

# SEA DIVER

**the underwater explorer**

**Ages 8 to Adult**

## SEA DIVER

The SEA DIVER is a unique activity toy which demonstrates the scientific principle of the cartesian diving bell and includes a patented grappling claw mechanism that picks up and releases underwater objects.

## PRINCIPLES OF OPERATION

The SEA DIVER operates on a principle discovered by René Descartes, a 17th century scientist-philosopher. This principle concerns the compressibility of air vs. the incompressibility of water.

The SEA DIVER bell floats in the bottle of water because of an air bubble which is trapped inside the bell. If the air bubble is removed or made smaller, more water may enter the diving bell, reducing the buoyancy and causing it to sink. The bubble in the SEA DIVER bell is made smaller by applying hand pressure to the sides of the bottle. Since the water cannot compress, it transmits the pressure to the air bubble, making the bubble smaller. When the hand pressure is removed the air bubble in the diving bell expands and pushes the water out of the bell, causing it to rise.

## TO PLACE YOUR SEA DIVER IN OPERATION

Note: Please follow instructions carefully to insure proper operation of your SEA DIVER.

1. Fill a medium sized wide-mouthed jar or pitcher with water and let stand five (5) minutes or until air bubbles are gone. Try to use nonaerated tap water of 70 to 80 degrees. If the water is too hot or cold it will be difficult to adjust the buoyancy of the SEA DIVER bell.

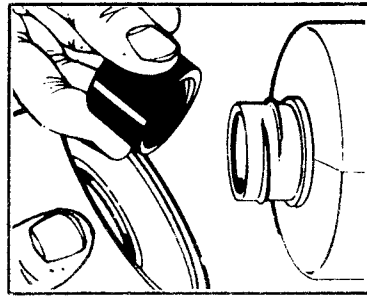
2. Remove the cap and base from bottle. You will find your SEA DIVER bell and salvage under printed disk. Pour gravel from plastic bag into bottle. Over a sink pour the water from the jar into the bottle filling it to the brim. Drop in salvage.

3. Place the diving bell in the bottle mouth, claws down, so that it floats high in the neck of the bottle. Check to make sure there is no gravel around the mouth of the bottle or in the cap. Replace the base and screw cap on tightly. Do not invert the bottle yet.

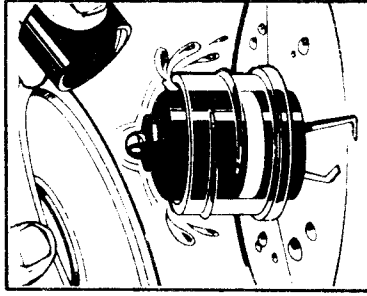
4. After inserting the SEA DIVER bell in the bottle and replacing the base and cap, tap the sides of the bottle with your knuckles or fingertips. You will notice a few small bubbles escaping from the area between the diver claws. Between taps, test the SEA DIVER bell by squeezing the bottle and causing the diving bell to sink.

5. Squeeze the bottle to cause the SEA DIVER bell to descend to the center of the bottle. Then, slowly turn the bottle over to allow the gravel and other objects to fall into the base end. Your SEA DIVER is now ready to operate. Once the SEA DIVER bottle has been inverted, the rate of descent may be adjusted by tapping the sides of the bottle to allow more air to escape from the bell. Proper buoyancy is attained when the SEA DIVER easily descends and ascends with an object held in its claws.

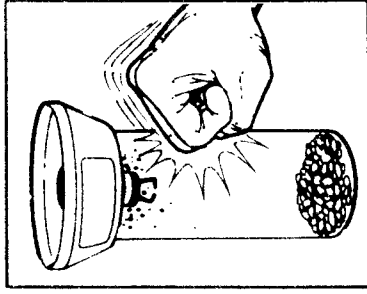
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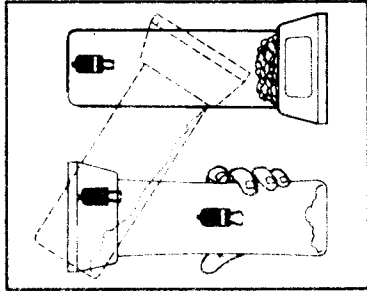
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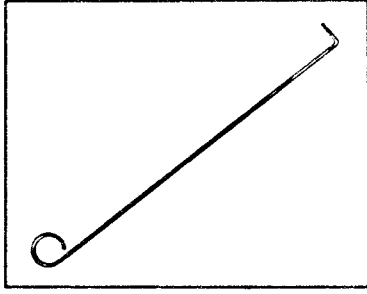
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5



6



6. Do not hesitate to experiment with the broad range of buoyancies under which the SEA DIVER will operate. Release of too much air will cause the SEA DIVER bell to sink or be unable to lift an object. When this happens, you can retrieve the diving bell by bending a small loop in one end of the retrieval wire and then bending about one-quarter inch of the other end straight out to be used as a hook. Next, hook the wire through the hole at the top of the diving bell and pull it out of the bottle. Shake the water from the diving bell and reinsert it into the bottle, then follow instructions four (4) and five (5).

If the SEA DIVER bottle is shaken violently or turned end to end too rapidly, the SEA DIVER bell may sink and will have to be retrieved.

## GAMES FOR YOUR SEA DIVER

**SALVAGE HUNT:** The object of this game is to be the first player to pick up, one at a time and in correct order, the anchor, cannon, pistol, sextant and lantern. To earn a point, a player must return the SEA DIVER bell to the top of the bottle with the salvage. If a player drops salvage on the way up, it is not counted as a point and play moves to his opponent and continues in this way until a player has picked up each item. Each object may be picked up only once by each player. The winner is the first person to pick up all the salvage in correct order.

**DROP ANCHOR:** The object of this game is to bring the anchor to the top of the bottle, release it, and catch it with the diving bell before it touches bottom. If the first player does not catch the anchor after one try, play passes to his opponent. A player earns one point each time he catches the anchor. The winner is the player with the most points after ten (10) rounds.

## HELPFUL PRECAUTIONS

Never operate your SEA DIVER in temperatures below 50 degree F. The clear bottle is made of P.V.C. (polyvinyl chloride) plastic which tends to become stiff and brittle when cold – at which time flexing could cause the bottle to crack.

Always keep your SEA DIVER bottle completely filled with water. Its operating principle is based on a small bubble trapped within the SEA DIVER bell. Excessive air within the bottle requires greater flexing of the sides and such increased pressure may reduce bottle life. Never FORCE your SEA DIVER by applying excessive hand pressure. SEA DIVER is designed to work with normal hand pressure. If your SEA DIVER seems difficult to operate, please reread and follow the instructions.

## TROUBLESHOOTING

**PROBLEM:** SEA DIVER bell has sunk.

**CAUSE:** All the air has escaped from the diving bell.

**REMEDY:** Retrieve diving bell with wire and repeat steps 3 and 4.

**PROBLEM:** SEA DIVER bottle leaks.

**CAUSE:** Cap is not on tight enough or there is gravel between the washer and the bottle top.

**REMEDY:** Rinse the gravel thoroughly from the cap.

**PROBLEM:** Diving bell is jammed with gravel and claws won't work.

**CAUSE:** Bottle has been turned right side up too rapidly when tuning for buoyancy and gravel has fallen directly inside the diver.

**REMEDY:** Disassemble diver and rinse thoroughly. Then reassemble.

**PROBLEM:** SEA DIVER bell will not lift objects but will ascend by itself.

**CAUSE:** Diving bell has become less buoyant through gradual loss of air.

**REMEDY:** Diving bell needs "retuning." Follow instructions 3 and 4.

We will be glad to answer inquiries regarding these rules. Parker Brothers, P.O. Box 900, Salem, Mass. 01970.

