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TOY SUBMARINE

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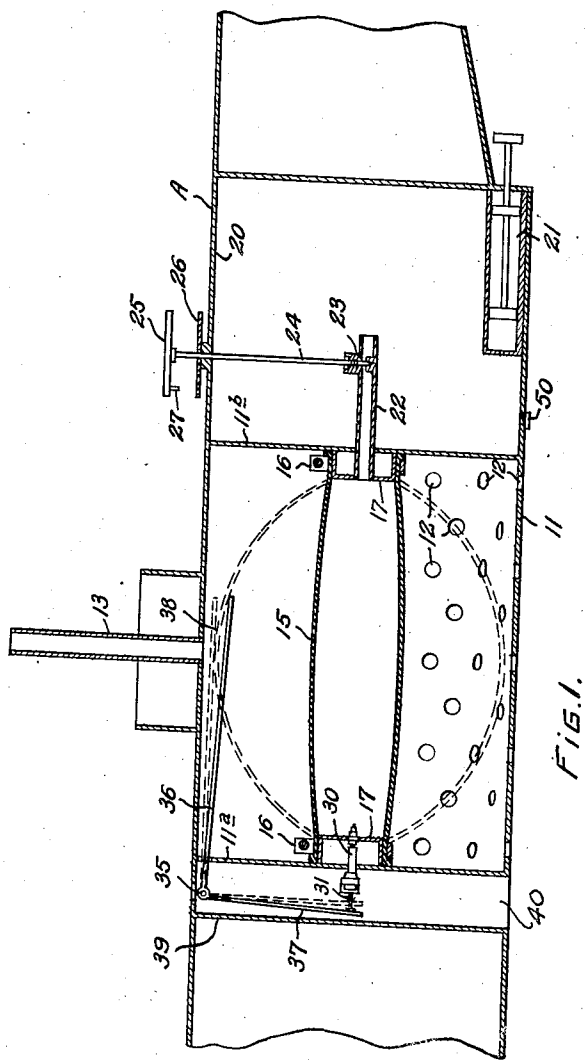


FIG. 1.

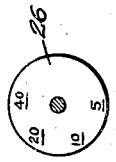


FIG. 2.

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TOY SUBMARINE

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5 Claims. (Cl. 46—94)

This invention relates to toy submarines.

It is a principal object of the invention to provide a toy of this nature which is adapted to dive to a predetermined depth and to rise automatically. It is a further object of the invention to provide a toy of this nature which will range away in diving.

It is a further object of the invention to provide such a toy which will remain buoyant after rising.

With these and other objects in view a submarine constructed according to the invention is featured by a hull including a ballast tank provided with ports to allow the entrance of water, a bladder for its ejection, a pressure tank for supplying air to the bladder, and an adjustable communication for admitting air from the pressure tank to the bladder. An optional feature may be an operating connection from the bladder for operating an exhaust valve automatically when a predetermined degree of inflation is reached, so as to prevent over-inflation of the bladder.

A device of this nature overcomes certain disadvantages of prior art toys. For instance, the emerging mechanism of one type of submarine is operated by contact with the bottom. Where the bottom is rough and the elevating element fails to make contact with it, the device will remain on the bottom and may thus be lost. The other type of bladder-operated devices are remotely controlled by the operator through a tube and bulb arrangement, which is complicated, inconvenient and unrealistic. Additionally, as compared with other types of toy submarines, the construction is simple and the cost of manufacture would be low, there being no machined mechanical parts.

Other aspects of the invention will become apparent from the following description and reference to the accompanying drawing illustrating a toy submarine being a preferred embodiment, and in which,

Figure 1 is a fragmentary longitudinal sectional view taken through this preferred embodiment in sufficient detail to understand the operation thereof.

Figure 2 is a plan view of a dial used to facilitate adjustment of the mechanism for different depths.

Referring more particularly to the drawing, A represents the hull of the submarine. In the hull A is a ballast tank 11 defined by end bulkheads 11*a* and 11*b*. The bottom of the tank 11 is perforated as at 12 to allow the entrance of water and may be hingedly connected to the hull so that it can be swung downward for access to the bladder. The top of the tank is provided with an air outlet tube 13 simulating a periscope.

Centrally arranged within the tank 11 and extending across it as shown is a bladder 15 of rubber or other suitable airtight elastic material. Each end of the tube is secured by clamps 16 in an airtight connection to a collar 17 carried by each of the bulkheads, 11*a*, 11*b*.

In the hull adjacent the ballast tank is a pressure tank 20 in which air may be compressed by means of a pump 21 communicating with the atmosphere. A pipe 22 leads from the pressure tank through the collar 17 to the inside of the bladder 15. This communication is controlled by a valve 23 having a stem 24 extending upwards through the hull of the submarine to an operating wheel 25. This valve is very finely adjustable to allow a slow leak of air from the pipe 22 to the bladder, as will be more fully explained. Beneath the wheel 25 is a dial 26 graduated in depths so as to facilitate various settings of the pointer 27 on the wheel 25 to be made.

Communicating with the end of the bladder 15 opposite to the pipe 22 and mounted in the bulkhead is an air valve 30 through which air may be exhausted, by inward pressure on its plunger 31. Hingedly mounted as at 35 is a lever 36 having an arm 37 extending downwards to a point opposite the stem of the valve 31 and another arm 38 extending in a horizontal direction through the bulkhead 11*a* to within the ballast tank 11 above the bladder. Upward movement of the arm 38 causes an inward movement of the arm 37 to move the valve stem 31 into open position. The parts can be of very simple construction. For instance, the valve 23 may be similar to that used on a "Colman" lamp and the valve 30 an ordinary bicycle valve.

A bulkhead 39 closes off the water-accessible portion of the submarine from the forepart of the hull. An opening 40 in the bottom of the hull gives access for manual operation of the valve 30. An outlet controlled by a plug 50 is provided in the bottom of the pressure tank for the purpose of exhausting any moisture which may accumulate in the latter.

Operation

When the submarine is to be operated the pressure is set up in the tank 20 by means of the pump 21, then the valve 25 is set to give a predetermined leak of air from the pressure tank to the bladder, the markings on the dial 26 facilitating this adjustment.

The submarine is launched immediately with the bladder in the deflated position as shown in cross section in Figure 1, and at once water will enter the ports 12 to fill the remainder of the tank, trapped air being driven out through the tube 13. When this has taken place the specific gravity of the water is sufficient for the craft to submerge. As it sinks, the bladder gradually becomes inflated forcing water out of the tank 11. As the bladder becomes inflated more and more, the craft's rising speed will increase and it will eventually break the surface. When the bladder becomes sufficiently fully inflated, as indicated in dotted lines in Figure 1, it will press the arm 38 upwards so as to operate the exhaust valve 30 allowing air to escape from the bladder 15, preventing further inflation.

The craft is preferably so constructed that it will not dive vertically to the bottom but will range away so as to dive obliquely in a manner similar to a real submarine. In this way the toy will rise at some considerable distance from the point at which it was launched. If desired, a string may be attached to it so that it may be pulled in from the edge of the water.

Advantages

There are numerous advantages to toys of this nature. In the first place it is relatively simple to make, embodying as it does few working parts. It is fool-proof in that the mechanism is adjusted so that the craft will remain at the surface rather than submerging out of reach, when the cycle of operation is completed. The important working part, namely the bladder, may be easily replaced when it is worn out. The valves are of conventional types which may also be replaced. Other advantages will be evident from the description and by comparison with other toys.

It will be understood that various modifications may be made in this invention without departing from the spirit thereof or the scope of the claims, and therefore the exact forms shown are to be taken as illustrative only and not in a limiting sense, it being desired that only such limitations shall be placed thereon as may be imposed by the state of the prior art or are set forth in the accompanying claims.

I claim:

1. A submersible toy, comprising, a hull including a ballast tank having water ports and an air outlet, an air tank in said hull, a bladder in said ballast tank, communication between said air tank and said bladder, adjustable means for controlling said communication, and means for exhausting air from said bladder.

2. A submersible toy, comprising, a hull including a ballast tank having water ports and an air outlet, an air tank in said hull, a bladder in said ballast tank, communication between said air tank and said bladder, adjustable means for controlling said communication, valve means for exhausting air from said bladder, and means operable by inflation of said bladder for actuating said valve means.

3. A submersible toy comprising a hull, a ballast tank in said hull, the bottom of said ballast tank including exhaust ports and in the top an air vent, a bladder in said ballast tank, a compressed air tank in said hull and having a communication with said bladder, adjustable means for regulating said communication, valve means for exhausting said bladder and means operable by inflation of said bladder for operating said valve means.

4. A submersible toy, comprising, a hull including a ballast tank having water ports and an air outlet, an air tank in said hull, a bladder in said ballast tank expansible for forcing the water therefrom, communication between said air tank and said bladder, means capable of being adjusted and set for controlling said communication, and valve means for exhausting air from said bladder.

5. A submersible toy, comprising, a ballast tank having water ports and an air outlet, an air tank connected to said hull, a bladder in said ballast tank, communication between said air tank and said bladder, valve means for controlling said communication and means for allowing air to escape from said bladder.

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