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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

WARSHIP CONSTRUCTION IN GOVERNMENT YARDS

The fact that the first large battleship to be constructed in a government yard has been built in the same time as that required to construct a sister ship in what is probably the best equipped private yard in the United States, is a matter that is giving the Navy Department no little satisfaction; for it has disposed effectually of the popular belief that warship construction in a government yard was necessarily tedious, costly, and poorly done.

How it has come about that such an impression exists is a question that takes us back to the day of the building of the "Maine" and the "Texas." Both of these vessels were long in construction, the cost of which was very high; but this is explained by the fact that when they were built, our navy yards were suffering from very serious political interference, and were burdened with a large number of employees who had gained their entrance to the yards through political influence, and regarded their positions as of that kind in which a minimum amount of work is to be done for a maximum amount of pay. To turn out efficient work under such circumstances, especially in the difficult art of warship construction, was a simple impossibility—as the various naval constructors soon found out to their sorrow. Moreover, when the "Maine" and the "Texas" were built, steel warship construction was in its infancy in this country, and the navy yards were but poorly equipped for the task, much of the plant being quite out of date.

To-day, however, we have changed all that. Thanks largely to the energy and courage of the late Chief Naval Constructor, our navy yards have been entirely emancipated from political control, new drydocks, buildings, and plants have been built and installed, until to-day our best yards, and notably that at Brooklyn, are in first-class condition, and capable of turning out the very best work.

The Bureau of Construction and Repair, as soon as it felt that it was in condition to handle warship construction to advantage, began to urge strongly upon the Secretary of the Navy the advantage of constructing some of our new ships in government yards. The principal arguments in favor of such a course were, first, that the private builders, who were showing a great lack of diligence in the prosecution of their contracts for new ships, would be stimulated to greater activity if they knew that ships were being built in government yards, and a new standard of expeditious work thereby set up. Another, and not less important object aimed at, was to insure that the full working staff of the navy yard would be constantly employed at all seasons of the year. Hitherto the navy yards had labored under the great disadvantage that when the regular repair work was completed, it became necessary to discharge a large proportion of the working force. The mechanics thus set free scattered in search of work, and in the following season, when repair work became active, it was necessary to gather a new force, which had to become acquainted with the plant and the general working of the navy yard before the best results could be secured. Now, it was judged that by having one or more new ships always on the stocks, the necessity for discharging any of the force, when repair work slackened, would be removed, inasmuch as it could be transferred to new construction.

It is now nearly two years since the new regulations were put in force, and it was decided to put them to a searching test by ordering the construction at the Brooklyn navy yard of one of the largest battleships ever built for any navy. At the same time, the contract for a sister ship was placed at the private yard of the Newport News Shipbuilding Company, one of the most completely equipped plants in the world.

The results have exceeded the most sanguine expectations of the Navy Department, for, in spite of the disadvantages under which the Brooklyn navy yard labored, owing to the fact that it had to build entirely new ways and erect a large cantilever traveling crane before the keel of the vessel could be laid, the "Connecticut" has been built in about the same time, namely, eighteen months, as was the "Louisiana," while both the time of construction and the cost of the vessel have been considerably less than was estimated at the time the order for the vessel was given—and this in spite of the fact that the hours of labor are shorter, and the pay is higher in government than it is in private shipyards.

The SCIENTIFIC AMERICAN has always been a strong advocate of the policy of building some of our new warships at government yards, and therefore it gives us particular pleasure to congratulate the naval constructors on the excellent results that have been achieved in the case of the "Connecticut." The effect of the new policy on the private shipbuilding firms of the country has been everything that could be desired. There has been a notable acceleration in the rate of construction, the "Louisiana" having been launched in eighteen months from the date of the laying of the keel, no less than 7,000 tons of steel being worked into her hull at that period. This is a great improvement on any previous work, the best record previous to this for a battleship being about two years' time, and this for a vessel of smaller size and less importance than the "Louisiana." It is to be hoped that the good results that have been attained will encourage Congress to allot a certain portion of every shipbuilding programme to government yards, and that not only New York, but League Island, Boston, and other leading government yards will be given their share of the work.

THE CHALLENGE CUP MOTOR-BOAT CONTEST.

The races for the Gold Challenge Cup of the American Power Boat Association, which are being run off as we go to press, have proved that the development of the motor boat in this country has progressed to a point at which it can compare in point of speed and reliability with the fastest of the European craft. In saying this it is but fair to state, however, that many of the boats are carrying engines of foreign make, and to this extent the performance is robbed of much of its purely American character. In the lines of the boats, and the design of their propellers, however, both elements of the highest importance as affecting the speed, even of these diminutive craft, the contestants are the product of our own builders.

In the first day's race, intended to be over a 32-knot course from the Columbia Boat Club House, West 85th Street, up the Hudson and back, but actually measuring 27.25 knots, the best performances were those of the winner, Mr. W. K. Vanderbilt's "Mercedes VI.," and the "Vingt-et-un," which made the highest speed over the course. The "Challenger," which has just returned from her unsuccessful quest of the Harmsworth Cup in England, was the scratch boat, and she allowed "Vingt-et-un" 10 minutes 17 seconds; "Speedway," 19 minutes 20 seconds; "Mercedes," U. S. A., 20 minutes 5 seconds; "Macaroni," 26 minutes 56 seconds; "Mercedes VI.," 31 minutes 12 seconds; "Shooting Star," 31 minutes 29 seconds; "Flip," 32 minutes 17 seconds; "Marcirene II.," 56 minutes 55 seconds; and "Josephine," 59 minutes 17 seconds. The first to cross the line was to be the winner. The "Mercedes VI.," steered by Mr. Vanderbilt, proved so speedy that she was the first to overtake the mark boat, which had to drop anchor at once, in order to furnish a turning point. The "Mercedes VI." finished first, covering the course at a speed of 23.07 miles an hour. The "Vingt-et-un," which finished fifth, made the best speed, averaging 24.76 miles an hour. The second race was run off in a nasty sea, and many of the smaller boats shipped so much water that they had to stop to bale out, the "Mercedes VI.," which was the first around the mark, being one of these. The "Vingt-et-un" came through in splendid style, thanks to her high freeboard, and careful handling, covering the course at an average speed of 25.36 statute miles per hour. This performance is particularly gratifying because of the fact that she carries an American-built engine. This speed brings the American record within less than a mile of the 26.25 miles an hour recently made at Monte Carlo by the "Trefle-a-Quatre." In both races the "Challenger," as the result of some defect in her thrust block, did not go over the course.

WATER VERSUS STEAM POWER.

Steam power is going out of fashion. Water power is coming in. Electrical transmission is working the change. Carried to its possible results, this utilization of water powers means the extinction of the steam engine. Such a complete victory for water power in many cases is by no means improbable. An example is ready at hand. In Niagara Falls, a city of large and varied manufacturing interests, not a single steam engine is at work. This instance is not as exceptional in its conditions as might be thought. Great as is the power of Niagara Falls, the cost of development per unit of plant capacity is quite as large as that on many another river. On the other hand, the price of steam coal at Niagara Falls is much below that in New England and many other parts of the country.

Results in the extinction of steam power plants at Niagara Falls are exceptional in degree rather than in kind. In hundreds of villages and towns throughout the country steam engines have been almost, if not altogether, displaced by electrically-transmitted water power. In scores of cities steam engines of the largest sizes have been shut down, and their work taken up by electric power from distant waterfalls. The steam plants thus rendered silent and useless are not designed for any particular line of industry. Some stand in former power houses of electrical supply and railway systems, that are now operated from sub-stations with transmitted water power. Idle steam plants in such locations may be seen at Montreal and Albany, Buffalo and St. Paul, Salt Lake City and San Francisco. In some such cases, as at Buffalo and Montreal, the steam plants are not started even at times of maximum loads on the electric systems. Others of these idle steam plants are in large cotton mills, as at Montreal, where the electric motors that are doing the former work of the steam equipment have an aggregate of thousands of horse-power. Large machine works furnish other illustrations of steam plants that have been put out of service by transmitted water power and electric motors. In one such case, at Concord, N. H., the shops of the railway that hauls all of the coal entering the city are operated by electric motors of about 550 horse-power total rating, and the steam plant that formerly did the work is permanently out of use. Another case, this time in Buffalo, shows the substitution of electric water power for steam in a plant for the manufacture of pumps, where the horse-power required is over two thousand. So the list might be indefinitely extended to include grain elevators and malt houses, flour and cereal mills, rubber works and iron foundries, ore smelters and chemical works, and almost every sort of manufacturing industry that requires mechanical power in large or small units. No loads are too great to be operated by transmitted water power, and none are too small for efficient driving with electric motors. The sewing machine making shirts, and the heavy machinery employed in the construction of steel ships, are alike moved by the transmitted energy of distant, falling water.

With factory loads as well as electrical supply and railway systems shifting from steam to water power, the amount regularly transmitted to cities is already large and is rapidly increasing. Portland, Me., and Springfield, Mass., each receive more than two thousand horse-power electrically transmitted from waterfalls. At both Manchester, N. H., and Hartford, Conn., the corresponding figures are more than three thousand. About ten thousand horse-power goes alike to Schenectady, N. Y., and San Francisco, Cal. St. Paul, Minn., gets approximately four thousand horse-power, Albany, N. Y., fully as much, and Los Angeles, Cal., more. Montreal leads the list of centers for transmitted water power with nearly thirty thousand, and Buffalo is a close second with much more than twenty thousand horse-power, at times of maximum load. The city of Niagara Falls itself is so close to the electric generating stations that its supply of energy may be said to be distributed rather than transmitted, but the amount utilized there is nearly seventy thousand horsepower. To this striking example of great industries built up about an electrically-developed water power may be added that of Shawenegan Falls, Massena, and Sault Ste. Marie, near each of which thousands of electrical horse-power are distributed to manufacturing plants.

Without the aid of electrical transmission and distribution this displacement of steam by water power could never have taken place on its present great scale. Even at water-power cities the distribution and the application of energy to manufacturing plants is accomplished much more readily by electrical means than with the water itself. It is largely for this reason that many water powers previously unused are now becoming centers of industry. The great majority of manufacturers, however, cannot be drawn away from the centers of population, even by the advantages of cheap water power, and for them the choice is necessarily between steam plants and transmission from distant waterfalls. This choice is based on commercial rather than on sentimental or even sanitary reasons. Electrical energy transmitted from water powers displaces steam in manufacturing plants, not so much because the former is cleaner, safer, and more conducive to good health, as because it is cheaper. Perhaps the most remarkable feature of the electrical development of water power is the fact that the energy can be transmitted ten, scores, and even hundreds of miles, and then delivered in large units at prices below the cost of power from coal. Of course, the distances over which water power can be profitably transmitted vary much with the conditions at both the generating and the receiving ends of the line, but experience has amply shown that a transmission of some length may be made to advantage from almost every water power