

It burns from the time it is ignited until the charge leaves the gun, and it steadily pushes, as it were, on the charge from the powder bed to muzzle."

OUR WONDERFUL GUNS.

"It is much more effective than the powder of the past?" I asked.

"Yes," replied the secretary; "I can hardly describe its power. Some of the projectiles we now use weigh as high as 1,100 pounds, or half a ton, and the guns which shoot these great masses of steel and balls are forty feet long and weigh more than sixty tons each. It takes 550 pounds of this powder for a single charge of one of these guns, and through it this half ton of chilled steel flies from the muzzle of the gun at the rate of 2,100 feet per second and goes thirteen miles before it stops. Take your pencil and estimate what those figures mean. A ton is a good load for a team of horses. Four charges of powder for one of those guns would be all that the horses would want to pull. Two of those projectiles would be a wagon load, and to carry off the gun itself, were it loaded upon wheels, one hundred and thirty horses would have to be hitched to it. Twenty-one hundred feet per second is at the rate of almost a mile in two and a half seconds. If that velocity could continue the projectile would go on at the rate of about twenty-three miles a minute. It would cross the Atlantic in less than two hours and a half, and it could go around the world in less than a day. These guns are called the thirteen-inch guns. Four of them are to be placed on each of the battleships, and thus will form a part of the armament of the Indiana, the Oregon and the Massachusetts."

"Can we make as good guns as the Europeans?" I asked.

"There is no doubt of it," was the reply. "Experiments show that we are doing so. The gun manufactory at the navy yard here is one of the finest in the world, and a man from one of the big establishments of Europe when he visited it the other day said he had never seen anything equal to it. We can turn out guns very rapidly, and since its opening we have completed a large number of fine guns, ranging from four to thirteen inches in size, and weighing from thirty-four hundred pounds to one hundred and thirty-five thousand pounds each. We have now one hundred and eight guns afloat, two hundred and ninety-eight completed, and have seventy-seven in hand. We will soon be making armor-piercing shells for our six and eight-inch guns, and will eventually make shells for our largest guns, weighing eleven hundred pounds. These big shells will go forth from the gun at a velocity of from 2,000 to 2,600 feet per second."

OUR GUN WORKS AND TORPEDO FACTORIES.

"Are our naval factories such that we are now practically independent of any other country in the making and equipment of our naval vessels?"

"Yes," replied the secretary; "we can make any kind of a gun that may be needed, and with the great forging works which we now have at Bethlehem and at the Carnegie works near Pittsburgh we are in the position to create as great a navy as the future may demand. What we now need is more battle ships. We need plenty of good torpedo boats to defend our harbors, and my idea of

the navy is that it should be large enough to command peace and protect American citizens in their rights the world over. We have lately established a factory in this country for the making of torpedoes, and we are making some of the best armor of the world. The armor which binds the naval vessels today is of rolled or hammered steel, to which we have added about three per cent of nickel, with such success that our plate is superior to any other armor plate of the world."

A WORD ABOUT TORPEDOES.

"Is the torpedo of much value in the naval warfare of today?" I asked.

"I think there is no doubt of that," replied the secretary. "All of the great nations are adding torpedo boats to their naval forces. England has nearly 200 and is building twenty-five more. France has 180 and is building forty. Russia has 150 and is building more. Germany has 109, and the other powers are well equipped. At a test of torpedo boats last summer in England twenty-four torpedo boats attacked a squad of cruisers and gun boats. The result was that after seven days' trial these had destroyed one battle ship and six cruisers, and eighteen out of the twenty-four torpedo boats were destroyed. Of course there was no actual destruction of these vessels, and the torpedoes were so fixed with collapsible heads that no real damage was done. It was, in fact, like the firing of a blank cartridge, but the effect could be scientifically estimated from the torpedoes having struck the ships. The result of the trial was as I have stated, and the estimated value of the battle ship and six cruisers destroyed amounted to about \$9,500,000 including 2,050 men. The value of the eighteen torpedo boats was only \$1,800,000, and the men destroyed would have been only 360. In other words, the torpedoes did about five times as much damage in proportion to their cost as the battle ships and cruisers. The torpedo vessels which are now being built abroad are fast, and they range in size from 700 to 900 tons. They will go from nineteen to twenty knots per hour. The torpedo boats are from 100 to 200 tons in size, and they will go from twenty-three to twenty-nine knots per hour. Twenty-nine knots is more than thirty-two miles, and these boats fly through the water at the speed of the average railroad train. The torpedoes, used are the automobile torpedoes and they are about eleven feet long with a diameter of seventeen inches.

"They explode as soon as they touch the ship, and they are so made that they can be sent as straight through the water as a ball from a gun. They are fired by powder or compressed air, and compressed air is the motive power which runs the engines in the torpedo and propels it by means of the screws. They go forth from the torpedo boat at the rate of about thirty miles per hour, and they run by the air power contained within them half a mile with accuracy.

"This is the Whitehead torpedo. The Howell torpedo is propelled by the gyratory motion of a wheel within it which is set spinning before the torpedo leaves the ship."

"How about electricity in the use of torpedoes?"

"The Simms-Edison torpedo is worked by electricity. Some of these are stationed off from the shore and connected by electric wires. They are pro-

pelled, steered and exploded by electricity. The power comes from a machine on shore or on a ship. We have not found them as efficient as the Whitehead torpedo, and it is with the Whitehead and the Howell that our best experiments have been made."

"How about the dynamite cruiser?"

"You refer to the 'Vesuvius.' This is a boat of 930 tons. It was finished in 1890 and it is armed with three dynamite guns, each of which is 55 feet long. These guns throw shells of dynamite weighing as much as 500 pounds each, and each gun can be discharged, once every two minutes. The ship has two engines, each of which has nearly 4,000-horse power, and in addition to these dynamite guns it has a light battery consisting of three three-pounders. It has a speed of twenty-two knots per hour and carries between sixty and seventy men."

OUR BIG BATTLE SHIPS.

"Can you give me some idea of our big battle ships, Mr. Secretary?"

"We have three battle ships building of the first class, each of which is 10,200 tons in size, and one ship building which is 11,300 tons. We have also the 'Texas' and the 'Main,' which range between 6,300 and 6,600 tons in displacement. The 'Iowa' is 11,300 tons and one of the largest ships in the world. With its full coal supply it will have a displacement of over 12,000 tons, and it is to have a speed of sixteen knots per hour. In order to give you some idea of one of these battle ships, this vast vessel is placed with Harveyed nickel steel, fourteen inches thick, with a wood backing twelve inches thick. She has turrets which are armored with fourteen-inch plates, and she will be equipped with four twelve-inch guns, together with a number of eight-inch and twenty-eight rapid firing and machine guns. She will have 11,000 horse power, and she will have cost when she is completed in 1896 more than \$3,000,000. Russia has a new ship called the 'Rurik' which has 13,250 horse power, while the 'Indiana' and 'Massachusetts' have each 9,000 horse power. The armor on these two last vessels is eighteen inches thick and they are to cost not more than \$4,000,000 apiece."

WE NEED BATTLE SHIPS AND TORPEDO BOATS.

"Are we not spending a great deal on the navy?"

"Yes," replied Secretary Herbert, "but the amount we are spending now is considerably less in proportion to our population than that which we spent just before the war. I think expenditures ought to go on until we have a much better navy. We ought to have seven or eight more battle ships and some torpedo cruisers and some torpedo boats."

THE MONITORS.

"How about the monitors?"

"They are especially valuable as far as the strength of our sea coast is concerned. We have five of them, the Puritan, Miantonomoh, Monadnock, Terror and the Amphitrite. These ships are protected by armor ranging from nine to eleven and a half inches in thickness. They have revolving turrets and each of them has a speed of over ten knots an hour. They are so armed that they will be of great value in the time of war. They are developed on the basis of the old Monitor, and they are the most powerful ships of their draught and dis-