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[54] **SWIMMING POOL ALARM** 3,092,822 6/1963 Dorman.....340/261
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200/61.47, 61.51

[57] **ABSTRACT**

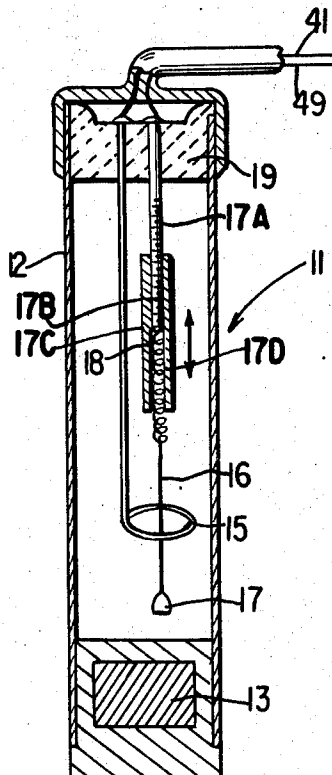
A simplified and highly sensitive swimming pool alarm having a solid-state circuit which responds to a water disturbance sensing unit in the pool and has means to adjust the sensor. The circuit, when energized, initiates an audible alarm which sounds continuously until a power switch is opened.

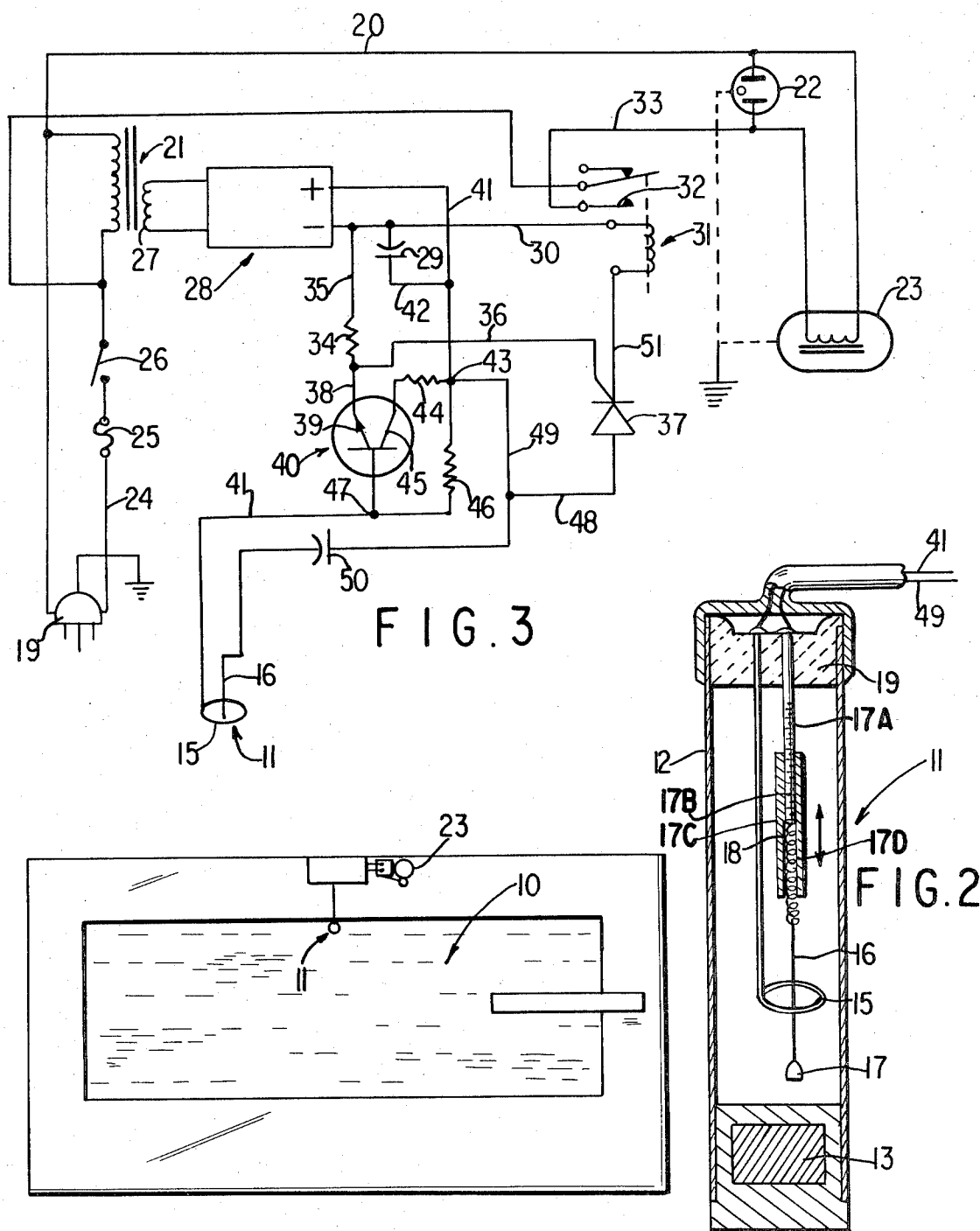
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2 Claims, 5 Drawing Figures





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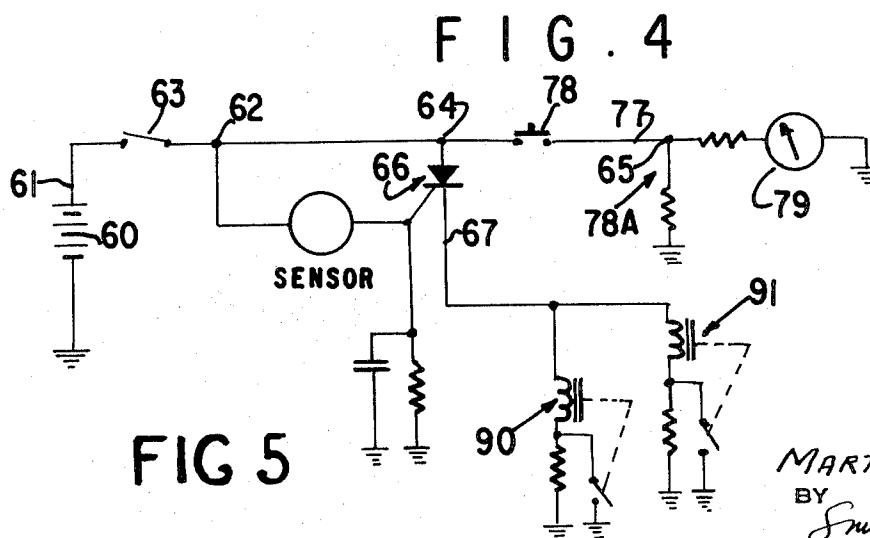
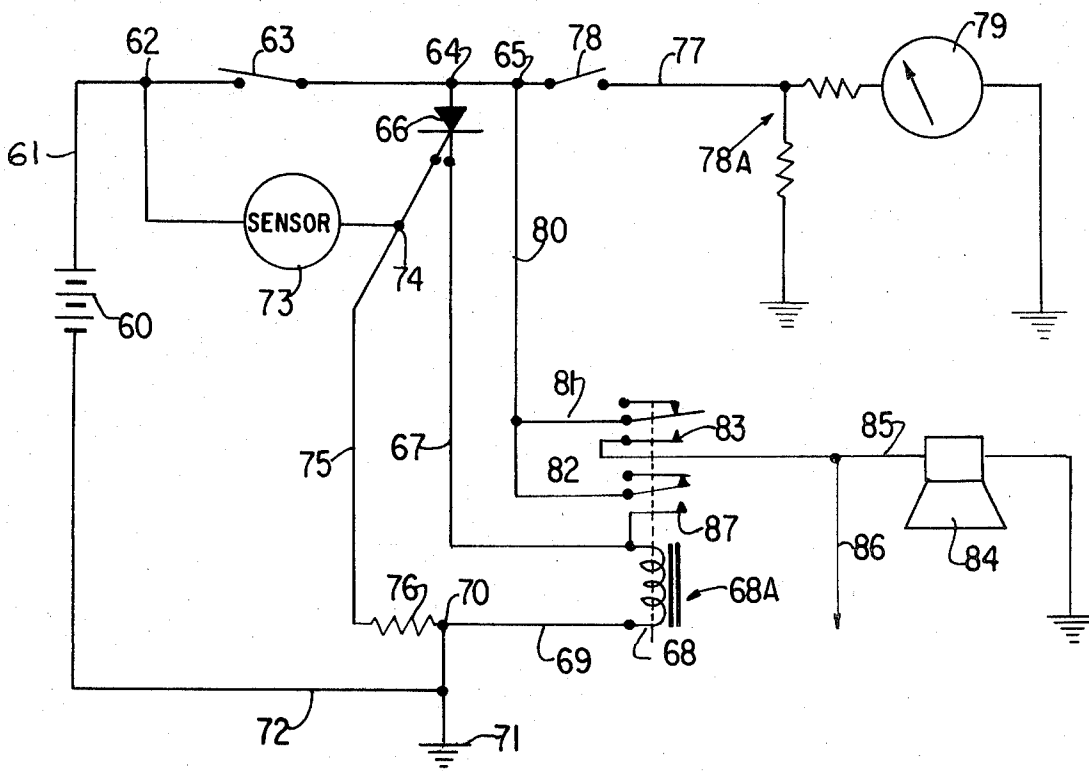


FIG 5

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SWIMMING POOL ALARM

This invention relates to swimming pool alarm devices, and more particularly to an alarm responsive to disturbances in the water of the pool.

Various alarm devices for swimming pools are known, most of which involve a float element which moves in response to wave motion, such as when a child or intruder falls into or enters the pool, and uses some form of electro-mechanical switching means which is operated by the float to sound an alarm. The prior art devices tend to be bulky, rather costly, and are not sufficiently sensitive to relatively small waves or ripples in the water while being insensitive to the falling of small objects such as leaves or twigs. Also, there has been no simple means of adjustment.

One of the objects of the invention is to provide an improved pool alarm arrangement.

A further object is to provide an improved sensing unit for a pool alarm.

In one aspect of the invention, a small sensing unit is suspended in the water and is coupled with an electronic triggering circuit which energizes the primary alarm circuit when a relatively slight water disturbance takes place. The sensing unit has a means for adjusting sensitivity thereof.

Other features, objects, and advantages of the invention will become apparent from the following description and drawings which are merely exemplary.

In the drawings:

FIG. 1 is a plan view of a swimming pool equipped with the alarm device of the invention;

FIG. 2 is a central vertical section through a sensing unit or switch embodied in the alarm device;

FIG. 3 is a schematic wiring diagram of a circuit employed in the alarm device;

FIG. 4 is a schematic wiring diagram employing battery operated circuitry for the alarm device; and

FIG. 5 is a wiring diagram showing a modification of FIG. 4.

Referring to the drawings in detail, wherein like numerals designate like parts, numeral 10 designates a swimming pool equipped with an alarm, said alarm including a sensing unit 11 which may be placed close to one side wall of the pool so as to be clear of swimmers. Sensing unit 11 comprises a watertight float casing 12 (FIG. 2) which is cylindrical and elongated and may be quite small. The unit 12 may be weighted at its lower end as indicated at 13 (FIG. 2) so that it will normally float in an upright position. Within float casing 12 and suspended from a plug 19 of electrical insulating material in the top thereof is a ring electrode 15 surrounding a central axial pendulum electrode 16 in a normally spaced relation thereto. The pendulum electrode 16 has a small pendulum weight 17 at its lower end. The sensing unit 11 will float upright in the pool when the water is undisturbed, but when waves are created by someone entering the pool, or by a small child falling into the water, the float will wobble and the pendulum electrode 16 will strike the ring electrode 15. An audible alarm 23 will then be sounded and will continue to sound until a power switch is opened.

The pendulum is suspended from a rod 17A which has a threaded portion 17B upon which is mounted a sleeve 17C. A flexible member such as spring 17D is incorporated in the pendulum shaft C. Adjustable means 17C can be adjustably movable so as to expose varying

lengths of the spring which will adjust the period or sensitivity of the sensing unit. If desirable, the sleeve can be moved to cover the spring so as to disable the switch.

As an example of one type of circuit with which the sensing unit can be employed, reference is made to FIG. 3, wherein a standard 110-volt a.c. grounded plug 19 has a common conductor 20 connected with the primary 21 of a step-down transformer 21A. Conductor 20 is connected to one side of a grounded outlet receptacle 22 to provide a connection to a remote alarm if desired. From this point, conductor 20 leads to and is connected with a bell or other alarm 23.

A conductor 24 from plug 19 is connected through a fuse 25 and a single-pole single-throw power switch 26 to the opposite side of transformer primary coil 21. Transformer secondary 27 is connected to full-wave bridge rectifier 28 having, for example, a peak voltage of 25 volts. If, for some reason, the transformer secondary should become shorted, bridge 28 will self-destruct due to over-voltage and act as a safety device in the system.

The negative output terminal of bridge 28 is coupled directly to a capacitor 29, serving as a filter, and through a wire 30 to the coil of a relay 31 having a normally open contact 32, as shown. The relay contact 32 is connected by wire 33 to the other side of receptacle 22 and to the bell or signal 23.

The negative terminal of bridge 28 also is connected with a resistor 34 through conductor 35, the other end of resistor 34 being connected through wire 36 to the gate of silicon controlled rectifier (SCR) 37. Wire 38 connects resistor 34 to the emitter 39 of an NPN type transistor 40.

Positive terminal of bridge rectifier 28 is connected by wire 41 and wire 42 to filter capacitor 29. Wire 41 also is connected at 43 with resistor 44 which is connected with collector 45 of transistor 40. Wire 41 also leads to another resistor 46 which is connected at 47 with the base of transistor 40. From this point, wire 41 leads to and is connected with electrode 15 of sensing unit 11. Wire 48 leads from the anode of SCR 37 to wire 49 which is connected at 43 to wire 41 and to resistor 44. Wire 49 in turn is connected to capacitor 50 and then to the pendulum electrode 16 of sensing unit 11. The cathode of SCR 37 is connected through wire 51 with the opposite terminal of the coil of relay 31.

Assuming that power switch 26 is closed, the sensing unit 11 is suspended in the water of a swimming pool, and a child, intruder or the like falls into or enters the pool thus to disturb the water, the resulting waves cause the pendulum electrode 16 to touch the ring electrode 15. A pulse from capacitor 50 will offset the bias of transistor 40, causing a pulse to form on the gate of SCR 37. This pulse causes SCR 37 to turn on and close a circuit through the relay 31 via lines 30, 51, 48, 49 and 41. Since this current is supplied by a d.c. voltage (e.g., 25 volts) from rectifier 28, the SCR becomes self-locking. Operation of relay 31 closes contacts 32 and effects operation of alarm 23 and energization of outlet 22. Resistor 46 functions as an over-voltage device so that should bridge 28 fail to destroy itself in response to a short circuit in the transformer, the alarm will be activated. The sensor unit 11 is isolated from the d.c. power supply at the bridge rectifier 28 by transistor

40 and resistor 46 on one side of the circuit and by the impedance of capacitor 50 on the other side.

When the alarm bell sounds in response to movement of the sensing unit 11 and the described closing of relay 31, the alarm will continue to sound until someone opens power switch 26. With the power switch closed and assuming no disturbance of the water and with electrodes 15 and 16 of sensing unit 11 open, there will be no circuit completed through the relay contacts and the system will remain dormant.

FIG. 4 illustrates a modified and somewhat simplified circuit for operating the alarm wherein a battery 60 provides the power for the alarm circuit. As shown, the battery 60 is connected by line 61 to a junction 62, a manually operated switch 63, a junction 64, and a junction 65. Junction 64 connects with the anode of a thyristor such as a silicon controlled rectifier (SCR) 66 having its cathode connected by wire 67 to a coil 68 of a relay 68A. The other end of the coil 68 is connected by wire 69 to a junction 70 and a ground 71. Ground 71 is also connected by wire 72 to the other side of battery 60.

A sensor 73, which may be the sensor of FIG. 2, is connected between the junction 62 and the gate of SCR 66 through a junction 74. Junction 74 is connected by a wire 75 and resistance 76 to junction 70. A wire 77 connected through switch 78 provides a circuit through network 78A for a milliamperemeter 79 which may be provided to indicate the battery strength. Junction 65 connects with a line 80 having branches 81 and 82. Branch 81 is adapted for connection with a contact 83 operated by relay 68. Contact 83 connects with a horn 84 or other alarm through lines 85 and 86, line 86

being adapted for connection to a remote alarm if desired. Branch 82 is adapted for connection to a holding contact 87 connected to relay coil 68.

Thus, in this embodiment, when the switch 63 is closed and a disturbance in the water of the pool occurs, sensor 73 triggers SCR 66 to operate relay 68A and close contact 83 to give an alarm. Holding contact 87 continues operation of the alarm even though thyristor or SCR 66 discontinues conduction.

FIG. 5 shows a circuit similar to FIG. 4, reference numerals the same when appropriate. Switch means 90 and 91 are operated when a signal is applied to the solenoid thereof through line 67.

It should be apparent that details of construction can be varied without departing from the spirit of the invention except as defined in the appended claims.

What is claimed is:

1. A swimming pool alarm apparatus comprising an electrically operated alarm including circuit means, a sensing unit disposed within the water of the swimming pool, said sensing unit being movable by disturbance of the water and having electrodes which are normally separated when the water is calm but which engage when the water is disturbed thereby causing movement of the unit, said sensing unit including a pendulum means having a flexible coil spring connection at the top thereof, a weight at the bottom thereof, and adjustably movable tubular sleeve means arranged to closely surround at least a portion of said spring length to vary the number of exposed coils and thereby change the sensitivity of the pendulum.

2. The apparatus of claim 1 wherein the circuit means includes a solid state switching means.

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