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TORPEDO BOATS.

One of the most satisfactory of the new additions to the United States navy is the torpedo boat Cushing, of which a full description, with illustrations, was given in the SCIENTIFIC AMERICAN of February 1 last.

This boat lately sailed from Rhode Island, where she was built, to Washington. The little ship is satisfactory as a first example, and shows that the government can, and has, after long trial, produced one torpedo boat that is nearly up to the best standards of its class. Other governments have scores of torpedo boats. The United States has now built one. The ice is broken. Let us hope that hundreds of others, even better than the Cushing, will soon be constructed. They are wanted in all our harbors to assist defense.

The Cushing lately sailed from Newport to New York, driven at the highest speed they could get from her, and made the voyage in three minutes less than seven hours, at an average velocity of 19 1/4 knots per hour. This is superior performance, and indicates an excellence of construction in the mechanism and vessel that is very promising for the future.

On her trial trip she developed 22 1/2 knots per hour. The contract called for 22 knots for three hours.

The Cushing is 138 feet long over all, and she draws five feet three inches of water. Her depth from the crown of the deck amidships to the keelson is ten feet, and her breadth of beam fifteen feet. Her displacement when loaded with ten tons of coal amounted to 117 tons. She can carry thirty-nine tons of coal, with which she could steam 3,000 miles at ten knots per hour. Economy of space was one of the chief objects in view on the part of her builders. Every cubic foot is utilized. She has eleven compartments and ten water-tight bulkheads. There are no doors connecting the compartments. The lower decks fore and aft are entered only by hatchways. She has fuel bunkers all along her sides, abreast of her engines. Her only other protection is her pumping machinery. She can pump 100 tons of water in seven minutes, 870 tons per hour, and her own weight in less than ten minutes. If she should have a shot hole nine inches in diameter through her engine room compartment, her pumping capacity would enable her to keep free from water.

When equipped, she will carry a torpedo tube on each bow and a torpedo gun amidships, and will thus be able to launch three torpedoes at once. She will carry five rapid-fire one-pounder cannons, and will have a search light.

She is built with twin screws and quadruple expansion engines. There are more than three miles of tubes in her boiler and more than one mile in her condenser. It is estimated that on her official trial trip she developed more than 1,700 horse power. The diameter of her turning circle is only 250 feet. She can be propelled astern as well as forward, and has made over seventeen miles an hour while going in that way. The tubular boilers of the Cushing are of English design, such as are used in the fastest British torpedo boats.

The success of the Cushing and her presence in Washington, where members of Congress can witness her maneuvers, will, we hope, lead them to authorize the construction without delay of a better and faster class, such, for example, as the flock of torpedo boats possessed by the Italian government, among which are the Aquila, Sparviero, Nibbio, Falko, Aoltoio, etc. These boats are 13 feet longer than the Cushing and have a little greater engine power. On their three hours' trials three of them developed respectively 26.2, 26.6, 26.8 knots, the fastest being over 4 knots quicker than the Cushing. During some of the trials a speed at the rate of 28 knots per hour was attained. The Italian navy has several torpedo boats of smaller dimensions than the Cushing, some of which run at 22 1/2 knots per hour. A guaranteed speed of 26 1/2 knots is required by the Russian government for torpedo boats lately ordered. These fast boats are built at Elbing, Prussia.

SHIPS AND GUNS NEEDED FOR DEFENSE.

A recent number of the New York Herald gives at considerable length a showing of the insecure condition of the American coast cities in respect to naval attack by foreign enemies. Reports of opinions by naval and military officers are also given, the general purport of which is that at present, and for many years to come at the rate of progress now being made, our principal seaport cities are likely to remain exposed to easy capture by any determined enemy having under its control a few superior vessels of war. The Herald gives a pictorial representation showing the helpless situation the city of New York would be in, supposing a hostile fleet should approach only as near the metropolis as Flushing Bay, 8 1/2 miles from the City Hall and Post Office. The picture represents the ruins of the government edifice, as a result of a hit by a single shell from a great gun. New York, Brooklyn, and adjacent cities would be at the mercy of such a fleet. At present there are no forts, no guns, no ships, and few available means at command of the government of power sufficient to prevent the coming in of hostile war ships to the position mentioned. What is true of New York is equally true of all the principal

cities on our seaboard. Portland, Me., with its splendid harbor, would be an easy prey to an enemy. Modern war ships might lie at anchor, out of range of the present old guns and fortifications, and shell all parts of the city.

Portland is the strategic key to the military occupation of all Maine and the greater part of New Hampshire, and is necessary as a winter port to the Province of Quebec. Between hostile powers, whichever one has Portland has practically all the country between the lower St. Lawrence and the Atlantic seaboard east of Portland as tributary dependencies.

In case of war between the United States and Great Britain, the capture of this city would be among the first achievements aimed at. Its capture would put the invaders effectually in possession of the whole territory, to use as a base of operations and supplies.

In the present state of its defenses Portland could easily be captured by an invasion from the sea, but could never be recaptured by forces from the land. The loss of this portion would be well nigh fatal to American supremacy in New England, for with the fall of Portland would fall in due time Boston also.

Boston is equally defenseless. So are Baltimore, Charleston, Savannah, New Orleans.

Colonel J. A. Smith holds that it pays to build forts we do not use, simply because the building of them removes the need to use them. The nation that is not defended is the one that needs defenses most, and when the need arises, it is most likely to come suddenly. If by building forts and ships of war the country can avoid a war, the money that they cost is well spent. Few will dissent from the correctness of this proposition.

As to modern fortifications, such as the construction of first-class steel defenses, we believe Congress has so far done nothing. But in respect to war ships some progress has been made. We have now in the Mediterranean a fleet of four steamers, not very fast and not formidable, but still creditable ships. Three other better vessels are nearly ready, and a few on the stocks. The strongest fighter of these—the Texas—built on English plans, it was found, after construction was well begun, would probably not float, owing to excessive weight, and work was stopped. But the most recent conclusion is that she will float, and her completion is advised.

The Board of Bureau Chiefs of the Navy Department have finally recommended a few minor changes in the plans of the vessel, but, on the whole, have made no material reduction in the weights, thus practically acknowledging that the original calculations were correct. The principal changes made are in the location of the heavy guns and a reduction of the space for stores. As originally designed, the guns were raised only eighteen inches above the decks. On account of the liability of injury to the deck when these great guns are fired, the board concluded to raise them to three feet above the deck. It the end it may be found desirable to reduce by an inch or so the thickness of her armor, so as to provide more stores and more men. The work of construction can continue, however, without further delay.

Future of the Electric Motor.

Joseph Wetzler, in his article in Scribner's on the "Electric Railway of To-day," concludes by making the following prediction: "With the advantages of the electric railway so clearly pointed out, and so unquestionably demonstrated in actual practice, it would not be unsafe to hazard the opinion that, in ten years, at the farthest, there will not be a horse railway in operation, at least in our own country. The horse will then be once more returned to his legitimate field of labor, and the street car passenger will be transported at an increased speed, and with all the comforts of easy riding, in cars propelled and lighted by electricity; while it is by no means improbable that, with further work on the line indicated, the passenger may step aboard a train in New York at ten in the morning and eat a five o'clock dinner in Chicago on the same day. Enough has indeed been accomplished to show that electricity is destined to be one of the most powerful factors entering into our social conditions, and that the ease of distribution and convenience of power afforded by it must bring forth changes in the social order which are even now hardly realized."

Good Advice.

Don't sign, says a contemporary. But such a caution as this seems hardly necessary to any person in the full possession of his faculties. Yet it is astonishing how many people there are, including good business men, who attach their signature to papers or documents whose contents might have a serious bearing upon themselves or their affairs, with scarcely a glance at their contents. Carelessness in failing to acquaint themselves with the contents of a paper before signing it has worked incalculable harm to thousands of well intentioned people. Then read all papers carefully before you sign them, particularly those that express or imply anything in the nature of a contract or a legal obligation.