

# INVENTIONS SERIES 2: THE SUBMARINE

The first designs for the submarine date back to the 1500s, but the actual idea goes back even further. The need to explore the vast depths of the sea goes back to Ancient Egypt. The Temple of Thebes holds the first images of men using hollow sticks to breathe underwater for hunting; it was a strategic way to survive and sparked the idea of underwater combat.

The first recorded plan for a submarine came in 1578 from William Bourne, an English former Royal Navy gunner. His book, "Inventions and Devises," published in 1578, which discussed the building of an underwater navigational vehicle. The thought was to decrease the submarine's overall volume rather than flooding its chambers. In 1680, Giovanni Borelli duplicated an Italian plan, which was the making of a craft that would be made out of multiple goatskins! Each goatskin was to be secured to an *aperture* at the bottom. Borelli planned to *submerge* this underwater ship by filling the skins with water, and raise it by forcing the water out with a twisting rod. Though the submarine was never built, it was the first attempt toward the making of the future *ballast* tank. Then in 1776, David Bushnell built the first combat submarine "Turtle", which could hold a single man. This submarine was the first to dive, surface, and be used in Naval combat. Robert Fulton, known for the development of the steam engine, built a submarine

called "Nautilus" in 1801 which was actually an elongated version of the "Turtle". It had a sail for above water and a hand-cranked screw while down in the depths of the sea! The air was compressed air so two divers could stay under for a total of five hours. In 1900 the U.S. Navy held a submarine design competition, where Irish immigrant, John Holland, won and his design was later known as the USS Holland (SS-1). It was the first to have torpedoes, run on gasoline, have electricity and move well underwater. This basic design became the regular for the United States submarine development.

## VOCAB:

Aperture- an opening, as a hole, slit, gap, or crack

Submerge- to put or sink below the surface of water, cover with water

Ballast- any heavy material carried in a vessel to provide desired stability.

## COMPREHENSION:

(Write your answers on the back of this page)

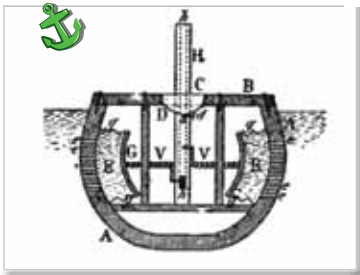
What were the two different theories on how to get a submarine underwater?

What submarine could hold two divers and for how long?

Draw a picture on the back showing how the Egyptians used water to gather food.

## FUN FACT:

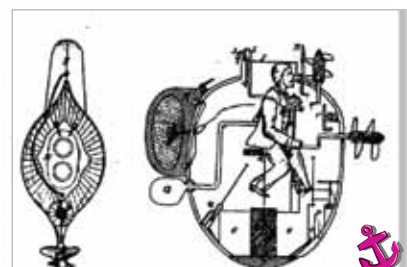
The name "Nautilus" was taken from the 1870 novel, "20,000 Leagues under the Sea," by Jules Verne. The name was given to several U.S. Navy boats – including the world's first nuclear-powered submarine, the 1954 USS Nautilus.



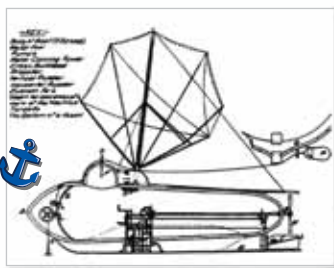
1578, William Bourne's creation was a wooden framework bound in waterproofed leather. It was to be submerged by using hand vises to contract the sides and decrease the volume.



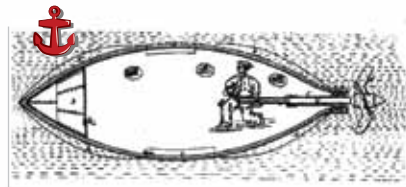
1680, Giovanni Borelli reproduced an Italian plan which was the making of a craft which used multiple goatskins.



Dubbed the "Turtle" because it resembled a sea-turtle floating vertically in the water. It was operated by Sergeant Ezra Lee. Built by David Bushnell in 1776.



The Nautilus, the elongated submarine was controlled by a hand-cranked propeller.



Phillips was granted an 1852 patent for a "Steering Submarine Propeller." Steering, along with up-and-down movement, was controlled by a hand-cranked propeller on a swivel joint.



The US Holland (SS-1) could make vast changes in depth and altitude underwater. It also had a reloadable torpedo tube.