keep them at the required depths. The mines, being spherical, roll along the ship hull until the trigger is struck, the detonator is operated and the mine explodes. The mines are always invisible, consequently there are no means of avoiding them, except by a knowledge of their location.

As the guns and torpedoes were increasing in power, size and range and their handling made more facile, the ships were also increasing in size and speed and their armor improved. The introduction of breech-loaders in 1880 caused a great change in the construction of ships. The deadly effect of torpedoes rendered it necessary to provide more protection by greater subdivision of the ships and by the plating of the hull below the main belt down to the bilges. The ship which possesses the most powerful guns and the greatest speed can keep out of the range of other ships and thus be out of danger of being hit by the enemy. This is the value of the dreadnought "Queen Elizabeth" class.

It is interesting to note the increase in power of the guns. For example, formerly 12-inch guns were 30 calibres in length, used 88½ lbs. of cordite and the projectile had a muzzle energy of 28,000 foot-tons. The newer 12-inch guns are 50 calibres in length, require about 400 lbs. of cordite and the muzzle energy is 53,400 foot-tons. The 15-inch guns on the "Queen Elizabeth" class of dreadnought fire shells weighing 1,925 lbs. with a muzzle velocity of 2,500 feet per second and a muzzle energy of 83,500 foot-tons.

The engineers are called upon to build guns that will withstand the enormous and ever-increasing stresses. The wire guns are built in sections, the tube and jacket are made from steel ingots. The centre of the ingots are cut out owing to the fact that in cooling the ingots have different qualities as to strength and it is necessary to use only the portion that is uniform in quality. One hundred and thirty-five miles of steel wire ¼ x 1/16 inch are wound on the tube under great tension.

The range of such guns is over 10,000 yards, at which distance the opposing battleship is on the horizon and its hull cannot be seen by the men at the guns. Admiral Percy Scott, who was recently appointed to adopt protective measures in London against Zeppelins, invented the fire director. This device is placed at or near the top of the mast where the men can observe the enemy's ship and from that position the officer, provided with powerful and accurate range finders, can train, elevate and fire the gun and watch the effects. The gun crews merely attend to the loading.

The warships are equipped with electric machinery, light, telegraphs, telephones, wireless telegraphs, mechanical devices of various kinds, pumps, hydraulic machinery, winches; in short, the warship is a veritable floating workshop containing complicated machinery which depends for its efficient operation in the distraction and excitement of a battle, upon the stamina of the men. As Lord Charles Beresford said: "You may have what size of ship you like, as many as you like, with guns, armor, boilers and engines, but remember it is the human element, and only the human element, that wins battles."

From what has already been stated, it is almost superfluous to state that the officers of the Royal navy and any navy are engineers by the very nature of their profession and the function of their office. But until a few years ago the engineer was regarded by the deck officer as a kind of "glorified mechanic—a smoke admiral" —or, as one admiral styled him, "the king of grease." Some improvement was effected, yet there is still the remains of the aristocratic attitude towards those who have occasion to dirty their hands. Mr. Peter Swan, in a letter to "Engineering" of August 13th last, stated that "in the Royal navy the captain must have a genteel beamaphrodite to come between the oily wind of the artificer and his nobility." Under the present system the cadets in Great Britain have to attend the R. N. College at Greenwich or the engineering college at Portsmouth for four years before going to sea, and have to study physics, marine engineering, use of tools and machines. They afterwards go to sea for two years as midshipmen and have there to study mechanics, applied sciences, marine engineering, gunnery and navigation. They then become sub-lieutenants and have to pass an examination, after which they select their future course. Up to this point all officers receive the same training but afterwards they specialize. Lieutenants who elect to follow the engineering branch specialize as executive engineers, although their status is claimed to be unsatisfactory.

The men also are trained, for while the officers may direct and control, the men constitute a most important factor in the handling of ships. The stokers and operative engineers in the hold of the vessel, a considerable distance below the water line, and liable to disastrous attacks by submarines, etc., the gunners in the turrets under bombardment from the huge guns, the electricians who have to maintain the electric equipment while the battle is raging, the telegraphists, and so on, all require training in times of peace.

The salvaging of sunken submarines is a business which until recently was not organized until after the disasters occurred, but France, in 1911, built a submarine salvaging dock to prepare for such accidents. This consists of a great hollow sided hull, 328 feet long by 82 feet wide. It has no bottom and the top is occupied by 10 massive girders. There is a space 42 feet wide between the two hollow sides so that when a submarine weighing about 1,000 tons has to be raised great chains are slung from the girders and secured to the sunken submarine by divers. When everything is ready the winches on the dock are operated and the submarine is brought up suspended on the chains between the walls of the dock.

Floating docks are more familiar as they are to be found in many ports and harbors where ordinary graving docks are not available or where the cost of construction of such docks is too great. Floating docks are built of hollow walls and floor, and when a ship is to be received for repairs, cleaning or painting, water is admitted into the hollow space, which causes the great dock to sink. When the floor is at a sufficient depth the ship is floated over it and the water is pumped out, causing the dock to rise again, raising the mightiest warship high and dry.

Engineers have also designed and built lighthouses and furnished them with powerful lights and signals to warn the seafaring community, thrown great breakwaters into the sea to quell the turbulent waters, constructed graving docks and ordinary docks, piers and jetties, cut canals which cross continents and join oceans, harnessed waters and reclaimed lands. They have also made contrivances which are delicate, sensitive and exceedingly accurate, gauges, micrometers, balances and a host of instruments which require thought, care and precise action.

In August over two million pounds of halibut were landed at Prince Rupert. The salmon pack there amounted to 12,000,000 pounds. The total amount of fish handled at that port was 15,121,500 pounds.