

Appendix 4

# the submarine in the early 19th century



*A replica of Monturiol's Ictineo II. Launched in 1864 it was the first submarine boat to be independent of an outside source of air and to be combustion-powered. The earlier Ictineo I had been powered by a hand-cranked propeller. Unlike most early submarines, which had either treasure-hunting or warfare in mind, those designed and built by Monturiol were intended for scientific research.*

As Prince Dakkar himself made clear, the concept of a submarine boat was not original with him. Nor, for that matter, were many of the features incorporated into the *Nautilus*. His primary contribution was in the development of an advanced motive power, which allowed for not only unprecedented performance but the development of a vessel of equally unprecedented size.

The reader has already been introduced to the Narcisco Monturiol's *Ictineo* and Robert Fulton's famous *Nautilus*, which lent its name to Dakkar's great invention. But Fulton did

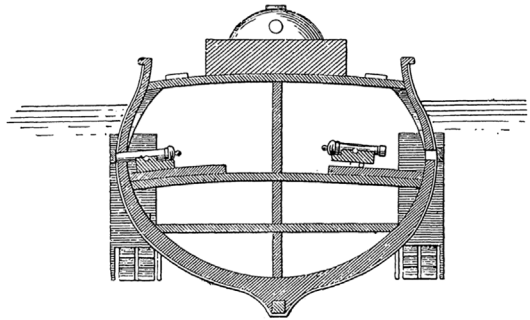
not abandon his interest in submarine navigation after that. In 1814, he introduced the *Mute*, named for the hoped-for silence of its propulsion, an enormous, 80-foot-long semi-submersible vessel

carrying a crew of 100 men working a pair of side-paddles. It failed in its trials and Fulton died before he could provide any improvements.

In 1801 and 1807, respectively an English inventor named Hodgman and a German named Klingert tested designs for submarine boats. Little is known about these vessels other than that the German's resembled a diving bell.

The year 1807 also saw a submarine boat designed by the brothers Couëssin. Presented to Napoleon, the *Nautilé* was to have had a barrel-shaped hull 28 feet long, with cone-shaped bow and stern. It was equipped with oars for propulsion while submerged and, like Fulton's *Nautilus*, with sails for surface navigation. Its official trials took place in 1810. Although these were successful, interest in the vessel was abandoned.

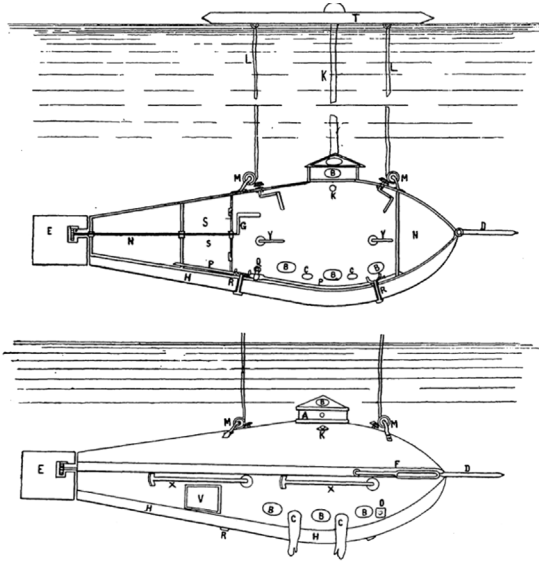
In 1821, an American, Captain Johnson, proposed an ambitious design for a submarine boat 100 feet long. It never got past the planning stage. He later navigated the Thames in a submarine boat of his own design, remaining submerged for up to ten hours. Two years later, another American officer, Shuldhham came up with a more modest design. Created largely with warfare in mind, it would have been capable of diving to a depth of 30 feet.



*Cross section of L'Invisible.*

Captain Montgery of the French Navy suggested a submarine boat in 1825, *L'Invisible*. This ambitious vessel—86 feet long, 23 feet wide and 14 feet deep—would have been armed with four large cannons, a pump for ejecting a form of Greek fire, one hundred torpedoes and an equal number of rockets, all to say nothing of small arms for the crew.

In 1820, the notorious British criminal and adventurer, Tom Johnson, hatched a scheme to rescue Napoleon from St. Helena by means of a pair of submarine boats. The first of these would



Castera.

have been the *Eagle*, a vessel of 114 tons, 84 feet long and with a beam of 18 feet. It would have been propelled by two steam engines of 40 horsepower each. The *Etna* would have been a 23 ton vessel, 40 feet long, with a beam of 10 feet. Manning these would have been a crew of thirty, in addition to four engineers. The submarine boats would have also been armed with twenty torpedoes.

In 1826, the French General Boisseroles suggested that submarine boats could be

used to sweep the harbor of Cadiz of Spanish warships. However, when it proved that his design was but an inferior version of that proposed by the Couëssins, it was abandoned.

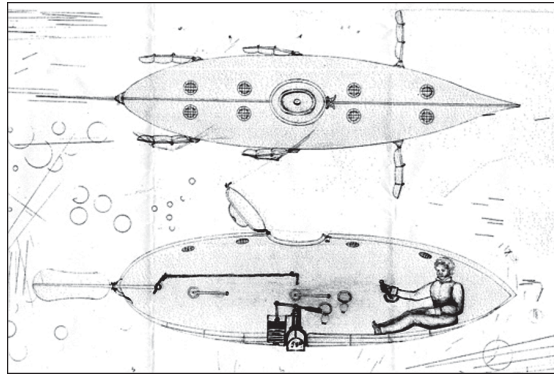
One of the first patents for a submarine vessel was taken out by the French magistrate, Castera, in 1827. Intended as a rescue craft rather than a warship, it was to have been propelled by either oars or a hand-turned propeller. It may have been the first submarine boat to be equipped with a lock to allow divers ingress and egress.

A Spanish inventor name Cervo demonstrated his spherical, wooden submarine in 1831. He was never seen again.

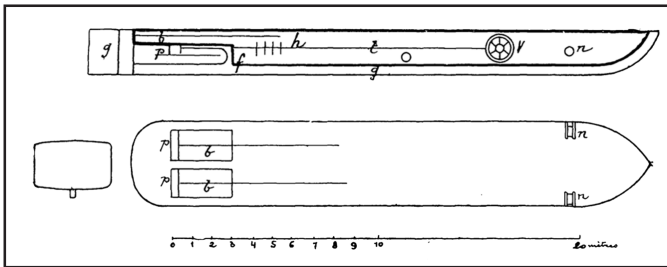
The following year was marked by the first appearance of Brutus de Villeroi, one of the more important names in the history of submarine navigation. In this year he successfully demonstrated a small submersible—named *Nautilus*—only ten feet long and three feet in diameter. In it he made dives lasting as long as twenty minutes, during which he performed various manouvers. In 1835, he demonstrated his boat before members of the British Admiralty, who were much impressed, especially by one dive that lasted for

two hours. In spite of this enthusiasm, Villeroi tried for more than 30 years to sell his design to the French navy, to no avail.

In 1834, Jean-Baptiste Petit built a small—12 feet—submarine boat that was propelled by oars. He performed a test but during one dive, the vessel did not return to the surface and its creator was lost.



De Villeroi's *Nautilus*.

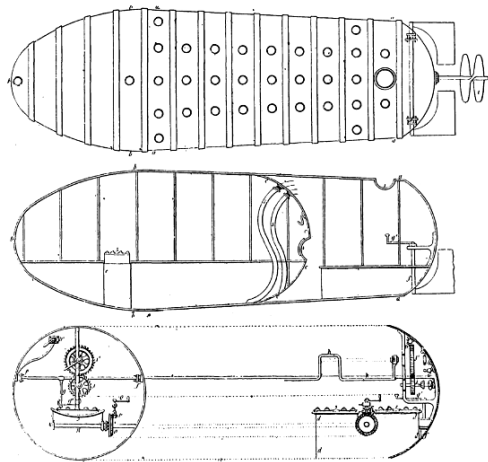


*Aubusson*.

The year 1840 saw an ambitious plan put forward by the Marquis de la Feuillade d'Aubusson. Seventy-six feet long with a

flat deck, it was to be propelled by means of alternating cylinders.

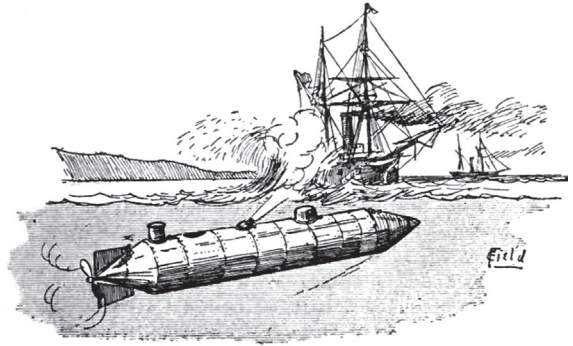
A Dr. Payerne developed a self-contained diving bell in 1842, that required no physical connection with the surface. Three years later he built his first submarine boat. It was unique in possessing one of the first true air locks, allowing divers to enter and exit the craft without flooding it. Payerne's boat was a great success, being used to clear the harbors of Brest and Cherbourg. In 1846 he was joined by M. Bouet. Together, they created a barrel-shaped



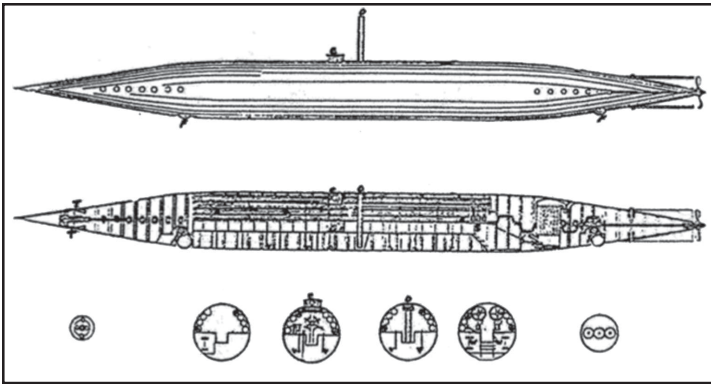
*Payerne*.

submarine boat 35 feet long. This “hydrostat” was propelled by a hand-cranked propeller. It did not prove to be successful and was later converted to a diving bell.

Beginning in 1845, an American shoemaker named Lodner D. Phillips built designed at least four submarines. His



*Phillip’s second model demonstrating its proposed underwater cannon.*



*Phillip’s third model.*

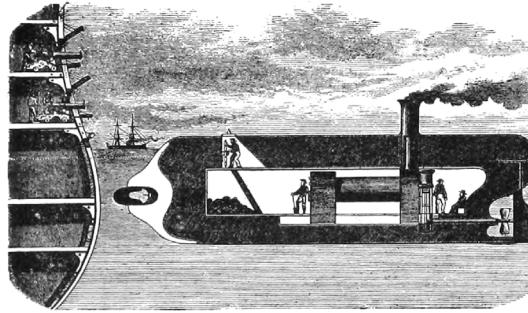
third model, built in 1851 and known as the *Marine Cigar*, was stable enough that he was able to take his family on underwater jaunts. He built two

submarine boats in 1851. Both were 50 feet long, but just five and four feet in diameter respectively. Phillip’s vessel even included a rocket launcher! Ultimately the inventor sadly became yet one more martyr in the history of submarine navigation.

A French inventor named Alexandre allegedly performed experiments in New York harbor, claiming to have achieved depths of up to 50 feet.

The year 1852 saw the schemes of the fortuitously named French inventor, Le Batteau. His barrel-shaped submersible was meant to retrieve treasures from the ocean floor, but never left the drawing board.

In 1854, Professor Marié-Davy of the Montpellier University in Hérault, drew up plans for a submarine boat that boasted a entirely unique idea: its propeller would be turned by electricity. His cigar-shaped vessel was also to be equipped with an electrically powered augur at its bow, with which it could drill into the hulls of enemy ships.

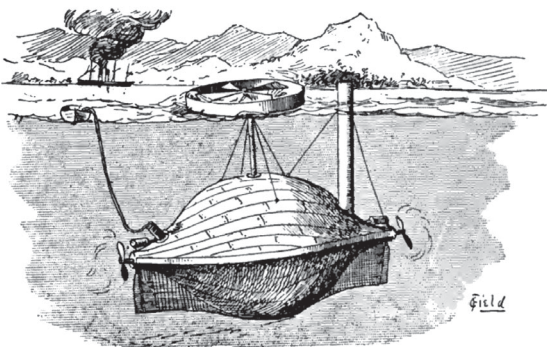


*Nasmyth.*

Two more submarine boats were proposed in 1854. The first was invented by M. Cambrez-Bassompierre. It would have been propelled by oars. The second was an idea of an anonymous prisoner at Ajaccio. The egg-shaped boat had a four-bladed propeller in its bow and a spear-shaped rudder at the stern.

In 1855 a M. Picot-Guérand proposed a submarine boat capable of cutting the wires of contact mines. Meantime, Scott Russel designed a boat similar to Bauer's *Diable Marin*. It sank during its trial run and its crew perished. Charles Babbage, famous for his work in developing mechanical computers, presented a model to the British Admiralty that was intended for use in the Siege of Sebastopol. It would have been 46 feet long, with a beam of 4 feet 6 inches and a depth of 3 feet. Carrying a crew of six, resembled a diving bell in that it was open at the bottom. It was

scrapped after its initial trials. A Russian officer named Spiridinoff, also with Sebastopol in mind, drew up plans for a submarine similar to that proposed by Dr. Payerne. Intended to be propelled by the propulsion of water, squid-style, it never made it off the drawing board.

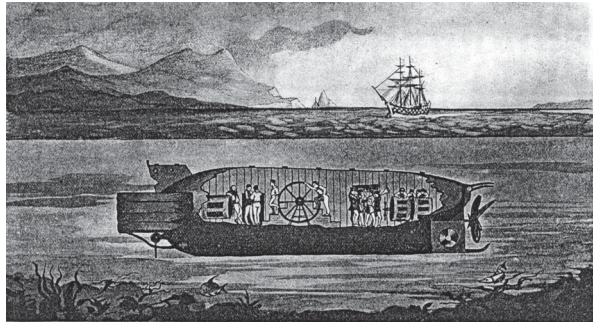


*Alphabegöity.*

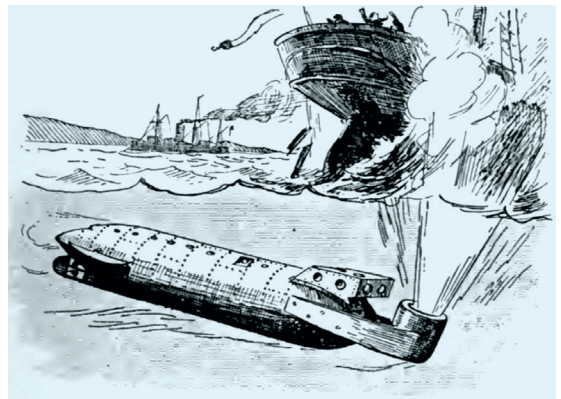
In 1855, Vilcoq and Deschamps invented a small submarine boat that boasted a unique feature. The steersman, encased in an indiarubber suit, stood on the upper deck while the vessel was submerged. The year 1855 also saw the submarine boat proposed by the British engineer, James Nasmyth. Technically not a true submarine, Nasmyth's 70-foot-long steam-powered "mortar" could only partially submerge. A ram-shaped beak contained a high explosives that would be used against the hull of an enemy ship. A dome-shaped conning tower in the bow contained the steersman.

One of the strangest projects was the "hydroscaphe" created in 1856 by a gentlemen burdened with the surname of Alphabegöity. It never went past the model stage, but the full-scale submarine boat would have been 82 feet long and 40 feet in diameter. The same year saw a design suggested by William Edward Newton that resembled more than anything an enormous lemon.

The first submarine boat designed by Wilhelm Bauer, one of the most important names in the history of submarine navigation, saw the light of day in 1850. Called the *Brandtaucher* ("Fire-diver"), it was a failure, but this did not deter its inventor nor his backers. His researches were ultimately realized in the launch of the *Diable Marin* in 1856. It was a large craft—52 feet long with a beam of 12 feet and a depth of 11 feet--and featured a

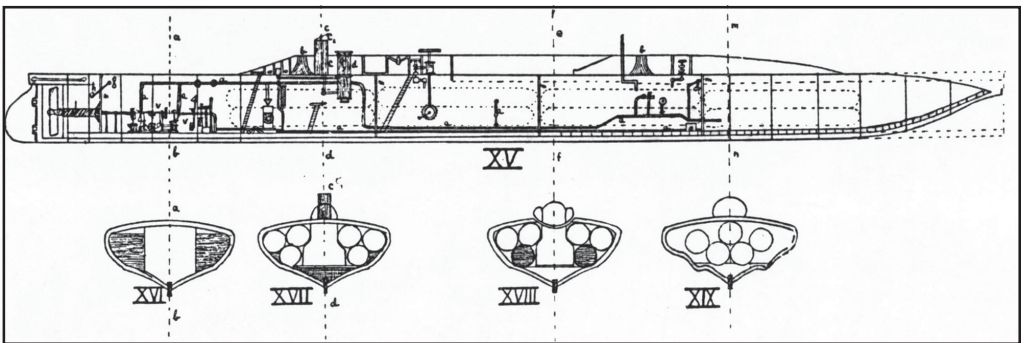


*Bauer's Diable Marin.*



*Bauer's sea-mortar at work.*

number of technological and engineering innovations. A suitable power source eluded Bauer, however, and he was reduced to having the propeller turned by the crew working a treadmill. Tests were largely successful, but interest eventually lagged and Bauer ultimately abandoned his work in 1858. He went on to propose a bizarre submarine weapon. The bow of the vessel terminated in a kind of large iron cup. This was to be filled with explosives and manipulated under the hull of an enemy ship, where it was then detonated.



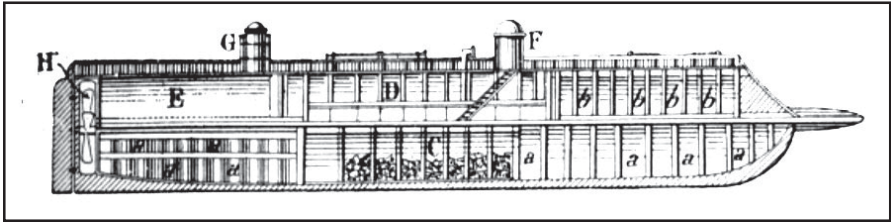
*Le Plongeur.*

Captain Bourgois of the French navy began his researches into the possibility of a submarine boat as early as 1858. His initial designs were augmented by Charles Brun, an engineer. Construction began in 1860 and the result, *Le Plongeur*, was launched in April, 1863. Although not particularly successful, two models were exhibited at the Paris Exhibition of 1867, where they attracted much attention. The compressed-air engines were to produce 84 horsepower, driving the vessel at a speed of 9 knots on the surface.

An American named Delaney exhibited an egg-shaped, steam-powered submarine boat in London in 1859.

The astonishing *Plongeur* began deep-sea trials in 1863. Prince Dakkar, in the researches that led to the construction of the *Nautilus*, had been very much inspired by this wonderful invention created by Captain Bourgois and the engineer Brun. An impressive

134 feet in length, with a beam of 20 feet, a depth of 14 feet and a displacement of 350 tons, it was the largest submarine boat built before the launch of the *Nautilus*. Powered by compressed air-driven motors, its hull was divided into numerous water-tight compartments. Air and provisions for a crew of twelve for 48 hours was provided. Light came from a series of lenticular glasses set into the upper part of the hull (at night one or two lanterns

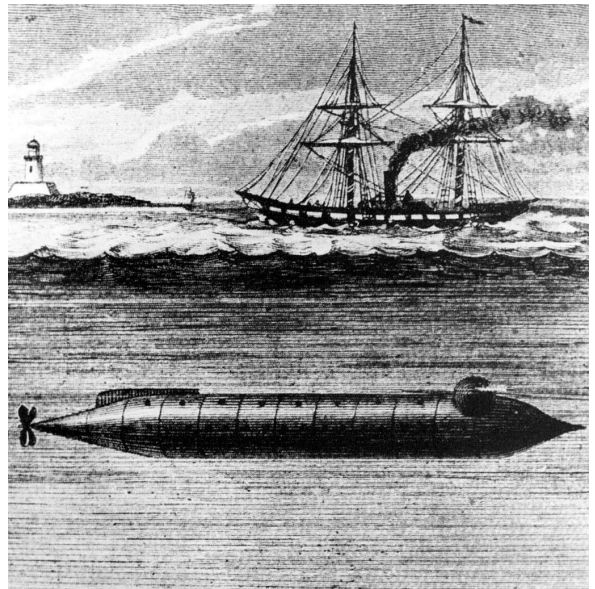


*Alstitt.*

would be allowed). One novel idea that appealed to the prince was the inclusion of a large lifeboat that was set into a recess in the “dorsal fin” that ran along the top of the vessel.

The year 1863 saw the first submarine boat designed with two means of propulsion: steam and electricity. It was the creation of an American engineer named Alstitt and was built in Mobile, Alabama. The telescopic funnel could be retracted before diving and hermetically sealed.

During the American Civil War an unnamed French inventor received nearly one million dollars (in today’s currency) to build his submarine boat along with a half million dollar bonus for every ship sunk. Resembling to a degree the *Alligator* designed by Villeroy, it

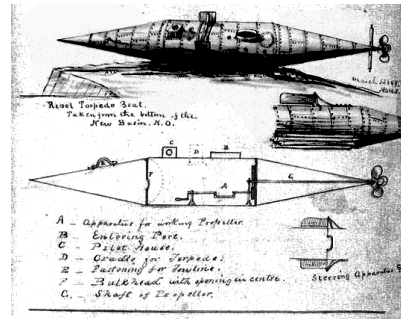


*Alligator.*

would have been 35 feet long and six feet in diameter. A crew of sixteen, eight to each side, would work oars that pierced the hull.

After trying to interest the French navy in his invention, Brutus de Villeroi immigrated to the United States in 1856. Five years later he constructed a submarine boat dedicated to salvage work. Its success led to a contract with the United States Navy. The result was the submarine boat, *Alligator*. Thirty feet long and 6 feet in diameter it was propelled by 16 hand operated oars. These were ultimately abandoned in favor of a hand-cranked propeller. Air was supplied to the crew through an air pump attached to hoses connected to two floats on the surface. It sank in 1862 during a storm while being towed to South Carolina.

During the American Civil War, the Confederacy developed a semi-submersible craft, the CSS *David*. Propelled by a steam-powered engine, it could not fully submerge but was capable of operating with only its funnel and air



A typical "David."



The Hunley was the subject of a painting created in 1862 by Conrad Wise Chapman.

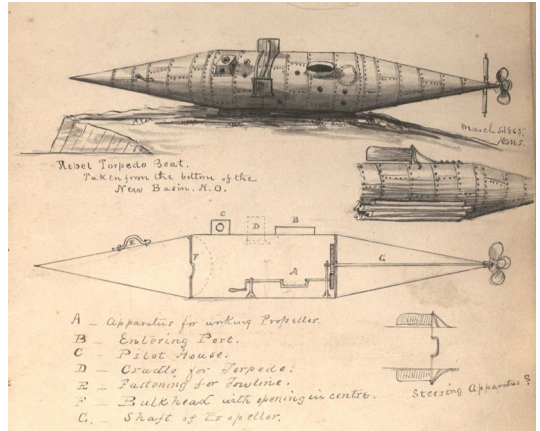
intake above water. Twenty similar craft were constructed and launched by the Confederacy during the war.

The only true submarine boat that saw service during the Civil War was the *CSS Hunley*. Recycled from an existing steam boiler it was 40 feet long and less than four feet in diameter. It was propelled by an eight-man crew turning a hand-cranked propeller.

Like the Davids, the *Hunley's* was equipped with a spar torpedo. In 1864, after many failed attempts, the *Hunley* finally succeeded in sinking an enemy ship. Unfortunately, the submarine boat and its crew were lost as well.

Steam gauge manufacturers James McClintock and Baxter Watson constructed a submarine to use against Union gunboats patrolling Lake Pontchartrain. The resulting *Pioneer* was constructed of iron and was 30 feet long and 4 feet in diameter. It was powered by a hand-cranked propeller. In 1862, a month after receiving a letter of marque from the Confederate government, the *Pioneer* was scuttled in the New Basin Canal.

Another, nameless and undocumented, submarine boat was built by the Confederacy. It was constructed of riveted iron and was 20 feet long, 3 feet wide and 6 feet deep. Like the *Pioneer*, it was powered by a hand-

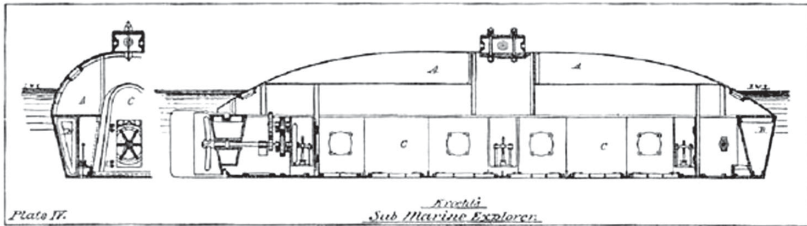


*The Pioneer depicted in an eyewitness sketch by a Union engineer.*



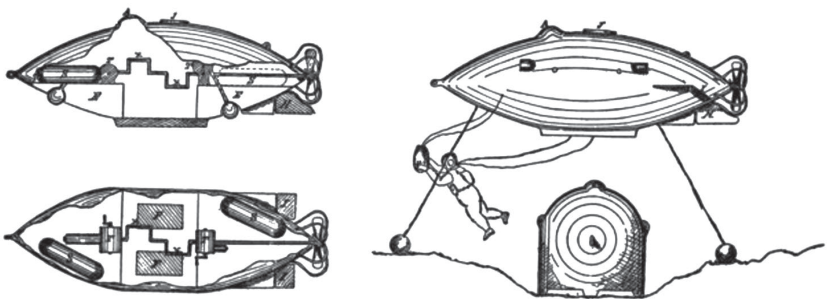
*The unknown Confederate submarine boat discovered in Louisiana in 1878.*

cranked propeller. It was discovered during the dredging of a bayou in Louisiana in 1878.



*The Sub Marine Explorer.*

German immigrant Julius Hermann Kroehl built his *Sub Marine Explorer* in Brooklyn in 1863-65. Kroehl had been inspired by the work of inventor Van Buren Ryerson, who had developed an advanced form of diving bell. Made of cast and wrought iron the *Sub Marine Explorer* was 36 feet long, 10 feet in diameter, and displaced 80 tons. A hand-cranked propeller generated up to four knots of speed. It featured a compressed air chamber lying beneath the upper hull which was filled with compressed air at a pressure of 200 psi. The main hull was taken up by a working space for the crew and ten ballast tanks. Reaching the depth desired, Kroehl allowed enough pressured air into the submarine boat to equalize the outside sea pressure. The crew



*The Intelligent Whale.*

could then open hatches in the bottom of the submarine and work on the seabed.

After successful trials in the East River in 1866, Kroehl tried to sell his invention to the US Navy, but to no avail. It was eventually sold to a company in Panama hoping to use it for hunting pearls, where it was eventually abandoned.

In 1863, Scovel S. Merriman contracted to build his *Intelligent Whale*, which was completed by the American Submarine Company in 1866. Made of half-inch thick boiler iron, the vessel was 28 feet long, nine feet high and seven feet wide. A crew of four men propelled the submarine boat by turning cranks attached to a four-bladed propeller. A speed of four knots could be achieved. Enough compressed air was carried to allow for ten hours of submerged operations. The vessel was controlled by a rudder and aft trim planes. Visibility was provided by a squat conning tower with bull's eye glass. It could stay submerged up to ten hours. Divers could exit the submarine boat via hatches in the floor.

It might be worth noting that the *Icteneo*, the *Intelligent Whale*, the *Hunley*, the unknown Confederate submarine boat and the *Pioneer* all still exist and are on public exhibit at various museums.



*The Intelligent Whale today.*