A white-haired Englishman sat next me at "table d'hôte," — a crabbed specimen, I thought, — and our conversation was usually upon the weather. One day I spoke of Switzerland. His whole face changed. In an instant we were talking like old friends. "Do you know St. Bernard?" I asked. His countenance fell. "I have just returned from there," he answered. "I went on a sad errand, and I return sadder than I started. Have you ever heard of Turk?" he continued, and not waiting for my reply he told shortly in outline the story I knew so well; adding, "I was at the hospice when Turk was born. Every summer since, I have gone back to see him. He always greeted me and knew me, and many a time have I offered any sum to the monks to own him; but they would not give him up. Last winter I heard that he was dead. I felt as if I had lost a friend. I wrote to ask for his skin, and receiving no reply, I have been to get it myself." "Well?" I asked, thinking I must say something. "Well, some shrewd American was before me! Begging your pardon, sir, it 's a nation given up to gain. I wager the fellow will give lecturing tours, with Turk's skin, all through the States! And I — I loved that dog. I would give a thousand pounds to find the man!" "Save your money, sir," I answered. "It 's enough that you loved the dog. I am the American! You are welcome to Turk's skin!"

I felt as Jean did: "*That* is not Turk!"

MODERN HARBOR DEFENSES.

By Lieutenant W. R. Hamilton.

For years past, the newspapers throughout the United States have published articles relating to Coast or Harbor Defenses, and at every session of Congress there have been frequent discussions of the same subject.

It would seem that the question had been so thoroughly canvassed that every one ought to be quite familiar with it. Yet, I venture to say that there are few, even among Congressmen or the writers for the newspapers, who are really conversant with the subject, and understand the systems and the methods devised in modern times to defend a great country from invasion by an enemy's fleet. Even if their elders were familiar with this branch of military science, boys are interested in all that relates to war.

Although in so short a space as this paper, we can not go over the ground very much in detail, yet I will try to explain, for young readers, the modern methods of fortification, and the wonderful appliances designed for forts and defenses that may hereafter be constructed.

The word "fortify" is derived from two Latin words, meaning "*to make strong*" any place. The place may be a city, a harbor, a village, a mountain-pass, a depot of supplies, or any important position it is deemed advisable to strengthen.

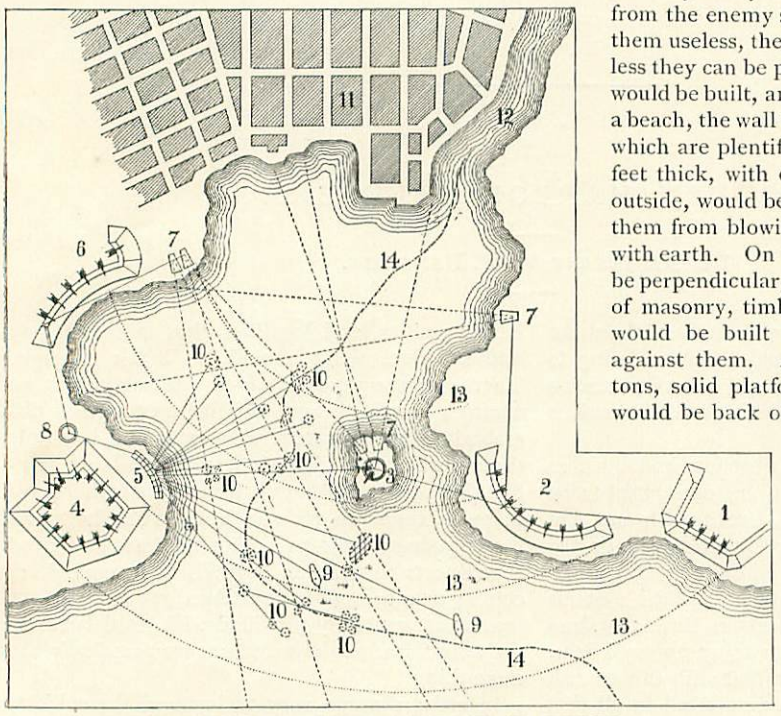
In countries like the United States, the coast is so long that it would be necessary to fortify many harbors, cities, and localities, that an enemy may find no place weak enough to break through. There are many places which will not permit an enemy's vessels to approach close enough to disembark troops and material of war, and it is only those harbors and places where he can land, or inflict damage on us, that we have to defend. Coast defenses, therefore, include the forts and batteries, the torpedo-systems and other methods employed at sea-ports to keep an enemy's war-vessels from coming near enough to do us damage; and as these towns are generally provided with good harbors, the term "harbor defenses" means practically the same thing.

In order that we may understand the subject, let us take a supposed harbor and its fortifications, as represented by the map on the next page. Examining it, we find a river opening into a large, deep harbor. By the mouth of the river is a large city, whence many railroads branch out into the interior of the country. The city is also very rich and contains many supplies valuable to an enemy. If he could take it, he might destroy the railroads and prevent troops and supplies coming from the interior of the country. He could seize so much valuable plunder as to reimburse himself for the expense of the war. Other great damage might be done, also. In case war was declared and there were no defenses, he could sail up the harbor, and,

anchoring within easy range of the city, demand a tribute of one hundred million of dollars to be paid within forty-eight hours, threatening otherwise to destroy the city. What consternation would then result! As no one would wish to give up his property without being paid for it,—and in this case there would be no pay,—every one would at once try to get away with all the money and portable property he possessed. The railroads would be overcrowded and could not carry all who wished to leave. The roughs, the idlers, the criminals and outlaws, might riot and commit crimes without restraint; probably no one would be able to control them.

Troops could be brought from the interior, but of what use would their rifles or cannon be against the steel armor of the war-vessel? The tribute would have to be paid, or the vessel could, at the end of forty-eight hours, throw huge shells, which, exploding in various parts of the city, would kill people and burn buildings. By refusing to pay, the people would lose life and property worth much more than the one hundred million of dollars demanded.

It is to prevent such disasters that, in time of peace, harbor defenses are made. From surveys and soundings, every foot of ground at the bottom of the harbor and the sea, near the coast, may be known and accurately mapped. The channel for large vessels may be supposed to follow along the coast, and then pass up the center of the harbor. It is represented in the map by the crooked line crossing the straight and the circular lines. These circular lines are mile circles, the upper one being three miles, and the others four, five, and six miles, respectively, from the city. As the enemy may have very large and powerful guns to throw shells a great distance, it will be necessary for the defenders of the city first to make large and powerful cannon, and put them along the coast far enough away to reach the enemy while sailing by it. But these great guns take many months to make, and are very costly machines, and as one shell from the enemy striking them would render them useless, they will be of little service unless they can be protected. So a strong wall would be built, and, if the place should be on a beach, the wall would be of sand and earth, which are plentiful and cheap. Walls forty feet thick, with even thicker slopes on the outside, would be made of sand, and to keep them from blowing or falling away, sodded with earth. On the inside, the walls should be perpendicular, and, to keep them so, walls of masonry, timber, or other hard material would be built first, and the sand piled against them. As great guns weigh many tons, solid platforms of iron and masonry would be back of the walls for them to rest on, so that, when ready to fire, their muzzles shall project over the tops of the walls. But were they to remain in this position all the time, they would be easily seen, and exposed — with the gunners who were loading them — to the enemy's fire. To prevent this, the carriages on which they are mounted can be made to sink when a shot is fired, and carry the guns with them below the top of the wall, or "crest of the parapet." As these huge guns would weigh a hundred tons, or more (some now being made would weigh one hundred and fifty-six tons), and the carriages on which they are mounted would weigh half as much again, they could be raised only by the aid of steam or hydraulic power. Behind the wall and under its cover the gunners might load the guns in safety.



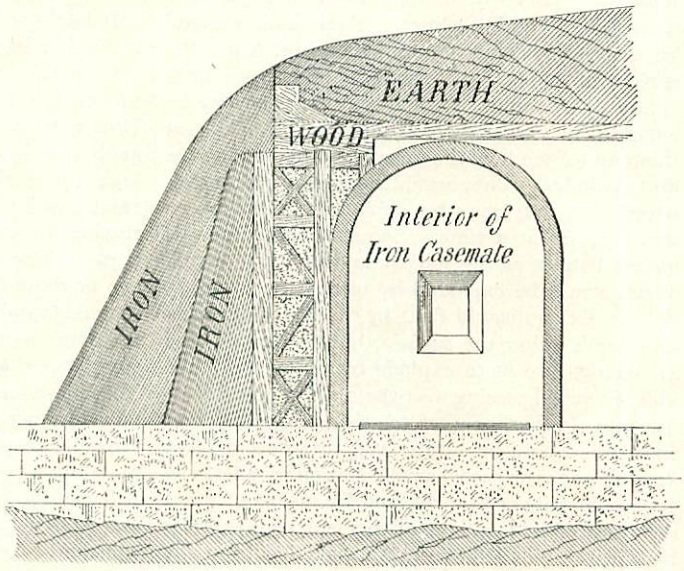
SKETCH MAP OF A MODERN HARBOR AND ITS DEFENSES.

1, Sand Battery; 2, Armor Battery; 3, Turret Fort; 4, Casemate Fort; 5, Torpedo Gallery; 6, Heavy Battery; 7, Electric Lights; 8, Observation Tower; 9, Torpedo Boats; 10, Submarine Mines and Torpedoes; 11, City; 12, River; 13, Mile Circles; 14, Channel.

To hoist the immense charges of powder, weighing hundreds of pounds, and the immense projec-

tiles weighing much more, to a level with the guns and to shove them in, would require a derrick that is also manipulated by steam. When all loaded, the guns and carriages would be raised by steam, but the gunners would be exposed if, in order to sight them, they attempted to look along the tops of the guns. So a pair of mirrors will be used over each gun. These are to reflect the sea, the vessels, and the sighting-lines of the guns, one on another, so that the gunners standing below and peering upward into a mirror can tell when their guns are pointed at the object. The guns have to be "traversed" to right or left, and the muzzles to be raised or lowered by steam. When all is ready the gun is discharged by electricity. So with the other guns. If a ship could pass by this battery without serious injury, the course of the channel would bring her nearer to the land, and here it would be proper, therefore, to construct another battery. Let us call the first one which we have described No. 1, and then we can name this, No. 2. As a moving ship would be less likely to be struck by a shot than a large and stationary object like a battery, it would be necessary to make No. 2 fort as strong as, or stronger than, No. 1. In No. 1 and No. 2 the guns are mounted "en barbette"; that is, they fire over the crest of the parapet. But here we have neither earth nor sand sufficient to make our wall so thick. So here we would put up a wall of masonry, outside of which should be a little earth and strong timbers, and then in front of these strong plates of steel or iron. In other words, the fort is actually armor-plated. The guns, as in No. 1, should be mounted on disappearing carriages, and never rise, or come into view of the enemy, till they are ready to hurl their huge bolts at the vessels. The shock of discharge, or recoil, would force back the guns, and guns and carriages would sink till they are below the parapet, and are ready for reloading.

It would be much more difficult to pass this battery than to pass No. 1, especially if there should be built, on the mainland opposite, a very powerful fort, and on an island near the shore, another. This latter would be a curiosity. It would be a "turret fort," and externally nothing could be seen but a large dome of cast-iron or steel. Containing two or more openings in it for guns, it would revolve horizontally upon wheels traveling in circular tracks. The entire mass would be moved by steam generated in boilers far below ground. While the guns were being loaded, the huge turret would present nothing but a large circular dome of iron to the enemy, with openings on the side opposite the vessel. When the guns were loaded, the commander would press a small lever, and the huge dome slowly turn around till the openings were where he wished them to be. He would then stop it by another pull of a lever, and the big guns would be run out and pointed. The recoil having thrown them back again into the turret, it would at once commence to revolve, and continue till the openings are away from the enemy's fire. You have often seen swing-bridges revolving on little wheels that travel around a pier built in midstream. The turret would travel in the same way, but, the weight being very much greater, would require steam power.



On the opposite side of the channel would be the main fort. Here, the land being much higher, the fort would be built on the casemate plan; that is, the guns, instead of firing over the walls, "en barbette," would fire through little openings or ports in the sides of the walls. The room for the gun would be roofed over and partly closed at the rear. Perhaps other guns might be mounted on top also "en barbette." This fort would be armor-plated, and to protect the gunners and interior of the casemates, when the gun is withdrawn into its casemate, heavy steel shields or doors would swing across the ports. These could be opened and the guns run out when ready to fire. All this would be done by steam.

It would seem that with such an array of strong

forts and powerful guns it would be impossible for any vessel to sail past and remain afloat. But nowadays vessels are made to go so fast that, traveling at full speed, it would be very hard to hit them from the shore. So some means of retarding their progress must be devised, and therein lies the sphere of action of submarine mines. These mines would be made by placing about the harbor, below the surface of the water, torpedoes filled with gun-cotton or dynamite, so that the charges may be exploded by electricity or by contact. Looking at the map we see how they would be placed, by the dotted circles. They would be in groups, so contrived that they may be exploded singly, or an entire group at a time. Some of the mines lie on the bottom of the harbor and in the channel. These would be exploded by electricity, from the shore. Others would float in the water at a certain depth below the surface, but anchored; and all arranged so as to explode by contact with the hull of a vessel passing over them. If a vessel coming into the harbor were to steam along at great speed she would be sure to run into one of these floating mines or pass over the stationary ones. So she would sail very slowly, and by means of great booms stretched out on all her sides and strong nettings weighted down and suspended from the booms, try to catch the floating torpedoes or mines, or burst them before they were near enough to harm her. Also, by discharging shells filled with dynamite, on the bottom, and exploding them there, she would set off the submarine mines in that vicinity. But to do this she must sail very slowly, and thus give the great guns on shore plenty of time to knock her to pieces.

In order to avoid this, the vessel might try to pass the batteries at night. Then she could sail along slowly, pick up and destroy the torpedoes, and if the night were very dark, as a night selected for such an exploit should be, the gunners on shore would not be able to see her very well. Therefore, to prevent this, powerful electric lights should be at different points on the shore, which would light up the channel and a wide zone on both sides. These lights should be in the safest places possible, and to prevent their being destroyed by shots from the enemy's guns, they should be low down in "emplacements," and their light be thrown on reflectors, which in turn could cast it out over the waters. The reflectors might be destroyed, but they also might be quickly and easily replaced; the lights themselves would be comparatively safe.

But the enemy might attempt to destroy the mines by other means. He might have a number of small boats — steam-launches, and so on — called patrol-boats, which could be used in shallow waters. With these he might steal along in the dark part of the waters, noiselessly, and carry parties of men to destroy the electric lights, or pick up torpedoes. So the forts on shore should have guard-boats to constantly patrol the water. They should be armed with machine-guns which would quickly destroy the small boats.

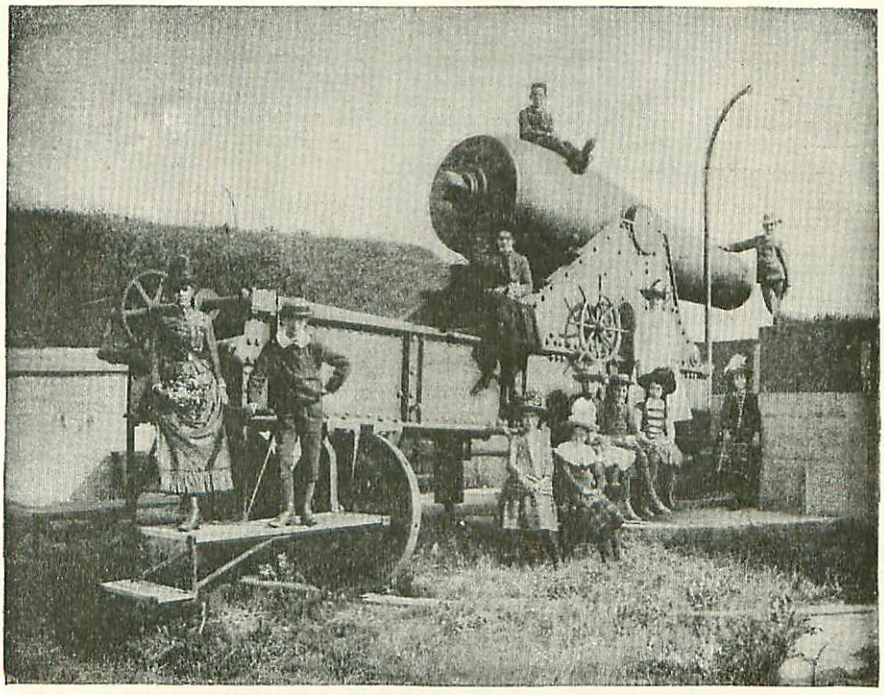
It might seem impossible for the enemy to break through a line thus fortified, and so he might decide to take up a position outside, and attempt to silence the guns of the forts, or destroy them. Undoubtedly you know what mortars, or high-angle-fire howitzers are,— guns that fire shells high up in the air, which, dropping down, can reach the interior of the forts at points not to be reached by guns throwing projectiles at the usual angles. The accuracy of this fire is wonderful, and two or three dozen mortars playing on one of the batteries would make short work of it. To avoid them an enemy's position is made to change constantly, so that he can not accurately get the range. Torpedo-boats are sent out at him, which at a certain distance from him launch their torpedoes. Movable torpedoes, controlled by electricity, running on wires from the torpedoes to the shore, and even submarine boats that sail under water and fasten torpedoes to the hull, all keep him constantly on the move. Against such boats and torpedoes as he sees, he turns his machine and quick-firing guns, but his only defense against those under water is to keep moving about, with his guard-boats patrolling all around him and his booms and netting stretched out.

The auto-movable torpedo is controlled by a man on shore, as in fact would be all the torpedoes and mines, and so there should be built what are called torpedo galleries. They would be strong places, built low down, within which are electric batteries and wires running to the different mines and torpedoes. A movable torpedo can be accurately controlled to a distance of about a mile from shore. It has one or two wires which unreel as the machine progresses. They are connected with a battery on shore, and one man, there, can not only explode the torpedo when he desires, but he can guide it, turn it around, stop it, or make it go ahead again. Electricity plays perhaps the most wonderful part in all these huge works. On the map will be noticed, by the main fort, a little round building — No. 8. This would be the place for the "tower of observation" of the commanding officer. From here he could see all over the harbor and away out to sea. The tower would be strong, and inside would be the wonderful key-boards of the electric system. By means of these, the commander could telephone to the captain of Battery No. 1 to load his guns, and aim them at such and such an angle and direction. The captain of the

battery would do so and telephone back the moment he was ready. The commander could tell the captain to fire, or he could, if he chose, press a little key and himself fire each gun singly or all the guns at once. He could do the same with all the batteries and forts, and he could, from his little tower miles away, by a light touch of his finger explode every gun in the harbor, and send tons and tons of metal flying with crushing force at any vessel he pleased. He could do even more. He could explode any, or all, of the mines and torpedoes at once, or he could have one grand simultaneous explosion of all the guns, torpedoes, and mines. At each fort and battery would be stationed officers who by means of instruments would find exactly the course of the enemy's ships. This would be telegraphed to the commander, who would thus know at every instant just where any vessel is, and how fast she is sailing. So he could predict that a ship will pass a certain spot at a certain time, and, if she did not change her course, could press the key, and blow up the vessel, or send at her a huge bolt of iron or steel. If the enemy had landed a force on the mainland down the coast, and it was marching on the fort to take it in the rear, the commander could wait till he saw the force on a road approaching the fort, when, pressing another key, several iron doors of the fort would open and automatic machine-guns pop out, and commence firing at the rate of six hundred shots per minute apiece, and keep it up till the key was pressed again, when they would withdraw and the shields close. It can be seen that the commander should know absolutely all that is going on, as otherwise he might fire into his own forts, or on his own patrol-boats.

Now, an enemy would not attack a strongly fortified place with one vessel. He would have a large fleet, and the defending party should have on hand a large fleet also. So rams and heavy floating-batteries would be built.

From the foregoing, we see that there are needed for harbor defenses, first, powerful guns; second, powerful fortifications to protect the guns; third, torpedoes, torpedo-boats, and systems of submarine mines; fourth, electric lights; fifth, emplacements for the lights; and sixth, floating-batteries and rams and patrol-boats. Armor on forts should be two, or two and a half, or even three feet thick. It can be seen that an immense amount of labor is necessary to build these, and to complete the huge guns. To complete such a system requires many years and the expenditure of much money, but in case of war, it would be money saved in the end.



A BIG GUN AT NEW YORK HARBOR UNDER FIRE FROM THE CAMERA.