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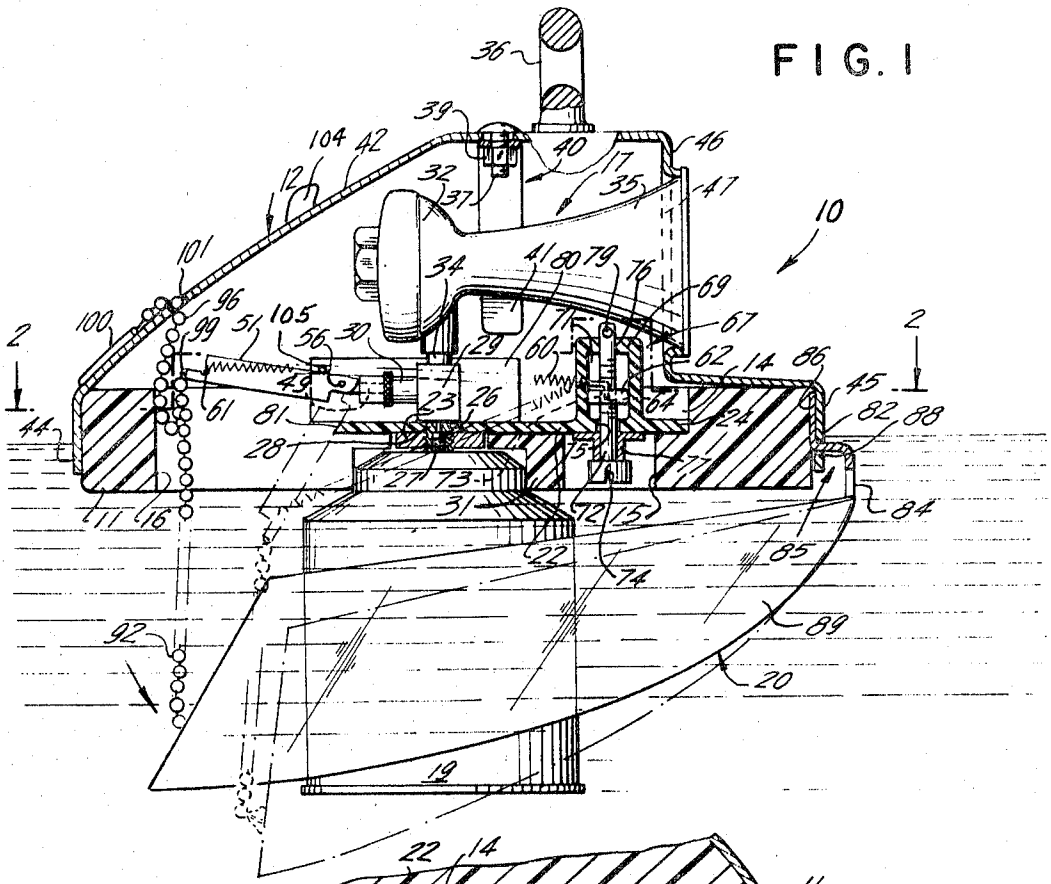
Sept. 23, 1969 L. P. TETRAULT 3,468,283

POOL ALARM

116-67

Filed May 3, 1967 2 Sheets-Sheet 1

FIG. 1



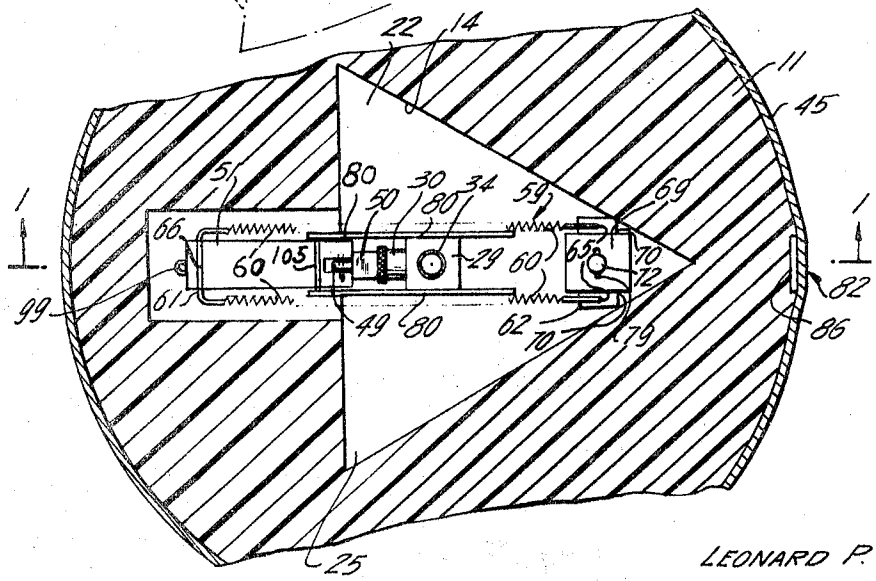




FIG. 2

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POOL ALARM

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FIG. 3

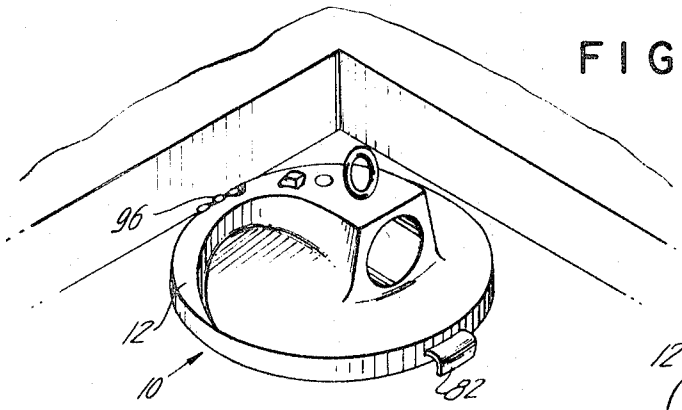
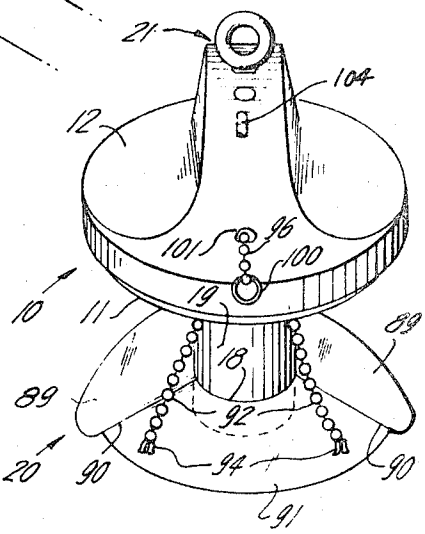



FIG. 4



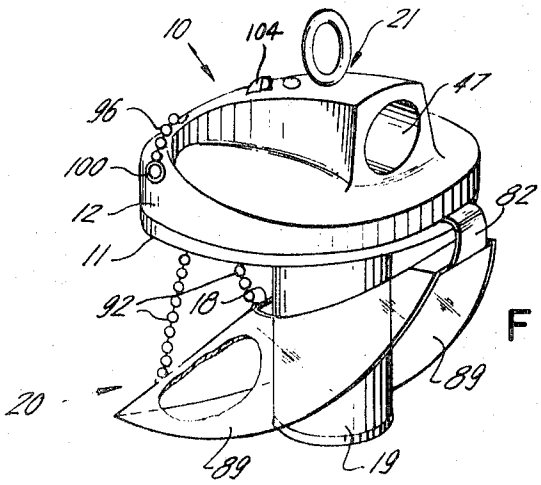
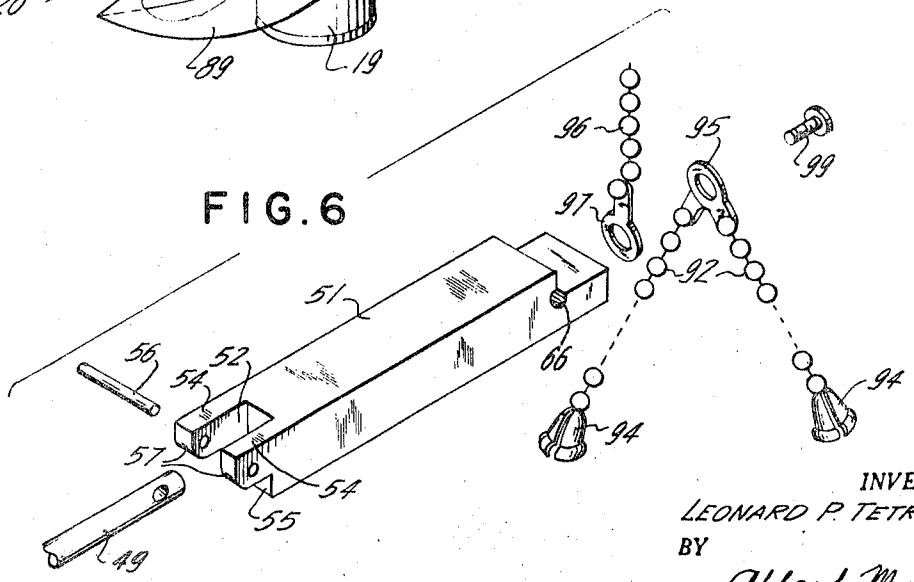




FIG. 5

FIG. 6




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United States Patent Office 3,468,283
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3,468,283

# POOL ALARM

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Int. Cl. G08b 3/02, 3/06
U.S. Cl. 116—67 14 Claims

## ABSTRACT OF THE DISCLOSURE

The pool alarm of the invention comprises a buoyant body adapted to float on the surface of the water in the pool, there being a vane member, which is immersed in the water, having a broad generally horizontal surface connected to and supported by the body. The vane member, because of the water above it, tends to remain behind when the buoyant body rises either as a whole or locally as a result of a disturbance in the water. Means is provided on the alarm to detect relative movement between the body and the vane member, such means operating a signal means which is preferably mounted on the alarm. In the illustrative embodiment the signal means is gas-powered, and when energized remains in operation until reset.

## BACKGROUND OF THE INVENTION

### Field of the invention

The invention relates to an alarm or signalling device which emits a signal or warning upon a disturbance in a pool of liquid such as a swimming pool.

### Description of the prior art

Prior pool alarms are shown in the patents to Gerber, No. 2,896,038, July 21, 1959; Northey, No. 2,935,582, May 3 1960; and in the pending application of Nelson et al., Ser. No. 525,008, filed Jan. 10, 1966, which is assigned to the same assignee as the present application. The device of Gerber floats on top of the pool and operates by establishing a conductive path between electrodes of the water of the pool. The system of Northey employs a housing fixed with respect to the pool, such housing having a pair of compartments into and out of one of which water passes more rapidly than into and out of the other. The signal of the Northey device is operated by a diaphragm between the compartments, such diaphragm being movable by a pressure difference in the compartments. The alarm device shown in the Nelson et al. application employs a diaphragm which spans a chamber in pressure communicating relationship with a body of air confined above the surface of a portion of the liquid in the pool. Distortion of such diaphragm by changes in pressure in the air which is trapped in the chamber caused by disturbances of the liquid in the pool closes contacts in an electrical circuit for energizing an electric signalling device.

The devices of Gerber and Nelson et al. employ electrically operated signalling devices with supply circuits and switches therefor and thus are prone to failure by reason of current leakages and short circuits caused by moisture in the air, by the water of the pool, or by rain water. The signalling device of Northey operates for only a short time, and then only at the height of the disturbance in the pool. The signal emitted by such device may, therefore, escape the notice of persons other than those in the immediate vicinity of the pool.



## SUMMARY OF THE INVENTION

The alarm device of the invention includes a buoyant body adapted to float on the surface of the water in the pool, such body carrying a signal means and means responsive to disturbances in the water to operate the signal means. In the illustrative preferred embodiment of the invention the pool alarm employs an air or gas operated horn carried by the buoyant body as the signal means. The means for powering such horn is preferably "Freon," which is contained in liquified form in a pressure can partially submerged in the water of the pool so that such water acts as a heat sink to supply heat to the container to counteract its cooling upon the discharge of its contents in expanded, gaseous form.

The means for detecting disturbances in the water of the pool is in the form of a broad, preferably somewhat flexible vane which is supported upon the buoyant body, is immersed in the water, and is preferably disposed generally therebelow. The vane is so constructed as to be generally movable as a whole with respect to the buoyant body, and preferably has a specific gravity close to that of water, so as substantially to nullify the effect of the inertia of the vane itself in the operation of the alarm. The vane is self-sustaining but is thin. When the buoyant body rises as a whole or locally during tipping, all or part of the vane tends to remain behind, that is, at a fixed position in the water. Means is provided connecting the vane to the signal means so as to operate the signal means upon a predetermined degree of movement of the vane as a whole downwardly with respect to the buoyant body.

The illustrative pool alarm is so constructed that when once energized the signal means remains operative until either the source of gas pressure is exhausted or the signal means is shut off by a reset mechanism. After the alarm device has been reset, the alarm device is ready for further operation, assuming that a substantial amount of gas remains in the gas container.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a view partially in longitudinal axial section and partially in side elevation of the illustrative embodiment of pool alarm in accordance with the invention, the operating lever for the signalling device of the alarm being shown in solid lines in its cocked position and in phantom lines in the position in which it operates the alarm device, the section being taken along the line 1—1 of FIG. 2 looking in the direction of the arrows;

FIG. 2 is a view partially in plan and partially in horizontal section through the pool alarm of FIG. 1, the section being taken along the broken section line 2—2 of FIG. 1;

FIG. 3 is a view in perspective of the pool alarm floating in a swimming pool which is fragmentarily shown;

FIG. 4 is a view in top rear perspective of the pool alarm;

FIG. 5 is a view in perspective of the pool alarm, the view being taken from somewhat above the alarm and to one side of the front end thereof; and

FIG. 6 is a view in perspective of the operating lever for the signalling device, portions of the chains connecting the lever to the alarm operating vane or sail and to the lid of the pool alarm, and a portion of the operating plunger for the valve of the alarm device being shown somewhat schematically in exploded relationship with such lever.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawings, the illustrative embodiment of pool alarm is designated generally by the reference character **10**. Such pool alarm has a buoyant body **11** in the form of a molded piece of molded foamed polystyrene, and a removable downwardly concave lid **12** which tightly covers the main extent of the body **11**. Body **11** is provided with a shallow recess **14** shaped to accept a mounting plate **22** for the signalling device. Body **11** has a laterally centrally located vertical opening **15** adjacent the front thereof and a central vertical longitudinally extending slot **16** adjacent the rear thereof. The signalling device of the alarm, which is generally designated **17**, is mounted upon the plate **22** which, as above noted, fits within the shallow recess **14** in the body **11**. It will be seen that the shape of plate **22** and recess **14** is such as to prevent rotation of plate **22** with respect to the body **11**. In the illustrative embodiment the plate and recess are triangular in shape, the plate **22** having an apex **24** and a base **25**.

The signalling device **17** is powered by compressed gas from a container or can **19** which is secured to and depends from the plate **22** in a manner to be described. The disturbance detecting means is in the form of a generally annular vane **20** which is secured centrally to the forward edge of the body **11**, the vane having a central hole **18** best shown in FIG. 1, through which the lower end of the can **19** freely protrudes so that the can is partially immersed in the water of the pool.

The base plate **22** is provided with a generally central hole **26** therethrough to receive therethrough the short externally and internally threaded end portion **28** of housing **29** of valve **30**. Valve **30** is held in position on base plate **22** by a lock nut **23** on the external threads of end portion **28** of valve **30** and tightly engaging the lower surface of base plate **22**. Nipple **27** of container **19** is threaded into the internally threaded opening of end **28** of valve **30** in order to secure container **19** to valve **30** for operation of the signalling device **17**. The upper end of the can **19** fits snugly within the forward vertical opening **15** in the body **11**. By screwing the can **19** and thus the nipple **27** upwardly into end **28** of the casing **29** of the valve **30**, the contents of the container **19** are opened to the valve **30** and sealed against leakage to atmosphere by a mechanism within the end **28** of valve **30**; such screw connection also securely attaches the container **19** to base plate **22**.

The signalling device **17** is in the form of an air or gas horn having a main body **32** which is connected to the upper portion of the valve housing **29** by a second threaded nipple **34**. The signalling device has a main forwardly flared horn portion **35**, the forward end of which communicates with an opening **47** through the lid **12**. The lid **12** is held in such position by a clip device **40**, to be described, and by virtue of fitting tightly over the outside diameter of buoyant body **11**. Clip device **40** includes a threaded stud **37** which extends downwardly through an opening in the lid **12** and is retained in place by a nut **39**. Such nut also secures a downwardly extending spring clip device **40** to the stud. The clip device **40** has opposed symmetrical oppositely bent depending spaced fingers **41** which are adapted to be sprung downwardly over the root of the flared horn portion **35** of the signalling device, as shown in FIG. 1, thereby securely but releasably to retain the lid in position on the body **11** of the alarm device.

As indicated at **21** in FIGS. 4 and 5 a handle for lifting the alarm out of the water is provided by the lifting ring **36** secured to the lid **12**.

The top wall **42** of the lid **12** slants downwardly toward the rear where it is connected to a vertical skirt **44** which overlies the rear surface of the body **11** of the alarm device. At its forward end the wall **42** is disposed generally horizontal and is joined to a forward vertical wall **46** having a large hole **47** therethrough aligned with the mouth of the horn portion **35**.



The valve **30** of the alarm device, which is of conventional construction, has a central plunger pin **49** extending horizontally rearwardly from the casing **29** of the valve **30**. The valve **30** is of such construction that the valve is closed when the plunger pin **49** is in its normal, forward position and the valve is open when the pin is pulled to be displaced rearwardly relative to the casing **29** of the valve. Surrounding the outer end portion of the plunger pin **49** is a fixed sleeve **50** secured to the casing **29** of the valve **30**.

A generally horizontally extending toggle bar **51** as shown in FIG. 6 is provided with a vertical central slot **52** in the forward end thereof, such slot freely receiving the outer end of the pin **49** between the thus formed spaced ears **54**. The bar **51** is pivotally secured to the outer end of the plunger pin **49** by a pivot pin **56** which extends in that order through a first ear **54** on bar **51**, the plunger pin and the second ear **54**. The ears **54** have somewhat less vertical thickness than the height of the bar **51**, the lower surfaces of the ears **54** being formed by a 90° cut **55** in the lower forward edge of the bar **51**.

The forward lower corners of the ears **54** are identical and are made in the form of cams **57** which bear upon respective diametrically opposed outer end portions of the sleeve **50** projecting rearwardly from the body **29** of the valve **30**. The configuration of the cams **57** is such that when the bar **51** lies horizontnally or somewhat above the horizontal, as shown in FIG. 1, the plunger pin **49** is in its forward position and the valve **30** is closed, and that when the bar **51** is pivoted downwardly appreciably, the plunger pin **49** is pulled rearwardly and the valve **30** is opened.

To provide for such operation of the bar **51** by the water disturbance-responsive vane **20**, there is provided a cocking means comprising a toggle device of which the bar **51** forms one arm. The other arm of the toggle device is formed by a composite spring device **59** which has two spaced parallel coil tension spring portions **60** joined by a cross portion or bar **61**. The cross bar **61** of the composite spring device is stably received within a transversely extending seat **66** in the bar **51** adjacent the rear end thereof. The forward ends of the two legs of the composite spring device **59** are provided with downwardly bent tangs **64**, such tangs being received within vertically extending holes **65** adjacent the ends of a cross bar **62**. Bar **62** is adjustable vertically relative to the plate **22**, in a manner to be described, and thus with respect to the pivot pin **56**, whereby to permit the adjustment of the sensitivity of the toggle device.

The ends of cross bar **62** extend through the end walls of a bridge **67** which rises above the main extent of the plate **22** and is preferably molded integrally therewith. The bridge **67** has an upper broad portion **69** which is attached to the plate **22** by opposite spaced parallel end walls **70**. The end walls **70** have aligned rectangular apertures **71** therethrough to receive the ends of the bar **62** and to permit its vertical adjustment throughout a substantial range of travel. A vertically disposed adjusting screw **72** extends freely through a hole **75** in plate **22** and a hole **76** in portion **69** of the bridge **67**. The screw **72** is threadedly mounted in a threaded central hole **73** in the bar **62**, the enlarged head **74** of the the screw **72** being disposed beneath the plate **22**, as shown in FIG. 1. The head **74** of the screw **72** is slotted, as shown, and is exposed within opening **15** in body **11** for adjustment as by a screwdriver. The screw **72** is retained against substantial upward vertical movement by a spacer sleeve **77** which is telescoped thereover and is disposed between the bottom surface of the plate **22** and the head **74** of the screw, and against downward movement by a cross pin **79** which extends through the upper end of the screw at a location above the upper portion **69** of the bridge **67**.

It will be apparent that when the bar **62** is adjusted vertically to the position shown in FIG. 1, the spring portions **60** of the composite spring device **59** have their forward end portions located slightly above the pivot pin **56**. The spring portions **60**, therefore, exert a component of force upon the bar **51** which tends to rotate it clockwise as it is shown in FIG. 1. When the bar **51** is subjected to a counterclockwise force, as by a downward pull upon the rear end thereof, the spring action of the device **59** is overcome, the bar **51** then swings through dead center, and thereafter assumes a lowered stable position in which the cams **57** pull the plunger **49** into its rear terminal position, thereby fully opening the valve **30**. To avoid the jamming of the cams **57** against the sleeve **50**, the rear edge of the plate **22** is provided centrally thereof with a bevelled stop surface **81** which is engaged by the lower surface of the bar **51** when the latter is in its lowermost position. The plate **22** is provided with spaced parallel longitudinally extending upstanding wings **80** which are disposed inwardly of the respective legs **60** of the spring **59**. The wings **80** extend rearwardly somewhat beyond the rear edge of the plate **22**.

In the embodiment shown the casing **29** of valve **30** is square in horizontal section. The wings **80** are spaced apart a distance which slightly exceeds the width of the casing **29**, so that the wings prevent the rotation of the valve and horn after they have been assembled on the plate **22**. The bar **51**, which is rectangular in cross section, has a width which is slightly less than the distance between the wings **80**, whereby the wings guide the bar in its oscillation in a vertical plane, and prevent the turning of the bar about its longitudinal axis.

The vane **20** is attached centrally to the body **11** of the alarm device at the forward end thereof by a connecting means which is generally designated **82**. Means **82** includes a vertically extending relatively narrow laterally central upstanding arm portion **84** on the vane, such arm being bent rearwardly and then upwardly at **85**, terminating at an upwardly projecting tang **86**. Such arm portion of the vane extends inwardly through a hole **88** in the forward edge portion **45** of the lid or cover **12** so that the upstanding tang **86** of the vane is gripped between the inner surface of portion **45** of the lid and the forward surface of the body **11**.

The main portion of the vane **20** slants downwardly at a relatively small angle from the forward edge to the rear edge thereof, the forward main portion of the vane being slightly curved at **89** from the central arm **84** rearwardly to two generally oppositely extending shallow radial folds **90** as shown in FIGS. 4 and 6 in the vane. The portion **91** of the vane rearwardly of the folds **90** is generally of flat, sector shape. Symmetrically secured to portion **91** of the vane adjacent the rear edge thereof and to the rear of folds **90** are two angularly disposed runs **92** of a flexible tension sustaining member such as a bead chain, which exerts substantially no opposing force when it is subjected to compression. Thus any upward movement of the vane is not transmitted by the runs **92** of the flexible member, and unwanted closing of the valve **30** by the vane is avoided.

The runs **92** of the bead chain are secured at their lower ends to fittings **94** secured to the portion **91** of the vane, the runs **92** of the bead chain extending upwardly symmetrically in an inverted V relationship to a fitting **95** by which such runs are secured to the rear end of the bar **51**. Also secured to the rear end of the bar **51** is the lower end of an upper run of a flexible member **96**, which is likewise shown as being a bead chain. A fitting **97** on the lower end of chain **96** and the above-mentioned fitting **95** have ring portions through which a machine screw **99** screwed into the bar **51** extends. The upper end of the upper bead chain **96** is provided with a pull ring **100** which when extended lies somewhat above the lid **12** at the location of a hole **101** therethrough through which chain **96** extends freely.



The bar **51** may be pulled upwardly into the valve-closed position of FIG. 1 by pulling ring **100** upwardly, thereby pulling the chain **96** upwardly through hole **101**. The bar **51** may be locked in such valve-closed position by hooking the pull ring **100** over a fixed upstanding projection **104** which, in the embodiment shown, is formed integrally with the lid or cover **12** of the alarm device. The pool alarm is rendered operative by releasing ring **100** from projection **104**, whereby the bar **51** is then free to pivot downwardly from its valve-closed position into the valve-open position shown in phantom lines in FIG. 1.

In the device shown, there is provided a positive stop to prevent movement of the bar **51** upwardly past its valve-closed position. Such positive stop is in the form of a cross pin **105** which extends between the wings **80** at their rear upper corners. The bar **51** engages the pin **105** when the bar is disposed in the full line position thereof shown in FIG. 1, thereby preventing any possible reverse camming effect between cams **57** and the rear end surface of sleeve **50** and the opening of the valve **30** to bleed off the gaseous contents of container **19**.

The illustrative pool alarm is substantially equally sensitive to disturbances in the water of the pool which occur either immediately in the vicinity of the alarm or are spaced therefrom in any direction. Any disturbance in the water of the pool which causes the alarm device to rise as a whole with reference to the water will produce a substantial downwardly directed force upon the vane **20** and thus upon one or both of the lower runs **92** of the chain. A downward pull upon one or both of such chains of a predetermined value, depending upon the adjustment of the toggle angle by the screw **72**, will cause the bar **51** to be pulled downwardly past dead center and then, under the action of the springs **60**, to snap downwardly into its fully valve-open position, as shown in phantom lines in FIG. 1. Such action occurs even when the disturbance in the water is such as merely to cause the alarm device as a whole to tip. Under such conditions a substantial pull is exerted upon the run **92** of the lower chain which is at the side of the pool alarm which then tends to rise. Again, if such pull is of sufficient magnitude, the toggle device will be actuated to open the valve.

A satisfactory material from which the vane **20** may be made is heavy sheet vinyl acetate. The vane is made of such thickness as to be self-sustaining but not so thick that it cannot bend at the connecting means **82**, as when the vane is subjected to a disturbance in the water.

In the illustrative embodiment, the vane is made of such diameter that it extends beyond the outline of the alarm device proper in all directions. The edges of the vane thus act as a guard to maintain the alarm device proper free from contact with the walls of a pool in which the device may be freely floating. Should a disturbance occur in the water when the alarm device is in contact with the wall of the pool, the friction between the edge of the vane **20** and such wall adds to the downwardly directed force exerted upon the vane should the alarm device tend to rise as a whole or to be tipped by such disturbance. It is to be understood, however, that the diameter of the vane may vary somewhat from that in the illustrative embodiment, and that such diameter may, if desired, be smaller than that of the body of the alarm device.

The loud blast of the horn can be heard for a very substantial distance and will draw people to the pool. Should gas still remain in the container **19** when a person reaches the alarm, the horn may be shut off by grasping the lifting ring **36** to lift the alarm device at least partially from the water, and then pulling the ring **100** upwardly, thus restoring the bar **51** to the upper, valve closed position, shown in solid lines in FIG. 1. Alternatively, of course, the bar may be restored to its upper position by pulling upwardly on the pull ring **100** only

while the alarm device remains in the water. The pull ring **100** may also be employed as a lifting handle, the raising of the alarm device from the water by the pull ring **100** alone also serving to shut off the horn should it then be operating.

Although a limited number of embodiments of the invention have been illustrated in the accompanying drawings and described in the foregoing specification, it is to be especially understood that various changes, such as in the relative dimensions of the parts, materials used, and the like, as well as the suggested manner of use of the apparatus of the invention, may be made therein without departing from the spirit and scope of the invention, as will now be apparent to those skilled in the art.

I claim:

**1.** A pool alarm comprising, a supporting buoyant body adapted to float on the surface of the water in a pool, normally inoperative signal means mounted on the body, a broad transversely extending vane connected to and supported by said body for separating movement with respect thereto, the vane being positioned below the body to be completely submersible a substantial distance below the water surface, means for detecting relative separating movement between the vane and the body when the body rises as a result of a water disturbance, and signal operating means mounted on the body responsive to the detecting means for actuating the signal means into continuous operation upon the detection of a predetermined degree of relative separating movement.

**2.** The pool alarm of claim **1** wherein detecting means includes a tension sustaining member extending between and secured to the vane and the signal operating means.

**3.** The pool alarm of claim **2** wherein the vane is pivotally attached to the body at one zone thereof, and the tension sustaining means is secured to the vane at a location remote from said zone of its pivotal attachment to the body.

**4.** A pool alarm as claimed in claim **3** wherein the vane is annular and loosely surrounds a lower portion of the signal means, and the tension sustaining member has two similar parts, each of said two parts being connected at one of its ends to the signal operating means and at the other of its ends to the vane at spaced zones located substantially symmetrically relative to the zone of attachment of the vane to the body.

**5.** A pool alarm as claimed in claim **1** wherein the tension sustaining member is flexible and exerts substantially no thrust upon the signal operating means when the vane and body relatively approach each other.

**6.** The pool alarm of claim **1**, wherein the signal operating means includes a cocking means, and the detecting means includes an elongated tension sustaining member extending between and secured to said load and fire means and said vane.

**7.** A pool alarm as claimed in claim **6** wherein the cocking means comprises a toggle having first and second arms pivotally connected at their ends, said first arm comprising spring means connected to the toggle to retain the arms stably in either one of two terminal positions angularly displaced relative to each other, said tension sustaining member being connected at one end thereof to said second arm of the toggle.



**8.** A pool alarm as claimed in claim **7** wherein the signal means has an operating plunger reciprocable between two positions, the signal means being inoperative when the plunger is in a first position and operative when it is in a second position, and comprising means on the toggle for moving the plunger from said first to said second position thereof, thereby to operate the signal means, upon the movement of the toggle substantially from a first of its terminal positions toward and into its second terminal position.

**9.** A pool alarm as claimed in claim **8** wherein the means on the toggle for reciprocating the plunger comprises a plunger operating cam on one arm of the toggle remote from the pivotal connection between the two said arms.

**10.** A pool alarm as claimed in claim **9**, wherein the plunger is depressed when it lies in the said first position thereof and is extended when it lies in its said second position, and the surface of the cam rises from a first, low level zone, which operates the plunger when the toggle is in its first position, to a second, high level zone, which operates the plunger when the toggle passes through its central position in its travel from its first toward and into its second position, said second zone of the cam continuing to operate the plunger in the travel position, and stop means for stopping movement of said toggle in each of said terminal positions.

**11.** A pool alarm as claimed in claim **10**, comprising handle means for lifting the alarm from the water, and means connecting the handle means to the toggle whereby to restore the toggle to its first terminal position upon lifting the alarm by said handle.

**12.** A pool alarm as claimed in claim **1**, wherein the signal means includes a gas-operated horn, a container charged with gas under pressure for operating the horn, a normally closed valve interposed between the container and the horn, and means responsive to disturbances in the water for opening the valve to operate the horn.

**13.** A pool alarm as claimed in claim **12**, wherein the gas in the container is at least partially in liquified form.

**14.** A pool alarm as claimed in claim **13**, wherein the container is supported on the body so as to have a substantial part thereof immersed in the water of the pool, whereby the water functions as a heat source for the contents of the container.


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U.S. Cl. X.R.

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