

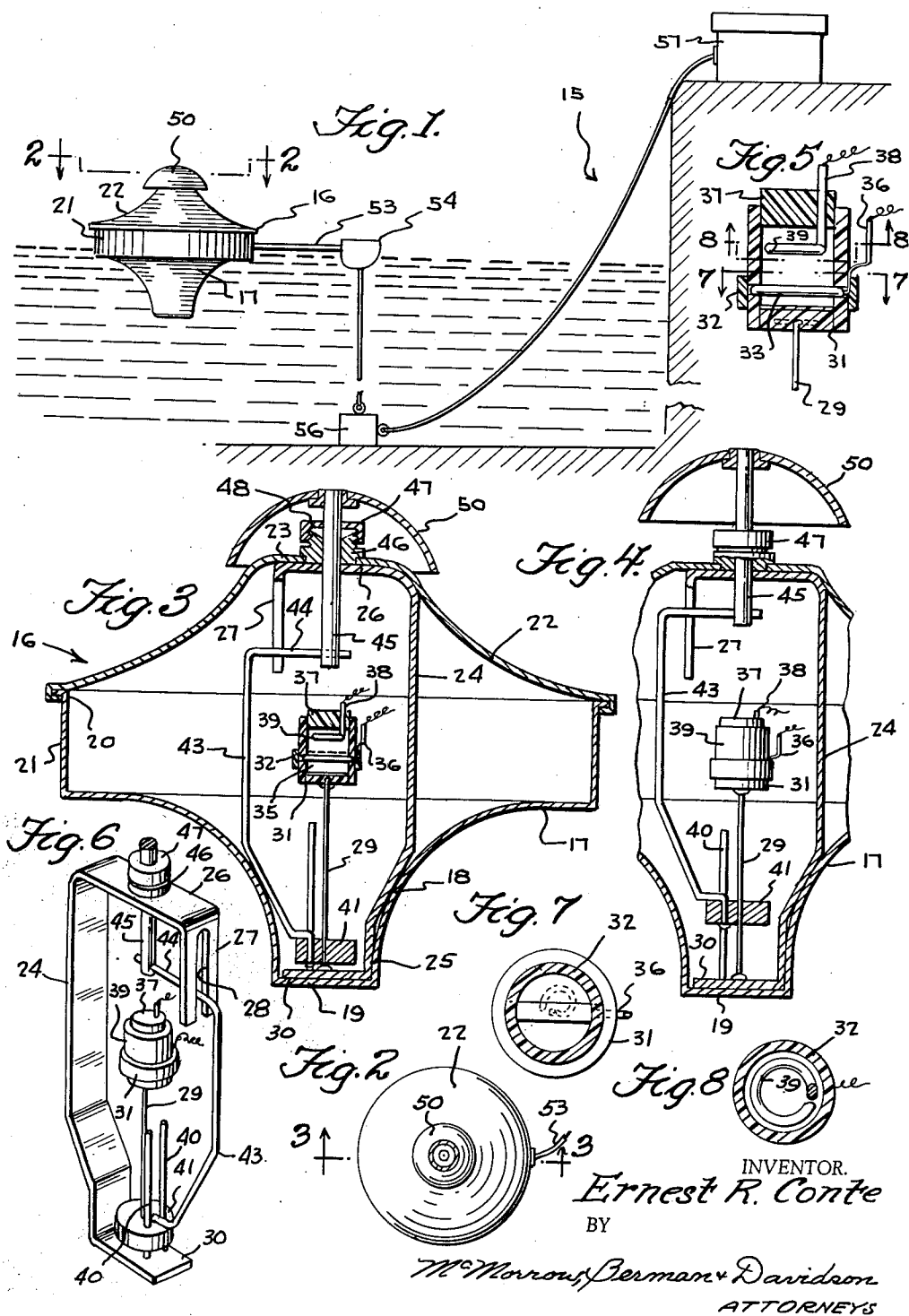
May 22, 1962

E. R. CONTE
SWIMMING POOL ALARM

3,036,296

Filed Oct. 28, 1958

2 Sheets-Sheet 1



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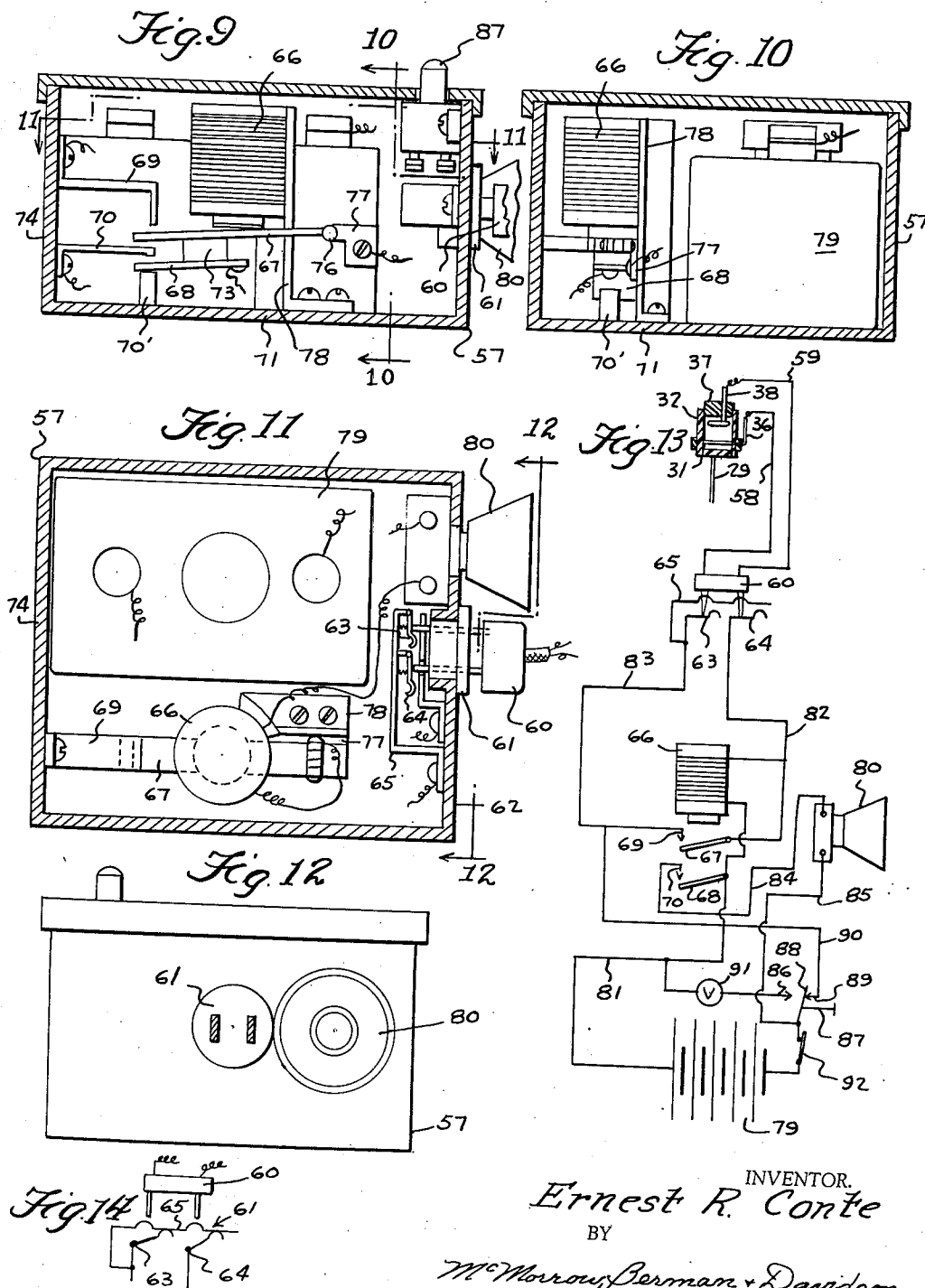
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SWIMMING POOL ALARM

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This invention relates to warning devices, and more particularly to a warning system for use in a swimming pool to provide an alarm when a person enters the swimming pool.

A main object of the invention is to provide a novel and improved swimming pool warning system which is simple in construction, which involves only a few parts, and which provides a dependable alarm when a child or animal, or any unauthorized person falls into the swimming pool in which the warning system is installed.

A further object of the invention is to provide an improved swimming pool warning system which involves relatively inexpensive components, which is easy to install, and which is reliable in operation.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a fragmentary vertical cross sectional view taken through a portion of a swimming pool provided with an improved warning system according to the present invention.

FIGURE 2 is a horizontal cross sectional view taken on the line 2-2 of FIGURE 1.

FIGURE 3 is an enlarged transverse vertical cross sectional view taken through the sensing element of the warning system of FIGURE 1 substantially on the line 3-3 of FIGURE 2.

FIGURE 4 is a fragmentary vertical cross sectional view, similar to FIGURE 3, but showing the damping member in a different position of adjustment than in FIGURE 3.

FIGURE 5 is an enlarged vertical cross sectional view taken through the oscillation-responsive switch device employed in the sensing element of FIGURES 2 and 3.

FIGURE 6 is an enlarged perspective view of the supporting bracket and the oscillation-responsive switch assembly employed in the sensing element of FIGURES 2 and 3.

FIGURE 7 is a horizontal cross sectional view taken on the line 7-7 of FIGURE 5.

FIGURE 8 is a horizontal cross sectional view taken on the line 8-8 of FIGURE 5.

FIGURE 9 is a longitudinal vertical cross sectional view taken through the housing containing the main electrical components of the swimming pool warning system shown in FIGURE 1.

FIGURE 10 is a transverse vertical cross sectional view taken on the line 10-10 of FIGURE 9.

FIGURE 11 is a horizontal cross sectional view taken on the line 11-11 of FIGURE 9.

FIGURE 12 is a vertical cross sectional view taken on the line 12-12 of FIGURE 11.

FIGURE 13 is a schematic wiring diagram showing the electrical connections of a typical swimming pool warning system according to the present invention.

FIGURE 14 is an enlarged diagrammatic view showing the manner in which the jack device receiving the plug associated with the oscillation-responsive switch automatically short circuits its terminals responsive to the removal of the plug.

Referring to the drawings, 15 designates a swimming pool which is provided with an improved warning system according to the present invention. The warning system comprises a sensing element 16 which floats on the surface of the pool and which responds to abnormal wave action on the surface of the pool, for example, to the disturbance

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which may be produced by a child falling in the pool or by an animal jumping into the pool.

The sensing element 16 comprises a hollow buoyant body including a bottom vessel 17 having a downwardly tapering, depending central portion 18 terminating in a horizontal bottom wall 19. Sealingly secured to the top rim of the vessel 17, namely, to the peripheral flange 20 at the top of its cylindrical main wall 21 is an upwardly converging cover member 22 terminating in the horizontal central top wall portion 23.

Centrally mounted in the body 17 is a rigid bracket member 24 having the right angled bottom end portion 25 which is rigidly secured in any suitable manner in the bottom portion of the downwardly tapering member 18. The bracket 24 is formed with a horizontal top portion 26 which is tightly engaged against the horizontal central top wall portion 23 of cover 22, said portion 26 terminating in the vertical, depending arm 27. Arm 27 is formed with the vertical guide slot 28.

Designated at 29 is an upstanding vibratory rod member which is secured at its bottom end to the horizontal bottom arm 30 of bracket member 24, the rod 29 extending upwardly a substantial distance and extending through and being rigidly secured centrally in the bottom wall element 31 of a mercury vessel 32 which is thus supported for vibratory movement on the rod 29.

The vessel 32 is formed of suitable insulating material. Secured transversely in the bottom portion of vessel 32 is an electrode rod 33 which is in contact with a quantity of mercury 35 provided in the vessel 32.

As shown in FIGURE 5, the electrode rod 33 extends outside the vessel 32 and is provided with a terminal wire 36.

The vessel 32 is provided with a top wall 37 in which is secured a second terminal 38 which extends vertically through the top wall 37 and terminates in a horizontal circular loop 39 of substantial area which is spaced a short distance above the normal level of the mercury pool 35 in the vessel 32.

Under normal conditions, slight undulations of the surface of the water in the pool will cause the vibratory rod 29 to sway slightly, but will not cause sufficient oscillation of the vessel 32 to cause the mercury 35 to engage the electrode loop 39. However, when a child or animal falls into the pool, a more intense wave action is produced, which greatly increases the amplitude of oscillation of the vibratory rod member 29 and the swinging movement of vessel 32, whereby the mercury 35 intermittently engages the loop 39. As will be presently explained, this causes energization of an audible warning device.

In order to prevent false alarms, particularly, when the atmospheric conditions are subject to considerable variation, for example when the surface of the pool is disturbed by winds and similar atmospheric changes, means are provided to regulate the degree of flexibility of the vibratory rod member 29, whereby the amplitude of oscillation thereof may be suppressed under conditions of ordinary surface movement of the water in the pool. Thus, a pair of vertical guide rods 40, 40 are secured to arm 30 adjacent to the vibratory rod member 29 and a damping disc 41 is slidably engaged on the vertical guide rods 40, 40 and on the vibratory rod member 29. The damping disc 41 is secured to the lower end of a rigid bracket rod 43 extending upwardly through the hollow body 17 and terminating at its top end in a horizontal arm 44 which is connected to a plunger member 45 extending slidably and sealingly through a bushing 46 provided centrally in the top wall 23 of cover 22. A gland nut 47 is threadedly engaged on the bushing 46 and surrounds a gland packing member 48 which sealingly engages the plunger 45 and which may be pressed thereagainst by tightening the gland nut 47.

Secured to the top end of the plunger member 45 is a hollow knob member 50 of generally spherical contour which overlies and covers the top wall 23 and adjacent upper portion of cover member 22, the knob member 40 being employed to adjust the plunger member 45 vertically so as to move the damping disc 41 into a desired position on the vibratory rod member 29, thus regulating the sensitivity of the oscillation-responsive switch element.

As shown in FIGURES 3 and 6, the top arm 44 of the bracket member 43 extends slidably through the vertical guide slot 28, whereby the bracket member 43 is guided in its vertical adjustment as it is moved by means of knob 50 and plunger member 45, and whereby the plunger member 45 is held against rotation.

A water-proof two-conductor cable 53 extends sealingly through the cylindrical wall 21 of the hollow body 17 and extends through a float member 54 located adjacent the sensing element 16, as shown in FIGURE 1, the cable 53 being secured to said float member and being in turn secured to an anchor member 56 resting on the bottom of the pool. The cable 53 extends upwardly from the anchor member 56 and extends into the housing 57 for the main electrical components of the system, said housing being disposed in any convenient location adjacent a margin of the pool 15.

The cable 53 contains a pair of conductors 58 and 59 which are respectively connected in the body 17 to the electrode terminal elements 36 and 38. The conductors 58 and 59 are connected to the respective terminals of a two-prong male plug 60 which is engageable in a jack 61 mounted in a wall 62 of housing 57.

The jack 61 is of conventional construction and includes a pair of terminals 63 and 64 engageable by the prongs of plug 60, said terminals 63 and 64 being otherwise engageable with a common shorting conductor 65 when the plug 60 is removed. Thus, as shown in FIGURE 14, when plug 60 is disengaged from the jack 61, the terminals 63 and 64 engage the common shorting conductor 65, short circuiting said terminals. However, when the plug 60 is engaged in the jack 61, the prongs of the plug respectively engage the terminals 63 and 64, making contact therewith, and moving said terminals away from the shorting conductor 65. This is shown schematically in FIGURE 13 wherein the prongs of plug 60 are illustrated in conductive engagement with the respective resilient terminals 63 and 64 and wherein said terminals are disengaged from the shorting conductor 65.

Mounted in the housing 57 is an alarm relay 66 having the respective conductive poles 67 and 68 which are simultaneously engageable with respective stationary contacts 69 and 70 responsive to the energization of relay 66.

Normally the poles 67 and 68 are in lowered positions, as illustrated in FIGURE 9, the lower pole 68 resting against a suitable stop element 70' of insulating material provided subjacent thereto on the bottom wall 71 of housing 57. As shown, the pole 68 may be connected to the pole 67 in parallel spaced relation thereto, through an insulating spacer member 73. The respective stationary contacts 69 and 70 may be mounted on a side wall 74 of housing 57, as shown, and are located so as to be respectively engageable by the poles 67 and 68 when said poles are elevated responsive to the energization of the relay 66.

As shown, the upper pole 67 may be pivoted at 76 to a conductive bracket member 77 suitably mounted in the housing 57, for example, secured to but insulated from a supporting bracket 78 of relay 66.

Mounted in the housing 57 is a suitable source of current, for example, a battery 79, and also mounted in said housing and projecting externally therefrom is an electrically operated alarm device 80, for example, a horn of any suitable type adapted to be energized to provide a loud audible signal when connected in circuit with the battery 79.

As shown in FIGURE 13, one terminal of battery 79 is connected by a wire 81 to the pole 68, and likewise to one terminal of the winding of relay 66. The other terminal of the relay winding is connected to a wire 82, which is in turn connected to jack terminal 64. Jack terminal 63 is connected by a wire 83 to the stationary contact 69 associated with the pole 67. The pole 67 is connected to the wire 82.

Stationary contact 70 is connected by a wire 84 to one terminal of the signal horn 80. The other terminal of horn 80 is connected by a wire 85 to the pole 88 of a push button-operated single pole double throw switch 87, the pole 88 of said switch normally engaging a stationary contact 89 and being movable into engagement with an opposite stationary contact 86 responsive to actuation of the push button thereof, whereby to disengage the pole 88 from the normally engaged contact 89. The pole 88 of switch 87 is connected through a manually operated master switch 92 to the remaining terminal of battery 79. The normally engaged stationary contact 89 is connected by a wire 90 to the wire 83. The remaining stationary contact 86 of switch 87 is connected to one terminal of a voltmeter 91, the opposite terminal of said voltmeter being connected to the wire 81. Thus, when the push button of switch 87 is actuated, the pole 88 is disengaged from contact 89 and is engaged with contact 86, whereby the voltage of the battery 79 will be read by a voltmeter 91, providing a check on the condition of said battery.

When the sensing element 16 is oscillated through an angle corresponding to that created by the wave action resulting from a child falling into the pool or an animal falling into the pool, as above described, the mercury 35 in vessel 32 engages the loop 39, bridging the terminals 63 and 64. This energizes relay 66 by a circuit comprising battery 79, wire 81, the winding of the relay, wire 82, conductor 59, the mercury switch, wire 58, wire 83, wire 90, contact 89, pole 88, the closed switch 92 and the remaining terminal of battery 79. As soon as relay 66 becomes energized, it elevates its poles 68 and 67, whereby the relay 66 is retained in energized position by the engagement of the pole 67 with its associated contact 69, bridging the conductors 82 and 83. At the same time, the horn 80 becomes energized by the engagement of pole 68 with contact 70 by a circuit comprising battery 79, wire 81, pole 68, contact 70, wire 84, the energizing winding of horn 80, wire 85, the closed switch 92, and the remaining terminal of battery 79. Thus, relay 66 remains energized, and horn 80 likewise remains energized, for a continued period after the initial energization of the relay 66, and can only be deenergized by actuating the push button switch 87, or by opening the manually operated master switch 92. When the push button switch 87 is actuated, the holding circuit for the relay 66 is broken, allowing the pole 67 to drop out of engagement from contact 69. When the push button switch 87 is released, the system will be automatically reset for a future operation.

As will be readily understood, deenergization of the relay 66 also deenergizes the horn 80, since pole 68 disengages from contact 70, opening the energizing circuit of the horn.

Removal of the plug 60 from the jack 61 automatically energizes the signal horn 80, since this bridges the conductors 82 and 83 by the engagement of the resilient terminals 63 and 64 with the shorting conductor 65. Thus, the disconnection of cable 53 from the main housing 57 will automatically set off the alarm horn 80.

As above mentioned, the sensitivity of the oscillation-responsive sensing element 16 may be regulated by adjusting the damping disc 41 vertically on the vibratory rod member 29. Thus, FIGURE 3 illustrates a position of the disc 41 adjacent the bottom end of rod 29, whereby the rod is free to vibrate and flex over a major portion of its length, providing maximum sensitivity of

the oscillation-responsive element. FIGURE 4 illustrates a different position of adjustment of the damping disc 41, wherein said disc has been elevated a substantial distance upwardly on the vibratory rod 29, substantially restricting vibration of the rod and thus greatly reducing the sensitivity of the switch device. This condition would be established when relatively rough conditions prevail, for example, when the surface of the water in the swimming pool is disturbed by winds or similar atmospheric disturbances, and wherein it is necessary to adjust the system to prevent false alarms.

While a specific embodiment of an improved swimming pool warning system has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A warning switch device for swimming pools comprising a hollow buoyant body, an upstanding vibratory rod member in said body secured at its bottom end to the bottom portion of the body and extending upwardly therein, a mercury vessel secured to and supported on the top end of said rod member and being free to oscillate in said body responsive to vibration of said rod member, a first electrode in the lower portion of said vessel a quantity of mercury in said vessel covering said first electrode, a second electrode secured in the upper portion of said vessel and being disposed a short distance above the normal level of the mercury, said electrodes having terminal portions exposed externally of said mercury vessel, and means to connect said terminal portions to an external signalling circuit.

2. A warning switch device for swimming pools comprising a hollow buoyant body, an upstanding vibratory rod member in said body secured at its bottom end to the bottom portion of the body and extending upwardly therein, a closed vessel secured to and supported on the top end of said rod member and being free to oscillate in said body responsive to vibration of said rod member, a first electrode in the lower portion of said vessel, a quantity of conductive liquid in said vessel covering said first electrode, a second electrode secured in the upper portion of said vessel and being disposed a short distance above the normal level of said conductive liquid, said electrodes having respective terminal portions exposed externally of said closed vessel, and means to connect said terminal portions to an external alarm circuit.

3. A warning switch device for swimming pools comprising a hollow buoyant body, an upstanding vibratory rod member in said body secured at its bottom end to the bottom portion of the body and extending upwardly therein, a closed vessel secured to and supported on the top end of said rod member and being free to oscillate in said body responsive to vibration of said rod member, a first electrode in the lower portion of said vessel, a quantity of conductive liquid in said vessel covering said first electrode, a second electrode secured in the upper portion of said vessel, said second electrode being formed at its bottom end with a horizontal loop of substantial area disposed a short distance above the normal level of the conductive liquid, said electrode having terminal

portions exposed externally of said closed vessel, and means to connect said terminal portions to an external signalling circuit.

4. A warning switch device for swimming pools comprising a hollow buoyant body, an upstanding vibratory rod member in said body secured at its bottom end to the bottom portion of the body and extending upwardly therein, a closed vessel secured to and supported on the top end of said rod member and being free to oscillate in said body responsive to vibration of said rod member, a first electrode in the lower portion of said vessel, a quantity of conductive liquid in said vessel covering said first electrode, a second electrode secured in the upper portion of said vessel, said second electrode being formed at its bottom end with a horizontal loop of substantial area disposed a short distance above the normal level of the conductive liquid, said electrodes having terminal portions exposed externally of said closed vessel, means to connect said terminal portions to an external signalling circuit, a damping member slidably engaged on said vibratory rod member and being movable along the length of said vibratory rod member to regulate its sensitivity of response to external vibration, and a rigid adjusting member secured to said damping member and extending slidably and sealingly through the top wall of said hollow body.

5. A warning switch device for swimming pools comprising a hollow buoyant body, an upstanding vibratory rod member in said body secured at its bottom end to the bottom portion of the body and extending upwardly therein, a closed vessel secured to and supported on the top end of said rod member and being free to oscillate in said body responsive to vibration of said rod member, a first electrode in the lower portion of said vessel, a quantity of conductive liquid in said vessel covering said first electrode, a second electrode secured in the upper portion of said vessel, said second electrode being formed at its bottom end with a horizontal, generally circular loop of substantial area, said loop being disposed a short distance above the normal level of the conductive liquid, said electrodes having terminal portions exposed externally of said closed vessel, means to connect said terminal portions to an external signalling circuit, a rigid guide rod secured in said body adjacent and parallel to said vibratory rod member, a damping member slidably engaged on said rigid guide rod and said vibratory rod member and being movable along the length of said vibratory rod member to regulate its sensitivity of response to external vibration, and a rigid adjusting member secured to said damping member and extending slidably and sealingly through the top wall of said hollow body.

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