

FIRST SUBMARINE BOAT.

Invention of David Bushnell as Early as 1775.

Doubtless that was the first submarine torpedo boat was the invention of David Bushnell of Saybrook, Conn. It was built in 1776, though Bushnell appears to have been working on the idea for many years prior to that.

While the boat was a rude affair of most primitive construction, there is hardly a question but that some use might have been made of it, had the government been willing to second him in his labors. As it was he spent his fortune on his invention and derived no benefit from it, nor did any one else.

Of the public men of the day, Thomas Jefferson alone seems to have taken an interest in the boat, for the only complete description of it is to be found in a letter which Bushnell wrote to him under date of October, 1787, in which he fully described the construction and operation of his unique craft.

This description is most minute and detailed, but in view of Holland's much discussed submarine boat and the interest all classes, save government officials, have taken in it, the letter is worth while producing in part. It is as follows:

"The external shape of the submarine boat bore some resemblance to two upper tortoise shells, joined together, the flue or entrance into the vessel being represented by the openings made by the shells of the shells at the head of the animal. The inside was capable of containing the operator and air sufficient to support him for thirty minutes without receiving fresh air. At the bottom opposite the entrance was fixed a quantity of lead as ballast, at one edge. Directly before the operator, who sat upright, was an oar for rowing forward or backward. At the other was a rudder for steering. An aperture at the bottom, with its valves, was designed to admit water, for the purpose of descending, and two brass forcing pumps served to eject the water within when necessary for ascending. At the top there was likewise an oar for ascending or descending, or continuing at any particular depth. A water gauge or barometer determined the depth of the descent, a compass directed the course, and a ventilator supplied the vessel with fresh air when on the surface.

"The entrance into the vessel was elliptical and so small as barely to admit one person. This entrance was surrounded by an iron band, the lower edge of which was let into the wood on which the body of the vessel was made in such a manner as to give its utmost support to the body of the vessel against the pressure of the water. Above the upper edge of this iron band there was a crown or cover resembling a hat, with its crown and brim, which shut water tight upon the iron band. The crown was hung to the iron band with hinges to make it turn over sideways when opened. To make it perfectly secure when shut it might be screwed down upon the band by the operator, or by a person within.

"There was in the brass crown three round doors, one directly in front, and one on each side, large enough to put the hand through. When open they admitted fresh air. Their shutters were ground perfectly tight into their places when shut. There were likewise several glass windows in the crown for looking through and for admitting light in the daytime, with covers to secure them.

"There were two air pipes in the crown, a ventilator, which drew fresh air through one of the pipes and discharged it into the bottom part of the vessel. The fresh air introduced by the ventilator expelled impure air through the outer pipe. Both air pipes were so constructed that they shut themselves whenever the water rose near their tops, so that no water could enter through them.

"The vessel was chiefly ballasted with lead fixed to the bottom; when there was not sufficient a quantity was placed within, more or less, according to the weight of the operator. Its ballast rendered it so solid there was no danger of its upsetting. The vessel with all its appendages and the operator was of sufficient weight to settle it low in the water. About 200 pounds of lead at the bottom for ballast could be let down forty or fifty feet below the vessel. This enabled the operator to rise instantly to the surface of the water in case of accident.

"When the operator desired to descend he placed his foot upon the top of the brass valve, depressing it, by which he opened a large aperture in the bottom of the vessel, through which the water entered at his pleasure. When he had admitted a certain quantity he descended very gradually. If he admitted too large a quantity, in order to obtain an equilibrium he ejected as much as was necessary by the two brass forcing pumps, which were placed at each end; when ever the vessel leaked or he desired to ascend to the surface he also made use of the forcing pumps.

"When the operator obtained an equilibrium, he could row upward or downward, or continue at any particular depth, with an oar placed near the top of the vessel formed upon the principle of a screw. By turning the oar in one direction he raised the vessel; by turning it in the other he depressed it.

"A glass tube eight inches long and one inch in diameter, standing upright, its upper end closed and its lower end, which was open, secured into a brass pipe, through which the external water had a passage into the glass tube, served as a water gauge.

"There was a piece of cork with phosphorus on it put into the water

auge, condensing the air within and sealing the cork on its surface. By the light of the phosphorus the ascent of the water in the gauge was rendered visible, and the depth of the vessel recorded by a graduated scale.

"An oar formed on the principle of the screw was fixed in the fore part of the vessel, and being turned in one direction rowed the vessel forward, and turned in the other rowed it backward. It was constructed to be turned by the hand or foot.

"A rudder to the hinder part of the vessel, which commanded it with the greatest ease, was made very flexible and might be used for rowing forward.

"A compass marked with phosphorus directed the course above and under the water.

"The internal shape of the vessel in every possible section of it verged toward an ellipsis, as near as the design would allow, but every horizontal section, although elliptical was yet as near to a circle as could be obtained.

Every opening was well secured. The pumps had two sets of valves. The aperture at the bottom for admitting water was covered with a plate perforated full of holes, to receive the water and to prevent anything from closing the passage or stopping the valves from shutting. The brass valve might likewise be forced into its place with a screw. The air pipes had a kind of hollow sphere fixed round the top of each to secure them from injury. These hollow spheres were perforated full of holes for the passage of the air through the pipes. Without the air pipes were shutters to secure them should any accident happen to the pipes or the valves on their tops."

Bushnell does not give the dimensions of his craft, but from his description and the fact that it was designed to carry but one man, it is probable it was no longer than a small row boat. Crude as it was, it fully expresses the idea back of the submarine boat of today. Even when floating on the surface of the water it must have been well nigh invisible.

The first submarine boat was equipped with a torpedo, or "internal," of which Bushnell also seems to have been the inventor, for in his letter he tells of the difficulty he had in convincing people that powder could be exploded in the water.

Describing the torpedo and the arrangement made for conveying it, and placing it in position to fire, Bushnell says:

"In the forepart of the brim of the crown of the vessel was a socket through which an iron tube passed. The tube stood upright, and could slide up or down six inches. At the top of the tube was a wooden screw fixed by means of a rod which passed through the tube and screwed the wood screw fast upon the top of the tube. By pushing the wood screw up again the bottom of a ship and turning it at the same time, it would enter the planks. When the wood screw was firmly fixed it could be cast off by unscrewing the rod which fastened it upon the top of the tube.

"Behind the vessel was a place above the rudder for carrying a large powder magazine. This was made of two pieces of oak timber large enough when hollowed out to contain 150 pounds of powder, with the apparatus used in firing it. A rope extended from the magazine to the wood screw above mentioned. When the wood tube was fixed and to be cast off from its tube, the magazine was to be cast off likewise, leaving it hanging to the wood screw. It was lighter than the water, that it might rise up against the object to which the screw and itself were fastened.

"Within the magazine was a clock constructed to run any proposed length of time under twelve hours. When it had run out its time it unplanned a strong lock resembling a gun lock, which gave fire to the powder. The apparatus was so planned that it could not possibly move till by casting off the magazine from the vessel it was set in motion.

"The operator could swim so low in the water as to approach very near a ship in the night, without fear of being discovered, and might, if he so chose, approach the stem or stern with very little danger. He could sink very quickly, keep at any necessary depth and row a great distance in any direction he desired without coming to the surface. When he rose to the surface he could soon obtain a fresh supply of air, and if it was necessary he might then descend again and pursue his course."

Bushnell made many experiments with his queer craft. In order to demonstrate its practicability. While none of the experiments were entirely successful, they were all far from being failures. They served to show that the boat and its infernal might be used on the ships of the enemy with telling results.

One attempt was made on a man-of-war lying off Governor's Island, New York harbor. The operator succeeded in propelling his boat under his intended victim without the least difficulty, so Bushnell claimed, but when it came to fastening the wooden screw in her planking he encountered some hard substance, and in shifting for a new point of attack drifted clear of the ship and could not again find her. After continuing his search for a long time he rose to the surface for a fresh supply of air, when he discovered that it was not far from daylight, and fearing discovery returned to New York. Some what later a trial was made in the Hudson river, but nothing was accomplished by it.

In 1777 Bushnell made his most successful experiment. It was conducted against the English frigate Cerberus, as she lay at anchor off New London.

By means of a line which he controlled at a safe distance from a whale boat, he sent his magazine or torpedo drifting down against the frigate's side.

The magazine was heavily charged with powder and was to be exploded at the proper moment by a gun lock on the inside.

It never reached its intended prey, however, but drifted foul of a small schooner, the crew of which took it from the water and proceeded to examine it at their leisure on deck. As they worked with it they managed to release the lock, and a frightful explosion followed, which killed three men on the spot and blew a fourth overboard. A subsequent attempt was made by Bushnell on the ships of a British fleet in the Delaware river. In this trial he did not use his submarine boat, but only his magazines or torpedoes. This attempt was entirely unsuccessful, owing to his lack of knowledge of the river's currents. This appears to have been his last effort to impress the public with the importance and utility of his inventions, for he shortly afterwards went to France, and remained abroad for many years. When he finally returned to America he settled in Georgia, where he died in 1820.

When a Person is Homesick.

There are few of us who have never known the pangs of homesickness, and those few are rather to be pitied than envied. Homesickness in mild form is a sign of a gentle mind, and indicates the possession of a love of home and country which is the characteristic of civilized and normal man.

This mild form, fortunately, is the only kind which most of us have experienced, for when the severe form takes possession of a person it is a terrible disease, causing untold misery and even death. This severe form, usually called nostalgia, has grown less common in these days of quick communication, or rapid transmission of news and of a widespread knowledge of geography.

The element of ignorance of one's surroundings and consequent sense of helplessness and despair of ever seeing home again, which at times gone by so oppressed the sufferer from nostalgia, is now removed, except in the case of the very young or the densely ignorant.

The greatest sufferers are Highlanders, German and Swiss mountaineers, or the Celtic Scots, and men are more apt to be overcome than women.

The victim of this extreme form of homesickness is almost always a resourceless person, one whose life is a routine of trivialities, whose ideas are few and limited, and such as they are, based upon familiar objects and well known associates. When such a person is placed in new surroundings no new ideas are created, but there is a gnawing longing for the past, which is the more intense as a return seems impossible.

The patient, for such he really is, broods over what he has lost, rejects what is offered in place of it, and becomes apathetic and taciturn. Sleep becomes fitful, and is disturbed by vivid dreams of home. The appetite fails, digestion grows poor, and the sufferer becomes thin and haggard. There is headache, with dullness of intellect and finally, perhaps, a condition of complete indifference to everybody and everything, which may end in death from a failure of the vital organs to perform their functions.

Could Not Boil the Water.

The advice given probably to each and every soldier before he left the United States as to how he might avoid the climatic dangers of Cuba could not in most instances be followed. The water, which was apparently good, was not boiled, for the good reason that there was nothing in which to boil it. One Massachusetts company was fortunate enough to have pots and kettles enough for the purpose and a captain energetic enough to enforce the order, and the men drank nothing but fluid which had gone through the heating process. The remainder of the army used the raw liquid.

Neither did the soldiers refrain from sleeping in the open air at night. On their forced marches they threw away nearly everything they had except their rifles, cartridge belts and canteens. When the halt came they simply threw themselves on the ground and slept there. Big camp fires were not and cannot be built, for the simple reason that they would be beacons to the enemy and also because dry firewood is scarce in a country so thoroughly saturated with moisture as Cuba is at this season of the year.

Keeping clean was another bit of advice which could not generally be followed. When on duty at the seashore the men took baths at every opportunity, but in the country, when marching, fighting and struggling for life, they were glad if they could get something to eat, which happened sometimes, and a dry place to sleep in, which did not often happen. Uniforms which were in fair condition when the wearers arrived in Cuba soon became disreputably dirty. Linen could not be washed, as there were no laundries and no washerwomen around. To keep clean under the circumstances was an impossibility for the average soldier.

All the advice given was well meant and if it could have been followed would doubtless have prevented much suffering, but things so shaped themselves that it became impracticable to obey all the rules of sanitation or even any of them. There were cases in which it seemed that things might have been done differently. The hospital at this place, for instance, might have been located in a healthier place than next to a row of old buildings and a railroad track, where two noisy locomotives ran back and forth at all hours. The facilities at hand might have been used to better advantage. Probably this has been recognized by those at fault or their superiors and in future campaigns similar mistakes will be avoided.

WHY WARS ARE SHORT.

They Affect the Whole World in a Business Way.

Short wars, very bitter and savage, while they lasted, but soon over, have been the rule of modern times. The modern spirit will not brook delay in anything, least of all in military operations. When the present war broke out the entire nation was clamorous for the immediate invasion of Cuba; thousands fully expected that the stars and stripes would be raised over Morro within a week, and were disappointed that this result was not achieved. Disregarding the fact that this country was utterly unprepared for war, people expected impossibilities. The government was compelled to create and equip an army, and, to do the administration justice, the work was done with wonderful celerity; but the fact that it was not instantly accomplished was to many a cause of annoyance and complaint. Yet in three months two Spanish fleets have been destroyed, the victorious American arms have been carried into the two Spanish possessions in the West Indies and a formidable force has been sent half round the world to fight for freedom on the Asiatic islands. Spain has had enough and if the war does not speedily end it will constitute a remarkable exception to the wars of our age.

The only other exceptions to the rule prevalent in this century have been civil conflicts waged among the people of the same country. A civil war differs in many important respects from a conflict between independent states. It is characterized by greater bitterness and, being carried on by the people rather than by the armies, rages in every country town and neighborhood and is protracted by the personal animosities of the people themselves. Our civil war lasted four years, the last insurrection in Cuba continued ten years; the last Carlist war in Spain was carried on for a period of four years, a previous insurrection among the Basques continued from 1830 to 1840, while the civil strife in the same region, following the pacification elsewhere after the downfall of Napoleon, continued seven years. These are the longest wars of this century; the remainder were seldom protracted beyond the second campaign.

The war between China and Japan lasted less than a year, for the signal success of the Japanese on sea and land resulted in the complete collapse of the Chinese military system, and overtures of peace were made as soon as the fact was clearly apprehended in Peking. The next serious conflict before that was the war between Turkey and Russia, which began early in the spring of 1877 and lasted through the summer. Military operations were suspended during the winter, and in the following spring peace was concluded before the season for campaigning began. The war which freed northern Italy from the domination of the Austrians and made the peninsula a kingdom a possibility, was waged between May 12 and July 12, sixty days covering not only the preliminary operations of the war, but also the negotiations of peace. All the actual campaigning was done in three weeks, Magenta being fought on June 4, and the battle of Solferino on June 24. The latter virtually concluded the war by satisfying the Austrians that there was no hope of ultimate success.

The last war between England and Russia, commonly known as the Crimean war, lasted about two years, being declared on March 28, 1854, and peace being declared March 30, 1856. The Crimean war originated in a dispute between France, Russia and Turkey as to the guardianship of the Church of the Holy Sepulcher in Jerusalem. Russia claimed the honor of controlling the holy places in virtue of the fact that they were nominally under the rule of Greek ecclesiastics, while the sultan, as lord of the land, declared that the shrines of the Holy City were his own peculiar property. War between Russia and Turkey began, and was conducted for a considerable time before the other powers of Europe participated in the struggle, but when the purpose of Russia to lay violent hands on as much of Asia Minor as could be appropriated became evident, England and France interfered and Victor Emmanuel, then king of Sardinia, sent a small contingent of troops to give his country a position among the European states. The allied passage of the Danube, the heroic struggles for the Shipka passes, the naval operations on the Black sea, the sieges of Batoum and Kars, the Bulgarian massacres, the complete defeat and dispersion of the army of Suleiman Pasha, the passage of the Dardanelles by the Ironclad, all were crowded into a period of less than a year.

The tremendous war between France and Prussia lasted only one year. War was declared in midsummer, and before the following spring the conflict was over. Gravelotte and Sedan, the sieges of Metz and Paris, the occupation of all northern and central France by the German hosts, the horrors of the commune and the suppression of the insurrection by the troops of the line in the streets of Paris crowded upon each other like the incidents of a melodrama, and before the astonished world fully realized the actual state of the case France was prostrate and United Germany consolidated into an empire, was the leading state of central Europe.

The war of 1866 between Austria and Prussia is known as the Seven Weeks' war. War was proclaimed June 18, the battle of Koniggratz followed in a few days, and the decisive overthrow of the Austrian arms on that memor-

able field led the government at Vienna to ask for peace at once. The petition was granted, and on August 23 the treaty was concluded by which peaceful relations were resumed. The Schleswig-Holstein war lasted but a few days—all the active campaigning being over in a week—but then this conflict was not really a war at all, for the helplessness of Denmark against the two powerful robbers which despoiled her territory led the government of Denmark to conserve the lives of its men, and only a show of resistance was made.

The war between this country and Mexico lasted two years, but there was really but one campaign, that made by Scott through the territory of Mexico, and resulting in the occupation of the capital. The war between the Texans and the Mexicans had been going on for several years prior to participation by the United States, but, being of the nature of a civil war, or, rather, of a rebellion against an organized government, does not come into the category of a war between independent states.

The wars resulting from the French revolution lasted, with short intervals, from 1799 to 1815, but though the whole period was virtually one protracted struggle, the individual wars of this time were short. Napoleon had the faculty of being able to overcome his enemy in a single campaign and rarely was two necessary to accomplish his purpose. Napoleon's campaign in Italy in 1796 was enough for Austria, and a treaty followed. The battle of Marengo in 1800 decided the fate of all North Italy, and was followed by peace; the campaign of Austerlitz resulted in the complete overthrow of the Austrian military power in 1805, and the Austro-Hungarian emperor was glad to make terms with the conqueror. Prussia was prostrated in a single campaign, which ended with the triumph at Jena in 1806. Napoleon subdued Spain in one summer, though the French did not count upon the guerrilla warfare immediately inaugurated by the Spanish chiefs against the invaders, which ultimately brought assistance from England, and was one of the contributing causes of the downfall of the great emperor.

The Russian arms could not resist the advance of Napoleon and the overwhelming defeat at Borodino, in 1812, gave him possession of the ancient capital of the czars. The emperor, however, could not overcome the elements. As Victor Hugo says, "Napoleon was conquered by God." He was not prepared for the terrible Russian winter, and the arctic winds, snow and sleet accomplished what the arms of man had never been able to effect. The fall of the great Corsican was as swift as his rise to power. One campaign, ending at Lepsic, sent him to Elba; from Elba he returned and with an expedition that seemed almost supernatural, prepared to take the field. The second empire lasted but 100 days, yet in this time were comprised the march from Paris into Belgium, and the mighty struggle at Waterloo.

The shortness of the wars of recent times is not by any means accidental, but attributable entirely to the conditions which now prevail. In former centuries war was carried on by kings and noblemen through personal motives, to gain private ends or gratify individual piques, often petty slights or affronts, such as are now regarded as unimportant. Monarchs and noblemen are now the servants instead of the masters of their people, and the restraints thrown about them by legislative bodies are such as often forbid their personal ambitions or animosities from involving a nation in war.

War was formerly waged by all the men of a nation. Every man was a soldier, but all soldiers did not serve at once, and while some were engaged in war, others remained at home to cultivate their lands and support the rest. Then armies in the field, in the most literal sense of the expression, lived upon the country, the soldiers paying little regard to the rights of property, and appropriating without even the promise of payment everything that might be needed for the use of the army. Now war is waged by regular or volunteer troops, forming, save in the case of one or two powers, only a small part of the nation. The expense of putting an army in the field and maintaining it there is enormous, and of itself so serious an item as to cause rulers to think twice ere committing their people to active hostilities. At the close of a war, it is now the general practice to compel the vanquished to bear all the cost of the war, and thus, in addition to the expense of equipping, maintaining and paying its own forces, the vanquished nation is compelled to shoulder the burden of the conquerors, and a knowledge that every penny will be mercilessly exacted in case of defeat acts as a deterrent upon governments that might be ready to rush into war.

War is no longer carried on as it once was, purely for the love of fighting. In earlier times war was the principal business of man, and fighting his choicest amusement. The German nobles of 300 years ago were always fighting, seizing the slightest occasion of controversy to war upon their neighbors. The Italian republics were quite as warlike, while in France and Spain the power of the aristocrats was mainly military, and so lightly did the royal authority rest upon the higher classes that lords of cities and country castles seldom took the trouble to refer their disputes to the crown, but settled them for themselves, so that all Europe was practically in a state of civil war; noblemen and small states struggling with each other about matters not in themselves of the slightest consequence, and which would now be regarded as insufficient cause for a lawsuit, much less for war.

Under such circumstances, war was almost continual, disputes were handed down from father to son, and thus wars protracted almost indefinitely. The hundred years' war between England and France was a case in point. Under present conditions it would never have been waged at all, the differences which operated as cause and occasion would have been settled by a meeting of representatives from the two nations. As with the hundred years' war, so with the thirty years' war, which, however, much the historians may attempt to exalt it as a struggle for religious liberty, was brought about quite as much by political and personal as by religious considerations, and long before it ended Catholic and Protestant states were fighting on both sides.

Such protracted conflicts like the two just mentioned were not wars at all in the modern sense, for the armies of both sides resolved themselves into thieving, murdering, plundering bands, avoiding decisive engagements and limiting their operations to sieges of isolated castles of towns and the defeat of small hostile detachments. Crecy, Poitiers, Agincourt, almost every battle of the hundred years' war was fought because the French were in numbers so overwhelming as to be confident of victory, and the English army was placed in a position where it was impossible to continue a retreat; but the defeats suffered by the French did not stop the war, which dragged its slow length along as before these thrilling victories.

The spirit of the modern age is one of commerce, of buying and selling. It is pre-eminently a peaceful spirit, and there is no more serious interruption to business interests, nothing is more destructive of business prosperity than war. All nations are now bound together by commercial ties of such intricacy that a disturbance of peace relations of two states instantly affects the general prosperity. War is therefore a serious nuisance in the family of nations, deprecated by all, for however remote it may be from the leading centers of finance and commerce, its injurious effects are felt in Paris, in Berlin, in New York, in short, wherever there are merchants, traders, banks and bankers. The battle in Manila bay affected the commerce of Amsterdam, Antwerp and Bremen. Shafter's attack on Santiago was felt in London and Paris; Miles' advance into Porto Rico had its influence on the business of all nations which had representatives on the island.

Civilization is thus approaching a point where war will not be tolerated at all when by any possibility it can be avoided, and where all nations affected by a quarrel between two will join hands to induce the belligerents to cease their strife at the earliest possible moment. International arbitration is yet a dream of the enthusiast, but the disastrous effects of war upon the business of neutrals are such that after a decisive engagement, or at most a campaign, other nations whose interests are suffering will tender their good offices to the belligerents to bring about a return of peace. So long as present conditions continue, therefore, wars will probably be short. As long as human nature remains what it always has been there will be strife; as long as the lust for conquest, the desire for revenge and the love of glory endure in the world there will be wars, but in the interest of civilization the controlling states of the world will do what they can to limit the length of an armed struggle between two and restrict it to the narrowest possible limits.

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Races in the Philippines.

Of the seven million inhabitants found in the Philippines, very few of them are Spaniards, less than one-fortieth of them live in Manila and about one-seventh of the entire population are believed to be unconquered natives. Among the natives are found representatives of several distinct races. The aborigines were probably the Negritos, a diminutive, dark-hued race, with features resembling the American negro. They are still found in limited numbers, a harmless, nomadic people, very fond of the dog and of a cigar, which they frequently smoke through the lighted end in the mouth.

The aboriginal people were gradually conquered and driven into the interior by invading Malays, whose descendants now form a large proportion of the population. The Tagals and Igoles are the most important of the Malay tribes, the latter being law-abiding and devoted to agricultural pursuits. The Tagals, with more warlike propensities, occupy the lowlands, living near the water in picturesque, elevated huts. They are in full possession of the interior of Mindanao, where, under the sovereignty of their own sultans, they are free to enjoy the cock fights, dancing and music, for which they seem to have a great aptitude. They have strongly fortified villages on the mountain sides, and while they acknowledge the suzerainty of Spain they do not pay taxes nor permit Spanish officials to reside among them.

Besides these two races there are in the Philippines Malay Indians and native Caucasians, with a large number of Chinese and Mestizoes. The laziness of the natives in time of peace is proverbial, but this is not to be wondered at when we know that nature has furnished the islands with a wealth of vegetation which may be used for food. Their indolence is probably increased by the climate, which is hot and enervating. The heat is, however, greatly moderated by alternating land and sea breezes, and a more healthful climate is unknown in tropical countries.—"The Philippine Islands" by John A. Osborne in the Chautauquan for July.