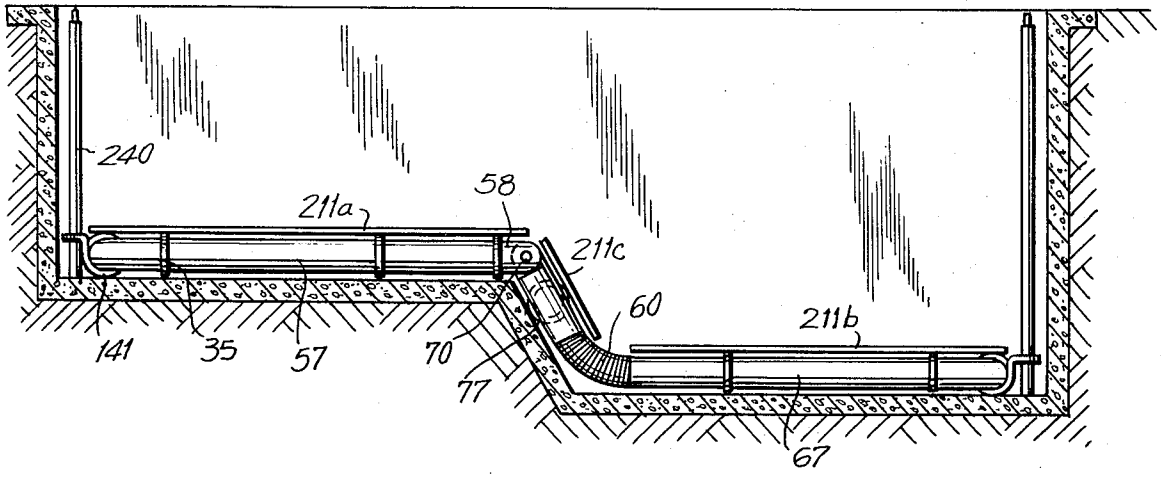


FIG. 9

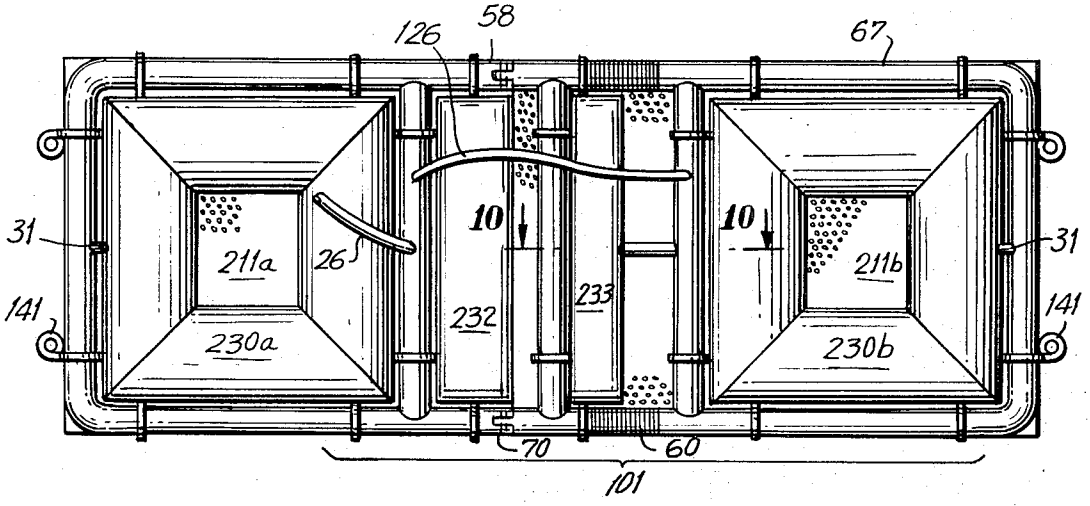


FIG. 10

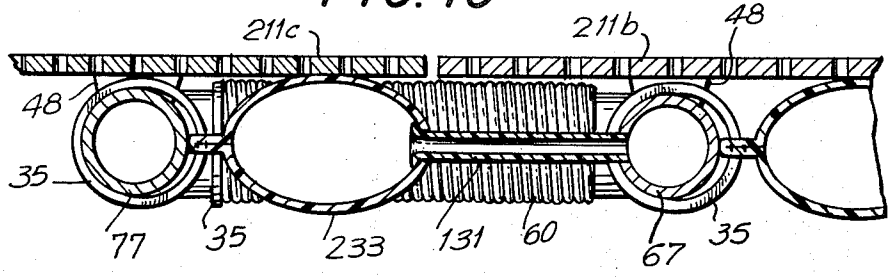


FIG. 11

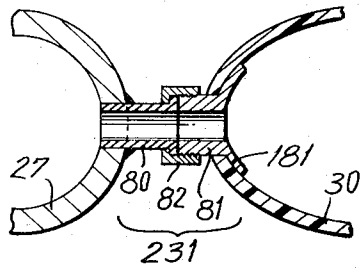


FIG. 12

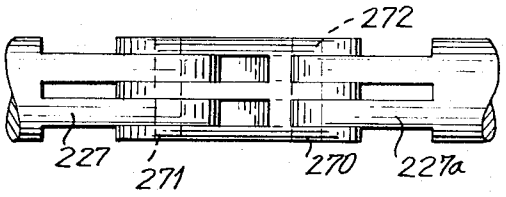


FIG. 13

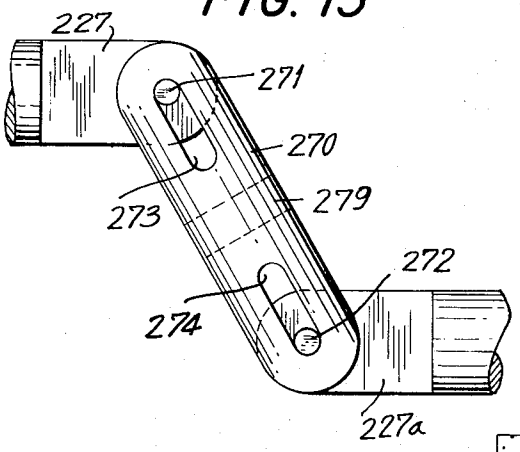


FIG. 14

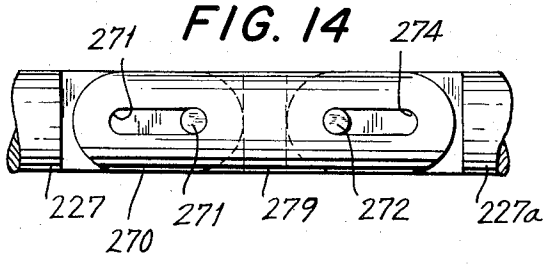


FIG. 15

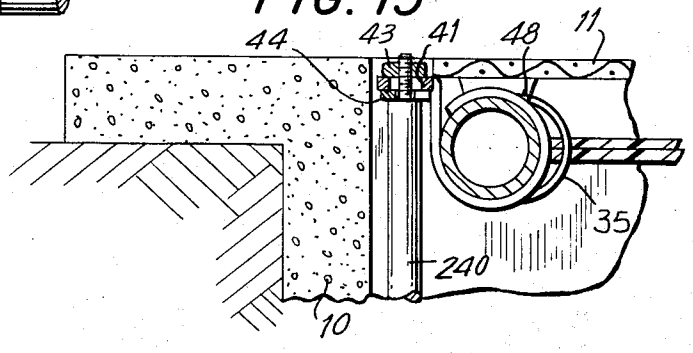
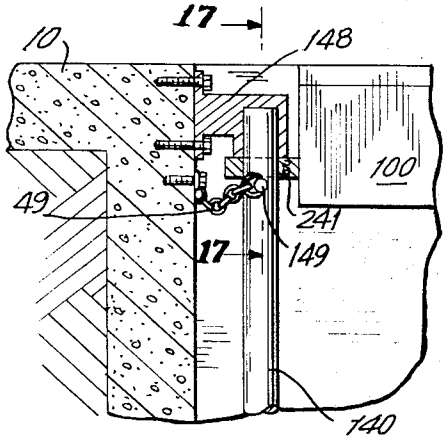


FIG. 16



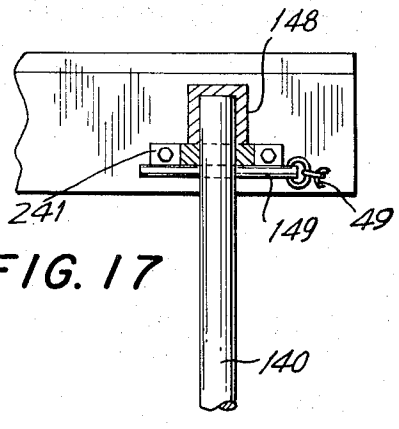


FIG. 17

FLOATABLE SAFETY COVER FOR SWIMMING POOLS

BACKGROUND OF THE INVENTION

The invention relates to pool covers whose primary function is the prevention of accidents connected with unattended swimming pools, particularly those located in unfenced yards of residential areas.

Such pools, whose number has been growing at a steadily increasing rate, present an unfortunate attraction to persons, particularly children, at times when competent supervision is not available. Experience has shown that neither fences nor the commonly employed fabric pool covers can prevent access to such pools, or offer protection to those who accidentally stray into them.

Many inventions in the prior art employ platforms which normally rest on the bottom of the pool and are raised to the surface, or suspended above the surface, when it is desired to render the pool inaccessible. These inventions ahve proved to be too complicated, cumbersome, expensive, or too restricted in applicability, to find commercial success.

It is, therefore, the primary purpose of the instant invention to teach the construction of a safety pool cover for swimming pools simple in structure and adaptable to all manner of pools and all planform shapes and bottom configurations.

It is a further objective of the invention to teach operating and control means for a swimming pool safety cover whose working is readily undertaken by the average person and which provides warning of the approach of a potentially unsafe condition.

It is yet another objective of the invention to describe constructional details and materials which render the manufacture and installation of such safety pool covers economical.

SUMMARY

The above objectives are attained by providing a safety cover for pools in which the upper surface, or platform, is manufactured from a water-permeable sheet of sufficient rigidity to support the weight of the average adult and of a material not subject to deterioration in contact with water; perforated hardboard and expanded metal screen being examples of suitable materials.

The platform formed by the aforementioned sheet is mechanically supported on a frame of rigid tubing, serving as a continuous manifold, through which compressed air is distributed to the floatation members. These floatation members are constructed from vulcanized rubber sheet, or a similar impermeable and elastic membrane, made into pressure-retaining pillows by sealing the corresponding edges of two identical sections.

In plan view the platform is tailored to the shape of the particular pool to be protected with the support frame and the floatation bags underneath the platform. With the floatation members in the collapsed condition, the safety cover has a higher density than the water in the pool and will sink below the surface until it rests on the pool bottom. Should it be necessary, ballast will be provided to achieve negative buoyancy. The floatation members are so sized and distributed that upon inflation that platform acquires excess positive buoyancy and rises to the surface of the pool, and, in the latter position, is capable of supporting a predetermined weight without sinking.

The safety cover of the instant invention may be also modified to adapt to swimming pools having non-level bottoms, as will generally be the case in pools equipped with diving boards or with a wading section for children. In such cases, the platform is subdivided into the requisite number of sections, conforming to the substantially planar sections of the pool bottom, each of these sections being supported on its individual frame of tubular material. The several sections are jointed with flexible or rotatable elements to permit the safety cover to conform to the contours of the pool bottom in the submerged position and to assume a flat, continuous upper surface when floated.

Inflation of the floatation members is preferably by means of compressed atmospheric air provided by a compressor mounted near the pool and discharging, through a non-return valve, into a plenum chamber. The tubular framework of the safety cover, serving as the air distribution manifold, is connected to the plenum and to a relief valve, for releasing the air from the floatation pillows when the cover is to be submerged. A pressure-sensing alarm system may be provided at the plenum to give an audible or visible danger signal should the pressure level drop to a point at which the excess buoyancy of the safety cover becomes inadequate for its life-saving purpose. Control devices may also be provided to restart the compressor and reestablish the desired buoyancy automatically.

To prevent excessive list of the pool cover, as well as to reduce mechanical friction and to prevent damage to the pool walls, it is desirable that the safety cover be provided with guide rods on which bushings attached to the frame ride as the cover travels from the operative, or floating, to the inoperative, or submerged, position or vice versa. The guide rods also permit the provision of simple and sturdy means for anchoring the safety cover in the floating position; providing additional safety when the pool is to be left unattended or unused, in winter for example, for any length of time.

Other features and further advantages of the invention will become apparent with reference to the description of the preferred embodiment illustrated on the accompanying drawings.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS:

In the accompanying drawings:

FIG. 1 is a perspective view of a rectangular swimming pool fitted with a safety pool cover of the instant invention;

FIG. 2 is a plan view of the inflation and control chassis of the embodiment of FIG. 1;

FIG. 3 is a sectioned view of the pool and cover of FIG. 1, taken along section line 3—3;

FIG. 4 is a sectional detail of the arrangement of guides and securing means of the safety cover, taken along section line 4—4 of FIG. 1;

FIG. 4 is a base view of a pool cover similar to that illustrated in FIG. 1;

FIGS. 6 and 7 are partially sectioned perspective and base views, respectively, of another embodiment of the safety pool cover, incorporating a pierced rigid platform;

FIG. 8 is a sectioned elevation of a swimming pool with a two-level bottom, showing an articulated safety pool cover of the instant invention in the fully submerged position;

FIG. 9 is a base view of the pool cover of FIG. 8, in the deployed position;

FIG. 10 is a partial section through the cover of FIG. 8, taken along section line 10—10 of FIG. 9;

FIG. 11 is a detail showing the interconnection of the air distribution manifold and a floatation member;

FIGS. 12, 13 and 14 are views of an alternative articulated joint for use in sectioned safety pool covers;

FIGS. 15, 16 and 17 are details indicating alternative embodiments of anchor means for locking the pool cover to the guide rods; and

FIG. 18 is a section through a manual pressure release valve employed in the control system of the safety pool cover.

DESCRIPTION OF THE PREFERRED EMBODIMENT:

In the perspective view of FIG. 1 a safety cover 1 is shown covering the water surface in a rectangular swimming pool 10. The pool 10 is of poured concrete construction and is of the type normally installed with its perimeter 9 flush with the ground. The pool cover is operated by means of compressed air and control chassis 20 is provided, connected to the pool by means of conduit 26.

The control chassis 20 incorporates an air compressor 21, with its drive motor 22 and control switch 23, a plenum chamber 25, receiving air from the compressor 21 by means of hose 24, manual release valve 90, and a pressure sensitive alarm 28. For greater convenience and safety the chassis 20 may be located at some distance from the pool. The relative arrangement of its components is shown in the plan view of FIG. 2.

The alarm 28 is set by the advance of a cam 72 bearing on push-button 74; the cam 72 being borne of the piston-rod of a pneumatic cylinder 71 subjected to plenum pressure. Should a leak, or unauthorized actuation of the release valve 90, cause a reduction in air pressure in the plenum 25, the cam 72 retracts under the influence of a return-spring 73 and sets off the alarm. The alarm may be an audible whistle, a flashing light, or a remote indicator.

FIG. 3 is a transverse section, taken along line 3—3 of FIG. 1, of the pool 10 and its safety cover with support platform 11, frame 27, floatation members 30 and guide rods 40. The conduit terminates, inside the pool, in a flexible section 26*a* communicating with the tubular frame 27 through which the air is distributed to the floatation pillows 30 and on which the platform 11 rests.

The vertical guide bars 40 are embedded in the base of the pool, near its side-walls, and co-operative with bearings 41 in restricing the pool cover to travel along a vertical path without touching the pool. Each bearing 41 is formed by piercing a circular hole through a length of metallic strap and wrapping the end furthest from the hole around a section of the support frame 27. Rigid alignment between the bearing 41 and frame 27 is assured by welding or cementing the two together.

The floatation members 30 are constructed from rubber sheet, in the manner of 'layflat' tubing, by superimposing two sheets similar in size and shape and cementing their edges into an air-tight seam. By means of this construction a self-collapsing tendency is imparted to the floatation pillows; i.e., upon opening the release valve 90 to the atmosphere the component sheets of the member 30 relax into close contact with one-another, thereby expelling the initially contained air. This feature assures the maximum possible differential buoyancy for the floatation members between their inflated and deflated conditions.

The floatation members are secured to the frame by flexible straps 35, suitably of rubber or plastic, as shown in FIG. 3. These straps encompass the frame tubes 27 and pass through, or clamp on, the seams of the floatation members 30 adjoining the frame. When slack, the floatation members 30 are trapped in the space formed by the frame 27, the platform 11 and the bottom of the pool; in the inflated condition they transfer their excess buoyancy to the platform by bearing against it from below.

FIG. 5 illustrates, in base view, a pool safety cover for a rectangular basin, incorporating a platform 11 similar to the equivalent element shown in FIGS. 3 and 4. The platform is supported on a frame 127 comprising a continuous, tubular member conforming to the inside perimeter of the pool, braced by a centrally located tube 127*a*, into which the compressed-air supply hose 26 is led. The frame 127 interconnects the floatation members 30, six in number, each of which is supplied with air via a nozzle 31.

The guide bars 40 employed in conjunction with the pool cover are engaged by bearing members 141, formed by contouring a section of metal bar into a pair of adjoining rings in planes rotated 90° relative one to another; one of these rings engaging the tubular frame 127 in secure frictional bond, the other providing a loose fit over the diameter of the guide bar 40.

A modified safety pool cover shown in FIGS. 6 and 7 employs a substantially rigid platform 111 provided with a plurality of apertures or passageways 41 for permitting the flow of water therethrough. The floatation members 130 are of the type disclosed in connection with FIGS. 1–5 and same are suitably connected to the conduit 26 for receiving air from a compressor. Such members 130 are fixedly secured in a suitable manner to the bottom of the platform 111 and extend along the peripheral edge 47. If necessary, depending on the platform's weight, additional floatation members 130 may also be provided centrally of the perepheral edge 47 and extend longitudinally and/or transversely of the platform 111. These members may be suitably interconnected with the peripheral floatation members or have other conduit means for transferring air to and from said members.

Another embodiment of the invention, specifically adapted to the protection of pools with increased depth over a portion of their area, is illustrated in FIGS. 8, 9 and 10. Such pools are commonly employed to provide a shallow wading section for children, or, alternately, when a diving board is fitted and it is necessary to provide a depth greater than normal for safe use by divers. In either case one section of the pool bottom lies at a lower elevation than the other and the submerged pool cover must conform, lest it obviate the purpose for which the step in the pool had originally been provided. Yet the pool cover must, upon inflation of its flotation members, be capable of rising into the surface of the pool as a flat horizontal platform.

The pool safety cover **101**, adapted to such use, comprises two separate platforms, **211**a and **211**b, supported on their frames **57** and **67** and interconnected by hinged platform segment **211**c, with its own frame **77** overlying the region of transition between the deeper and shallower portions of the pool. The frames **57** and **77** are hinged at a pivot **70**, while the frame **67** attaches to the frame **77** by means of springs **60**, which not only permit relative rotation but take up the differential between the submerged and deployed lengths of the pool cover.

The decking from which the platforms **211** are constructed is a perforated rigid sheet, the frames **57** and **67** are tubular and perform the function of air manifolds; frame **57** being interconnected with the air plenum **25** via conduit **26**, while air flow to, and from, the frame **67** is through the conduit **126** and frame **57**. Four floatation members are provided; **230***a* and **230***b* support, respectively, the platforms **211***a* and **211***b*, an additional floatation member **232** accepts the weight of the outboard extensions **58** of the frame **57** and a similar member **233** supports the frame **77** and its deck **211***c*.

FIG. **10** shows some of the detailsof the spring joint between frames **67** and **77**, including the nozzle **131** through which air is supplied to the floatation bag **233** from frame **67** and the support brackets **48** on which the platforms **211** are secured in rigid relationship with their supporting frames.

FIG. **9** shows the safety cover **101**, from its lower surface and in the deployed position, with the perimeter tubes of the three sub-frames aligned and the spring **60** compressed; FIG. **10** is taken along section line **10—10** of this view.

The detailed construction of a nozzle **231**, for supplying air to a floatation member **30**, is illustrated in FIG. **11**. The nozzle constructed in the manner of a union, with a flanged, tubular member **80** secured into a hole drilled in frame-tube **27** by cement or solder, a nut **82** entrapped on member **80**; a second member **81** being cemented to floatation pillow **30** at an integral flange **181**. The outer diameter of the member **81** is threaded to receive the nut **82**, which, upon tightening, brings the ends of members **80** and **81** into leak-tight engagement, thereby completing the conduit nozzle **231**.

An alternative structure for accomplishing the simultaneous rotational and axial relative motions of a multiple-platform pool cover is illustrated in FIG. **13**. A hinge-link **270** is shown, in the form of a triple-bladed yoke with a central spine **279**. Slots **273** and **274** are milled into the blades of the link **270** at either end to accept pins **271** and **272** located in tines at the ends of sub-frames **227** and **227***a*. The sub-frames are shown in the positions they would assume resting upon the bottom of a pool with dual depth. FIG. **12** is a plan view of the flexible connection of FIG. **13**; FIG. **14** is another sideview of the same mechanism, representing the floating position of the pool cover, with the sub-frames **227** and **227***a* in horizontal alignment with each other and the link **270**.

FIG. **15** is a sectional view of a pool cover of the invention in the floating, or deployed, position. It illustrates the manner in which such a cover may be secured to the upper ends of guide rods **240**. The locking of the pool cover in the deployed position is particularly useful on occasions when the pool is to be left unattended for a long period of time and it is desired to prevent the accidental, or deliberate, sinking of the cover. The guide rods **240** are provided with shoulders and threaded extensions of a smaller diameter, with nuts **43** engaging the threaded portion. When the pool cover floats into the deployed position, with its platform **11** substantially level with the edge of the pool, its guide bearings **41** are arranged to ride on the threaded extensions of the guide rods, permitting a C-washer **44** to be interposed between the shoulder of each guide rod and the lower surface of the corresponding bearing **41**, thereby preventing the latter from moving downward. The lock is secured by tightening the nut against the upper surface of the bearing, trapping the washer **44** between the bearing and the guide rod.

Another anchoring device incorporates the structure illustrated on FIGS. **16** and **17**. The guide rod **140** is provided with a cap **148** attached to the pool wall. The cap **148** limits the upward motion of the pool cover **100**. The pool cover may be locked in the upmost position by inserting locking pin **149**, located at hand by means of chain **49**, through a mating hole drilled into the guide rod **140**.

FIG. **18** illustrates an alternative embodiment of the release, that component of the control chassis **20** which permits the discharge of compressed air from the floatation chambers of the pool cover and causes the pool cover to sink into the inactive position.

A valve-body **99** is provided with a nozzle **98**, communicating with the plenum chamber **25**, and another nozzle **91**, open to the atmosphere. An orifice-plate **92** is interposed between these nozzles and is normally covered by a seal-plate **93** mounted on stem **94**. The stem **94** is biased, by a spring **95**, to maintain tight contact between the seal-plate and the orifice-plate. A handle **96** is hinged to the body **99** in such a manner that depressing the handle causes the stem **94** to move further into the body of the valve, thereby uncovering the perforations in the orifice-plate **92** and placing the intake and discharge nozzles, **98** and **91** respectively, into communication with one another. This permits the compressed air in the plenum **25**, and in the floatation members connected therewith through conduit **26**, to escape. As long as the handle **96** is held in the depressed position, the buoyancy of the pool cover will be continuously reduced, until the pool cover sinks below the surface of the water in the pool and settles to the bottom; the reduction in buoyant volume being aided by the self-collapsing feature of the floatation members themselves.

While the pools shown in the drawings are of masonry construction and rectangular in plan, the safety pool cover of the invention is equally adaptable to above-ground pools, to pools of differing shapes, bottom configurations, and constructions without departing from the teachings set forth herein. Similarly buoyancy may be provided by gases other than air and the inflating pressure may be derived from pre-compressed volumes of gas commercially available in high-pressure cylinders.

Other modifications of details of construction and of materials from those set forth above may also suggest themselves to one skilled in the art, once exposed to the foregoing disclosure.

What is claimed is:

1. A safety device for swimming pools, comprising:

a platform, substantially conforming to the water surface of said pool;

a rigid, tubular frame for supporting said platform;
buoyancy means, including at least one floatation bag fabricated from impermeable, elastic sheet material, secured to the underside of said platform;
gas compression means;
conduit means, interconnecting said gas compression means and said buoyancy means;
control means, for governing the flow of compressed gas through said conduit means, whereby said floatation bags may be caused to expand and raise said platform to the surface of said liquid in said pool, thereby preventing access to the pool; and
release means communicating with said conduit means, for venting compressed gas retained in said floatation bags to the atmosphere; whereby said platform may be caused to sink to the bottom of the pool, thereby permitting access thereto.

2. The safety cover defined in claim **1**, wherein said conduit means include:
a plenum chamber for compressed gas;
first channel means interconnecting said gas compression means with said plenum chamber;
second channel means interconnecting said control means with said plenum chamber;
third channel means interconnecting said release means with said plenum chamber;
first nozzle means, for admission of compressed gas into said tubular frame;
second nozzle means interconnecting each of said flotation bags with said tubular frame; and
fourth channel means interconnecting said plenum with said first nozzle means.

3. The safety pool cover defined in claim **1**, in which said gas compression means include an air compressor and a plenum chamber for compressed air.

4. The safety pool cover defined in claim **1**, in which said control means include a valve in said conduit means.

5. The safety pool cover defined in claim **1**, in which said release means include a manually operated vent valve.

6. The safety pool cover defined in claim **3**, further comprising alarm means sensitive to the pressure level of gas retained in said bags, for providing a signal when said pressure level drops below a pre-determined value; thereby indicating a potentially unsafe condition of the pool cover.

7. The safety pool cover defined in claim **1**, further comprising a control chassis for supporting said gas compression means, said control means and said release means, thereby permitting said components to be located at some distance from the pool.

8. The safety pool cover defined in claim **1**, further comprising:
guide means, including at least four vertical guide bars within the water volume of said pool, extending from the bottom thereof to above the normal water level; said guide bars cooperating with
bearing means, secured to said tubular frame, in restraining the platform into substantially horizontal alignment during travel between the bottom of the pool and the water surface.

9. The safety pool cover defined in claim **8**, wherein said guide bars are cylindrical, elongated members and said bearing means comprise a pluralty of cylindrical bushings rigidly affixed to said frame, each of said bushings being adapted to slideably engage one of said guide bars.

10. The safety pool cover defined in claim **8**, further comprising anchor means, for securing said bearing means to said guide means with said platform at the upper limit of its travel; thereby preventing the platform from sinking to the bottom of the pool upon actuation of said release means, or accidental venting of pressurized gas from said floatation bags.

11. The safety pool cover defined in claim **1**, wherein said platform is fabricated from a rigid, foraminous sheet material.

12. The safety pool cover defined in claim **1**, wherein said platform is fabricated from expanded metal mesh.

13. A safety pool cover adapted to swimming pools provided with substantially vertical perimeter walls and a segmented bottom contour with at least two differing elevations, comprising:
sectioned platform means, including a plurality of abutting sections, substantially conforming to the shape of the water surface in said pool;
support means, including a rigid tubular frame for each of said sections;
a plurality of floatation bags fabricated from impermeable, elastic sheet material, at least one of said floatation bags secured to the underside of each of said sections;
gas compression means;
channel means, interconnecting said gas compression means with a particular one of said rigid, tubular frames;
conduit means, interconnecting the other tubular frames with said particular one;
nozzle means, interconnecting each of said floatation bags with a tubular frame;
link means, for permitting relative pivotal and spatial movement between abutting pairs of said sections;
control means, for governing flow of compressed gas into said channel means, whereby said floatation bags may be caused to expand and raise said platform means to the surface of said water in the pool with said abutting sections aligned; and
release means, communicating with said channel means, for venting compressed gas retained in said floatation bags, whereby said platform means may be caused to sink to the bottom of the pool with each of said abutting sections resting on a corresponding segment of said pool bottom; and the actuation of said control means and said release means, alternately, preventing and permitting access to the pool.

14. The safety pool cover defined in claim **13**, further comprising:
guide means, including at least four vertical guide bars within the water volume of said pool, extending from the bottom thereof to above the normal water level; said guide bars cooperating with
bearing means, secured to said platfrom means, in restraining the abutting sections into progressively horizontal alignment during travel from the bottom of the pool to the water surface.

15. A safety device for swimming pools, comprising:
a rigid platform, substantially conforming to the water surface of said pool;

buoyancy means, including at least one floatation bag fabricated from impermeable, elastic sheet material, secured to the underside of said platform;

gas compression means;

conduit means, interconnecting said gas compression means and said buoyancy means;

control means, for governing the flow of compressed gas through said conduit means, whereby said floatation bags may be caused to expand and raise said platform to the surface of said liquid in said pool, thereby preventing access to the pool; and

release means communicating with said conduit means, for venting compressed gas retained in said floatation bags to the atomosphere; whereby said platform may be caused to sink to the bottom of the pool, thereby permitting access thereto.

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