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SATISFACTORY PROSPECTS FOR THE WAR VESSELS.

The recent achievements of the dynamite cruiser Vesuvius and the gunboat Yorktown, on their respective government trial trips, demonstrate something more than the mere certainty of acceptance of these vessels. To the William Cramp & Sons, it is sufficient to know that the vessels have proved a success, and to the government board, that the vessels have passed a satisfactory test. But to the public at large, to the shipbuilders of this country, and to builders abroad, the success of these two modern war vessels demonstrates the ability of American ship and engine builders to not only equal, but surpass those of foreign countries. When it is taken into consideration that the estimated speed of the Vesuvius and the estimated horse power of the Yorktown was placed as high in each case as it was supposed by the government officials possible for the contractors to attain, the wonderment is expressed that in each instance the contract requirements were exceeded far beyond the most sanguine expectations.

The Vesuvius was required by the government contract to make 20 knots per hour. On her official trial trip she made a mean of 21.646 knots per hour.

The contract requirements of the Yorktown called for a development of 3,000 horse power, with a provision that for every extra unit of horse power obtained, the contractors should receive a bonus of \$100. On her official trial trip the Yorktown developed, as an approximate mean for a four hours' continual run in a seaway, not less than 3,650 horse power, though the designer of her engines, Mr. Horace Lee, is inclined to place the figure as high as 3,700, the findings of the official board being not yet made public.

The ability of the Cramps to turn out such successful vessels as the Vesuvius and Yorktown shows for itself that the American shipbuilders of the past have worthy representatives at the present day, for it is well known that the name which the famous clipper ships in the forties and fifties won for American builders placed the latter ahead of all other ship designers in the world. The breaking out of the civil war found the American navy consisting of a great number of unseaworthy vessels. Before one year had passed, every ship yard on the Atlantic coast north of the Delaware capes was taxed to its very utmost, gunboats were turned out complete and with their batteries in place in 90 days after the first laying of their keels, while Monitors were rushed through in six months' time.

As a result the close of the civil war found the navy of the United States possessing more ships than that of any other navy in the world; while the muster rolls bore on their faces the names of some 100,000 seamen, ready for service and duty afloat. It must also be remembered that the civil war developed a type of vessels entirely new to warfare. This was the Monitor type, which immediately after became so popular among the naval establishments of foreign governments. Russia especially seized hold eagerly of the new idea, and was followed in quick order by France, Germany, Spain, and Italy. Although the Monitor type in its original design is fast becoming obsolete, there are features of it, however, which promise to become permanent fixtures in the armaments of naval vessels. The turret, revolving or fixed, is a purely Monitor idea, and at the present day it is safe to say that one-fifth of the heavy armored war ships of Europe carry a steel or iron turret on the spar deck. The 100-ton guns on the majority of the Italian vessels are mounted in turrets; the guns of the Thunderer type of the British navy are likewise; while in the German navy the Friedrich der Grosse and Preussen, sister ships, each of 6,660 tons displacement, carry their respective four 22-ton Krupp's in turrets, the thickness of metal ranging from 9 to 10 inches on different parts.

With the appearance of the dynamite cruiser Vesuvius among the vessels of this country's naval establishment, it is not at all unlikely that, before two years will have elapsed, several of the European governments will possess vessels of similar design, and intended for the same mode of warfare.

As it is now, the Cramps have received offers from foreign emissaries to build cruisers of the Vesuvius type, and it is understood that the firm has been offered as high as \$500,000 for the original vessel itself. This latter offer could not, of course, be taken up by the Cramps, inasmuch as over two-thirds of the vessel's contract price has been paid down by this government. The Italians are especially anxious to obtain the Vesuvius. They have also conferred with the officials of the Pneumatic Dynamite Gun Company, with the express view of purchasing guns for use aboard their own ships, even if they be unable to buy the Vesuvius, or manage to have built vessels of similar type.

There has been evinced a tendency on the part of some persons to deny the Vesuvius the name she is so justly entitled to, that of "the fastest vessel in the world of her tonnage class and over." The only vessel afloat which has attained in speed anything like that made by the Vesuvius in her speed attainments is the Tripoli, of the Italian navy. This vessel displaced, on trial, 831 tons; the Vesuvius displaced 810 tons. The

speed of the Tripoli was 20.1 knots over the measured mile, and less than 20 knots for the mean of a four hours' continual run. The El Destructor, of the Spanish navy, made a mean of 22.6 knots on a four hours' continuous run, but the El Destructor is less than 500 tons displacement, and carries little or no armament. The Vesuvius, on trial, was weighted down with 140 tons of armament.

Throwing the El Destructor out of comparison, which is only just and right, the Vesuvius presents herself to the world as an American-built ship, and one whose speed for her tonnage and over has never been exceeded. As for high horse power development per ton of machinery, boilers, and the like, the Vesuvius likewise attained to higher than ever got by any other vessel abroad having the same type of marine engines. She obtained an average mean of 16.9 horse power per ton of machinery, boilers, coal, and water in boilers. The best ever obtained abroad is placed at 12 horse power per ton, and an average of the best at 10 horse power. The Tripoli and El Destructor, however, carry engines of the locomotive type, and as for weight abroad, it is all in the machinery. It must be remembered, too, that no comparison is being made in relative attainments with torpedo boats of the Ariete type—boats built by Thornycroft. Such craft have no claim to comparison with sea-going cruisers of the Vesuvius type.

It now looks as if all the new ships of the navy are going to exceed the expectations of the Navy Department. The Petrel is likely to make 250 horse power over and above her contract requirements. This will give the contractors a bonus of \$25,000. The Bennington and Concord vessels, of the Yorktown type, are designed for 3,400 horse power, and their contractors expect to attain from the engines a development of 250 to 300 horse power over and above the stipulated number.

The four last years have done much to stimulate and encourage ship builders, and the success with which the latter are meeting promises to assure to them not only the confidence of the American people, but to serve also as an inducement for foreign purchasers to buy vessels of American build.

PROGRESS OF ELECTRIC ILLUMINATION.

For proof of the innate conservatism of the human family we have only to glance at the history of any great invention. Any innovation calculated to change old established manners and customs is sure to meet, at first, with opposition, and unless by actual trial it is shown to be desirable and advantageous, it dies and passes out of sight.

Every important invention passes through this ordeal. It is surprising, on taking a retrospective view of inventions that have proved of the greatest benefit to mankind, to note what struggles they have passed through before receiving anything like adequate acknowledgment from the public. On the other hand, when an invention has passed its period of probation, and is found desirable, its progress is rapid, and nothing can impede it. Several applications of electricity have reached this stage, and are progressing in a manner little dreamed of ten years ago by the most sanguine, and even now, very few, unless connected in some way with the industry, realize the extent of the adoption of the electric light and of electricity as a means of distributing motive power.

So far as we know, every city in the United States is provided with arc and incandescent illumination, and the introduction of electric lighting is rapidly extending to the smaller towns. Already hundreds of villages of only a few thousand inhabitants have their electric light plant. In many instances the electric light has been placed in competition with gas light, while in other cases it has been introduced to advantage where gas light was impracticable. In all these applications the economical distribution of power for small uses by means of the electric motor is a very attractive and important feature.

In addition to the general plants adopted by cities and villages, there are thousands of isolated plants for single buildings or groups of buildings, and electric lighting has been largely adopted by steamboat and railway lines. For isolated plants the storage battery is coming largely into use, the batteries being connected by day for charging with the arc lines, and used at night for incandescent lighting.

In addition to these applications of electricity, we find it largely employed in the mining districts, the generators being located upon the surface and the motors in the depths of the earth. Electric tramways are also of great utility in transporting ore and other materials, but a larger use is that of driving cars upon the street railways. Electric cars are now regularly manufactured, and they are in use not only in the cities, but in the small towns and villages. The extent to which this method of propelling cars has been adopted, and the rapidity with which it is progressing, is notable.

With all the perfection that has already been attained in electrical machinery, improvements are con-