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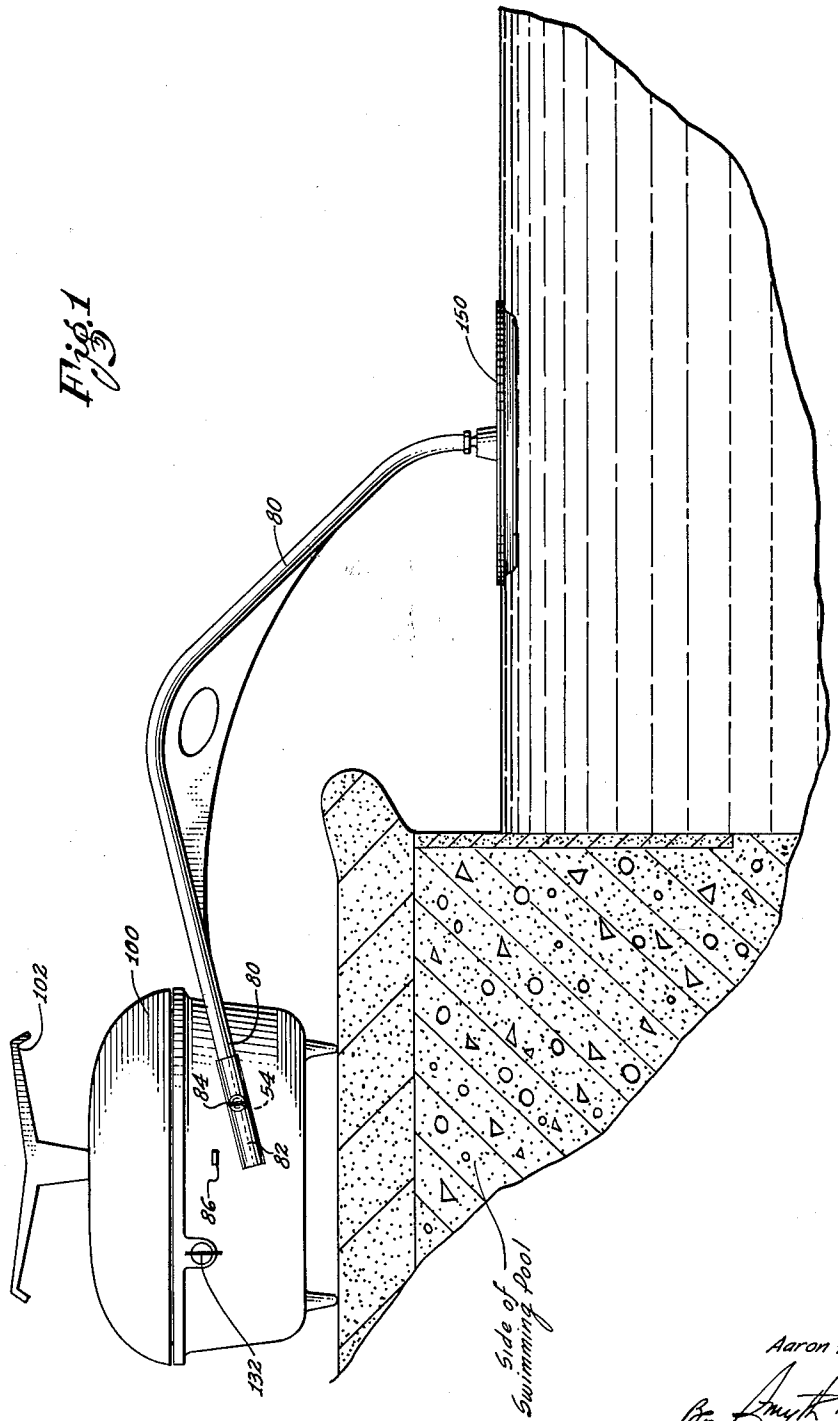
Sept. 19, 1961 A. P. EDELMAN 3,001,184

SWIMMING POOL ALARM UNIT

Filed Feb. 2, 1959 4 Sheets-Sheet 1

Fig. 1



INVENTOR:
Aaron P. Edelman
By Smyth & Roston
Attorneys

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OR IN 340/261

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SWIMMING POOL ALARM UNIT

Filed Feb. 2, 1959 4 Sheets-Sheet 2

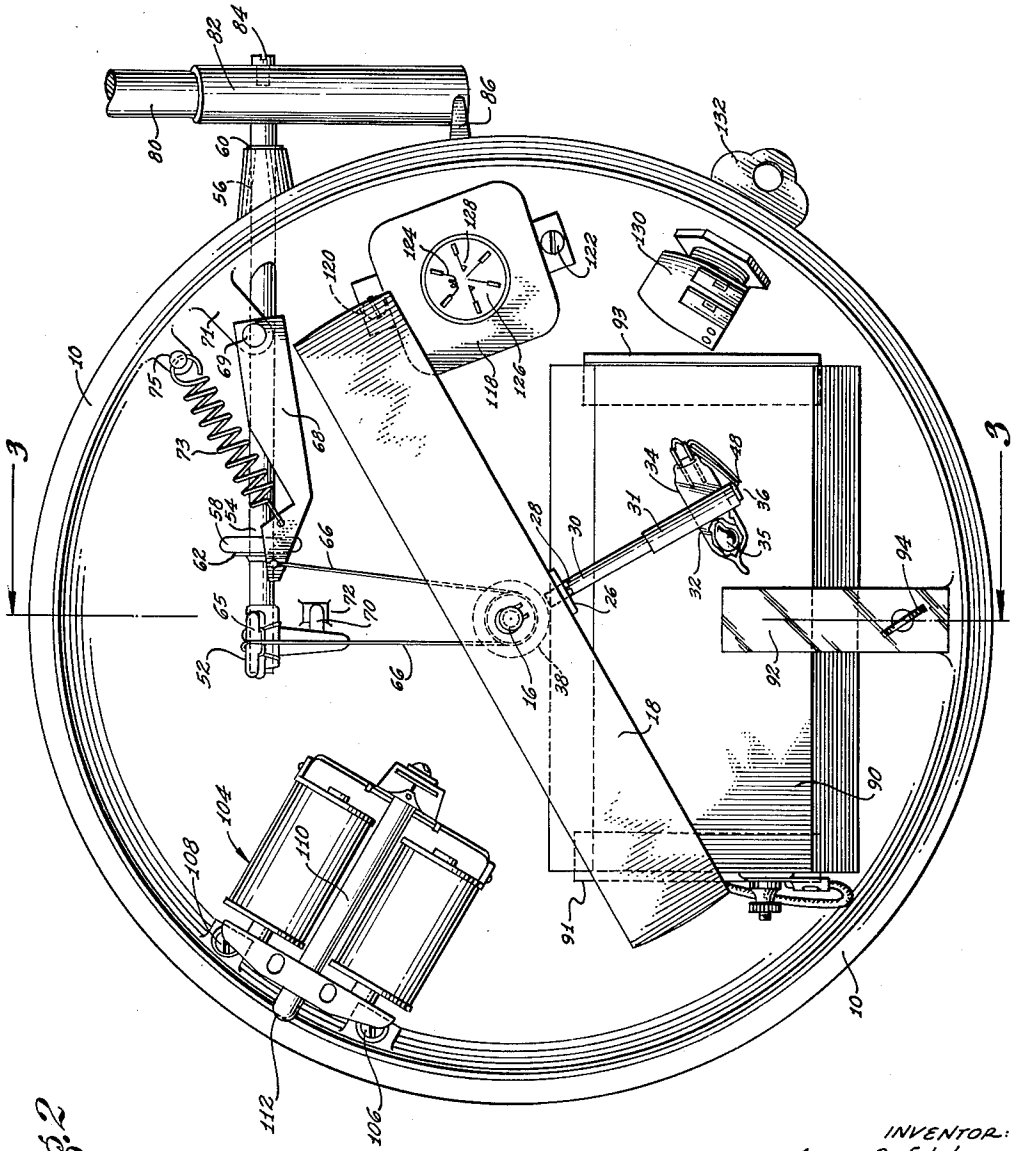


Fig. 2

INVENTOR:
Aaron P. Edelman

By Smyth & Poston
Attorneys

Sept. 19, 1961 A. P. EDELMAN 3,001,184

SWIMMING POOL ALARM UNIT

Filed Feb. 2, 1959 4 Sheets-Sheet 3

Fig. 3

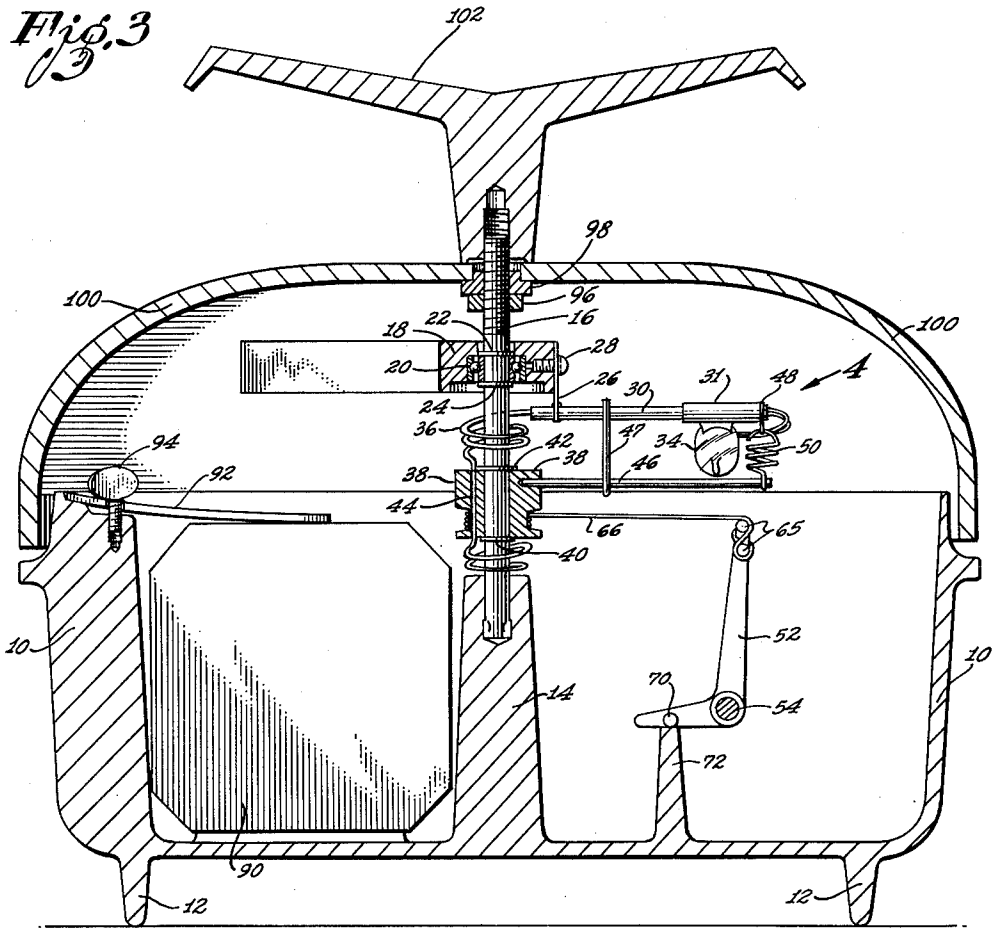
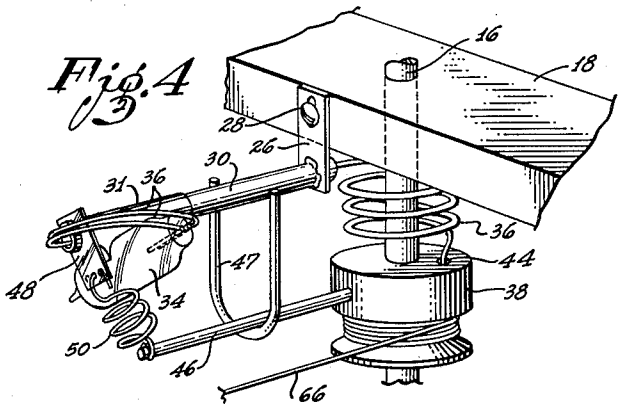


Fig. 4



INVENTOR:
Aaron P. Edelman
By Smyth & Roston
Attorneys

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SWIMMING POOL ALARM UNIT

Filed Feb. 2, 1959 4 Sheets-Sheet 4

Fig. 5

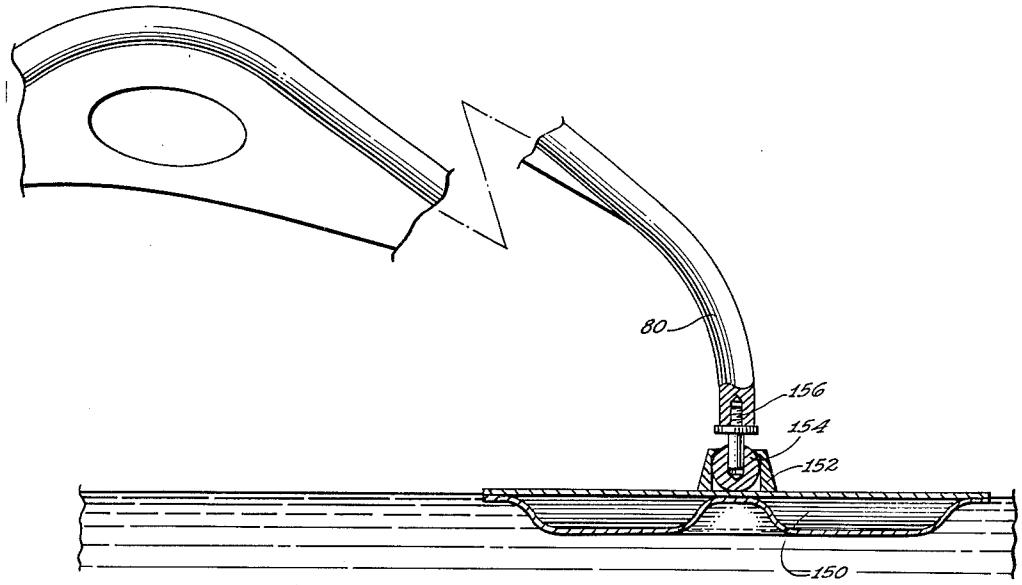


Fig. 6

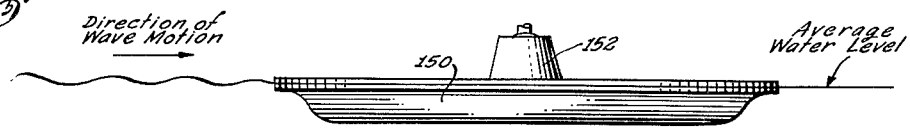


Fig. 7

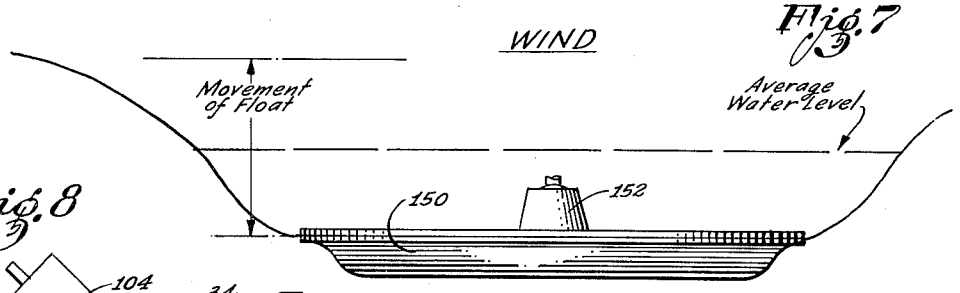
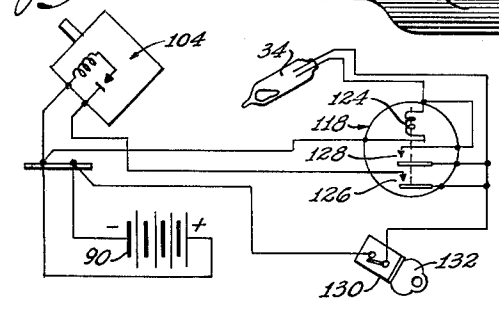


Fig. 8



INVENTOR:
Aaron P. Edelman

By Smyth & Roston

Attorneys.

United States Patent Office 3,001,184 Patented Sept. 19, 1961

3,001,184

SWIMMING POOL ALARM UNIT

Aaron P. Edelman, 6443 Columbus Ave., Van Nuys, Calif.

Filed Feb. 2, 1959, Ser. No. 790,520
12 Claims. (Cl. 340—261)

The invention relates to an improved unit for sensing surface wave motion on the surface of a body of fluid. In a specific embodiment, the invention is applicable to use in conjunction with swimming pools. When placed in the latter use, the unit of the invention serves as a positive means for providing an alarm should a person or object fall into, or otherwise enter, the water in the swimming pool.

The invention will be described as an alarm instrument for use in conjunction with swimming pools, as indicated above. It will become evident as the description proceeds, however, that the equipment of the invention is capable of being used in any application in which it is desired to detect the presence of surface waves on a body of fluid.

A mechanical filter may be incorporated into the unit, to render the unit responsive only to surface waves within a predetermined range of wave lengths. This is especially desirable in the use of the equipment in conjunction with swimming pools, so as to render the system unresponsive to surface waves caused by the wind.

A feature of the invention resides in the fact that it is constructed so that there are no electrical components in contact with the water in the swimming pool. This feature eliminates any real hazard of electric shock due to current conduction in the water of the pool, and it also eliminates any imagined hazard of that nature in the mind of the user. The unit of the invention is also advantageous in that it can be constructed as a portable, completely self-contained instrument. The instrument does not consume any power when in its stand-by condition, and it can therefore include its own battery without creating the problem of continual battery replacement due to stand-by current drain.

The equipment of the invention is also extremely advantageous in that no installation is required. The self-contained instrument is merely carried to the side of the pool and placed there, and a sensing arm associated with the unit is lowered until a float at the end of the sensing arm rests on the surface of the water in the pool. It is then only necessary to turn on a switch, which may be key operated, to place the unit in an operating condition. A quick test can be made at that time by moving the sensing arm slightly after the switch has been turned on. The actuation of the alarm in the instrument upon such movement of the sensing arm indicates that the unit is in proper operating condition.

The instrument of the invention, itself, is relatively simple and economical to construct, and it utilizes a minimum of components. The instrument can therefore be marketed and sold at a relatively low price. The components of the instrument and the manner in which they are interconnected are rugged in their composition. Despite its inherent sturdy nature, the instrument of the invention is extremely sensitive, and it immediately responds to wave motion of the surface of the liquid within the pre-set range of wave lengths to which the instrument is intended to respond. On the other hand, the unit can be made unresponsive to surface waves of other wave lengths, as noted above; and it is also unresponsive to gradual rises and falls of the water level due to evaporation, drainage or refilling of the pool.

The embodiment of the invention to be described includes an inertial mass which is rotatably mounted and which supports an actuating arm which, in turn, supports

a mercury switch. This mass serves as a resetting means for continually resetting the instrument to different water levels encountered by the sensing arm and its associated float. The sensing arm is coupled to the actuating arm, and the construction is such that slow movements of the sensing arm draw the inertial mass around with the actuating arm so that the mercury switch is not disturbed. However, the inertial mass does not immediately follow abrupt movements of the sensing arm, and the actuating arm under these latter conditions, is caused to actuate the switch and set off the alarm.

Due to the construction described in the preceding paragraph, the instrument does not respond to slow changes in the water level of the pool. However, the wave motion set up on the surface of the water in the pool due to a person, animal or object entering or falling into the pool, produces abrupt motion of the sensing arm which actuates the alarm.

As will be described, a mechanical filter, which may take the form of a float of a certain predetermined diameter together with a universal joint coupling the float to the end of the sensing arm, may be used to filter out wave motion due to wind and to thereby render the instrument unresponsive to such waves. It has been found that the surface waves due to wind have a materially shorter wave length than those caused by a body falling into the water of the pool. The diameter of the float can therefore be chosen to exceed the wave length of the wind-created surface waves so that the float remains at the average water level of the pool and imparts no motion to the sensing arm. However, the diameter of the float is chosen to be less than the wave length of the body-created waves so that the float rises to the crest of each of the latter waves and drops to the trough between successive ones of the latter waves. This latter movement of the float produces the desired movement of the sensing arm so as to activate the alarm. Further sensitivity is obtained by adjusting the inertial mass and spring constant of the unit to resonate within the desired range of wave lengths.

In the drawings:

FIGURE 1 is a side elevational view of the unit of the invention positioned beside a swimming pool with the float portion of the unit floating on the water in the pool;

FIGURE 2 is a top plan view of one embodiment of the wave sensing unit of the invention, with the cover of the unit removed, this view showing the various components which make up the illustrated embodiment and the maner in which these components are supported and disposed within a housing;

FIGURE 3 is a sectional view substantially on the line 3—3 of FIGURE 2, and this latter view illustrates more clearly the relation between an inertial mass included in the unit and an actuating arm to trip a mercury switch so as to activate an alarm;

FIGURE 4 is a fragmentary side view substantially along the direction of the arrow 4 of FIGURE 3 and illustrating the manner in which the mercury switch is supported on a rotatable supporting shaft, and the manner in which rotation of the shaft actuates the switch;

FIGURE 5 is a side elevation view of a suitable sensing arm assembly for use in conjunction with the unit illustrated in FIGURES 1–4, the assembly of FIGURE 5 including a sensing arm, a float, and a ball screw universal joint for coupling to the float to the end of the sensing arm;

FIGURE 8 is a circuit diagram of the electrical connections for the unit between the mercury switch and alarm bell which is activated by the switch; and

FIGURES 6 and 7 are schematic views of the float of FIGURE 5 and the manner in which the float serves

as a mechanical filter to sense only those waves which have a wave length exceeding a certain minimum wave length.

With reference now to the drawings, and especially to FIGURES 1–5, for a more complete description of the mechanical and electrical components which make up the illustrated embodiment of the invention, it will first be observed from FIGURES 2 and 3 that the components, exclusive of the float assembly, are contained in an appropriate housing **10**. The housing **10** may be formed from any appropriate weatherproof material, such as an aluminum casting; or it may, for example, be composed of a plastic. When an aluminum casting is used for the housing, it may be anodized to render it impervious to oxidation. As shown in FIGURES 2 and 3, the housing **10** has a generally cylindrical configuration, and it may have appropriate legs **12** formed at its bottom surface to support the unit. The housing **10** includes a central upwardly extending post **14** which serves to rigidly support a central shaft **16** in a generally upright vertical position.

An inertial mass **18** having an elongated generally rectangular configuration, as best shown in FIGURE 2, is rotatably supported on the shaft **16** by means of a bearing **20** (FIGURE 3), the bearing being held against axial movement on the shaft by retaining rings **22** and **24** (FIGURE 3). The inertial mass **18** is freely rotatable about the longitudinal axis of the shaft **16**. However, the inertial mass **18** has appreciable mass so that it exhibits material inertia effects.

A bracket **26** (FIGURE 3) is secured to one side of the inertial mass **18** by means of a fastener, such as the screw **28**. A first switch actuating arm **30** is secured to the bracket **26** by welding or soldering. The switch actuating arm **30** is supported by the bracket **26** and it extends radially outwardly from the longitudinal axis of the central shaft **16**. A sleeve **31** is rotatably and slidably mounted on the arm **30**. The ends of the sleeve **31** may be crimped inwardly and a quantity of dry lubricant may be supported between the sleeve **31** and the arm **30**. This provides for low friction and sliding motion of the sleeve **31** with respect to the arm **30**.

The screw **28** extends through a slot in the bracket **26** so that the bracket may be adjustable with respect to the mass **18**. An electric switch **34** is connected to the underside of the sleeve **31**. The electric switch **34** is preferably a mercury switch, since such a switch is waterproof. The mercury switch **34** is supported on the sleeve **31** at a position on the envelope of the switch such that the center of gravity of the mercury pool **35** (FIGURE 2) is as close to the longitudinal axis of the sleeve **31** as possible when the switch is tilted for the "off" position as shown in FIGURE 2.

The switch actuating arm **30** is preferably tubular so that the leads **36** from the switch **34** may conveniently extend through the hollow center of the arm **30** and down around the shaft **16** to the electrical components of the unit, as illustrated in FIGURES 3 and 4. These leads are preferably provided with nylon insulation for long wear, and they have a sufficiently large loop at the end of the arm **30** so that they will not impede to any extent the axial and rotational motion of the sleeve **31**.

A pulley **38** (FIGURE 3) is also rotatably mounted on the central shaft **16** and spaced axially from the bearing **20** on the shaft **16**. The pulley **38** is held against axial movement on the shaft **16** by a pair of retaining rings **40** and **42**. As illustrated in FIGURES 3 and 4, the pulley **38** has an opening **44** extending axially through it and spaced from its central axis, with this opening serving to receive the leads **36** from the switch **34**.

A second actuating arm **46** (FIGURES 3 and 4) is secured to the pulley **38**, and this second actuating arm also extends radially outwardly from the longitudinal axis of the central shaft **16**. The actuator arm **46** has a U-shaped bracket **47** welded or otherwise secured to it. The bracket extends upwardly and embraces the arm **30** to limit the relative radial movement of the arms **30** and **46**.

The sleeve **31** on the actuating arm **30** has a clip **48** secured to its outer end, as best shown in FIGURE 4. The clip **48** is provided with a plurality of holes at its free end for adjustment purposes, and a spring **50** has one end connected to the clip **48** through one of the holes. The other end of the spring **50** is connected to the end of the actuating arm **46**. The spring **50** tends to draw the actuating arms **30** and **46** so that they are disposed in axial alignment one above the other, with the clip **48** being directed downwardly. In this position of the actuating arms **30** and **46**, the mercury switch **34** is in a position such that its contacts are open.

The weight of the inertial mass **18** and the spring constant of the spring **50** are chosen to create a resonant condition within a predetermined operating range to increase the sensitivity of the instrument to wave lengths created by bodies to be detected.

Now, should the actuating arm **46** be slowly accelerated from rest about the longitudinal axis of the shaft **16**, the compressive force of the spring **50** would draw the actuating arm **30**, the bracket **26** and the inertial mass **18** about the longtudinal axis of the shaft **16** without producing any material rotation of the sleeve **31** about the longitudinal axis of the arm **30**. Therefore, the switch **34** would not be actuated. However, a relatively large acceleration of the arm **46** about the longitudinal axis is the shaft **16** would create a situation in which the inertial mass **18** would not immediately follow the movement. This would cause the spring **50** to be extended to the position shown in FIGURE 3 as the arm **46** moves with respect to the arm **30**. This, in turn, produces rotation of the sleeve **31** about the longitudinal axis causing the switch **34** to be tilted and hence its contacts closed.

In brief, therefore, the slow rotational movement of the arm **46** about the axis of the shaft **16** produces no rotational movement of the sleeve **31** about its axis so that the switch **34** is not actuated. However, an abrupt movement of the arm **46** causes the spring **50** to be extended, due to the lag of the inertial mass **18**. The extension of the spring **50** rotates the sleeve **31** about the longitudinal axis of the arm **30** and also subsequently causes the inertial mass abruptly to move. The inertial mass then swings about the axis of the shaft **16** to bring the arm **30** away from the arm **46** in the opposite direction. Then the inertial mass returns its swing in the previous angular direction. The resulting violent action is a reciprocal angular movement of the arms **30** and **46** in opposite directions with respect to one another about the axis of the shaft **16**. Such movement produces reciprocal angular motion of the sleeve **31** about the longitudinal axis of the arm **30** to actuate the switch **34**.

The movements of the arm **30** about the axis of the central shaft **16** is produced by a crank arm **52** (FIGURE 3). The crank arm **52** is mounted on a sensing shaft **54**. As shown in FIGURE 2, the sensing shaft **54** extends through the side of the housing **10**, and it is rotatably mounted in the housing by means, for example, of a pair of journals **56** and **58**. The shaft **54** is held against axial movement in the journals by a pair of retaining rings **60** and **62**. Two of the legs **12** of FIGURE 3 are positioned under the shaft **54** and in alignment with the shaft for stability purposes.

The crank arm **52**, as illustrated in FIGURES 2 and 3, is mounted on the end of the shaft **54** which protrudes to the left of the journal **58** in FIGURE 2. The crank arm **52** extends upwardly in FIGURE 3. The crank arm has a pair of integral transverse arms **65** (FIGURE 3) formed in spaced parallel relation at its upper end. A pulley cord **66** extends over the upper end of the crank arm **52** and is fastened to the arms **65**. The

pulley cord 66 is wound about the pulley 38 which was described above. The pulley cord may, for example, be composed of steel wire or a braided cord.

A tension arm 68 (FIGURE 2) has one of its ends fastened to the end of the cord 66 after the cord is looped several times about the pulley 38; and the other end of the tension arm 68 is attached to a screw 69, the screw being threaded into a boss 71 formed on the inner surface of the housing 10. A spring 73 is attached to the tension arm 68 at a point adjacent the face end of the arm. The other end of the spring 73 is fastened to a boss 75 formed on the inner surface of the housing 10. This spring 73 serves to bias the pulley 38 in one angular direction about the axis of the shaft 16. This biasing is such to tend to rotate the crank arm 52 in a direction to tend to lift the float component of the unit out of the water so as to compensate to some extent for the weight of the float. The spring 73 serves to maintain the pulley cord 66 taut so as to prevent backlash. The spring and tension arm arrangement serves to maintain an essentially constant load on the cord 66 for all operating positions of the float.

The crank arm 52 has an integral projection 70 extending outwardly from its surface, and this projection is adapted to engage a stop 72 (FIGURE 3) which extends upwardly from the bottom of the housing 10 and which stop may be formed integral with the housing. The crank arm projection 70 and the stop 72 serve to limit the counterclockwise rotation of the crank arm 52 about the shaft 54.

It will be observed from an examination of the representation of FIGURE 3, that rotation of the shaft 54 and the crank arm 52 in a counterclockwise direction permits the spring 73 of FIGURE 2 to rotate the pulley 38 in a counterclockwise direction. This latter movement may continue until the projection 70 of the crank arm 52 is limited by the stop 72. This condition is realized when the float is raised above the upper limit of water level.

As shown in FIGURES 1 and 2, a sensing arm 80 is fitted into a sleeve 82 which, in turn, is secured to the protruding end of the sensing shaft 54 by means of soldering or welding. The internal surface of the sleeve 82 and the external surface of the portion of the arm 80 which extends into the sleeve have a mating configuration to prevent angular movement of the arm 80 with respect to the sleeve. A screw 84 serves to hold the arm 80 within the sleeve 82. Rotation of the crank arm 80, with the resulting rotation of the shaft 54 is limited in one direction by means of a stop 86 (FIGURE 1 and FIGURE 2) which protrudes out from the outer surface of the housing 10.

The crank arm assembly and associated mechanisms described above, limit the effective rotation of the crank arm 80. Therefore, if the water level is too low, the stop 86 is engaged; or if the float arm is removed from the water, the stop 72 is engaged; and possible damage to the internal mechanism is prevented.

Slow movements of the sensing arm 80 produce slow rotation of the pulley 38 so that the actuating arms 30 and 46 move in unison to draw the inertial mass 18 around the shaft 16. As described above, such movements do not disturb the switch 34. However, abrupt movements of the arm 80 set up the angular displacements between the arms 30 and 46 to rock the sleeve 31 and actuate the switch 34 in the manner described above.

The embodiment of the invention illustrated in the drawings carries it own power supply in the form of a battery 90 (FIGURES 2 and 3). This battery may, for example, be a usual 6-volt type of dry cell battery. The battery 90 is supported in the housing 10 on one side of the post 14, as shown in FIGURE 3, and it may conveniently be held in place between a pair of brackets 91 and 93 (FIGURE 2), which are mounted on the bottom of the housing 10. A clamp 92 extends over the side of the battery and it is mounted on the housing 10 by means, for example, of a thumb screw 94. The thumb screw 94 extends through the clamp and is threaded into the housing. The clamp 92 may be removed to replace the battery, merely by unscrewing the thumb screw.

The upper end of the central shaft 16 may be threaded to receive a jamb nut 96 (FIGURE 3). This jamb nut is used to adjust the clearance between the housing 10 and a bell 100 supported by the jamb nut. A bell centering nut 98 is threaded to the shaft 16 on top of the jamb nut 96. The bell 100 composed, for example, of aluminum is supported on the bell centering nut 98, and the bell 100 also forms a cover for the unit. The bell 100 does not make contact with the housing 10, as shown in FIGURE 3, so that it may be freely vibrated to emit audible alarm signals. The bell 100 is held in place by a barrel clamp 102 which is threaded on the end of the shaft 16 clamping the bell 100 to the cover nut 96. The barrel clamp 102 has a T-shaped portion which serves as a handle for the unit.

A bell actuator 104 (FIGURE 2) is mounted in the housing 10 by means, for example, of a pair of screws 106 and 108. This bell actuator may be of any suitable type, and it includes an armature 110. When the bell actuator 104 is energized, the armature 110 is caused to move back and forth in a violent reciprocal manner. The arrangement is such that the end 112 of the armature 110 is caused to strike the bell cover 100 upon the energizing of the actuator 104 so that the bell cover is set into violent vibrations to emit a loud bell alarm audible signal.

A relay 118 is also mounted in the housing by means of a pair of screws 120 and 122, as illustrated in FIGURE 2. The relay includes an energizing winding 124 and two pairs of normally-open contacts 126 and 128.

A key switch 130 (FIGURE 2) is also supported in the housing 10, and this switch is adapted to be operated by means of a removable key 132. The purpose of the switch 130 is to turn the unit on or off. For example, the unit is turned off when the swimming pool is in use. However, at the termination of such use, the key 132 may be inserted in the switch 130 to activate the unit, and the key subsequently removed so that the unit cannot be de-activated by any unauthorized person. It should be pointed out, that any attempt to move the unit when it is in its stand-by condition of activation, results in the movement of the arms 46 and 30 in a manner to set off the alarm. This feature prevents the unauthorized removal of the unit when it is placed in its stand-by condition.

As shown in FIGURES 1 and 5, the actuating arm 80 has a float 150 coupled to its remote end by means, for example, of a universal coupling. This universal coupling may include a ball retainer 152 (FIGURE 5), a ball 154 which is held in the retainer, and a screw 156 which extends into the ball and which is threaded to the remote end of the sensing arm 80.

The float 150 is adapted to be supported in the liquid, with its upper surface flush with the water level, as shown in FIGURES 1 and 5, to prevent any "sail boat" effects. That is, the float is designed to maintain its upper surface almost flush with the surface of the water so as to minimize direct wind effects which might give false indications. Any changes in the water level due to the causes enumerated above, merely causes the float 150 to rise or drop slowly which, in turn, causes the sensing arm 80 to rise or drop slowly which, in turn, causes the inertial mass 18 to assume a new position and to reset the instrument to the new water level. This action has been described previously in the present specification. However, any wave motion within a predetermined range of wave lengths, causes the float 150 to rise and fall abruptly to produce abrupt movements of the sensing arm 80 which serve to set off the alarm, in accordance with the operations described.

The float **150** preferably has a predetermined diameter of, for example, from 5 to 9 inches. It has been found that the normal wave length of surface waves due to wind is within the range of 0 to 4 inches. For such waves, and as shown in FIGURE 6, the float **150** remains at the average water level and produces no appreciable motion to the sensing arm **80**. For the waves set up by a body falling into the water in the pool, however, the float will move up and down (as shown in FIGURE 7) because these latter waves are larger in wave length than the float diameter. Therefore, and as shown in FIGURE 7, the float **150** rides up the crest of one wave and down into the trough between successive waves. These latter waves, therefore, cause the float to move up and down and thereby set up movements of the sensing arm **80** which serve to set off the alarm in the manner explained above. As noted above, the inertial mass **18** and spring **50** are designed to exhibit a resonant effect at a frequency such that relatively small disturbances by the latter waves may cumulate to set off the instrument.

The circuit connections of the instrument are shown in FIGURE 8. As shown in that figure, the positive terminal of the battery **90** is connected to one terminal of the actuator **104** and to one side of the energizing coil **124** of the relay **118**. The other terminal of the battery **90** is connected to the key switch **130** which, in turn, is connected to the armatures of the normally open contacts **126** and **128** of the relay **118** and to one of the terminals of the mercury switch **34**. The relay contacts **128** serve as holding contacts, and the fixed contact of this pair is connected to the other terminal of the relay energizing coil **124**, as is the other terminal of the mercury switch **34**. The fixed contact of the normally open contacts **126** of the relay **118** is connected back to the other terminal of the actuator **104**.

It will be observed that whenever the key operated switch **130** is open, the negative terminal of the battery **90** is open circuited so that the unit is completely deactivated. However, when the switch **130** is closed, actuation of the mercury switch **34** causes the energizing coil **124** to be energized so that the contacts **126** and **128** close. A holding circuit for the energizing coil **124** is then established by the contacts **128**, so that the relay remains energized even though the switch **34** subsequently opens. The closure of the relay contacts **126** completes the circuit to the bell actuator **104** so that the actuator is energized to sound the alarm. The instrument then continuously sounds an extremely loud audible alarm until the battery **90** runs down, or until the key operated switch **130** is opened.

The invention provides, therefore, a rugged and foolproof alarm system for use in sensing wave motion on a body of liquid. The specific application for the instrument of the invention, as described above, is in conjunction with swimming pools. When used in that application, the unit serves as a positive and sensitive alarm means to detect the presence of certain objects in the pool at a time when the pool would normally be unattended. The instrument of the invention is advantageous in that it may be constructed as a practical, portable, fully self-contained unit which requires no permanent installation. Moreover, the instrument is entirely safe in its operation and is not subject to the production of electric shocks or other hazards. As noted, the unit of the invention does not consume power when in a stand-by condition, and it may be powered by a dry-cell battery to permit its being marketed as a completely self-contained portable unit.

I claim:

1. A unit for providing an indication of the presence of surface waves on the water of a swimming pool, or the like, which waves have a wave length exceeding a predetermined threshold, said unit including: a housing; a central shaft mounted in the housing and adapted to be supported in a vertical position by the housing; an inertial mass rotatably mounted on the shaft; pulley means rotatably mounted on the central shaft and spaced axially from the inertial mass; a first actuating arm secured to the pulley and extending radially outwardly from the longitudinal axis of the shaft; a bracket affixed to the inertial mass; a second actuating arm having a longitudinal axis and being supported by said bracket for rotation about the longitudinal axis of said arm and extending radially outwardly from the longitudinal axis of the shaft; first resilient means connected to the remote end of the first actuating arm and to the remote end of the second actuating arm to maintain the first and second actuating arms in axial alignment with one another and to hold the second actuating arm in a predetermined angular position; switch means supported on the second actuating arm and adapted to be actuated when the second actuating arm is rotated about its longitudinal axis from said predetermined angular position; second resilient means tending to impart rotational motion to the pulley means about the shaft in one direction; a crank arm assembly including a pulley cord surrounding the pulley means for opposing the effect of the second resilient means on the pulley means; a sensing arm coupled to the crank arm assembly; a float attached to the remote end of the sensing arm and adapted to sense predetermined wave motion to cause the crank arm assembly to move the second actuating arm with respect to the first actuating arm thereby to produce rotation of the first actuating arm and actuate the switch means; and electric alarm means connected to the switch means to provide an indication when the switch means is actuated.

2. The combination defined in claim 1 and which includes a universal coupling for coupling the float to the end of the sensing arm and in which the float has a predetermined diameter so that the sensing arm responds only to waves having a wave length exceeding a predetermined minimum wave length.

3. The combination defined in claim 1 and in which said electric alarm means includes a bell cover and an electrically operated bell actuator and means for coupling the bell actuator to the switch means.

4. The combination defined in claim 1 and which includes means for supplying electrical energy to the electric alarm means, and a key-operated switch included in the supplying means for activating and de-activating the unit.

5. The combination defined in claim 1 and which includes relay means for controlling the electric alarm means, and means including a battery mounted in the housing for supplying electrical energy through the relay means to the electric alarm means.

6. The combination defined in claim 1 in which the inertial mass and the first resilient means are constructed to a wave motion sensed by the float assembly within a to wave motion sensed by the float assembly within a predetermined range of wave lengths.

7. A unit for providing an indication of the presence of waves on the surface of a body of liquid, said unit including: sensing means including a float adapted to be supported on the surface of the body of liquid, a stationary platform adjacent the body of liquid, electric switch means, actuating means for the switch, an inertial mass at the stationary platform and coupled to the switch actuating means, a control means coupled to the sensing means, means coupling the switch actuating means to the control means to cause the actuating means to actuate the switch upon relative movement between the control means and the actuating means, the inertial mass being freely rotatable to render the actuating means unresponsive to relatively slow movements of the sensing means, and said inertial mass providing relative movement between the actuating means and control means to cause the switch to be actuated upon relatively fast movement of the sensing means, and means including electrically actuated alarm means electrically coupled to the switch to be activated upon actuation of the switch by the actuating means.

8. A unit for providing an indication of the presence of surface waves on the surface of a body of liquid, said unit including: sensing means including a float adapted to be supported on the surface of the body of liquid, a central shaft, an inertial mass rotatably supported on the shaft for free rotation about the longitudinal axis thereof, means including a first radial switch actuating arm supported by the inertial mass and extending radially outward from the longitudinal axis of the shaft, switch means coupled to the first actuating arm, means including a second radial actuating arm coupled to the sensing means and extending radially outward from the longitudinal axis of the shaft, resilient means intercoupling the first and second actuating arms to cause the first arm to actuate the switch upon relative movement between the first and second actuating arms, the inertial mass being freely rotatable to render the first actuating arm unresponsive to relatively slow movements of the sensing means, and said inertial mass providing a relative movement between the first and second actuating arm to cause the switch to be actuated upon relatively fast movement of the sensing means, and means including electrically actuated alarm means electrically coupled to the switch to be activated upon actuation of the switch by the first actuating arm.

9. A unit for providing an indication of the presence of surface waves upon the surface of a body of liquid, said unit including; mechanical sensing means including a float adapted to be supported on the surface of the body of liquid, a central shaft, an inertial mass rotatably supported on the shaft for free rotation about the longitudinal axis thereof, bracket means affixed to the inertial mass, a first switch actuating arm supported in the bracket and extending radially outward from the longitudinal axis of the shaft, a sleeve rotatably and slidably mounted on the first switch actuating arm, switch means mounted on the sleeve and adapted to be actuated upon rotation of the sleeve about the longitudinal axis of the first switch actuating arm, pulley means rotatably mounted on the central shaft, a second switch actuating arm affixed to the pulley means and extending radially outward from the longitudinal axis of the central shaft, means for coupling the sensing means to the pulley means to produce rotation of the pulley means upon movements of the sensing means, resilient means intercoupling the sleeve and the second actuating arms to cause the sleeve to rotate about the longitudinal axis of the first actuating arm upon relative movement between the first and second actuating arms, the inertial mass being freely rotatable to render the first actuating arm unresponsive to relatively slow movements of the sensing means, and said inertial mass producing relative movements between the first and second actuating arms to cause the switch to be actuated upon relatively fast movements of the sensing means, and means including electrically actuated alarm means electrically coupled to the switch to be activated upon actuation of the switch by the first actuating arm.

10. The combination defined in claim 9 in which the inertial mass and the resilient means are constructed to exhibit a resonance effect at a predetermined operating frequency corresponding to surface waves within a predetermined range of wave lengths.

11. A unit for producing an indication of the presence of surface waves on the surface of a body of liquid, said unit including: a housing, a central shaft rigidly supported in the housing and adapted to extend in a vertical direction, mechanical sensing means including a movable sensing arm and a float mounted at the remote end of the arm to be supported on the surface of the body of liquid, an elongated inertial mass, bearing means for mounting the mass on the central shaft with the mass being freely rotatable about the longitudinal axis of the shaft, bracket means affixed to the inertial mass, a first switch actuating arm supported in the bracket means, a sleeve mounted on the first actuating arm for axial movement thereon and for rotation about its own longitudinal axis, said first actuating arm extending radially outward from the longitudinal axis of the shaft, a mercury operated switch mounted on the sleeve and adapted to be actuated upon rotation of the sleeve about its own longitudinal axis, pulley means rotatably mounted on the shaft in axially displaced relation with the inertial mass, a second switch actuating arm affixed to the pulley means and extending radially outward from the longitudinal axis of the central shaft, means for coupling the sensing arm to the pulley means to produce rotation thereof upon movement of the sensing means, resilient means intercoupling the sleeve and the second actuating arms to cause the sleeve to rotate about its longitudinal axis upon relative movement between the first and second actuating arms, the inertial mass being freely rotatable to render the first actuating arm unresponsive to relatively slow movements of the sensing means, and said inertial mass providing relative movement between the first and second actuating arms to cause the switch to be actuated upon relatively fast movements of the sensing means, and means including electrically actuated alarm means electrically coupled to the switch to be activated upon actuation of the switch by the first actuating arm.

12. The combination defined in claim 11 and which includes a universal coupling for coupling the float to the end of the sensing arm, the float having a disk-shaped configuration and having a selected diameter to produce movement of the sensing arm only in response to surface waves having a wave length in excess of a predetermined minimum wave length.

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