Nov. 21, 1961 H. A. WARNER 3,009,286

AQUATIC AMUSEMENT DEVICE

Filed Jan. 20, 1960

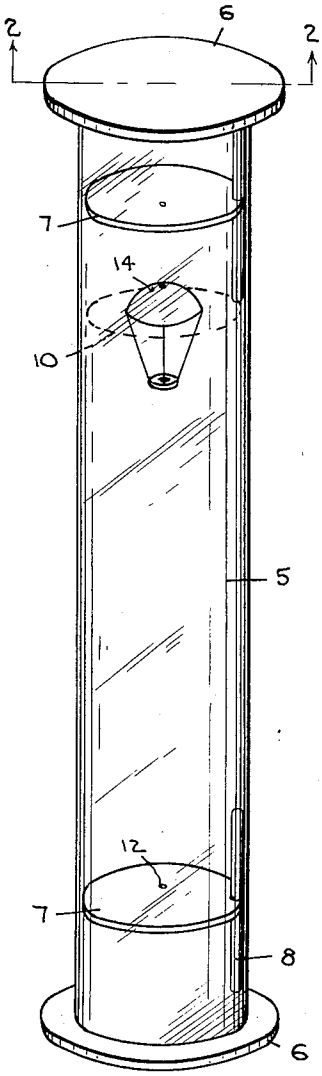


Fig. 1.

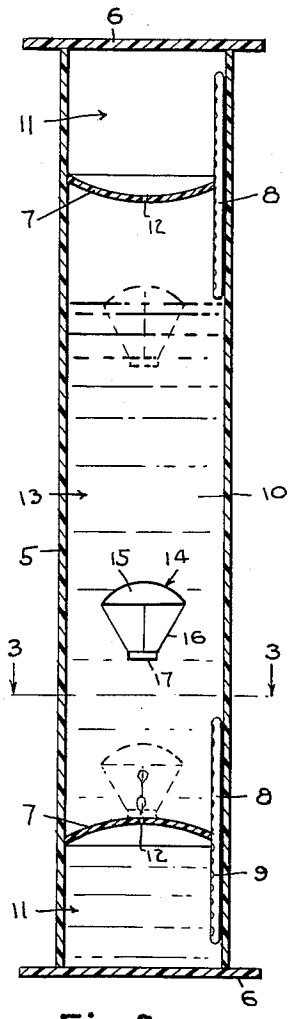


Fig. 2.

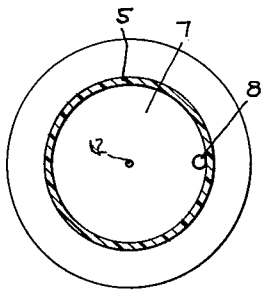


Fig. 3.

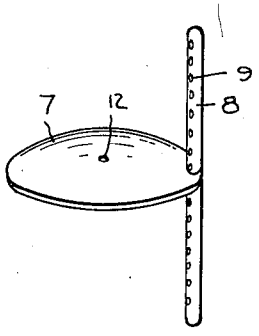


Fig. 4.

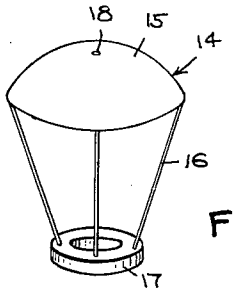


Fig. 5.

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AQUATIC AMUSEMENT DEVICE

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This invention relates to an aquatic toy or amusement device wherein a shiftable body is animated or caused to move within a body of liquid under the influence of air bubbles caused by the displacement of air in the device.

The invention embodies a preferably cylindrical housing of transparent form that is closed at its opposite ends and with the body portion adapted to be disposed in a perpendicular manner and reversible as to the supporting end portions and with the body having disposed therein a body of liquid and suitable objects that are adapted to move within the body of liquid under the influence of air being displaced in bubble form at the lower part of the device that functions to impart buoyancy and lifting power to the object through the column of liquid or to impart animation to other selected objects that may be disposed within the body of liquid and in the line of movement of the activating bubbles.

The invention contemplates a preferably plastic tube of transparent form having relatively large end closures that constitute supporting base members and with the tube being chambered at its opposite ends to alternately constitute liquid and air chambers and with the chambers being formed by diaphragms that span the diameter of the tube inwardly from its opposite ends and to be sealed with respect to the tube and with the diaphragms at the opposite extremities of the device being in opposed convex relation with respect to each other and with each of the diaphragm devices being centrally apertured and having at their marginal edges capillary wick devices that are designed to cause the main body of liquid to be progressively fed to a lower chamber at a predetermined rate, causing a displacement of the air within the lower chamber where it is expelled in bubble form through the aperture of the diaphragm and with the movable object normally resting in a position to be in the line of movement of the bubbles whereby the object is caused to collect a body of air and to become buoyant so that it will rise to the surface of the main column of liquid where it will release its buoyant air, causing the object to again fall downwardly by gravity through the main column of liquid to again rest upon the lower diaphragm, such action being repeated so long as air is being expelled from the lower chamber.

The invention contemplates a device as above described having substantially identical chambers at its opposite ends and a relatively long intermediate chamber that are defined by the convex diaphragms and with each of the diaphragms carrying wicks or similar capillary devices that function to feed the liquid from the main column gradually into the lower chamber to displace the air therefrom for collection within a movable body of general canopy form that is disposed in the main body of liquid and having a weighted element connected thereto whereby when sufficient air being expelled from the lower chamber has collected beneath the canopy, the object will rise through the main body of liquid and with the canopy being apertured at its top central portion that permits the predetermined escape of the air so that the object will then drop downwardly through the column of liquid. While a movable object, such as a parachute has been illustrated, the invention is not to be considered restricted as to the design of any other movable object that is adapted to become buoyant when disposed in the path of movement of the air bubbles.

A further object of the invention comprises a main tubular body that is partitioned adjacent its opposite ends to form alternate air and water chambers and an intermediate relatively long chamber that is adapted to support a column of liquid and with the device being reversible from end to end when one lower chamber has been completely filled with liquid so that the device will then function in an identical manner, regardless of which end of the device is in supporting position.

Novel features of construction and operation of the device will be more clearly apparent during the course of the following description, reference being had to the accompanying drawings wherein has been illustrated a preferred form of the device and wherein like characters of reference are employed to denote like parts throughout the several figures.

In the drawings:

FIGURE 1 is a perspective view of a reversible aquatic amusement device constructed in accordance with the invention,

FIGURE 2 is a vertical section taken substantially on line 2—2 of FIGURE 1,

FIGURE 3 is a horizontal section taken substantially on line 3—3 of FIGURE 2,

FIGURE 4 is a perspective view of one diaphragm and associated capillary feed tube and,

FIGURE 5 is a perspective view of one form of movable object adapted to traverse a column of liquid in a device.

Referring specifically to the drawings, the numeral 5 designates a preferably plastic or similar transparent tubular housing, that is open at its opposite ends. The housing at its opposite ends is closed by a plate 6, that constitutes a closure for the device and a stand upon which the device may rest in a vertical position.

Positioned inwardly from the body 5 at substantially identical spacing from the plate 6, are preferably inwardly convex diaphragms 7. The diaphragms 7 are preferably sealed with respect to the tubular body 5 around their marginal edges and the convex diaphragm 7 at each end of the device are in convex opposed relation to each other. Each of the diaphragms 7 at one marginal edge are provided with perforated tubular wicks 8. The wicks 8 extend above and below the diaphragm 7, as clearly shown in FIGURE 2. While the wicks 8 have been shown as being tubular and perforated at 9, it will be within the scope of the device to have these wicks formed of any recognized fluid absorbent materials. However, it has been found that as one successful type of wick, the tubes 8 have a relatively small diameter and are closed at their upper and lower ends and perforated throughout one side wall for the full height.

Disposed within the tube 5 is a column of liquid 10, such liquid being of any desirable nature, such for instance as water. The positioning of the diaphragms 7 provide at the upper and lower ends of the device, combined water and air chambers 11. Each of the diaphragms 7, substantially centrally of the apex thereof, are provided with apertures 12. The positioning of the diaphragm 7, while providing the chambers 11, also provide an intermediate elongated chamber 13, wherein is disposed the major volume of the liquid 10.

Movable through the body of liquid 10, is a floatation object, indicated as a whole by the numeral 14. The object 14 is here illustrated as a parachute, but it will be apparent that other floatation or movable objects may be employed. The object 14 embodies a canopy 15 of general concavo convex formation, having shroud lines 16, that are connected through the marginal edges of the canopy 15 at equidistantly spaced points and that diverge downwardly to be connected to a weighted ring 17, and whereby the ring 17 functions to cause the object 14 to

initially settle downwardly through the column of liquid. The canopy 15, substantially centrally with respect to its convex shape is provided with an air escape opening 18.

In assembling the device, one diaphragm 7 with its wick device 8 is inserted through one open end of the tube 5 with a suitable cement around its marginal edge to cause it to adhere to the inner side walls of the tube 5 after which, the adjacent closure plate 6 is sealed with respect to the open end of the tube. A column of liquid is then disposed within the tube 5 to a predetermined elevation, with the liquid passing through the wick device 8 to substantially fill the lower chamber 11 and to expel the air therefrom through the aperture 12. The opposite diaphragm 7 with its wick device 8 is then inserted and sealed at the opposite end of the tube 5, forming the upper chamber 11, after which the opposite plate 6 is sealed with respect to the tube. It will be understood of course that when the liquid is inserted into the tube 5, the object 14 is disposed therein and settles by gravity to be disposed over the discharge opening 12 of the lower diaphragm 7. The upper chamber 11 now constitutes an air chamber, with all of the liquid being disposed jointly in the tube 5 and the lower chamber 11. Now, when the device is to be placed in animated operation, the tube 5 is inverted to stand upwardly upon its opposite closure plate 6. The object 14 will drop in a reverse direction, due to the weighted ring 17 and the fluid 10 will fall downwardly to engage the lower diaphragm 7, with the object 14 resting upon the now disposed lower diaphragm 7. The aperture 12 of the diaphragms 7 are of a predetermined diameter that would normally prevent the water from entering the lower chamber, when the lower chamber is filled with air and for a progressive transfer of the main column of liquid to the lower chamber, it has been found necessary to employ the capillary wick devices 8 and the wick devices 8 convey the water from the main chamber at a relatively slow rate of speed, gradually compressing the air therein and forcing it through the aperture 12 and, when sufficient air has been displaced from the lower chamber, it will be collected under the canopy 15, causing the object to become buoyant and it will rise upwardly through the main column of liquid where it will remain floating until its entrapped air has been exhausted through the aperture 18 of the canopy when it will again fall downwardly and, so long as air bubbles are being discharged from the lower diaphragm 7, the object will rise and fall through the column of liquid. Simultaneously, the upper wick device 8 causes the liquid in the upper chamber 11 to be progressively fed downwardly at a corresponding rate of speed to the main body of liquid and a corresponding amount of liquid discharged from the upper chamber 11 will pass into the lower chamber 11, leaving the upper chamber filled with air and a predetermined body of air between the upper diaphragm and the top of the column of liquid. When the device is reversed, the upper chamber is reversed upon the bottom and the object 14 falls over and downwardly to rest upon the now lower disposed diaphragm 7, in the position illustrated in dotted lines in FIGURE 2 and, as the wick 8 feeds the liquid downwardly to the lower chamber 11, air is displaced and bubbles upwardly through the aperture of the lower diaphragm in substantially an identical manner, functioning to animate or move an object under the influence of air bubbles through a column of liquid that is calculated to be amusing or educational.

It will be apparent from the foregoing that a very novel form of aquatic amusement device has been provided. The structure is simple, is strong, durable, sealed against the escape of the liquid and provides a reversible device that functions to impart animation to any desired object that may be disposed within the path of movement of the bubbles passing upwardly through a lower chamber.

It is to be understood that the invention is not limited to the precise construction shown, but that changes are contemplated as readily fall within the spirit of the invention as shall be determined by the scope of the subjoined claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An aquatic amusement device of the character described that is invertible and that comprises an elongated transparent tubular housing open at its opposite ends and closed by base forming end plates, diaphragms disposed inwardly from the opposite ends of the housing to define a relatively long intermediate main chamber and relatively smaller and identical end chambers, a column of liquid disposed in the main chamber and a movable object disposed in the column of liquid, the end chambers adapted to be alternately filled and drained from the column of liquid when the device is inverted, an air escape aperture formed in each diaphragm whereby air is forced out of the end chamber then in lower position to pass upward through the column of liquid in the form of bubbles, the bubbles being collected by the object to impart buoyancy thereto and causing the object to rise to the top of the column of liquid, fluid from the end chamber then in upper position being discharged to the column of liquid at the same rate of speed as the lower end chamber is being filled and means carried by each diaphragm and constituting passages between the intermediate chamber and the end chambers for controlling the filling and emptying of the end chambers.

2. The device according to claim 1, wherein the diaphragms are convex toward each other, the diaphragms being cemented around their marginal edges to the housing.

3. The device according to claim 2, wherein the diaphragms are centrally and axially apertured with respect to the housing.

4. The device according to claim 1, wherein the last named means comprises capillary wick devices that are connected to each diaphragm and that project into the end chambers and into the intermediate chamber wherein the liquid is caused to be transferred from the column of liquid to the end chamber then in lower position for expelling the air therefrom and to transfer the liquid from the upper end chamber to the main column of liquid at substantially identical speeds, the said capillary wick devices being slender tubes closed at their ends, the said tubes being provided with closely arranged apertures in one side wall and for substantially the full length of the tubes.

5. The structure according to claim 1, wherein the movable object is in the form of a parachute having a convex canopy and a weighted ring that is connected to the canopy by shroud lines, the said canopy adapted to receive air bubbles being discharged from the lower chamber whereby to impart the buoyancy thereto, the said canopy at its center being provided with an air escape aperture whereby the air will escape when the parachute reaches the top of the column of liquid and permit the parachute to again settle downwardly toward the lower diaphragm.

6. An aquatic amusement device of the character described that is invertible and that comprises an elongated transparent tubular housing open at its opposite ends and closed by base forming end plates, diaphragms disposed inwardly from the opposite ends of the housing to define a relatively long intermediate main chamber and relatively smaller and identical end chambers, the housing adapted to be disposed in a perpendicular manner to rest upon one selected end plate, a column of liquid disposed in the main chamber and with the column of liquid terminating below the upwardly disposed diaphragm to form an air pocket, a movable object disposed in the column of liquid between the diaphragms, the end chambers being adapted to be alternately filled and drained from the column of liquid when the device is inverted, an air escape aperture formed in each diaphragm whereby air is forced out of the end chamber then in lower position to pass upwardly through the column of liquid in the form

of bubbles, the bubbles being collected by the object to impart buoyancy thereto and causing the object to rise to the top of the column of liquid, fluid from the upwardly disposed end chamber being progressively discharged to the column of liquid at the same rate of speed as the lower end chamber is being filled, the discharge of liquid from the upwardly discharged end chamber being replaced by air from the air pocket through the aperture of the diaphragm and means carried by each diaphragm and forming liquid passages between the end chambers and the intermediate chamber for controlling the filling and emptying of the end chambers.

7. An aquatic amusement device of the character described comprising, a housing closed at its opposite ends, said housing being adapted to stand upright on one or the other of said ends, spaced partition members in the housing inwardly of the ends thereof, said partition members defining a central chamber between them, each of the partition members defining an end chamber between it and one of the end walls, a movable object contained within the central chamber and disposed in a column of liquid contained in said central chamber, each of the partition members being apertured to permit of the passage of air through said apertures, liquid-conveying means located adjacent to each partition member and arranged for conveying liquid from the column of liquid in the central chamber to the lowermost end chamber when the housing is standing upright on one of its ends, the liquid thus transferred to said lowermost chamber being effective to force the air out of said chamber and through

the aperture in the lower partition member and reach the object in the central chamber and elevate it upwardly within the housing.

8. A reversible aquatic amusement device of the character described comprising, an elongated tubular and transparent housing closed at its opposite ends, the housing being adapted to be alternately disposed in perpendicular position to rest upon either of its ends, partitions in the housing near the opposite ends thereof to thereby divide the interior of the housing into a central chamber and end chambers, the central chamber being relatively long and holding a column of liquid within which an object is located, each of the partitions being apertured to establish communication between the central chamber and the end chambers and permit the passage of air when the housing is perpendicularly disposed, means in the housing for causing a slow transferrence of some of the liquid from the column in the central chamber to the then-positioned lowermost chamber and to cause the liquid so transferred to displace air from said lowermost chamber through the aperture in the then lowermost partition and into the central chamber to reach the object therein and cause said object to be elevated in said central chamber through the column of liquid therein.

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