May 14, 1968 J. T. JOHNSON 3,382,606

CARTESIAN TYPE TOY

Filed March 11, 1966

FIG. 1.

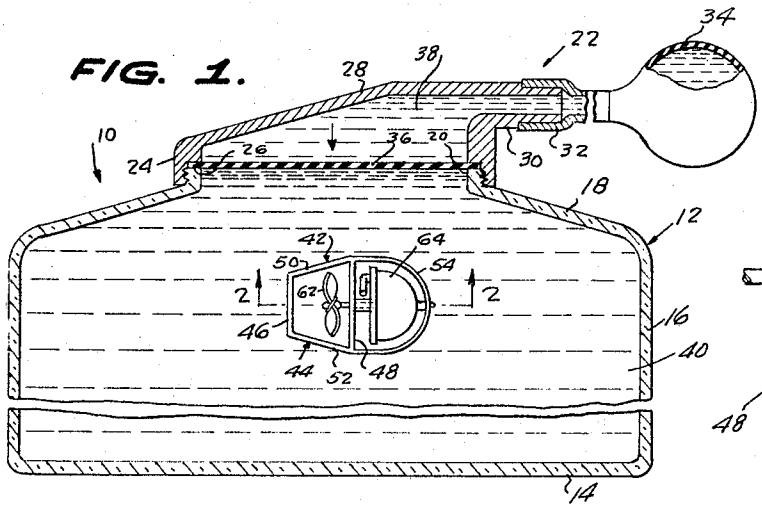


FIG. 4.

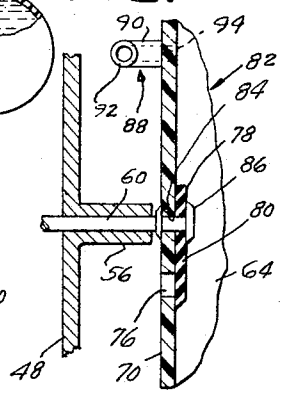


FIG. 2.

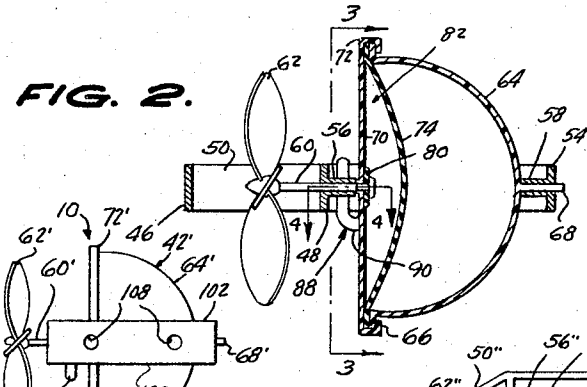


FIG. 3.

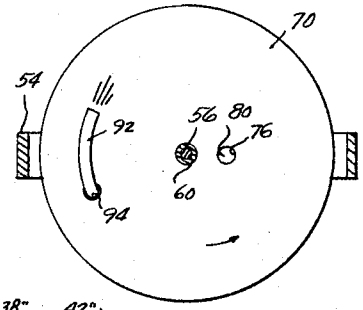


FIG. 5.

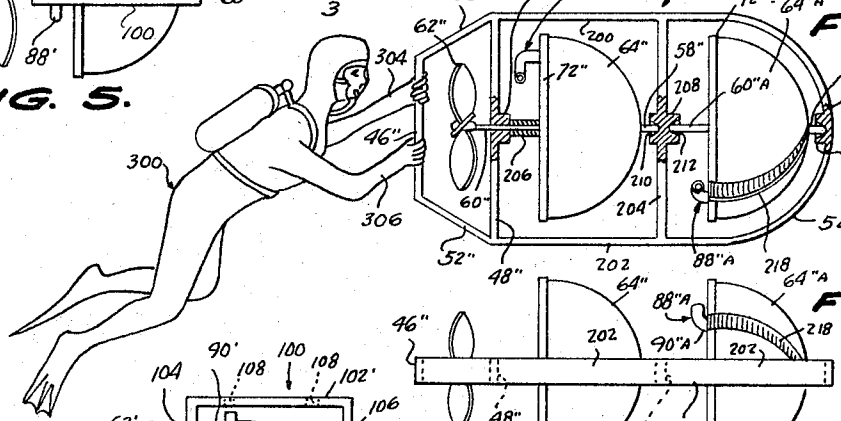
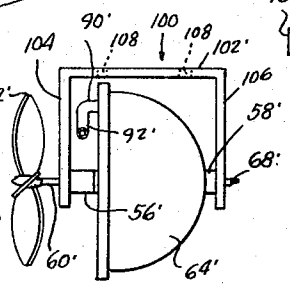


FIG. 7.

FIG. 8

FIG. 6.



INVENTOR.
JAMES T. JOHNSON,
BY
Berman, Davidson & Berman
ATTORNEYS.

United States Patent Office 3,382,606 Patented May 14, 1968

3,382,606

CARTESIAN TYPE TOY

James T. Johnson, Rte. 2, Kissimmee, Fla. 32741

Filed Mar. 11, 1966, Ser. No. 533,700
13 Claims. (Cl. 46—91)

This invention relates to submersible type toys and, more specifically, the instant invention pertains to an amusement device or toy of the Cartesian type. Cartesian type amusement devices are old and well-known in the art and are generally constructed to comprise compressible bodies to displace a variable quantity of liquid, or as hollow bodies which admit or expel liquid to alter the weight of the body in accordance with the prevailing pressure so that the weight of the body is slightly less than the weight of the liquid displaced thereby when the pressure is low, and slightly greater than the weight of the displaced liquid when the pressure is high. Among such prior art devices are those in which the center of gravity is altered in relation to the center of buoyancy upon contraction or influx of liquid to cause the devices to alter their inclinations simultaneously with their upward and downward movements.

This invention falls within the general scope of such amusement devices.

One of the primary objects of this invention is to provide a Cartesian type diving toy wherein means are provided for driving the toy in a linear or curvilinear path, as well as to obtain vertical movement of the toy.

Another object of this invention is to provide a self-propelled Cartesian type toy together with means for steering the same in a selected path.

This invention contemplates, as a still further object thereof, the provision of a Cartesian type amusement device or toy which is non-complex in construction and assembly, inexpensive to manufacture, and which is durable in use.

Other and further objects and advantages of the instant invention will become more manifest from a consideration of the following specification when read in conjunction with the annexed drawing, in which:

FIGURE 1 is a vertical medial cross-sectional view of a Cartesian type toy constructed according to this invention;

FIGURE 2 is an enlarged detail cross-sectional view of the submersible element of the toy, FIGURE 2, being taken substantially on the horizontal plane of line 2—2 of FIGURE 1, looking in the direction of the arrows;

FIGURE 3 is an end elevational view of the submersible element, FIGURE 3 being taken substantially on the vertical plane of line 3—3 of FIGURE 2, looking in the direction of the arrows;

FIGURE 4 is an enlarged fragmentary detail cross-sectional view, FIGURE 4 being taken substantially on the horizontal plane of line 4—4 of FIGURE 2, looking in the direction of the arrows;

FIGURE 5 is a top plan view of the Cartesian type toy according to the second embodiment thereof;

FIGURE 6 is a side elevational view of the toy shown in FIGURE 5;

FIGURE 7 is a top plan view, partly broken away, of a third embodiment of this invention, and including an optional stabilizing element therefor; and

FIGURE 8 is a side elevational view of the toy shown in FIGURE 7.

Referring now more specifically to the drawing, reference numeral **10** designates, in general, a Cartesian type toy constructed in accordance with the teachings of this invention. As is shown in FIGURES 1 to 4, inclusive, the toy **10** is seen to comprise a vertically-elongated substantially hollow cylindrical container **12** formed of

glass or other preferred rigid transparent materials, the container **12** including a normally horizontal flat discoidal base wall **14** from the circumferential marginal edge of which arises an upright hollow cylindrical sidewall **16**. The upper end of the sidewall **16** is integral with the peripheral marginal edge of the base of a substantially hollow frusto-conical top wall **18** which terminates substantially in the plane of the frustum in an upright substantially hollow cylindrical externally-threaded neck **20**.

Reference numeral **22** denotes, in general, a fluid or liquid pump which includes a vertically-elongated substantially hollow cylindrical internally-threaded throat **24** reduced in diameter adjacent its upper end to form an internal downwardly-facing annular shoulder **26**. A substantially conically-shaped cover plate **28** has its circumferential marginal base edge integrally-connected with the upper end of the throat **24** and extends upwardly therefrom. The cover plate **28** is intersected by an elongated substantially hollow cylindrical conduit **30**. The outer end of the conduit **30** has releasably and frictionally-secured thereon the open outer end of an elongated hollow tubular flexible connector member **32**, the other or inner end of which is integral and in open communication with an enlarged substantially hollow spherical elastic bulb **34**.

As is seen in FIGURE 1 of the drawing, a relatively flat thin flexible cylindrical diaphragm **36** extends across the open upper end of the neck **24** and is clamped thereagainst by the shoulder **26**. The throat **24**, cover plate **28**, and the diaphragm **36** define a normally horizontal substantially hollow liquid chamber **38** in open communication with the inner end of the conduit **30**. With continued reference to FIGURE 1 of the drawing, it is seen that the container **12** is normally filled with a transparent liquid such as water, for example, indicated herein by reference numeral **40**, and with the water **40** extending upwardly in the neck **24** to the extent that the underside of the diaphragm **36** is flush with or is tangential with the liquid level of the water **40**.

At **42** is denoted a submersible jet-propelled toy which includes an open trapezoidal frame **44** defined by a pair of laterally-spaced substantially parallel flat side frame members **46**, **48** and end members **50**, **52**, the latter diverging away from the opposed ends of the side frame member **46** for rigid connection with the opposed ends, respectively, of the side frame member **48**. To the opposed ends of the side frame member **50** are also rigidly-connected the opposed ends of an elongated ogive-shaped from frame member **54**.

The side frame member **48** and the front frame member **54** are each provided with centrally-located transversely-extending openings surrounded by laterally-spaced substantially hollow tubular integrally-formed confronting and axially-aligned bosses **56**, **58**, the function of which will be described below.

Reference numeral **60** (see FIGURES 2 and 4) designates an elongated substantially cylindrical shaft having a pair of opposed inner and outer ends. The inner end of the shaft **60** is journaled for rotation in the side frame member **48** and its boss **56** and the outer end thereof has fixedly-secured thereto a conventional four-bladed propeller **62** which is encompassed within the trapezoidal frame **44**.

Referring now specifically to FIGURES 1 to 4, inclusive, reference numeral **64** indicates a hollow ridged semispherical air-charged receptacle having a laterally and outwardly-extending annular flange **66** at the base end thereof. The semispherical air-charged receptacle **64** is provided, at the apex end thereof, with a radially-extending stub shaft **68** which is journaled for rotation in the hollow boss **58**. The base side of the semispherical receptacle **64** is closed by a substantially rigid thin cylindrical closure wall

70 having a reverted flange 72 at the circumferential marginal edge thereof. As is clearly seen in FIGURE 2, the reverted flange 72 is adapted for releasable engagement over the annular flange 66, and the flange 66 and the reverted flange 72 releasably-secure therebetween the peripheral marginal edge of a flexible cylindrical diaphragm 74. To serve a function to be described infra, the closure wall 70 is provided with a transversely-extending opening or port 76 (see FIGURE 4).

The inner end of the shaft 60 is journaled for rotation in the side frame member 48 and its boss 56, the inner end of the shaft 60 projecting beyond the outer end of the boss 56. The projecting end of the shaft 60 extends transversely through an opening 78 formed in the closure wall 70 at the center location thereof and mounted on the extended end of the shaft 60 is one end of an elongated substantially rectangular flexible flap valve 80. The flap valve 80 is of such length as to permit the other end thereof to extend across the port 76 to serve a function to be described. As is seen in FIGURES 2 and 4, the flap valve 80 is disposed within a hollow liquid-receiving chamber 82 of variable volume, the chamber being defined, of course, as the space extending between the closure wall 70 and the flexible diaphragm 74. The closure wall 70 and the flap valve 80 are fixedly-secured on the shaft 60 for rotation therewith between the rivet heads 84, 86. Reference numeral 88 indicates a substantially hollow L-shaped conduit having a foot portion 90 and a leg portion 92. The open outer end of the foot portion 90 extends transversely through a suitable opening 94 formed in the closure wall 70 and is in open communication with the liquid-receiving chamber 82. The leg portion 92 of the conduit 88 is arcuately-shaped (see FIGURE 3) and parallels a portion of the contour of the peripheral marginal edge of the closure wall 70. In FIGURES 1 and 2 it is seen that the semispherical receptacle 64, the closure wall 70 and the above-described elements associated therewith are supported within that portion of the toy frame which includes the side frame member 48 and the ogive front frame member 54.

Again referring to FIGURE 1 of the drawing, it is seen that the submersible element 42 is disposed within the hollow cylindrical container 12 and is immersed in the water or liquid 40 below the diaphragm 36. It is now obvious that with the container 12, the fluid pump assembly 22 and the diaphragm 36 assembled in the manner described supra, the submersible element 42 may be made to move vertically in either direction through the application and release of pressure (as by manual exertion by the user's hand) on the bulb 34. Upon the application of pressure to the bulb 34 the fluid contained therein and in the chamber 38 is compressed to exert a pressure on the diaphragm 36 which, in turn, exerts a corresponding pressure on the water 40. This last-mentioned pressure forces open the flap valve 80 to permit the water 40 displaced by the pressure on the diaphragm 36 to enter the variable-volume liquid-receiving chamber 82 through the port 76. The displaced water, in filling the chamber 82, changes the center of gravity of the submersible element 42, causing it to dive forwardly and downwardly. As the chamber 82 fills, the diaphragm 74 is distended in the direction of the front frame member 54 and compresses the air in the receptacle 64. Upon release of the pressure on the semispherical bulb 34, the air compressed in the receptacle 64 exerts a back pressure on the diaphragm 74 forcing the liquid in the chamber 82 to seat the flap valve 80 across the port 76 and to force the displaced liquid through an L-shaped condiut 88 for discharge through the open outer end of the leg portion 90. This creates a jet reaction tending to drive the receptacle 64, the closure wall and the elements associated therewith to rotate in a counerclockwise direction (see arrow in FIGURE 3) so that the shaft 60 and the connected propeller 62 rotates in the same direction, thereby driving the submersible element in a linear or a curvilinear direction. In operation, the counter-torque developed by the toy is seldom sufficient to cause the side, end and front frame members 46, 48, 50, 52 and 54 to rotate in the reverse direction in the absence of a stabilizer, but stabilizing means may be provided in the manner set forth below. Linear movement effected by the above-described jet reaction is converted into curvilinear movement when the submersible element 42 strikes the sidewall 16 and traces its contour. Steering of the submersible element 42 is obtained by the user of the toy 10 through the observation of the position of the L-shaped conduit 88 at which time the course of the submersible element may be changed, at will, through manipulation of the bulb 34 to increase or decrease the fluid pressure on the diaphragm 36 as the conduit 88 reaches certain angular positions relative to the axis of the shaft 60.

In this embodiment of the invention, as well as those to be described infra, the diaphragm 36 has a distinct function in that it serves to prevent the fluid or water with which the bulb 34 is normally completely filled from being ejected therefrom in a substantially jet stream which could disturb the operation of the toy.

FIGURES 5 and 6 illustrate a second embodiment of this invention wherein all component elements of the first thereof are retained with the exception of the framework which has been simplified. Hence, the component elements of the second embodiment finding their counterparts in the first bear identical reference numerals, but to which have been ascribed a prime mark to effect differentiation therebetween. Thus, and as stated above, the original frame is herein simplified in the second embodiment of the invention to comprise an inverted substantially U-shaped open frame 100 (see FIGURE 6) having a bight 102 from the remotely-disposed ends of which laterally-project, respectively, a pair of depending longitudinally-spaced, parallel and confronting support arms 104, 106. The bight 102 is provided with a pair of longitudinally-spaced, transversely-extending openings 108. The shaft 60′ extends transversely through the arm 104 and boss 56′ and is rotatably-journaled therein. In a similar manner, the shaft 68′ is journaled for rotation in the boss 53′ and its associated arm 106. The openings 108 afford connection with some other device (a toy ship or other simulated article, for example) having some degree of buoyancy and which, at the same time, will lend itself to effect stabilization of the submersible element 42′.

FIGURES 7 and 8 illustrate a third embodiment of this invention which repeats, in part, the subject matter of the other two embodiments of this invention and, consequently, the component elements of this embodiment finding their counterparts in the preceding inventions described above bear the same reference numerals, but to which have been added a double prime mark.

In making specific reference to FIGURES 7 and 8, the toy 10″ is seen to include a connected series of longitudinally-extending open frames X, Y and Z. The component elements of the trapezoidal frame X are found in the first embodiment of this invention and include the side frame members 46″, 48″ and the end frame members 50″, 52″. The second frame Y comprises the side frame member 48″ from the opposed ends of which forwardly-project, respectively, a pair of end frame members 200, 202 in spaced parallel and confronting relation relative to one another. The forward ends of the end frame members 200, 202 are connected to the opposed ends of a transversely-extending side frame member 204, thereby giving a substantially rectangular configuration to the frame Y wherein the side frame member 48″ is common to both frames X and Y. The open frame Z is ogive in configuration and includes the side frame member 204 to the ends of which are connected the ends of the ogive front frame member 54″. Since the side frame member 204 is common to both of the frames Y and Z it is thus seen that all three frames, the back frame X, the intermediate frame Y, and the front frame Z all include

as an element thereof an element which is common to at least one other element of a second frame.

As in the preceding embodiments of this invention, the side frame member **48″** includes the hollow boss **56″** through which the shaft **60″** extends. In this embodiment of the invention, however, an elongated substantially hollow cylindrical spacer sleeve **206** is mounted on the shaft **60″** intermediate the boss **56″** and the adjacent side of the cylindrical closure wall **70**. The side frame member **204** intermediate its ends has integrally-formed therewith a boss **208** which projects on opposite sides of the side frame member **204**. One side of the boss **208** is provided with a recess **210**, the recess **210** being adapted to receive the outer end of the stub shaft **58″** to rotatably-support the same in the boss **208**. In this embodiment of the invention, the outer end of the shaft **60″A** is not rigidly-connected to a propeller such as is indicated at **62″**, but is, instead, journaled within the recess **212** so that the same may be rotated within the boss **208**. The stub axle **58″A** has its outer end received within a recess **214** formed in an inwardly-projecting boss **216** integrally-formed with the ogive frame member **54″** at the apex thereof. The L-shaped conduit **88″A** is identical in construction with respect to the conduits **80** or **80′**, but in this instance, the conduit **88″A** has an internal diameter greater than the internal diameter of the L-shaped conduit **88′**. The outer side of the air receptacle **64″A** is provided with a colored stripe **218** which serves as visual indicator means to the operator to serve a function to be described. As is seen in FIGURES 7 and 8, the stripe **218** extends from the apex end of the air receptacle **64″A** to the base end thereof. The end of the stripe **218** adjacent the base end of the receptacle **64″A** terminates on a radial which includes the foot portion **90″A** of the conduit **88″A** (see FIGURE 8).

The operation of this embodiment of the invention is exactly the same as the operation of the preceding embodiments of the invention with but two exceptions. First, in constructing the L-shaped conduit **88″A** with an inside diameter greater than the inside diameter of the L-shaped conduit **88″** greater control over the steerage of the submersible element **42″** is obtained. Such a construction results, of course, in the more rapid expulsion of the air compressed in the receptacle **64″A** with a somewhat lower rate of fluid discharge from the receptacle through the conduit **88″A** which tends to provide a greater steerage control than is obtainable in the first two of the above-described embodiments of this invention. Secondly, the stripe **218**, when observed by the operator of the toy **10**, gives visual evidence of the position of the L-shaped conduit **88″A** relative to the axis of the shaft **60″A** whereby the operator need not stand in such a position as to observe, directly, the positioning of the L-shaped conduit **88″A** when exercising steerage control over the submersible element **42″**.

In the embodiment of FIGURES 7 and 8 there is shown an optional element which may be included with the other embodiments of this invention, if desired. The element is generally denoted by reference numeral **300** in FIGURE 7. The element **300** comprises a substantially thin flat member cut and painted to resemble an underwater diver. Projecting forwardly of the main body portion **302** of the element **300** are a pair of vertically-spaced arms **304**, **306** which may be, optionally, provided with means to detachably or permanently connect the element **300** to the side frame member **46″**. In this position, the element provides stability to the toy, as well as means for obtaining the more accurate steerage thereof.

Other simulated objects may be used to stabilize the embodiments of the instant invention, and such objects may be pegged or otherwise fastened in the openings **108** to achieve similar results.

While all of the embodiments of the invention detailed supra show the toy in association with the supporting frame and propeller means, these are unnecessary since the toy is operable in the absence of these elements. Thus, basically, the toy may be considered as comprising of only the semispherical receptacle **64**, the diaphragm **74**, the closure wall **70** and its port **76**, the flap valve **80**, and the conduit **88**.

Having described and illustrated several embodiments of this invention in detail, it will be understood that the same are offered merely by way of example, and that this invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A submersible element for a Cartesian toy comprising a substantially hollow receptacle having a pair of opposed closed ends, a flexible diaphragm extending transversely across said receptacle intermediate its said ends to divide said receptacle into a pair of air-containing and liquid-receiving chambers, said receptacle having a port extending transversely therethrough and in open communication with said liquid-receiving chamber, a liquid pressure-responsive flap valve disposed within said liquid-receiving chamber and mounted on said receptacle, said flap valve normally seating across said port to close the same against liquid entry, and a conduit having a pair of opposed ends, said conduit having one of its said ends extending transversely through said receptacle in open communication with said liquid-receiving chamber, and the other end of said conduit being externally-disposed relative to said receptacle.

2. A submersible element for a Cartesian toy comprising a substantially open frame, a substantially hollow receptacle having a pair of opposed ends, a flexible diaphragm extending transversely across said receptacle intermediate its said ends to divide said receptacle into a pair of air-containing and liquid-receiving chambers, said receptacle having a port extending transversely therethrough and in open communication with said liquid-receiving chamber, a liquid pressure-responsive flap valve disposed with said liquid-receiving chamber and mounted on said receptacle, said flap valve normally seating across said port to close the same against liquid entry, a conduit having a pair of opposed ends, said conduit having one of its ends extending transversely through said receptacle in open communication with said liquid-receiving chamber, the other end of said conduit being externally-disposed relative to said receptacle, and means supporting said opposed ends of said receptacle for rotation on said frame.

3. A submersible element for a Cartesian toy comprising an open elongated frame including a pair of end frame members and a side frame member connected to and extending between a pair of adjacent ends of said end frame members, a substantially hollow receptacle having a pair of opposed ends, a flexible diaphragm extending transversely across said receptacle intermediate its said ends to divide said receptacle into a pair of air-containing and liquid-receiving chambers, said receptacle having a port extending transversely therethrough and in open communication with said liquid-receiving chamber, a liquid pressure-responsive flap valve disposed within said liquid-receiving chamber and mounted on said receptacle, said flap valve normally seating across said port to close the same against liquid entry, a conduit having a pair of opposed ends, said conduit having one of its ends extending transversely through said receptacle in open communication with said liquid-receiving chamber and the other end of said conduit being externally-disposed relative to said receptacle, and means supporting said opposed ends of said receptacle for rotation on said frame.

4. A submersible element for a Cartesian toy comprising an open elongated frame including a pair of end frame members and a side frame member connected to and extending between said pair of adjacent ends of said end frame members, a substantially hollow receptacle having a pair of opposed ends, a flexible diaphragm extending transversely across said receptacle intermediate its said ends to divide said receptacle into a pair of air-

containing and liquid-receiving chambers, said receptacle having a port extending transversely therethrough and in open communication with said liquid-receiving chamber, a liquid pressure-responsive flap valve disposed within said liquid-receiving chamber and mounted on said receptacle, said flap valve normally seating across said port to close the same against liquid entry, a conduit having a pair of opposed ends, said conduit having one of its ends extending transversely through said receptacle in open communication with said liquid-receiving chamber and the other end of said conduit being externally-disposed relative to said receptacle, means at said opposed ends of said receptacle rotatably-supporting said receptacle on and between said end frame members, said means including a shaft having an end thereof fixedly-secured to one end of said receptacle with the other end extending transversely through one of said end frame members, said shaft being rotatable with said receptacle, and propeller means fixedly-secured on the other end of said shaft for rotation therewith.

5. A submersible element for a Cartesian toy as defined in claim 4, and means on said side frame member for connection to stabilizing means.

6. A submersible element for a Cartesian toy comprising an open elongated frame, said frame including a pair of laterally-spaced and substantially parallel side frame members, a pair of longitudinally-spaced end frame members, each of said end frame members connecting, respectively, an adjacent pair of ends of said side frame members, an ogive front frame member having its ends connected, respectively, with an adjacent pair of ends of said end frame members, a substantially hollow rigid receptacle having a pair of oppositely-disposed open and closed ends, a rigid closure wall extending across and closing said open end of said receptacle, a flexible diaphragm extending across said receptacle adjacent the inner side of said closure wall and dividing said receptacle into a pair of air-containing and liquid-receiving chambers, said closure wall having a port extending transversely therethrough, means supporting said receptacle for rotation on said frame, said means comprising a stub shaft having one of its ends fixedly-secured to said closed end of said receptacle for rotation therewith, the other end of said stub shaft being journaled for rotation on said ogive front frame member centrally of the ends thereof and an elongated shaft having one of its ends fixedly-secured to said closure wall centrally thereof for rotation with said receptacle, the other end of said shaft extending transversely through the side frame member adjacent said ogive frame member centrally of said ends thereof and being journaled for rotation therein, said other end of said shaft having an end portion disposed between said side frame members, a propeller fixedly-secured on said end portion of said shaft between said side frame members, a liquid pressure-responsive flap valve disposed in said liquid-receiving chamber and having a pair of opposed ends, means fixedly-securing one of said ends of said flap valve to said fixedly-connected end of said shaft with its other end normally extending across and closing said port against entry of said liquid into said liquid-receiving chamber, and an L-shaped conduit having an end thereof extending transversely through said closure wall and in open communication with said liquid-receiving chamber, the other end of said conduit terminating adjacent the peripheral edge of said closure wall.

7. A submersible element for a Cartesian toy as defined in claim 6, wherein said other end of said conduit is congruent with respect to the outer peripheral edge of said closure wall.

8. A submersible element for a Cartesian toy comprising an open elongated framework including a plurality of connected frames, the first of said frames comprising a pair of spaced substantially parallel side frame members, a pair of spaced end frame members, each of said end frame members connecting, respectively, a pair of adjacent ends of said side frame members, the second of said frames comprising one of said side frame members and a side frame member longitudinally-spaced from said one side frame member, a second pair of end frame members, each of said second pair of end frame members connecting, respectively, a pair of adjacent ends of said one and last-named side frame members, the third frame comprising said last-named side frame member and an ogive front frame member having its ends fixedly-secured to the ends of said last-named side frame member, a substantially hollow rigid receptacle for said second and third frames, each of said receptacles being hollow and being formed of a substantially rigid material, each of said receptacles having a pair of oppositely-disposed open and closed ends, a rigid closure wall extending across and closing said open end of said receptacle, a flexible diaphragm extending across said receptacle adjacent the inner side of said closure wall and dividing said receptacle into a pair of air-containing and liquid-receiving chambers, said closure wall having a port extending transversely therethrough, means supporting each of said receptacles for rotation on their respective frames, said means comprising a stub shaft having one of its ends fixedly-secured to said closed end of said receptacle for rotation therewith, the other end of said stub shaft for the receptacle of said second frame being journaled for rotation on said last-named side frame member centrally of the ends thereof, an elongated shaft having one of its ends fixedly-secured to said closure wall of said receptacle for said second frame and centrally thereof for rotation with said receptacle, the other end of said shaft extending transversely through said one side frame member and into said first frame, said shaft being journaled for rotation in said one side frame member, a propeller mounted on said other end of said shaft and disposed in said first frame, said stub shaft of the other of said receptacles for said third frame having the other end thereof journaled for rotation in said ogive front frame member centrally of the ends thereof, and an elongated shaft having one of its ends fixedly-secured to said closure wall centrally thereof for rotation with said other receptacle, the other end of said last-named shaft extending into said last-named side frame member and being journaled for rotation therein, each of said receptacles having a liquid pressure-responsive flap valve disposed in its said liquid-receiving chamber and having a pair of opposed ends, means fixedly-securing one of said ends of each of said flap valves to said fixedly-connected end of said shafts, respectively, with its other end normally extending across and closing said ports against entry of said liquid into said liquid-receiving chambers, and an L-shaped conduit for each of said receptacles, each of said conduits having an end thereof extending transversely through the closure wall of its associated receptacle and being disposed in open communication within the liquid-receiving chamber formed therein, the other end of said conduits terminating the peripheral edge of the closure walls of their respective associated receptacles.

9. A submersible element for a Cartesian toy as defined in claim 8, wherein said other end of each of said conduits is congruent with respect to an adjacent portion of the peripheral edge of said closure walls.

10. A submersible element for a Cartesian toy as defined in claim 8, wherein said L-shaped element for the receptacle disposed in said third frame has an inside diameter greater than the inside diameter of the L-shaped conduit of said receptacle disposed in said second frame.

11. A submersible element for a Cartesian toy comprising a substantially hollow receptacle having a pair of opposed ends, a flexible diaphragm extending transversely across said receptacle intermediate its said ends to divide said receptacle into a pair of air-containing and liquid-receiving chambers, said receptacle having a port extending transversely therethrough and in open communi-

cation with said liquid-receiving chamber, a liquid pressure-responsive flap valve disposed within said liquid-receiving chamber and mounted on said receptacle, said flap valve normally seating across said port to close the same against liquid entry, a conduit having a pair of opposed ends, said conduit having one of its ends extending transversely through said receptacle in open communication with said liquid-receiving chamber and the other end of said conduit being externally-disposed relative to said receptacle, and an elongated shaft, said shaft having one of its ends fixedly-secured to said closed end of said receptacle, and a propeller fixedly-mounted on the other end of said shaft.

12. A submersible element for a Cartesian toy as defined in claim 3, and a stabilizing element connected to one of said end frame members and extending away from said frame.

13. A submersible element for a Cartesian toy as defined in claim 3, wherein said toy is disposed within a substantially hollow container completely liquid filled and having an open end, a flexible diaphragm extending across said open end and having a pair of opposed sides with a side thereof engaging said liquid in said container, and liquid pump means connected on said open end for applying liquid pressure to the other side of said diaphragm.

References Cited

UNITED STATES PATENTS

2,525,232	10/1950	McGaughy	272—8
3,229,419	1/1966	Fry	46—62
3,324,573	6/1967	Lavallee	46—94

LOUIS G. MANCENE, *Primary Examiner.*

R. F. CUTTING, *Assistant Examiner.*