Oct. 27, 1953 D. B. WITTRY 2,656,644

WALKING SUBMERSIBLE TOY

Filed April 15, 1950

Fig. 1

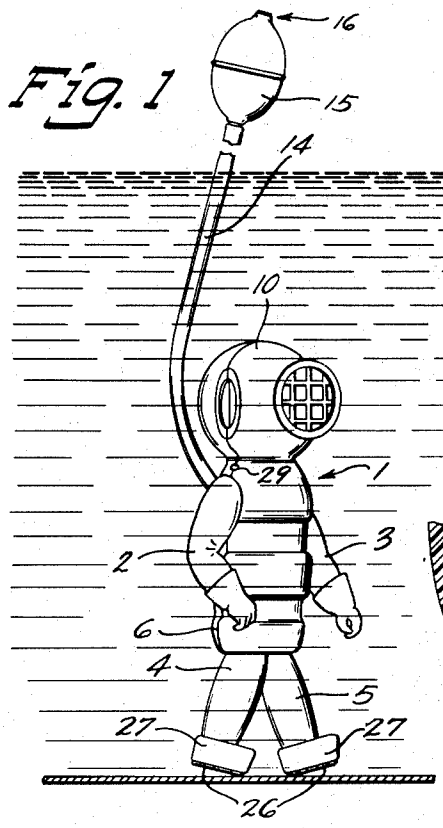


Fig. 4

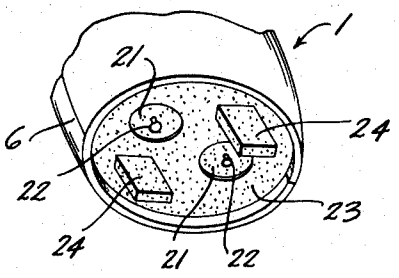


Fig. 5

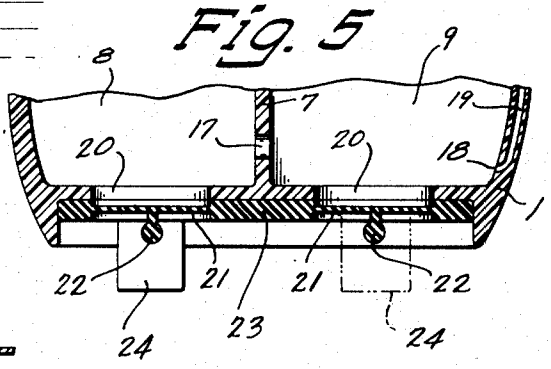


Fig. 2

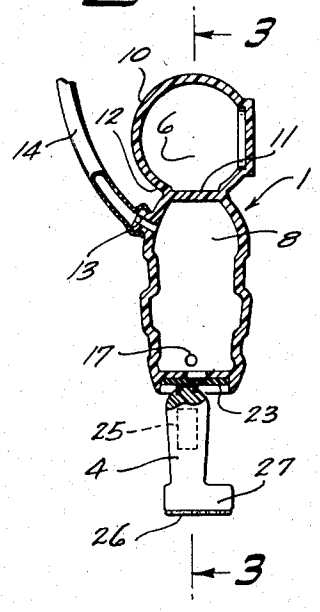


Fig. 3

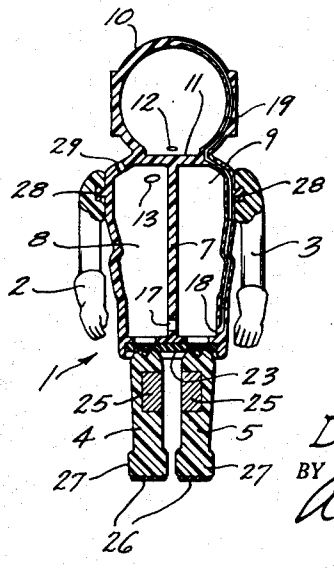
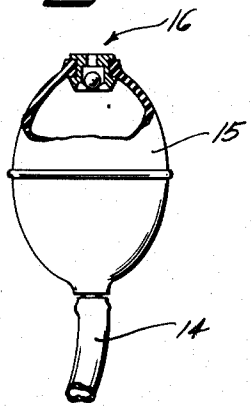


Fig. 6



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WALKING SUBMERSIBLE TOY

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9 Claims. (Cl. 46—92)

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This invention relates to a submersible toy of the type generally manipulated by a manually compressible bulb to which the diver is connected by a tube.

The principal object of the invention is to provide a novel action manipulation for the toy.

Another more specific object of the invention is to provide a toy diver that can be made to rise and sink in water and to execute a directional walking motion while under water, at will.

The invention has been applied to the construction of a toy diver wherein a plurality of connected compartments are provided inside the body of the diver, and the entrance of air and water into the same is controlled by a hand-squeezed bulb so that a diaphragm, which serves as a piston near the hinged connection between each leg and the body, effects a leg action for the diver.

An illustrative embodiment of the invention is shown in the accompanying drawings in which:

Figure 1 is a perspective view showing a diver submerged and in an active position;

Fig. 2 is a vertical section taken on a central transverse plane of the diver;

Fig. 3 is a vertical section taken on a plane at right angles to Fig. 2 and on line 3—3 thereof;

Fig. 4 is an enlarged perspective view of the bottom of the body section of the diver with the legs removed;

Fig. 5 is an enlarged detail section showing the diaphragm mounting and construction; and

Fig. 6 is an enlarged detail view showing the operating bulb construction for the toy.

The diver illustrated comprises a body 1 to which is pivotally attached a pair of arms 2 and 3 and a pair of legs 4 and 5.

The body 1 is molded of a suitable synthetic resin composition and may be formed in two pieces joined together at the seam 6 in a vertical plane.

The body 1 is hollow and is divided by a central vertical partition 7 into two compartments 8 and 9 disposed on opposite sides of the body.

The head 10 of the body constitutes a third compartment which is separated from the top of compartments 8 and 9 by a partition 11 extending across the neck of the diver. The head 10 has a rear lower port 12 which provides for filling of the head compartment with water when the diver is submerged and for draining of water from the head when the latter is raised.

One of the lower compartments, preferably the right-hand compartment 8, is connected through a port 13 in the rear wall of the compartment near

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the top of the latter and a connecting flexible rubber tube 14 to a hand-compressible bulb 15. The bulb 15 has a port with a check valve 16 therein for free admission of air thereto when expanding after a squeezing thereof.

The partition 7 has a port 17 connecting compartments 8 and 9 near the bottom thereof. Compartment 9 has a small orifice-like port 18 at the bottom connected by a passage 19 extending upwardly in the wall of the body at the parting line between the sections to the top of the head where it opens into the head compartment.

The bottom of each of the compartments 8 and 9 has a large diameter opening 20 therein sealed by a flexible rubber-like diaphragm 21 with a central stud-like projection or pin 22 adapted to fit into a complemental recess in the upper end of the corresponding leg 4 or 5.

The diaphragms 21 may be either molded as a part of or held in place by a plate 23 which fits into the flanged lower end of body 1 and which preferably carries a flap-like flexible hinge projection 24 secured thereto or molded integral therewith for each corresponding leg 4 and 5. The plate 23 is preferably glued to the bottom of body 1 and completes the closure for the bottom of the compartments 8 and 9.

The legs 4 and 5 are weighted by suitable metal inserts 25 disposed at a height to provide ease of manipulation of leg action. The weights are of a heft that will enable the diver to float when all of the compartments 8, 9 and 10 are filled with air, and which will effect sinking of the diver when either compartment 8 or 10 or both are substantially filled with water. The floating position of the diver should be upright with only the top of the head above water so that port 12 is submerged.

The legs 4 and 5 are secured to the body 1 by the corresponding projections or pins 22 and suitable hinges 24 which extend into complemental recesses in the upper end of each leg and are preferably glued therein.

On one side, illustrated as the right side, the hinge 24 is disposed to the rear of pin 22 so that the corresponding right leg hinges near its rear edge on the flexible hinge 24 therefor and is swung rearwardly upon a downward depression of the corresponding diaphragm 21 and pin 22.

On the other side, the left side in the present illustration, the hinge 24 is disposed forward of the pin projection 22 so that the corresponding left leg hinges near its forward edge on the flexi-

ble hinge 24 therefor and is swung forwardly upon a downward depression of the corresponding diaphragm 21 and pin 22.

For an upward inward movement of the diaphragms 21, the right leg in the illustration will move forwardly and the left leg will move rearwardly. This relationship of the legs is determined by the relation of compartments or chambers 8 and 9. The leg directly beneath the compartment that is connected to tube 14 should have its hinge rearwardly of its diaphragm so that it will move rearwardly upon a downward movement of the diaphragm caused by increased pressure in the chamber.

This walking action of the legs may be transmitted into an actual forward movement of the toy along the bottom of a tank by providing a frictional tread 26 on the bottom of the feet 27 at the lower end of the legs 4 and 5.

The arms 2 and 3 are attached to the body 1 by means of the lateral circular projections 28 disposed at the shoulders of the body and upon which the arms are free to swing in a life-like manner as the diver walks forwardly.

The arms 2 and 3 are constructed by molding from the same or a similar synthetic resin as the body 1.

A small pin-hole port 29 may be provided in the top shoulder of compartment 8 for the restricted escape of air from the diver while submerged, to give a slow bubbling of air upwardly through the water from the diver.

In operating and manipulating the diver described and shown by way of illustration of the invention, the diver is first placed on the water, preferably in a flat bottom container such as a bath tub, laundry tub, dish pan, or the like. The diver will float with the weighted legs downward.

By squeezing bulb 15 with the hand, air is forced out through the body of the diver from compartment 8 through port 17 to compartment 9, thence through port 18 and passage 19 to head 10, and out port 12; and then by releasing the bulb with a finger over the port of check valve 16, water is drawn into the head compartment 10 through port 12 and thence through passage 19 and port 18 to compartment 9 and port 17 to compartment 8, partially filling the latter and causing the diver to sink to the bottom.

When the diver has been lowered to the desired level, which for descriptive purposes will be assumed to be at the bottom of the tank so that the diver stands with his feet on the bottom, the operator may release his finger from the port of valve 16 and allow air to enter and complete the expansion of bulb 15 to normal size.

The conditions with the diver standing on the bottom of the tank are approximately as shown in Fig. 1. The right-hand compartment 8 will be the one containing the most water, since in drawing the water into the body it first enters compartment 10 and then passes into compartment 9 through passage 19 and port 18 until it covers port 17, after which it passes into compartment 8 through port 17 and will rise in compartment 8 toward the port 13 connected with tube 14. Compartment 9 will remain substantially filled with air to provide the necessary buoyancy of the diver. Initially this buoyancy is displaced to the left of the center of gravity of the diver, and the diver stands on the right foot.

To make the diver walk, the bulb 15 is squeezed and released alternately in repeated cycles in timed relation to the desired walking action.

Each time the bulb 15 is squeezed, pressure is built up in compartments 8 and 9 to force diaphragms 21 downwardly and effect a hinging movement of the right leg 4 rearwardly and of the left leg 5 forwardly, thereby tending to propel the diver forwardly upon the right leg 4 which sustains the weight of the diver.

Simultaneously with this forward movement, the forcing of air down tube 14 by the contraction of bulb 15 forces water from compartment 8 through port 17 into compartment 9, thereby shifting the center of buoyancy to the right so that at the end of the specified walking stroke the weight of the diver will be upon the left foot. Port 18 and passage 19 are sufficiently small to restrict the momentary escape of water therethrough and compartment 9 becomes substantially filled with water while compartment 8 is emptied of water down to port 17.

Upon each releasing of the bulb 15 by the hand with a finger over the port of valve 16, a suction effect is obtained in the compartments 8 and 9 and diaphragms 21 move upwardly to effect hinging action of legs 4 and 5 in the opposite directions, thereby propelling the diver forwardly upon the left leg 5. Simultaneously with this stroke of the walking action water will rise in compartment 8 and lower in compartment 9 so as to shift the center of buoyancy back to the left side, placing the weight of the diver on the right foot at the end of the stroke.

With some skill of manipulation the diver can be caused to walk straight ahead or to the left or right or in a circle, as desired by the operator.

The diver can be made to rise to a floating position by slowly and repeatedly squeezing the bulb to drive the water from the compartments 8, 9 and 10 through final port 12, and quickly releasing the same to permit air to enter through valve 16. If desired, the valve 16 may be eliminated and solely the finger of the operator may be employed to control air movement through the port into and out of bulb 15.

Various embodiments of the invention may be employed within the scope of the following claims.

I claim:

1. A submersible toy diver comprising a hollow body, a pair of leg members hinged to the lower end of said body side by side, a separate diaphragm in an opening in the bottom wall of the body disposed adjacent the hinge of each leg with the hinge of one leg disposed forwardly of the corresponding diaphragm and the hinge of the other leg disposed rearwardly of the corresponding diaphragm, means connecting each diaphragm with the corresponding leg to actuate the same upon its hinge in response to movements of the diaphragm, and means to effect alternate cycles of pressure change within said body whereby both of said diaphragms are cyclically moved in and out to effect action of the legs in opposite directions simulating a walking movement therefor.

2. A submersible toy diver comprising a hollow body having a vertical central partition extending from the back to the front wall thereof and dividing the same into two chambers, a pair of leg members hinged side by side to the lower end of said body to provide for forward and rearward movement of the legs, a diaphragm at the lower end of each chamber in an opening in the bottom of said body, means connecting each diaphragm with a corresponding leg whereby in-and-out movement of the diaphragms will effect leg action for the toy, and means to effect alter-

nate cycles of fluid pressure change within said chambers whereby said diaphragms are caused to actuate said legs in a walking action.

3. A submersible toy diver comprising a hollow body having a vertical central partition extending from the back to the front wall thereof and dividing the same into two chambers, a pair of leg members hinged side by side to the lower end of said body to provide for forward and rearward movement of the legs, a diaphragm at the lower end of each chamber in an opening in the bottom of said body, means connecting each diaphragm with a corresponding leg whereby in-and-out movement of the diaphragms will effect leg action for the toy, the hinge for one of said legs being disposed forwardly of the corresponding diaphragm and its connection to the leg and the hinge for the other of said legs being disposed rearwardly of the corresponding diaphragm and its connection to the leg, and means to effect simultaneous cycles of increasing and decreasing fluid pressures within said chambers whereby said diaphragms are moved outwardly simultaneously to move said legs in opposite directions, and inwardly simultaneously to reverse the movement of the legs and thereby provide a walking action for the toy.

4. A submersible toy diver comprising a hollow body having a vertical central partition extending from the back to the front wall thereof and dividing the same into two chambers, a pair of leg members hinged side by side to the lower end of said body to provide for forward and rearward movement of the legs, a diaphragm at the lower end of each chamber in an opening in the bottom of said body, means connecting each diaphragm with a corresponding leg whereby in-and-out movement of the diaphragms will effect leg action for the toy, the hinge for one of said legs being disposed forwardly of the corresponding diaphragm and its connection to the leg and the hinge for the other of said legs being disposed rearwardly of the corresponding diaphragm and its connection to the leg, said partition having an opening therethrough near the bottom to connect said chambers, one chamber having a small port for the admission of water thereto near the bottom thereof, a flexible tube connected by a port to the upper end of the other chamber, and means connected to said tube to supply and withdraw air from the body of the diver in cycles of alternate increasing and decreasing fluid pressure for said chambers whereby said diaphragms are moved outwardly simultaneously to move said legs in opposite directions, and inwardly simultaneously to reverse the movement of the legs and thereby provide a walking action for the toy.

5. A submersible toy diver comprising a hollow body having a vertical central partition extending from the back to the front wall thereof and dividing the same into two chambers, a pair of leg members hinged side by side to the lower end of said body to provide for forward and rearward movement of the legs, a diaphragm at the lower end of each chamber in an opening in the bottom of said body, means connecting each diaphragm with a corresponding leg whereby in-and-out movement of the diaphragms will effect leg action for the toy, the hinge for one of said legs being disposed forwardly of the corresponding diaphragm and its connection to the leg and the hinge for the other of said legs being disposed rearwardly of the corresponding diaphragm and its connection to the leg, said partition having

an opening therethrough near the bottom to connect said chambers, the chamber disposed above the leg that is hinged forwardly of its diaphragm having a small port for the admission of water thereto near the bottom thereof, a flexible tube connected by a port to the upper end of the other chamber which is disposed above the leg that is hinged rearwardly of its diaphragm, and means connected to said tube to supply and withdraw air from the body of the diver in cycles of alternate increasing and decreasing fluid pressure for said chambers whereby said diaphragms are moved outwardly simultaneously to move said legs in opposite directions, and inwardly simultaneously to reverse the movement of the legs and thereby provide a walking action for the toy, the water admission port serving for the initial admission of water into said body to substantially fill the opposite chamber by initial suction through the tube whereby the toy may be caused to sink and the side of the toy immediately above the leg which moves rearwardly at any given time is less buoyant than the side of the toy immediately above the leg which moves forwardly so that traction may be maintained between the bottom of the legs and a surface upon which the toy walks.

6. A submersible toy diver comprising a hollow body having a vertical central partition extending from the back to the front wall thereof and dividing the same into two chambers, a pair of leg members hinged side by side to the lower end of said body to provide for forward and rearward movement of the legs, a diaphragm at the lower end of each chamber in an opening in the bottom of said body, means connecting each diaphragm with a corresponding leg whereby in-and-out movement of the diaphragms will effect leg action for the toy, the hinge for one of said legs being disposed forwardly of the corresponding diaphragm and its connection to the leg and the hinge for the other of said legs being disposed rearwardly of the corresponding diaphragm and its connection to the leg, said partition having an opening therethrough near the bottom to connect said chambers, a flexible tube connected by a port to the upper end of the chamber which is disposed above the leg that is hinged rearwardly of its diaphragm, an initial supply of liquid in the chamber connected to said tube substantially filling the chamber and a corresponding initial supply of air in the opposite chamber, and means connected to said tube to supply and withdraw air from the body of the diver in cycles of alternate increasing and decreasing fluid pressure for said chambers whereby said diaphragms are moved outwardly simultaneously to move said legs in opposite directions, and inwardly simultaneously to reverse the movement of the legs and thereby provide a walking action for the toy while alternately changing the buoyancy of the body laterally to correspond with the side having the forwardly moving leg in each instance.

7. A submersible toy diver comprising a hollow body having a vertical central partition extending from the back to the front wall thereof and dividing the same into two chambers, a pair of leg members hinged side by side to the lower end of said body to provide for forward and rearward movement of the legs, a diaphragm at the lower end of each chamber in an opening in the bottom of said body, means connecting each diaphragm with a corresponding leg whereby in-and-out movement of the diaphragms will effect leg action for the toy, the hinge for one of said

legs being disposed forwardly of the corresponding diaphragm and its connection to the leg and the hinge for the other of said legs being disposed rearwardly of the corresponding diaphragm and its connection to the leg, the chamber disposed above the leg that is hinged forwardly of its diaphragm having a small port for the admission of water thereto near the bottom thereof, said partition having an opening therethrough near the bottom to connect said chambers, a flexible tube connected by a port to the upper end of the chamber which is disposed above the leg that is hinged rearwardly of its diaphragm, and a hand contractible bulb connected to said tube to supply and withdraw air from the body of the diver in cycles of alternate increasing and decreasing fluid pressure for said chambers whereby said diaphragms are moved outwardly simultaneously to move said legs in opposite directions, and inwardly simultaneously to reverse the movement of the legs and thereby provide a walking action for the toy, the first named port serving for the initial admission of water into said body to substantially fill the opposite chamber by initial suction through the tube whereby the toy may be caused to sink and the side of the toy immediately above the leg which moves rearwardly at any given time is less buoyant than the side of the toy immediately above the leg which moves forwardly so that traction may be maintained between the bottom of the legs and a surface upon which the toy walks.

8. A submersible toy diver comprising a hollow body having a vertical central partition extending from the back to the front wall thereof and dividing the same into two chambers, a hollow head for said body partitioned therefrom across the neck thereof to provide a third chamber, a pair of leg members hinged side by side to the lower end of said body to provide for forward and rearward movement of the legs, a diaphragm at the lower end of each chamber in an opening in the bottom of said body, means connecting each diaphragm with a corresponding leg whereby in-and-out movement of the diaphragms will effect leg action for the toy, the hinge for one of said legs being disposed forwardly of the corresponding diaphragm and its connection to the leg and the hinge for the other of said legs being disposed rearwardly of the corresponding diaphragm and its connection to the leg, the chamber disposed above the leg that is hinged forwardly of its diaphragm having a small port near the bottom thereof and leading through a passage to the top of said head chamber, a port to the outside for said chamber near the neck line, said first named partition having an opening

therethrough near the bottom to connect said first named chambers, a flexible tube connected by a port to the upper end of the chamber which is disposed above the leg that is hinged rearwardly of its diaphragm, a hand contractible bulb connected to said tube to supply and withdraw air from the body of the diver in cycles of alternate increasing and decreasing fluid pressure for said chambers whereby said diaphragms are moved outwardly simultaneously to move said legs in opposite directions, and inwardly simultaneously to reverse the movement of the legs and thereby provide a walking action for the toy, and weights for said legs correlated to the buoyancy of said hollow body and head to effect initial floating of the diver with the outside port thereof below water level, said ports serving for the initial filling of said head with water by suction from said bulb to effect sinking of the diver, and for continued admission of water through said passage from the head to said body chambers to substantially fill the chamber connected to said bulb whereby the side of the toy immediately above the leg which moves rearwardly at any given time is less buoyant than the side of the toy immediately above the leg which moves forwardly so that traction may be maintained between the bottom of the rearwardly moving leg and a surface upon which the toy walks.

9. A submersible toy diver comprising a hollow body, means to admit and to discharge water from said hollow body to cause the diver to sink and to rise in the water, means to supply air to said body during submergence, a pair of leg members hinged to said body, means to actuate said legs in opposite directions in response to alternate increasing and decreasing of pressure within the body to provide a leg action for the diver, and means to shift the weight of the water in said body from side to side in synchronism with the leg action to effect a control of traction between the bottom of said legs and a surface supporting the same to effect directional movement of the diver under the influence of said leg action.

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