Dec. 20, 1966 J. A. FORS 3,292,303

CONTROLLABLY SUBMERSIBLE TOY

Filed Aug. 27, 1964 2 Sheets-Sheet 1

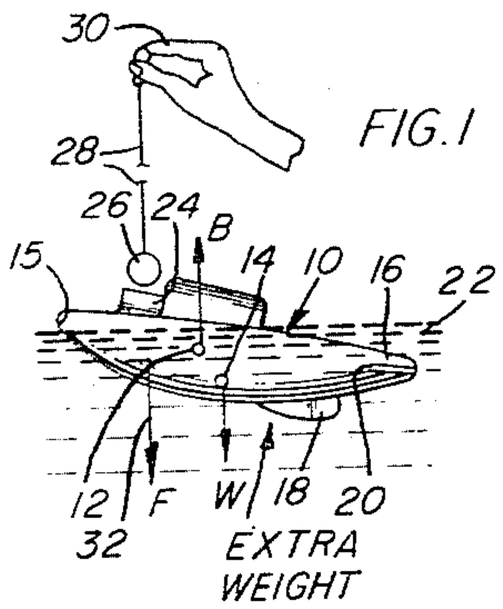

FIG. 1

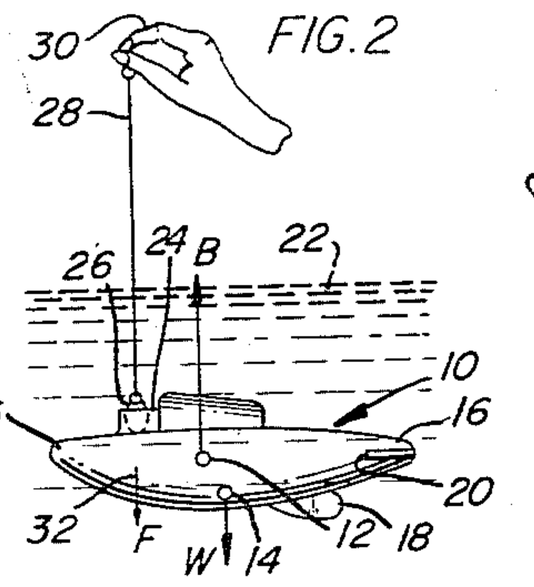

FIG. 2

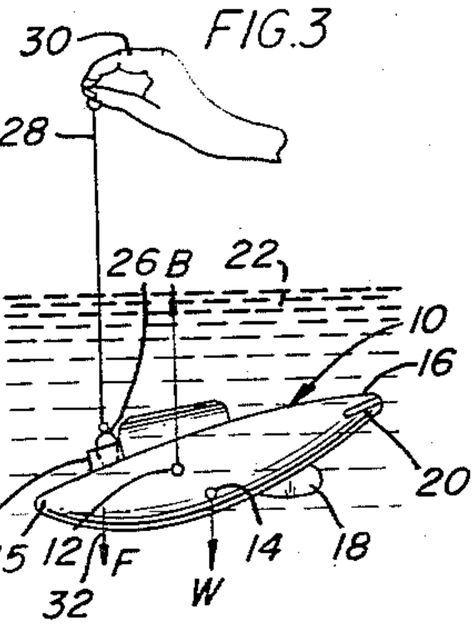

FIG. 3

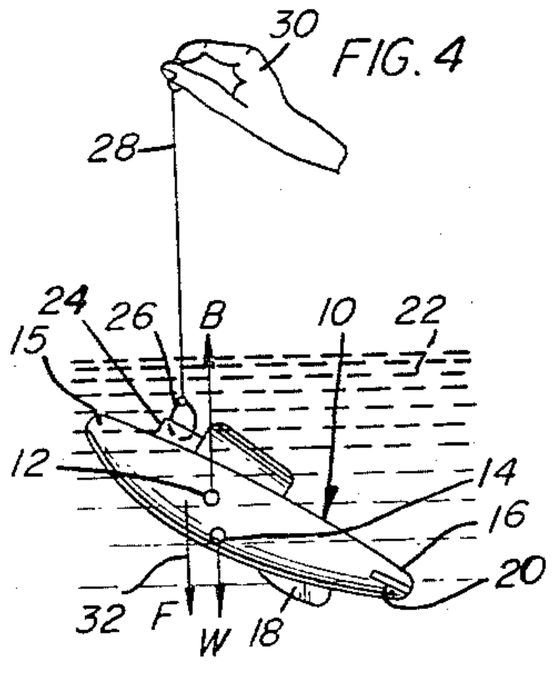

FIG. 4

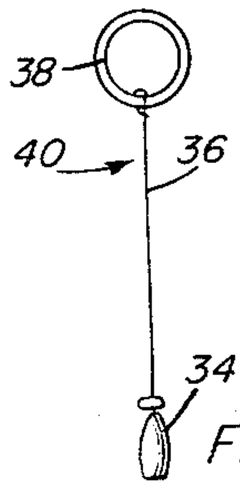

FIG. 5

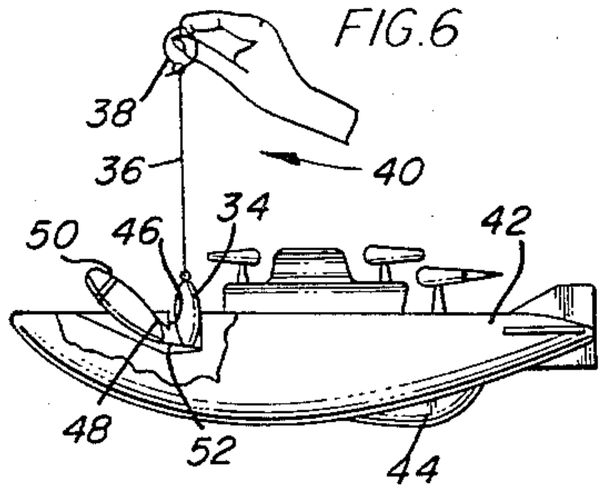

FIG. 6

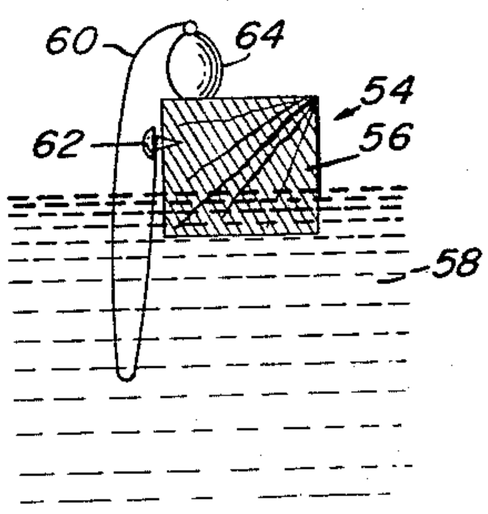

FIG. 7

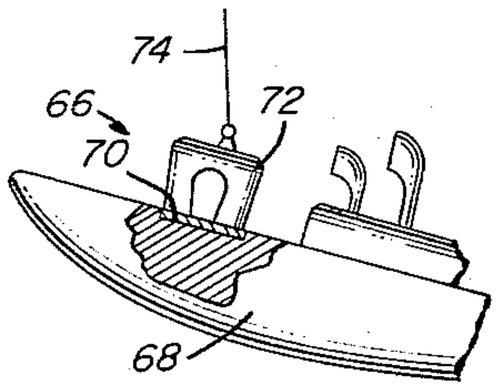

FIG. 8

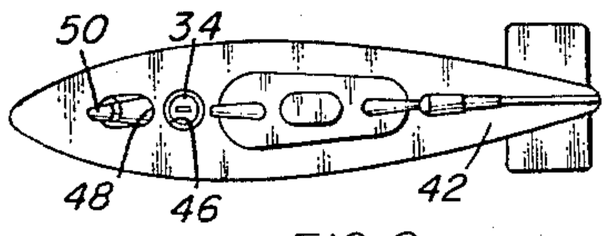

FIG. 9

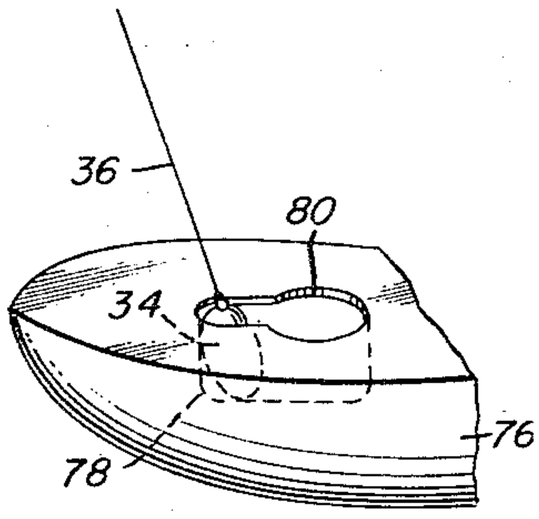

FIG. 10

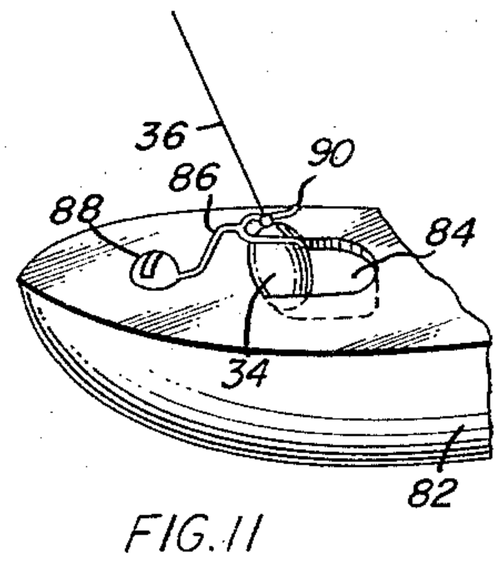

FIG. 11

INVENTOR
JAMES A. FORS

BY

ATTORNEY

Dec. 20, 1966 J. A. FORS 3,292,303

CONTROLLABLY SUBMERSIBLE TOY

Filed Aug. 27, 1964 2 Sheets-Sheet 2

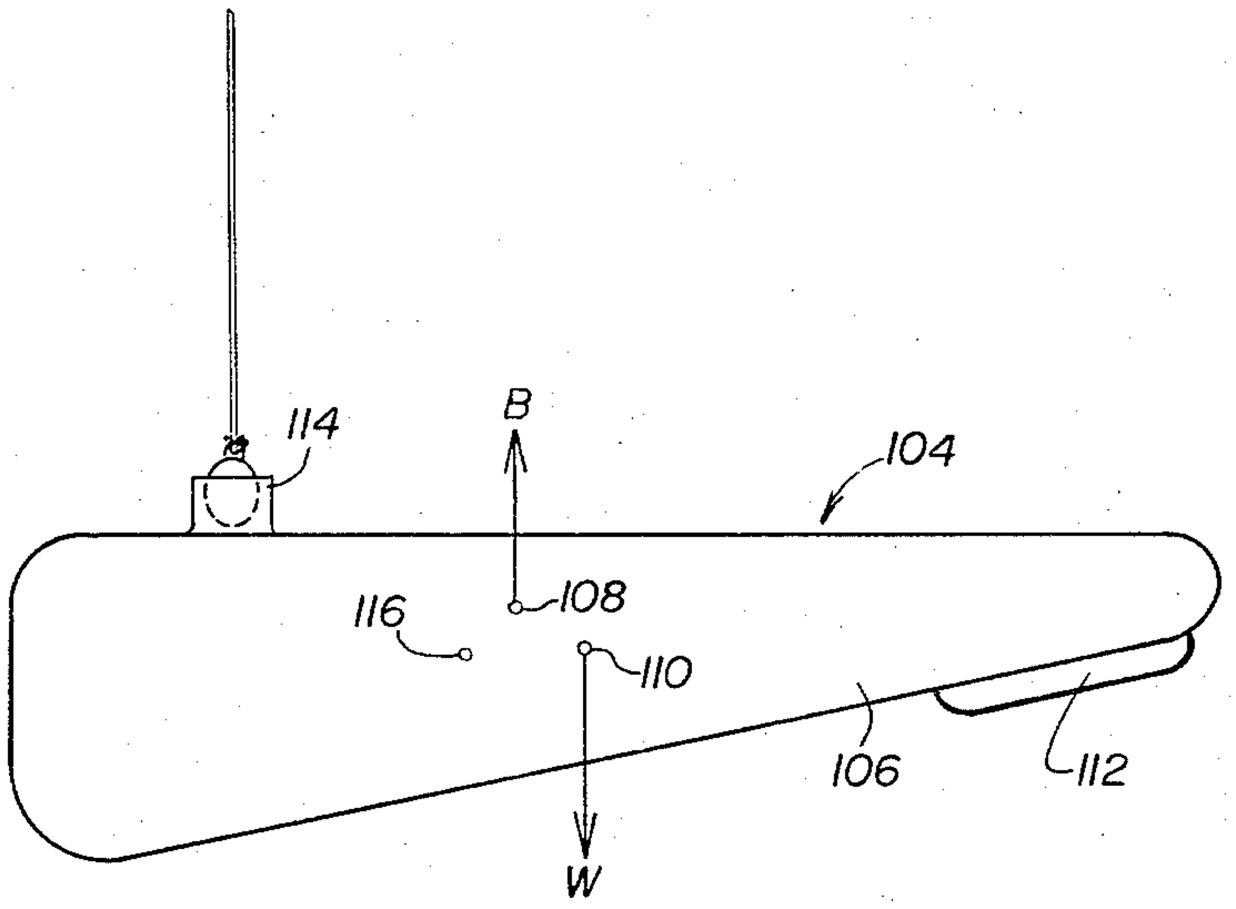

FIG. 14

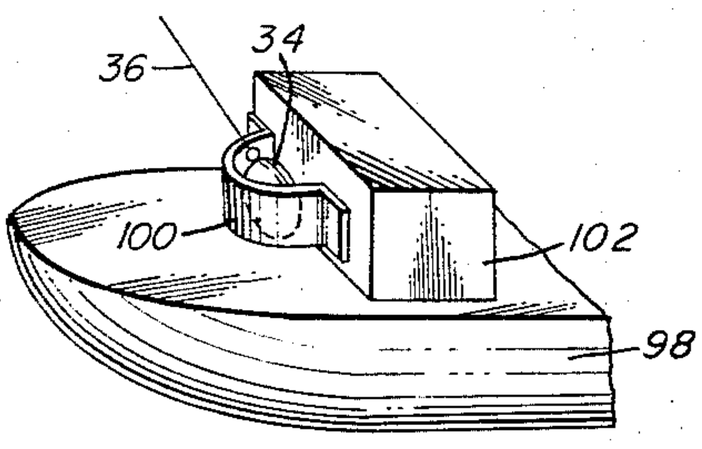

FIG. 13

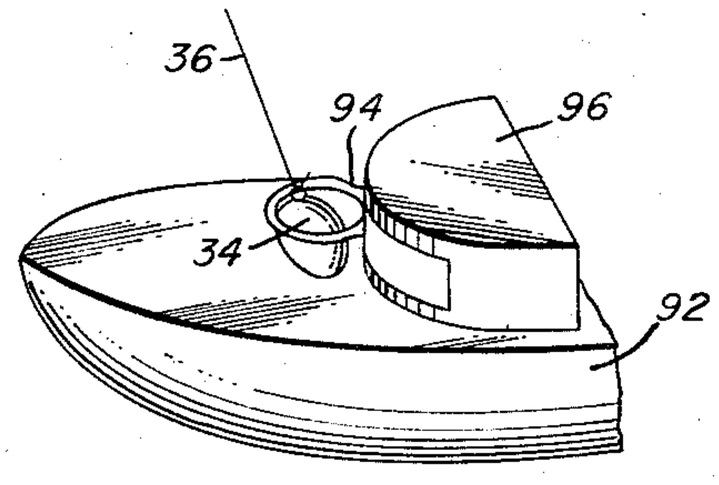

FIG. 12

Inventor
James A. Fors

By

Brangley Baird Clayton Miller & Vogel.
Attys.

United States Patent Office

3,292,303

Patented Dec. 20, 1966

3,292,303
CONTROLLABLY SUBMERSIBLE TOY

James A. Fors, 4958 W. Parker Ave.,
Chicago, Ill. 60639

Filed Aug. 27, 1964, Ser. No. 393,485
6 Claims. (Cl. 46—94)

This is a continuation-in-part of application Serial No. 95,124, now Patent No. 3,147,567, filed Mar. 13, 1961.

This invention relates to a submersible toy. More particularly it relates to a toy which may be manually manipulated in water in any desired direction.

It is an object of this invention to provide a toy which under manual control through a cord or string may be manipulated up and down and about in a body of water.

A further object is to provide a submersible toy manually controlled by a cord or string which is separable from said toy.

Still another object is to provide such a toy in which separation of the control cord is readily effected manually without touching the submersible toy.

A still further object is to provide a toy which under manual control through a cord or string may be manipulated up and down and about in a body of water and in which the cord or string is readily separable from the remainder of the toy without touching the latter.

A further object is to provide such a toy having a portion simulating a torpedo releasable by said cord or string.

Other objects will appear hereinafter.

In order that the invention may be better understood, reference is made to the accompanying drawings which form a part of this specification and in which

FIGURE 1 is a view in elevation of a toy embodying features of this invention;

FIGURE 2 is a view of the same toy submerged;

FIGURE 3 is another view of the same toy being directed downwardly;

FIGURE 4 is still anotther similar view showing the same toy being directed upwardly;

FIGURE 5 is a view in elevation of a cord and weight embodying features of the present invention;

FIGURE 6 is a view in elevation of another submersible toy embodying features of the present invention;

FIGURE 7 is a view in elevation of a simulated depth charge and floating support used in accordance with the present invention;

FIGURE 8 is an enlarged view in elevation of another modification of the submersible toy forming the subject matter of this invention;

FIGURE 9 is a plan view of the toy shown in FIGURE 6; and

FIGURES 10, 11, 12, and 13 are fragmentary views in perspective of various modifications of the toy shown in FIGURE 1; and

FIGURE 14 is a view in elevation of another toy embodying features of this invention.

Referring first to FIGURES 1 to 4, it is pointed out that these figures show a toy element **10** generally simulating a submarine although it could just as well simulate a fish or any other submersible body. Whatever it simulates, however, the element **10** should have a specific gravity less than that of water so that by itself it has substantial buoyancy and will float in water.

Another important characteristic of the toy element **10** is that it is so constructed that its center of buoyancy **12** indicaed by the arrow and the letter "B" is located forwardly of the center of gravity **14** indicated by the arrow and the letter "W" in FIGURES 1 to 4, inclusive. As a result, the toy element **10** floats alone with its forward end **15** higher than its rear end **16** as shown in FIGURE 1.

The toy element **10** may be formed of any desired material. As might be expected, a particularly suitable material of which to form the body of element **10** is wood. Whatever may be the way in which the element **10** is given its buoyancy, it is particularly convenient to displace the center of gravity **14** toward the rear **16** by including in the element **10** a portion **18** designated "extra weight," which is located toward the rear **16** and has a density substantially greater than that of the remainder of the element **10**. By locating the portion **18** on what is intended to be a lower part of the element **10**, the element is caused to remain in the desired position in the water with the portion designed to be uppermost in that position. A body of relatively dense metal serves very well as the body **18**. Fins such as **20** may be provided if desired but should not normally be depended upon to maintain the element **10** in the desired position in the water or to guide its movements within the water designated **22**.

Forwardly of the center of buoyancy **12** and on what is intended to be the upper surface of the element **10**, a cup-shaped portion **24** is preferably provided at a location predetermined as hereinafter explained, to maintain the desired balance of element **10** in the water **22**. The position of portion **24** is such as to satisfy two conditions as will become clear and in this connection has a distinct relation to the locations of the center of buoyancy **12** and the center of gravity **14** as will be explained.

The toy element **10** as heretofore indicated, by itself, floats in water in the position shown in FIGURE 1. It will be noted that in this FIGURE 1 there is shown suspended above the toy element **10** a weight **26** supported on a string or cord **28** held by the hand **30** of the person manipulating the toy **10**. The weight **26** as will appear is designed to be received relatively snugly in the cup-shaped portion **24**. The weight **26** is so selected with reference to the element **10** that when manual support of weight **26** by the hand **30** of the manipulator is no longer provided the element **10** will dive as shown in FIGURE 3. The arrow **32** and letter "F" in FIGURES 1 to 4 indicate the position and direction of the force exerted by the weight **26** on the element **10**. The weight of the portion **26** is of such magnitude that the center of gravity of the combination of element **10** and weight **26** when positioned as shown in FIGURES 2, 3, and 4 is forwardly of the center of buoyancy **12** of element **10**. On the other hand, the weight of weight **26** preferably does not greatly exceed the value required to meet the foregoing requirements. It is, however, desirable that weight **26** remain in the cup **24** except when lifted therefrom by a sharp jerk or when it is removed therefrom by continued lifting after toy element **10** has reached the position shown in FIGURE 1.

The value of weight **26** and the position of cup **24** in addition to being such that vertical manual manipulation of cord **28** as described may cause element **10** to be disposed in various positions as shown in FIGURES 1 to 4 should also be such that element **10** may be readily guided through a body of water such as illustrated at **22**. It has been found that when element **10** and weight **26** are so designed that the foregoing conditions are satisfied and the cup **24** or its equivalent are located in the forward portion and perferably the forward one third of element **10**, the latter may be very readily guided through forward movements, upward, downward, or horizontal through a cord or string **28** attached, as shown, to the weight **26**. Manipulation of the hand **30** under the circumstances described will cause the element **10** to follow substantially exactly the movements of the hand **30** through a path varying as to the horizontal from a circle

to any other desired form and the weight balance described at the same time permits the path to be varied vertically by the same means. The design is still further improved by locating the position of cup **24** in the forward one fourth of element **10** and still better results are obtained if the location is just within the forward one fifth. Attempts to place the location of cup **24** closer to the forward end of element **10**, however, while acceptable from the guidance standpoint tend to produce unrealistic designs and structures in which the element **10** when free of weight **26** as shown in FIGURE 1 tilts upwardly too far. For each of the possible locations on element **10** at which weight **26** acts, the center of buoyancy **12** must be located to the rear of the position where weight **26** acts and the center of gravity **14** must, in turn, be located rearwardly of the center of buoyancy **12**.

Referring next to FIGURE 5, it will be seen that there is shown therein a device consisting of a weight **34** secured to a lower end of a cord **36** which correspond, respectively, to the weight **26** and cord **28** above described. Secured to the upper end of cord **36** is a ring **38** preferably of a size conveniently received on a finger. The ring **38** when placed over the finger of a manipulator serves to insure that the weight **34** and cord **36** remain under the control of the manipulator when the cord and weight are placed in the water or the weight **34** is dropped into a body of water. Since the weight **34** is similar to the weight **26**, it can serve the purposes of the weight **26** as above described in connection with manipulations of the elements such as element **10**. The device desginated generally **40**, consisting of weight **34**, cord **36** and ring **38**, also has another use, however, in connection with which the ring **38** becomes particular desirable. Assuming that the element **10** simulates a submarine, the device **40** may be employed to simulate a depth charge employed to damage the element **10**. If, while the element **10** is being manipulated under water as shown in FIGURES 2, 3, and 4, the weight **34** is dropped down through the water **22** so that it engages the top part of the element **10** adjacent to the position where the weight **26** is acting upon element **10**, the effect of the weight **34** is to push the forward end of element **10** downwardly in the water **22**, in many cases causing the weight **26** to become separated from the cup **24** so that the hand **30** of the manipulator loses control over the element **10** which is then considered to have been damaged or sunk.

FIGURE 6 shows, in enlarged form, a simulation **42** of a submarine, which corresponds to the element **10** shown in FIGURES 1 to 4 for the purposes of the present invention. It is preferably provided with a weight **44** similar to weight **18** and has its centers of gravity and buoyancy located as above described. As shown in FIGURE 6, a portion of the submarine **42** is broken away adjacent the forward end to reveal a recess **46** which is somewhat deeper than the cup **24**, but as is clearly shown in FIGURE 9, the recess **46** like the cup **24** is located midway between the sides of the submarine **42**. Communicating with the recess **46** within the body of the submarine **42** is a second recess **48** extending forwardly and upwardly from the bottom of the recess **46** as shown. The submarine **42** is designed to be manipulated in substantially the same way as is described above in connection with the element **10**, and to this end, the device **40** is shown positioned in operating relation to the submarine **42** with the weight **34** seated in the recess **46** which is preferably of such size that it just receives the weight **34** comfortably.

Extending upwardly out of the recess or opening **48** is a device **50** simulating a torpedo. The lower end of this torpedo **50** has a strip **52** thereon either formed integrally with the torpedo **50** or suitably secured thereto. The strip **52**, which is perferably thin, may be formed of any desired material, but as shown in FIGURE 6 is long enough to extend from the lower end of the torpedo **50** down underneath the weight **34** so that the weight **34** rests on the lower end of the strip **52**. In addition to being thin, strip **52** is also preferably relatively narrow laterally of the submarine **42**.

In the use of the submarine **42** illustrated in FIGURE 6, the submarine is positioned in a body of water such as the body of water **22** with the torpedo **50** extending in the recess **48** as shown and with the weight **34** resting on the end of the strip **52** as is also shown. The submarine **42** may then be manipulated in the water manually in the same way as the element **10** described above. The torpedo **50** and the associated strip **52** are so constructed that this combination has substantial buoyancy in a body of water such as **22**, which may be accomplished in any desired way such as by forming the torpedo **50** of a material having a specific gravity less than that of water or by providing a closed air-chamber within the torpedo **50**. In any event, with the various parts assembled as shown in FIGURE 6, when the submarine **42** is manipulated in a body of water such as **22** in the normal manner described above, the weight **34** resting on the strip **52** retains the torpedo **50** in the position shown in the recess **48** despite the buoyancy of the torpedo **50**. However, if the manipulator gives a slight upward jerk to the cord **36**, the weight **34** is momentarily lifted part way out of the recess **46** so that it no longer rests upon the strip **52** and the result is that the buoyancy of the torpedo **50** then causes the latter to rise upwardly out of the recess **48** and travel upwardly in an inclined path toward the surface of the water **22**. A little bit of practice will enable the person manipulating the submarine **42** to jerk the cord **36** just sufficiently to release the torpedo **50** without jerking the weight **34** all the way out of the recess **46**, thus losing control over the submarine **42**. Also, with a moderately minimum amount of practice it becomes possible for the manipulator to so release the torpedo **50** that in its path of travel upwardly it will strike another object in the water at which it is aimed, as, for example, another submarine like the submarine **42**.

Turning now to FIGURE 7, it is pointed out that the device **54** as shown serves a purpose which is at least in part similar to that served by the device **40**. The device **54** comprises a float portion **56** which may be of any desired size or configuration, its chief characteristic being that it has substantial buoyancy so that the float may, for example, simply be a block of wood. The float **56** has a cord **60** secured thereto by suitable fastening means such as the tack **62** illustrated. The other end of the cord **60** is secured to a weight **64** generally similar to the weights **34** and **26** previously described. The weight **64** like the weight **34** is used to simulate a depth charge and which is normally supported on the float **56** as shown. When it is desired to employ the weight **64** as a depth charge, the float **56** is manually manipulated on the surface of the water to a position such that when the weight **64** is pushed off the float, it will drop on a submarine such as the submarine **42** or another type of element **10** in such a way as to cause the element to become disengaged from the weight and cord by which it is manipulated. The weight **64** is then pushed off the float **56** so that it drops down into the water as desired. Alternatively, the float **56** may serve merely as a support for the weight **64**, which when used as a depth charge, is lifted off the float **56** and aimed and dropped manually.

FIGURE 8 is a fragmentary view of the forward end of an element such as the element **10**, which simulates a submarine. This device designated generally by the numeral **66** comprises a portion **68** which simulates the submarine and has the same characteristics and features as the element **10** except as will be pointed out. In the drawing a portion of the submarine **68** adjacent the bow is broken away to reveal an iron plate **70** embedded in the deck of the submarine **68** and secured thereto. Positioned in engagement with the plate **70** is a magnet **72** having a cord **74** secured thereto. The plate **70**, which is located centrally between the sides of the sub-

marine **68**, preferably has a periphery conforming substantially to the overall periphery of the end of the magnet **72**. By this is meant that the plate is continuous across the open space between the two holes of the magnet **72** as well as across the pole faces. This arrangement facilitates location of the magnet in a desired predetermined position which is indicated by the location of the plate **70**.

In the device **66** the magnet **72** serves two purposes. In addition to serving as a means for connecting the cord **74** to the submarine **68**, it also serves the functions of the weights **26** and **34** which are described above. Thus, the position of the plate **70** is determined in the same way as the position of the cup **24** and of the recess **46** is determined as already described, and a weight is selected for the magnet **72** in the same way as the value of the weights **26** and **34** is determined. Thus, when the magnet **72** is positioned on the plate **70** as shown, the submarine **68** may be manipulated about a body of water in the same way as element **10** is manipulated as shown in FIGURES 2, 3, and 4. On the other hand, the device **66** has the characteristic that the magnet **72** is more difficult to dislodge from the submarine **68** than are the weights **26** and **34**. The plate **70** and magnet **72** are preferably chosen so that the force of attraction between them is of a low order with the result that the magnet **72** can be disengaged from the plate **70** by an upward jerk on the cord **74**. This feature is advantageous where it is desired to manipulate an element such as the submarine **68** so as to cause it to pass beneath some other object in or on the same body of water. To this end, the submarine **68** is manipulated so as to give it the necessary momentum to pass under the object in question and then the cord **74** is jerked to disconnect the magnet **72** from the plate **70** and the latter are lifted over the object in question and then lowered again into engagement with the plate **70** after the submarine **68** has completed its passage under the object. It will also be apparent that this same maneuver may be executed with the element **10** or the submarine **42** in which the weights are merely seated in recesses such as the cup **24** and the recess **46**.

FIGURE 10 shows the forward end of another form **76** of the element **10**, also simulating a submarine. The submarine **76** also has the same characteristics and features as the element **10** except that a recess **78** is provided below the deck of the submarine to receive a weight such as the weight **34**. Access to the recess **78** is provided by a key hole slot **80** on the deck of the submarine. The larger portion of the key hole slot **80**, which is positioned toward the stern of the submarine, is of suitable size to permit the weight **34** to pass therethrough, but the narrower portion of the key hole slot is narrow enough so that the weight **34** cannot pass through it. The recess **78** is so formed and positioned that when the weight **34** is in the forward portion thereof as shown beneath the narrow portion of the key hole slot **80**, the weight **34** is properly positioned with respect to the remainder of the submarine **76** in the same manner as the weights **26** and **34** are positioned, respectively, by the cup **24** and the recess **46** with respect to the element **10** and the submarine **72**.

In the use of the submarine **76** illustrated in FIGURE 10, the weight **34** is passed through the larger portion of the key hole slot **80** into the recess **78** and the cord **36** is then given a pull in a forward direction with respect to the submarine **76** to seat the weight **34** under the narrow portion of the slot **80**. Thereafter, so long as the submarine **76** is manipulated in the water in the normal way in which the cord **36** extends forwardly from the slot **80**, the weight **34** will be retained in the recess **78**. However, if it is desired to disengage the weight **34** from the submarine **76** for a purpose such as is described above in connection with the device **66**, by manipulating the cord **36** rearwardly in connection with the submarine **76** the weight **34** is brought into alignment with the larger portion of the slot **80** and may then readily be lifted through it.

FIGURE 11 shows still another modification similar to that shown in FIGURE 10. In this embodiment of the invention, an element **82** simulating a submarine is provided, only the forward portion thereof being shown in the drawing. The submarine **82** also corresponds in all respects with the element **10** as described above except in respect to the means provided thereon for cooperating with the weight **34** and cord **36**. As revealed by breaking away a portion of the submarine **82** in FIGURE 11, a recess **84** is provided below the deck of the submarine. This recess **84** is similar in horizontal cross section and position to the recess **78**, but as appears in the drawings is shallower than the recess **78** so that the weight **34** when seated therein extends above the deck of the submarine **82**.

Forwardly of the recess **84** an arm **86** is secured to the deck of the submarine **82** as at **88**. This arm **86** as may be seen extends upwardly and rearwardly and terminates in a yoke **90**. The yoke **90** as may be seen is centrally located laterally of the submarine and is positioned over the forward portion of the recess **84**. The weight **34** is readily placed in the recess **84** by inserting it in the rear portion of the recess. When the cord **36** is then pulled forwardly in normal operation of the submarine **82**, the weight **34** becomes engaged in the yoke **90** so that it is held in position in the recess **84** in proper relation to the centers of gravity and buoyancy of the submarine **82** as described above in connection with element **10**. As will be apparent, to remove the weight **34** from the recess **84** the cord **36** is moved rearwardly carrying the weight **34** to the rear of the recess from which it may readily be lifted without engaging the yoke **90**.

Two additional ways in which the weight **34** may be retained in operating position are shown in FIGURES 12 and 13. In FIGURE 12, which shows the forward end of a submarine **92**, a ring **94** is provided which is suitably secured to the forward wall of the superstructure **96** of the submarine a short distance above the deck. The submarine **92** is similar to the element **10** in its main features of construction, and in particular, in reference to the locations of its center of gravity and its center of buoyancy. The ring **94** is positioned on the submarine **92** in such a way as to locate the weight **34** centrally between the sides of the submarine and in the proper relation to the center of buoyancy and the center of gravity as above described. The simulation **98** of a submarine shown in FIGURE 13 is identical with the submarine **92** with the exception that the ring **94** is omitted and in its place there is substituted a band **100** secured to the forward wall of the superstructure **102** to provide means for receiving and retaining the weight **34** in its proper operating relation to the submarine **98**.

The modification shown in FIGURE 14 further illustrates the feature of this invention which is concerned with the guidance of the toy through forward movements in a generally horizontal direction, particularly when it is completely submerged. As may be seen, this embodiment also includes an element **104** simulating a submarine which for the purpose of better illustrating the guidance feature is provided with a hull **106** having a somewhat unusual or exaggerated configuration in that the broadside area of the forward or bow end is much larger than that of the stern end.

Like the toy element **10**, the toy **104**, by itself, floats in water and is so constructed that its center of buoyancy **108** indicated by the arrow and letter B is located forwardly of the center of gravity **110** indicated by the arrow and the letter W. Thus, as explained above, element **104**, like element **10**, floats alone with its forward end higher than its rear end. The body or hull **106** of toy **104** also, similarly to element **10**, is preferably formed of wood and, as also explained above, the center of gravity is displaced

toward the stern by a weight **112** secured to the underside of the hull **106** adjacent the stern, which weight also serves when the toy **104** is in the water, to maintain a predetermined surface of the hull uppermost.

On the uppermost portion of the hull of toy **104** a cup-shaped portion **114** is provided which corresponds to cup-shaped portion **24** on element **10** and thus serves to receive a weight such as the weight **26** during manipulation of the toy in water, as explained above. It has already been pointed out above that in accordance with the teachings of this invention, the cup-shaped portion **114**, which serves as the weight-receiving means, must be located forwardly of the center of buoyancy in a position such that the center of gravity of the combination of the element **104** and the weight **26** when positioned in recess **114** is located forwardly of the center of buoyancy **108**. It has also been pointed out that in addition to satisfying the foregoing conditions, the weight-receiving means, such as recess **114**, should be located in the forward portion of the toy and preferably in the forward one-third portion in order to facilitate movements of the toy **104** in horizontal paths, particularly in such paths which are curved or circular.

While for the purpose of such horizontal guidance, the location of the open upper end of the weight-receiving means in the forward portion of the toy or element is satisfactory in respect to toys such as toy or element **10** which have a more or less conventional and symmetrical configuration, it is necessary to state the requirement in different terms in order to make it applicable in respect to toy submarines and the like having hulls of other configurations such as that of the hull **106** of toy **104**. More particularly, such more general statement is that the open upper end of the weight-receiving means must be located forwardly of the centers or horizontal pressure on the sides of the toy when the toy is submerged. In the circumstances involved here, these centers will lie on the lines of intersection of the outer surface of the hull with a plane perpendicular to the longitudinal axis of the hull and intersecting a central, vertical longitudinal plane through the hull in a line which passes through the centroid of the area defined by the intersection of the latter plane with the outer surface of toy **104**. Preferably, the open upper end of the weight-receiving means is also located so that the maximum vertical longitudinal cross-sectional area of said toy forwardly the midpoint longitudinally of said open upper end is less than the corresponding area to the rear thereof. In FIGURE 14 the center of pressure on the side of toy **104** which is shown is indicated at **116**, the center of pressure on the other side being directly opposite thereto.

While the precise pressures are immaterial, the reference to the centers of pressure provides a convenient means for expressing the idea that when a lateral pull is exerted on the toys herein disclosed, the turning effect on the toy will be determined by whether the vertical cross-sectional area of the water against which the portion of the toy forward of the point where the pull is exerted has to move is greater or less than the remainder of that area. If the area forward is lesser, the forward portion of the toy will encounter less resistance to its movement and will thus move more rapidly in the direction of the pull than the after portion, thus causing the toy to turn in the proper way.

As will be apparent, when the weight-receiving means, such as **114** and the like, is located forwardly of the centers of horizontal pressure on the sides of the hull, the weight **26** when in the weight-receiving means will also be located forwardly of those centers of pressure. In a more general way, the important point is that the place where the string or cord **28** is secured to the weight **26** should be located forwardly of the said centers of pressure when the weight **26** is in the weight-receiving means since this is generally the place where the lateral pull is actually exerted on the toy. Also, it is preferable

that such place of connection or place where the pull is applied be located a substantial distance forwardly of the said centers of pressure and to this end, it is desirable that all of the open upper end of the weight-receiving means be located forwardly of the said centers of pressure. It is also pointed out that when the toy or element **104** is submersed in water and maintained in a horizontal position solely by the buoyancy of the water and the effect of the weight **26** on the toy in the position in which toy or element **10** is shown in FIGURE 2, and the string or cord **28** is taut and is held as shown in that figure with the upper end thereof positioned directly above the lower end, the string or cord throughout its entire length extends parallel to the vertical axis of toy **104** and is in its entirety located forwardly of the said centers of pressure.

It is indicated above that elements such as the element **10**, submarine **42**, and various other modifications of the element **10** may be constructed of any desired material, wood being given as an example. By way of further illustration, it is pointed out that these elements may also be formed of plastic and even of materials that have a specific gravity greater than water if an air chamber is provided therein to give the desired buoyancy. A cord such as cords **28** and **36** are particularly convenient means upon which to support weights such as the weights **26** and **34** but the invention is not intended to be limited to the use of cords for this purpose, it being within the scope of the invention to employ other types of supporting means as desired.

Referring particularly to FIGURE 8 of the drawings, it is pointed out that the plate **70** may be formed of any material which is attracted to a magnet such as the magnet **72**. Furthermore, the positions may be reversed and a magnet may be secured on or embedded in the deck of the submarine **68** in place of the plate **70**, there being available on the market small relatively light magnets which would still permit the submarine **68** to have the desired buoyancy even when carrying such magnet. Then, in place of the magnet **72**, a piece of iron or other material attracted to a magnet and having the desired weight could be employed by securing it to the string or cord **74**.

A wide variety of means of locating weights such as **26** and **34** in respect to elements such as the element **10** has been shown and described, but it is to be understood that the invention is not limited to the various means shown but includes within its scope other means of locating the weight on an element **10** in accordance with the principles described so that it may be manipulated up and down and around in a body of water. The depth charge devices as shown in FIGURES 5 and 7 are likewise merely illustrative and may be varied widely within the scope of the invention.

Many of the advantages of the invention will be apparent from the foregoing description. A novel submersible toy has been provided which may be manipulated under water manually both upwardly and downwardly and around as desired. At the same time, the control means is readily separable from the submersible toy to add to the variety of maneuvers which may be performed with the submersible toy.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof and therefore it is not intended to be limited except as indicated in the appended claims.

I claim:

1. A submersible toy which comprises an elongated body having a specific gravity less than that of water and shaped to facilitate its movement through water in a path extending in a predetermined direction generally axially of said body, the center of buoyancy of said body in water being located forwardly of the center of gravity of said body in said predetermined direction, means including a weight and means for supporting the same

manually, and means on said body having an open upper end for receiving said weight and located on a portion of said body designed to remain uppermost, said open upper end being located forwardly of the centers of horizontal pressure of the water on the sides of said body and forwardly of the said center of buoyancy of said body in a relation causing said body to move forwardly with said weight and supporting means, and said weight having a value sufficient to submerge said body completely and to tilt the axis of said body downwardly in water when the weight is so received on said body.

2. A submersible toy which comprises an elongated body having a specific gravity less than that of water and shaped to facilitate its movement through water in a path extending in a predetermined direction generally axially of said body, the center of buoyancy of said body in water being located forwardly of the center of gravity of said body in said predetermined direction, means including a weight and means for supporting the same manually, and means on said body having an open upper end for receiving said weight and located on a portion of said body designed to remain uppermost, all of said weight receiving means being located forwardly of the centers of horizontal pressure of the water on the sides of said body and forwardly of the said center of buoyancy of said body in a relation causing said body to move forwardly with said weight and supporting means, and said weight having a value sufficient to submerge said body completely and to tilt the axis of said body downwardly in water when the weight is so received on said body.

3. A submersible toy which comprises an elongated body having a specific gravity less than that of water and shaped to facilitate its movement through water in a path extending in a predetermined direction generally axially of said body, the center of buoyancy of said body in water being located forwardly of the center of gravity of said body in said predetermined direction, means including a weight and means for supporting the same manually, and means on said body having an open upper end for receiving said weight and located on a portion of said body designed to remain uppermost, said weight supporting means throughout its entire length extending parallel to the vertical axis of said body forwardly of the centers of horizontal pressure of the water on the sides of said body when said means is taut, said body is submersed in water and maintained in a horizontal position solely by the buoyancy of the water and the effect of the weight on the body, said weight is in said weight-receiving means and the upper end of said weight supporting means is positioned directly above the lower end thereof, and the said weight at the same time being located forwardly of the said center of buoyancy of said body in a relation causing said body to move forwardly with said weight and supporting means and said weight having a value sufficient to submerge said body completely and to tilt the axis of said body downwardly in water when the weight is so received on said body.

4. A submersible toy which comprises an elongated body having a specific gravity less than that of water and shaped to facilitate its movement through water in a path extending in a predetermined direction generally axially of said body, the center of buoyancy of said body in water being located forwardly of the center of gravity of said body in said predetermined direction, means including a weight and means for supporting the same manually, and means on said body having an open upper end for receiving said weight and located on a portion of said body designed to remain uppermost, said open upper end being located so that its midpoint longitudinally is forward of the centroid of the maximum vertical longitudinal cross-sectional area of said body and so that the portion of said area forwardly of the said midpoint is less than the corresponding area to the rear thereof and said open upper end at the same time being located forwardly of the said

center of buoyancy of said body in a relation causing said body to move forwardly with said weight and supporting means, and said weight having a value sufficient to submerge said body completely and to tilt the axis of said body downwardly in water when the weight is so received on said body.

5. A submersible toy which comprises an elongated body having a specific gravity less than that of water and shaped to facilitate its movement through water in a path extending in a predetermined direction generally axially of said body, the center of buoyancy of said body in water being located forwardly of the center of gravity of said body in said predetermined direction, means including a weight and means for supporting the same manually, and means on said body having an open upper end for receiving said weight and located on a portion of said body designed to remain uppermost, all of said weight-receiving means being located so that it is forward of the centroid of the maximum vertical longitudinal cross-sectional area of said body and so that the portion of said area forwardly of said weight-receiving means is less than the corresponding area to the rear thereof and said weight at the same time being located forwardly of the said center of buoyancy of said body in a relation causing said body to move forwardly with said weight and supporting means, and said weight having a value sufficient to submerge said body completely and to tilt the axis of said body downwardly in water when the weight is so received on said body.

6. A submersible toy which comprises an elongated body having a specific gravity less than that of water and shaped to facilitate its movement through water in a path extending in a predetermined direction generally axially of said body, the center of buoyancy of said body in water being located forwardly of the center of gravity of said body in said predetermined direction, means including a weight and means for supporting the same manually, and means on said body having an open upper end for receiving said weight and located on a portion of said body designed to remain uppermost, said weight-supporting means throughout its entire length extending parallel to the vertical axis of said body in a location such that it is forward of the centroid of the maximum vertical longitudinal cross-sectional area of said body and so that the portion of said area forwardly of said weight-supporting means is less than the corresponding area to the rear thereof when said means is taut, said body is submersed in water and maintained in a horizontal position solely by the buoyancy of the water and the effect of the weight on the body, said weight is in said weight-receiving means and the upper end of said weight-supporting means is positioned directly above the lower end thereof, and the said weight at the same time being located forwardly of the said center of buoyancy of said body in a relation causing said body to move forwardly with said weight and supporting means, and said weight having a value sufficient to submerge said body completely and to tilt the axis of said body downwardly in water when the weight is so received on said body.

References Cited by the Examiner

UNITED STATES PATENTS

1,736,270	11/1929	Mackintosh	46—94
2,168,767	8/1939	Ellsworth	46—94
2,708,810	5/1955	Canto et al.	46—94
2,909,868	10/1959	Lewis	46—241
3,147,567	9/1964	Fors	46—242

OTHER REFERENCES

Hausman: "Physics," published 1941, pp. 193, and 194.

RICHARD C. PINKHAM, *Primary Examiner.*

F. BARRY SHAY, *Examiner.*

F. B. LEONARD, *Assistant Examiner.*