SAFETY DEVICE FOR TOY WATERCRAFT

A toy watercraft includes a housing and a motor contained within the housing and operatively connected with a propulsion system for propelling the watercraft when the motor is operated. A safety device is constructed and arranged to permit operation of the motor when the watercraft is immersed in water, and prevent operation of the motor when the watercraft is removed from water.
Fig. 7
SAFETY DEVICE FOR TOY WATERCRAFT

CROSS-REFERENCE TO APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/655,443, filed Feb. 24, 2005, which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to motorized toy watercraft. More specifically, the present invention relates to a safety device for motorized toy watercraft that controls activation of the motor that powers the toy watercraft.

BACKGROUND OF THE INVENTION

[0003] Toy vehicles have proven to be very popular toys for children and adults of all ages. Many different types of toy vehicles have been provided in the past. For example, toy vehicles have been provided in the form of toy boats, toy cars, toy trucks, toy construction equipment, toy motorcycles and the like. Toy manufacturers are constantly trying to find ways to improve the operation of toy vehicles so that they look and function in a manner that is as real as possible, while also keeping the cost of the toy as low as possible. Many toy vehicles are made as miniaturized replicas of real full-size vehicles. Many such toys also include battery-driven motors that enable the toy to be self-propelled, thereby providing greater realism and further enjoyment for the user.

[0004] Toy watercrafts have been provided with propeller and jet drive systems for propelling the watercraft across water. Such toy watercrafts have been provided with remote control systems, such as radio frequency (RF) transmitters and receivers, which enable the user to remotely control the operation of the watercraft during operation. Other self-propelled toy watercrafts have been provided without remote control functionality, wherein the user simply turns on or off the power to the watercraft and the watercraft operates without user control.

[0005] Propeller-driven toy watercrafts include a propeller that is driven by a drive shaft connected to a motor, such as a miniature electric motor, housed within the watercraft. Such propeller-driven toy watercrafts have been provided in the past in a variety of forms and have proven to be a very popular toy for children and adults of all ages. Also, toy manufacturers have incorporated high performance features, e.g., significantly higher speeds, in the propeller-driven toy watercrafts to provide improved performance for the toys in order to further enhance enjoyment of the toys.

[0006] Such prior propeller-driven toy watercrafts have some disadvantages. For example, because the propeller operates at a relatively high speed, there is an increased chance for bodily injury especially to children. Accordingly, the propeller is encased in a housing for safety purposes. The housing is designed to prevent body parts, e.g., user’s fingers, from contacting the propeller in order to avoid bodily injury. However, the presence of the housing adversely impacts the propeller performance, thereby dramatically reducing the performance of the toy watercraft. Specifically, the housing encloses the propeller in a manner that prevents the propeller from performing optimally, which significantly reduces the speed of the toy watercraft.

SUMMARY OF THE INVENTION

[0007] The above-noted disadvantage of prior toy watercraft designs contribute to a less than ideal product from the end-user’s perspective. Such toys are typically purchased with the hope and/or expectation that the watercraft will perform optimally. These expectations are not always met by prior toy watercraft designs as a result of the above-noted performance drawbacks of the enclosed propeller. Thus, a need exists for an improved toy watercraft that eliminates the housing enclosing the propeller in order to enhance the speed of the toy watercraft, while still providing safety protection.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The accompanying drawings facilitate an understanding of the various embodiments of this invention. In such drawings:

[0012] FIG. 1 is a perspective view of an exemplary toy watercraft of a type to which the present invention is applicable;

[0013] FIG. 2 is a top view of the exemplary toy watercraft of FIG. 1, with an upper housing section of the toy watercraft removed to show the operating components of the toy watercraft including a safety device constructed according to an embodiment of the present invention;

[0014] FIG. 3 is a bottom view of the exemplary toy watercraft of FIG. 1, showing the safety device according to an embodiment of the present invention;

[0015] FIG. 3A is an enlarged view of a portion of FIG. 3;

[0016] FIG. 4 is a rear view of the exemplary toy watercraft of FIG. 1, showing the safety device according to an embodiment of the present invention;

[0017] FIG. 5 is a schematic view illustrating the exemplary toy watercraft with the safety device according to an embodiment of the present invention removed from water;

[0018] FIG. 6 is a schematic view illustrating the exemplary toy watercraft with the safety device according to an embodiment of the present invention immersed in water;
FIG. 7 is a circuit diagram of the safety device according to an embodiment of the present invention; and FIG. 8 is a schematic view illustrating the safety device according to an embodiment of the present invention and the power circuit of the exemplary toy watercraft of FIG. 1.

Detailed description of illustrated embodiments

An embodiment of the present invention will now be described with reference to the figures, wherein like reference numerals designate similar parts throughout the various views. As indicated above, the present invention is designed to improve the performance of toy watercraft, e.g., enhance the speed of toy watercraft, while still providing safety protection. An aspect of the present invention is to eliminate the typical housing that encloses the watercraft propeller and provide a safety device that prevents activation of a motor that powers the propeller when the toy watercraft is not immersed in water. By eliminating the typical housing that encloses the propeller, the toy watercraft can operate at an optimal speed, while the safety device provides safety protection to prevent body parts, e.g., user’s fingers, from contacting a rotating propeller when the toy watercraft is not immersed in water.

An embodiment of the safety device for toy watercraft will now be described. The example embodiment is illustrated in the figures and described as being implemented in a toy watercraft that is powered by a motorized propeller. However, it is noted that the invention is not limited to such implementations. Instead, the safety device can be implemented in any suitable toy watercraft, regardless of the specific structure of the toy watercraft. Specifically, the safety device can be implemented in any suitable toy watercraft in which it is desired to prevent operation of a motorized component of the toy watercraft when the toy watercraft is not immersed in water.

FIGS. 1-4 illustrate a toy watercraft 10 in the form of a miniaturized boat incorporating a safety device 50 according to an exemplary embodiment of the present invention. The toy watercraft 10 includes an outer housing 12 preferably made from a suitable plastic or other material that enables the toy watercraft 10 to float in water and be very durable. In the illustrated embodiment, the housing 12 is comprised of upper and lower housing sections 14, 16 that are joined together, in a known manner, during assembly of the toy watercraft 10. However, the housing 12 may have any other suitable structure.

FIG. 2 is a top view of the toy watercraft 10 with the upper housing section 14 removed from lower housing section 16. As illustrated, the lower housing section 16 is structured to contain the operating components of the toy watercraft 10 therein. Specifically, a miniaturized electrical motor 18 is contained within the toy watercraft’s lower housing section 16 for driving a propeller 20 for propelling the watercraft 10 through the water when the motor 18 is energized. A rudder 22 is provided for steering the watercraft 10 (also see FIGS. 3 and 4), thereby providing a fun and exciting toy that simulates a real working watercraft. A battery compartment 24 is provided in the lower housing section 16 for holding a battery 26 for powering the watercraft 10. However, the watercraft 10 may be powered in any other suitable manner.

A power switch 28 includes a working or lever end that extends out from the watercraft 10 in a way that enables a user to selectively move the lever between an “On” and “Off” location (see FIG. 1). When the switch 28 is in the Off position, no power is provided to the motor 18 housed in the watercraft 10 for driving the watercraft 10. Thus, the watercraft 10 does not operate when the switch 28 is in the Off position. When the switch 28 is moved to the On position, power may be provided to the motor 18 based on a sensed parameter of the safety device 50 as discussed in greater detail below. It is noted that the switch 28 could be located in any suitable location on the watercraft 10 depending on the particular design thereof.

The watercraft 10 may be remotely controlled by an operator using, for example, an appropriate wireless transmitter 30. In this embodiment, the watercraft 10 includes an antenna 32 for receiving control signals from the wireless transmitter 30. The wireless transmitter 30 is used in this embodiment to send forward, reverse and turning commands to the watercraft 10 during operation. Turning of the toy watercraft 10 is achieved in a known manner by controlling the angle of rudder 22. Alternatively, the toy watercraft 10 may operate on its own once the motor 18 is energized. For example, the watercraft 10 could have a propeller drive system and/or rudder that causes the watercraft 10 to move in a preset direction. Alternatively, the rudder 22 may be manually movable to a desired location by the user prior to energizing the toy watercraft 10 in a manner that manually preprograms a set direction for the watercraft 10.

The toy watercraft 10 is preferably constructed and designed to simulate a real watercraft, such as a jet ski, boat or other type of watercraft, thereby providing a realistic but miniaturized toy watercraft that can be played with in water, such as in a pool, pond, lake or other suitable body of water. The overall design and construction of toy watercrafts are generally known to those skilled in the art of toy design and manufacture. Thus, no further specific details regarding the particular watercraft itself will be provided herein, so as not to obscure the description of the safety device 50 of the present invention with unnecessary details. The remaining description herein will focus on the safety device 50 itself and explain how the invention can be incorporated into toy watercrafts.

As best shown in FIGS. 3, 3A, and 4, a safety device 50 according to an embodiment of the present invention is incorporated into the lower housing section 16 of the watercraft 10. The safety device 50 is constructed and arranged such that the motor 18 may only be activated to power the propeller 20 when the watercraft 10 is immersed in the water.

As illustrated, the safety device 50 includes first and second sensors 52, 54 that are mounted to the lower surface of the lower housing section 16 in spaced apart relation. As a result, the first and second sensors 52, 54 are immersed or submerged in the water when the watercraft 10 is in the water (see FIG. 6), and the first and second sensors 52, 54 are removed from the water when the watercraft 10 is removed from the water (see FIG. 5).

The first and second sensors 52, 54 are arranged such that operation of the motor 18 and hence the propeller 20 is at least partially determined by a sensed parameter of

【4】 | FIG. 7 is a circuit diagram of the safety device according to an embodiment of the present invention; and FIG. 8 is a schematic view illustrating the safety device according to an embodiment of the present invention and the power circuit of the exemplary toy watercraft of FIG. 1.

Detai... and it is noted that the invention is not limited to such implementations. Instead, the safety device can be implemented in any suitable toy watercraft, regardless of the... it is desired to prevent operation of a motorized component of the toy watercraft when the toy watercraft is not immersed in water.

【5】 | FIGS. 1-4 illustrate a toy watercraft 10 in the form of a miniaturized boat incorporating a safety device 50 according to an exemplary embodiment of the present invention. The toy watercraft 10 includes an outer housing 12 preferably made from a suitable plastic or other material that enables the toy watercraft 10 to float in water and be very durable. In the illustrated embodiment, the housing 12 is comprised of upper and lower housing sections 14, 16 that are joined together, in a known manner, during assembly of the toy watercraft 10. However, the housing 12 may have any other suitable structure.

【6】 | FIG. 2 is a top view of the toy watercraft 10 with the upper housing section 14 removed from lower housing section 16. As illustrated, the lower housing section 16 is structured to contain the operating components of the toy watercraft 10 therein. Specifically, a miniaturized electrical motor 18 is contained within the toy watercraft’s lower housing section 16 for driving a propeller 20 for propelling the watercraft 10 through the water when the motor 18 is energized. A rudder 22 is provided for steering the watercraft 10 (also see FIGS. 3 and 4), thereby providing a fun and exciting toy that simulates a real working watercraft. A battery compartment 24 is provided in the lower housing section 16 for holding a battery 26 for powering the watercraft 10. However, the watercraft 10 may be powered in any other suitable manner.

【7】 | A power switch 28 includes a working or lever end that extends out from the watercraft 10 in a way that enables a user to selectively move the lever between an “On” and “Off” location (see FIG. 1). When the switch 28 is in the Off position, no power is provided to the motor 18 housed in the watercraft 10 for driving the watercraft 10. Thus, the watercraft 10 does not operate when the switch 28 is in the Off position. When the switch 28 is moved to the On position, power may be provided to the motor 18 based on a sensed parameter of the safety device 50 as discussed in greater detail below. It is noted that the switch 28 could be located in any suitable location on the watercraft 10 depending on the particular design thereof.

【8】 | The watercraft 10 may be remotely controlled by an operator using, for example, an appropriate wireless transmitter 30. In this embodiment, the watercraft 10 includes an antenna 32 for receiving control signals from the wireless transmitter 30. The wireless transmitter 30 is used in this embodiment to send forward, reverse and turning commands to the watercraft 10 during operation. Turning of the toy watercraft 10 is achieved in a known manner by controlling the angle of rudder 22. Alternatively, the toy watercraft 10 may operate on its own once the motor 18 is energized. For example, the watercraft 10 could have a propeller drive system and/or rudder that causes the watercraft 10 to move in a preset direction. Alternatively, the rudder 22 may be manually movable to a desired location by the user prior to energizing the toy watercraft 10 in a manner that manually preprograms a set direction for the watercraft 10.

【9】 | The toy watercraft 10 is preferably constructed and designed to simulate a real watercraft, such as a jet ski, boat or other type of watercraft, thereby providing a realistic but miniaturized toy watercraft that can be played with in water, such as in a pool, pond, lake or other suitable body of water. The overall design and construction of toy watercrafts are generally known to those skilled in the art of toy design and manufacture. Thus, no further specific details regarding the particular watercraft itself will be provided herein, so as not to obscure the description of the safety device 50 of the present invention with unnecessary details. The remaining description herein will focus on the safety device 50 itself and explain how the invention can be incorporated into toy watercrafts.

【10】 | As best shown in FIGS. 3, 3A, and 4, a safety device 50 according to an embodiment of the present invention is incorporated into the lower housing section 16 of the watercraft 10. The safety device 50 is constructed and arranged such that the motor 18 may only be activated to power the propeller 20 when the watercraft 10 is immersed in the water.

【11】 | As illustrated, the safety device 50 includes first and second sensors 52, 54 that are mounted to the lower surface of the lower housing section 16 in spaced apart relation. As a result, the first and second sensors 52, 54 are immersed or submerged in the water when the watercraft 10 is in the water (see FIG. 6), and the first and second sensors 52, 54 are removed from the water when the watercraft 10 is removed from the water (see FIG. 5).

【12】 | The first and second sensors 52, 54 are arranged such that operation of the motor 18 and hence the propeller 20 is at least partially determined by a sensed parameter of...
the first and second sensors 52, 54. The sensed parameter is associated with the watercraft's relation to the water such that the operation of the motor 18 is permitted when the sensors 52, 54 are immersed in the water. Likewise, operation of the motor 18 is prevented or ceased when the sensors 52, 54 are removed from the water.

[0031] In the illustrated embodiment, the sensed parameter of the first and second sensors 52, 54 is a resistance between the first and second sensors 52, 54. Thus, activation of the motor 18 that powers the propeller 20 is controlled based on the resistance detected by the first and second sensors 52, 54.

[0032] The first and second sensors 52, 54 are in the form of metal rods 56, e.g., nickel plated stainless steel, or other suitable conductive rod elements. Each rod 56 is secured to the lower surface of the housing section 16, and electrically connected to an application circuit for operating the motor 18.

[0033] As best shown in FIG. 3A, each rod 56 is generally C-shaped, and includes end portions 58, 60 and an intermediate portion 62 interconnecting the end portions 58, 60. The end portions 58, 60 extend through respective openings provided in the lower housing section 16, such that the intermediate portion 62 extends along the outer surface of the lower housing section 16 (see FIG. 4). Each rod 56 may be secured within the respective openings in any suitable manner, e.g., soldered. Moreover, each rod 56 has an end portion 58, 60 that is electrically connected to the application circuit, e.g., via wires (see FIG. 2), for operating the motor 18.

[0034] As shown in FIGS. 5 and 6, the application circuit is the form of a comparator 64 that controls activation of the motor 18 based on the variable resistance between the two sensors 52, 54. The comparator 64 makes use of the difference in conductance between a water medium (a relatively good conductor) and an air medium (a relatively poor conductor). Accordingly, if the resistance between the two sensors 52, 54 is relatively low, e.g., less than about 5 MΩ, the comparator 64 recognizes that the watercraft 10 is in the water and provides a “High” output to the power circuit 70 to permit operation of the motor 18 (FIG. 6). Likewise, if the resistance between the two sensors 52, 54 is relatively high, e.g., greater than about 100 MΩ, the comparator 64 recognizes that the watercraft 10 is in the air, and provides a “Low” output to the power circuit 70 to prevent or cease operation of the motor 18 (FIG. 5).

[0035] FIG. 7 is a circuit diagram of an embodiment of the comparator 64. As illustrated, the comparator 64 includes the pair of sensors (indicated as A and B), a diode D1, a number of resistors R1, R2, R3 and R4, and two transistors Q1 and Q2. When the watercraft 10 is immersed in water (FIG. 6), the sensors A, B are immersed in water and the circuit is completed, giving the relatively low electrical resistance in the water medium, with a small potential difference across AB. The transistor Q2, which serves as a signal inverter, then signals Q1 (which detects the surrounding resistance) to permit activation of the motor 18. That is, the feedback resistance from the sensors A, B is smaller than the resistance of R3, e.g., the voltage across R3 is greater than about 0.7V, thereby allowing the transistors Q1 and Q2 to turn on. The output point C goes to “High”, and the motor 18 may be activated to power the propeller 20.

[0036] Alternatively, when the watercraft 10 is removed from water (FIG. 5), the sensors A, B are removed from water and the circuit is broken, giving the relatively high electrical resistance in the air medium. The transistor Q2 sends an inverter signal to transistor Q1 to prevent activation of the motor 18. That is, the feedback resistance from the sensors A, B is greater than the resistance of R3, e.g., the voltage across R3 is less than about 0.7V, thereby turning the transistors Q1 and Q2 off. The output point C goes to “Low”, and the motor 18 may not be activated to power the propeller 20.

[0037] The sensors 52, 54 are spaced apart from one another a suitable distance to avoid completion of the circuit by residual water patches that are carried by the housing 12 when the watercraft 10 is removed from the water. Specifically, if the sensors 52, 54 are relatively close to one another, there is a greater likelihood that residual water patches may complete the circuit and allow the motor 18 to power the propeller 20 in the air until the water patches drain off. Thus, the sensors 52, 54 are preferably spaced on outer ends of the housing 12 (e.g., see FIGS. 3 and 4) to avoid such completion of the circuit when the watercraft 10 is removed from the water. Also, as shown in FIG. 4, the sensors 52, 54 are mounted on inclined portions of the lower housing section 16 such that water drains away from the sensors 52, 54 when the watercraft 10 is removed from the water. This arrangement helps to reduce residual water patches around the sensors 52, 54.

[0038] FIG. 8 is a schematic view that illustrates the relation between the safety device 50 and the power circuit 70. As illustrated, the power circuit 70 includes a controller 72 operable to provide power from the battery 26 to the motor 18 that drives the propeller 20 based on input signals from several input devices. As illustrated, the input devices include the safety device 50, the power switch 28, and the wireless transmitter 30 communicated to the controller 72 via the antenna 32.

[0039] When the switch 28 is in the Off position, no power may be provided from the battery 26 to the motor 18. Thus, the propeller 20 cannot operate when the switch 28 is in the Off position. When the switch 28 is moved to the On position, power may be provided from the battery 26 to the motor 18 based on the safety device 50. As explained above, power may be provided to the motor 18 when the watercraft 10 is in the water. Thus, the propeller 20 can only operate when the switch 28 is in the On position and the watercraft 10 is in the water. Once these two parameters are satisfied, operation of the propeller 20 may be controlled by the wireless transmitter 30. That is, the wireless transmitter 30 may send forward and reverse commands, and may control the speed of the watercraft 10. If the watercraft 10 is removed from the water and/or the power switch 28 is moved to the Off position, activation of the motor 18 and hence the propeller 20 is prevented or ceased. It is noted that the watercraft 10 may not include a power switch 28 and/or wireless transmitter 30, and operation of the motor 18 may be wholly determined based on the safety device 50.

[0040] As can be seen from the above description, the present invention provides a safety device 50 that can be used in an easy and effective manner in connection with motorized toy watercraft. The safety device 50 eliminates the need for a housing that encloses the watercraft propeller,
as the propeller 20 will only operate when immersed in water. In this way, the safety device 50 provides for safe, efficient, and high performance operation of the toy watercraft 10.

[0041] The above structure and arrangement of operating components is only exemplary, and any other suitable structure and arrangement of operating components may be utilized. The present invention is applicable to any suitable toy watercraft that is powered by a propeller, such as toy boats, toy personal watercrafts (such as a toy "Jet Ski") and the like. Additionally, as noted above, the safety device may be implemented in any toy watercraft in which it is desired to prevent operation of a movable component, e.g., propeller, when the toy watercraft is not immersed in water so that the movable component is not harmful to the user, e.g., children.

[0042] While the invention has been described in connection with what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the invention.

What is claimed is:

1. A toy watercraft comprising:
a housing;
a motor contained within the housing and operatively connected with a propulsion system for propelling the watercraft when the motor is operated; and
a safety device constructed and arranged to permit operation of the motor when the watercraft is immersed in water, and prevent operation of the motor when the watercraft is removed from water.

2. The toy watercraft according to claim 1, wherein the safety device includes first and second spaced-apart sensors provided on an external surface of the housing, the first and second sensors being arranged such that operation of the motor is determined by a sensed parameter of the first and second sensors.

3. The toy watercraft according to claim 2, wherein the sensed parameter is associated with the watercraft’s relation to water such that the operation of the motor is permitted when the first and second sensors are immersed in water, and operation of the motor is prevented when the first and second sensors are removed from water.

4. The toy watercraft according to claim 3, wherein the sensed parameter is a resistance between the first and second sensors.

5. The toy watercraft according to claim 4, wherein operation of the motor is permitted when the resistance between the first and second sensors is relatively low.

6. The toy watercraft according to claim 5, wherein operation of the motor is permitted when the resistance between the first and second sensors is less than about 5 MΩ.

7. The toy watercraft according to claim 4, wherein operation of the motor is prevented when the resistance between the first and second sensors is relatively high.

8. The toy watercraft according to claim 7, wherein operation of the motor is prevented when the resistance between the first and second sensors is greater than about 100 MΩ.

9. The toy watercraft according to claim 2, wherein the first and second sensors are metal rods electrically connected to an application circuit for operating the motor.

10. The toy watercraft according to claim 9, wherein the application circuit includes a comparator that controls operation of the motor based on a resistance between the first and second sensors, the comparator structured to use a difference in conductance between a water medium and an air medium to determine if the watercraft is immersed in water or removed from water.

11. The toy watercraft according to claim 10, wherein the comparator includes the first and second sensors, a diode, a plurality of resistors, and two transistors, the comparator being configured such that (1) a feedback resistance from the first and second sensors smaller than a selected one of the resistors turns the two transistors on to allow activation of the motor, and (2) a feedback resistance from the first and second sensors greater than the selected one of the resistors turns the two transistors off to prevent activation of the motor.

12. The toy watercraft according to claim 9, wherein the first and second sensors are spaced apart from one another such that the first and second sensors are spaced apart by a suitable distance to avoid completion of the application circuit by residual water patches that are carried by the housing when the watercraft is removed from water into air.

13. The toy watercraft according to claim 1, wherein the propulsion system includes a propeller.

14. A safety device for a toy watercraft including a housing and a motor contained within the housing and operatively connected with a propulsion system for propelling the watercraft when the motor is operated, the safety device comprising:

first and second spaced-apart sensors provided on an external surface of the housing, the first and second sensors being arranged such that operation of the motor is determined by a sensed parameter of the first and second sensors,

wherein the sensed parameter is associated with the watercraft’s relation to water such that the operation of the motor is permitted when the first and second sensors are immersed in water, and operation of the motor is prevented when the first and second sensors are removed from water.

15. The safety device according to claim 14, wherein the sensed parameter is a resistance between the first and second sensors.

16. The safety device according to claim 15, wherein operation of the motor is permitted when the resistance between the first and second sensors is relatively low.

17. The safety device according to claim 16, wherein operation of the motor is permitted when the resistance between the first and second sensors is less than about 5 MΩ.

18. The safety device according to claim 15, wherein operation of the motor is prevented when the resistance between the first and second sensors is relatively high.

19. The safety device according to claim 18, wherein operation of the motor is prevented when the resistance between the first and second sensors is greater than about 100 MΩ.

20. The safety device according to claim 14, wherein the first and second sensors are metal rods electrically connected to an application circuit for operating the motor.
21. The safety device according to claim 20, wherein the application circuit includes a comparator that controls operation of the motor based on a resistance between the first and second sensors, the comparator structured to use a difference in conductance between a water medium and an air medium to determine if the watercraft is immersed in water or removed from water.

22. The safety device according to claim 21, wherein the comparator includes the first and second sensors, a diode, a plurality of resistors, and two transistors, the comparator being configured such that (1) a feedback resistance from the first and second sensors smaller than a selected one of the resistors turns the two transistors on to allow activation of the motor, and (2) a feedback resistance from the first and second sensors greater than the selected one of the resistors turns the two transistors off to prevent activation of the motor.

23. The safety device according to claim 20, wherein the first and second sensors are spaced apart from one another a suitable distance to avoid completion of the application circuit by residual water patches that are carried by the housing when the watercraft is removed from water into air.