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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.

SUBWAY COMPETITION AND CHEAP FARES.

The citizens of New York must view with great satisfaction the friendly rivalry between the great transportation companies, for the privilege of providing better rapid transit facilities in New York city. The commanding position held by the company which has had the good fortune, or shall we rather say, foresight and courage, to secure the first subway system in this city, has thrown some of the other competing interests into a very natural combination, which cannot but work greatly in favor of the general public. If concessions in the form of continuous trips and cheap fares continue to be offered by these competing interests at the present rate, the new extensions of our Subway system will offer the cheapest, most extended, and most speedy system of transit in the world. There seems to be little doubt that as one result of the competition between the Interurban Company, the Brooklyn Rapid Transit, and the apparently allied interests of the Metropolitan, Pennsylvania, and New Haven systems, it will become possible within a few years' time to travel between the remotest limits of Greater New York for a single fare. This will be equivalent to taking a journey of from thirty to forty miles for five cents; and as far as we know, there is no instance of such cheap travel, nor anything approaching it, to be found in any part of the world.

ANOTHER TURBINE ATLANTIC LINER.

Contemporaneously with the completion of the maiden voyage of the first turbine Atlantic liner, the "Victorian," the sister ship "Virginian" was running her speed trials on the Firth of Clyde, when she developed the very creditable speed of 19.8 knots an hour. Compared with the daily records of the fastest Atlantic liners, this performance is not, of course, remarkable; but when we bear in mind that these two ships were designed originally for a sea speed of about 17 knots an hour, it will be seen that the accomplishment of nearly 20 knots on trial is one more tribute to the capacity of the marine turbine to exceed, when pushed to the limit, by a considerable margin the results for which it is designed. The "Victorian," which was illustrated in our issue of April 8, showed a trial speed of a fraction over 19 knots an hour. The first ocean voyage of the "Victorian," which consumed 7 days 22 hours and 50 minutes, was made under extremely unfavorable circumstances, as she started in a gale of wind, encountered bad weather on the way across, and was obliged to go considerably to the south of her natural course, as far south indeed as the latitude of New York, in order to avoid the icebergs, thereby lengthening her voyage by more than 300 nautical miles. Moreover, it was stated by the captain that the boilers gave considerable trouble by priming. The maximum speed reached during the voyage was 16½ knots. The "Virginian" completed her first voyage under favorable weather conditions in 6 days, 22 hours, and 45 minutes. This is the fastest record. On the important question of vibration, the officers and passengers appear to be unanimous in stating that it was practically eliminated in these ships. This, of course, does not prove that there will be a similar absence of engine vibration when a liner with turbine engines is being driven at the speeds of 23 to 23½ knots, at which the fastest of the German ships have been driven by their reciprocating engines. But it is fair to presume that even at such high speeds the vibration will be confined to that which comes from the propellers.

"CONNECTICUT"-"LOUISIANA" CONTEST.

Although the naval authorities, and particularly those at the New York navy yard, have strongly deprecated the idea that there was any shipbuilding contest going on between the New York navy yard, as builders of the "Connecticut," and the Newport News Company, as builders of the "Louisiana," the general press insists on calling it a contest, and no doubt the general public believes that each yard is exerting every effort to beat the record of the other. As a matter of fact, the private yard is doing its work in the way that long experience and careful management have shown produce the best results, and the navy yard is naturally making full use, in the construction of the "Connecticut," of its modern machinery, improved plant, and more efficient organization.

In the days when the late Rear Admiral Bowles, now president of a large private shipbuilding concern, was chief constructor at the navy yard, he was an earnest advocate of the policy of building some of our warships at government yards, chiefly because it would enable a large staff of skilled workmen to be kept constantly employed, and prevent that continual breaking up of the staff which took place whenever repair work was slack. The Scientific American has always heartily favored this policy, and we have followed with close interest the practical test of the question, which is now being made in the construction of the battleship "Connecticut."

In the early days of the reconstruction of our navy, the vessels that were built in government yards were extremely costly, partly because of the obsolete plant and poor equipment of the yards, and even more because of the fact that the navy yards were subject to political interference, and encumbered with a heavy burden of incompetent labor, which trusted to political "pull" to keep it in place. Although the equipment has been brought up to date, and political interference swept away, the popular idea as to the extravagance and costliness of government construction still survives, and seems to die a lingering death. Hence, it is natural that our very efficient corps of naval constructors are gratified at the present opportunity to prove that work of the highest class can be done as well, as quickly, and as cheaply, in the government yards as in the best private yards in the country.

An excellent opportunity to get the exact comparative figures of time and cost in the construction of the "Louisiana" and "Connecticut" has been afforded by an investigation recently made by the House Labor Committee, appointed to determine the desirability of Gompers's Eight-Hour Bill. The report contains statistical data concerning the cost of the two ships, and we learn that in the construction of the hull the average man at the New York navy yard accomplished as much every ten minutes as the average man at Newport News accomplished every twelve minutes and twenty-five seconds; although in a day of ten hours the Newport News man worked in 0.2 of a pound more than the average navy yard man did in a day of eight hours. The Newport News officials decided that the building of the hull offered the best basis of comparison, and they compiled a statement of the weights of material worked into the hull, and the total time of labor employed on hull construction. The same thing was done in connection with the "Connecticut," by the officials at the New York navy yard. The comparison showed that the average production per man, per hour, on the "Connecticut" exceeded by 24.48 per cent the average production per man, per hour, on the "Louisiana." A further inquiry into conditions at the government and at the private yards, with a view to explaining this remarkable result, elicited the following explanation of the high efficiency shown at the navy yard:

1. Higher rates of wages are paid at the navy yard than by private companies in Greater New York and elsewhere, and the rates of the latter average higher than companies elsewhere.

2. Employment the year around is steadier and more secure than in private yards.

3. The higher wages, shorter hours and steady employment attract the best grade of workmen to the navy yard, where a tacit recognition of an asserted economic theory prevails, that the best workmen cannot be induced to work extra hard without larger pay than the average.

4. Prompt recognition of good work by advance in wages and promotion in grade.

5. A large waiting list of mechanics and others from private shops to select from.

6. The expectation or belief that if the "Connecticut" was built in record time the building of another battleship would be given the Brooklyn navy yard.

7. A zeal generated by the general challenge of the country to the navy yard workmen to make good their claims in this test.

8. Prompt discharge for inefficiency.

9. Dismissal of workmen who could not or would not come up to a required standard of output in quantity and quality.

10. No restriction of output individually or collectively.

11. Loafing, soldiering or "marking time" not tolerated.

12. Workmen required to begin work the moment the whistle blows, and to continue working until the moment the whistle blows at quitting time.

13. Strict technical and exacting supervision of a high order of skill and experience.

14. A desire on the part of naval constructors and workmen to remove an impression of inefficiency growing out of former navy yard construction of war vessels, before civil service regulations controlled employment there.

It is not within our province to enter into the question of the eight-hour bill, and the above tabulated facts are given merely to show what excellent results have been obtained by the methods employed on the navy-built ship.

The building of the "Connecticut" has proved, among other things, that the men, under the system of the New York navy yard, are making more money in a given time; that the government is getting more for its money; and that it is getting it in a shorter time.

THE VANDERBILT WATER-TUBE BOILER FOR LOCOMOTIVES.

The high efficiency shown by the marine and stationary water-tube boiler, and the fact that the fire-tube locomotive boiler has about reached the limit of size compatible with the loading gage of the railroads, have naturally directed attention to the question of the employment of the water-tube boiler on locomotives. Our locomotive builders are approaching the stage at which the question of increasing the power of a locomotive is, broadly stated, one of securing increased boiler power within a given limit of size and weight of the locomotive. A specified number of square feet of heating surface in a properly-designed water-tube boiler has a higher average evaporative efficiency than the same heating surface in a fire-tube boiler; and it is realized that if the water-tube type could be so designed as to comply with the rather severe restrictions as to space and form involved in locomotive practice, it would be possible to secure a more powerful locomotive than could be constructed if the boiler were of the standard locomotive type. Another advantage would be the increased safety of the water-tube type; for an explosion would necessarily be limited in its effects, and could never be attended with the destructive results that follow the explosion of a boiler of the present type.

Although the application of the water-tube boiler to the locomotive involves some careful planning to fit it to the peculiar conditions, there are no insuperable difficulties of a structural character to prevent this being done. At the same time, the cost would certainly not be less (not at least in most of the designs that we have seen) and in some designs it would, undoubtedly, be greater. The chief obstacle to the extended use of the water-tube boiler on locomotives is the fact that a locomotive must be prepared to use, at times, water of a very poor quality, and this alone would prohibit the use of the water-tube type in certain localities. On roads where a uniformly good quality of water can be obtained, this difficulty would disappear.

In this connection we note that a patent has recently been granted to Mr. Cornelius Vanderbilt, for a locomotive boiler of the water-tube type, which presents an interesting study of this problem. The boiler consists of two upper, longitudinal drums, extending the full length of the boiler; a pair of side headers of the same length, and gangs of water tubes disposed in reverse curve form, connecting each drum with its own header. The headers are located above and outside the frames, and a cross-section of the boiler, at any point of its length, shows that its external casing conforms approximately in outline to the cross-section of a Wootton fire-box, the two side headers being located as far out beyond the wheels as the loading gage will allow. That portion of the boiler which lies forward of the firebox is formed with a third and larger header, which is placed intermediately between the side headers, and just above the main frames of the engine. A nest of tubes extends vertically from the two upper drums to this intermediate header, and the products of combustion have to pass through this nest on their way from the firebox to the smokebox. The boiler is carried directly upon an intermediate frame, which is supported on the main frame by chairs, and is tied transversely by a system of struts. To eliminate the stresses due to expansion and contraction, the boiler at certain points is supported on the frames by hinged connections.

Prof. Janssen has laid before the French Academy of Sciences an interesting report upon his recent researches on Mount Vesuvius. There was something fascinating about the way in which the octogenarian scientist described his arduous climb to the very brink of the great crater, and the way in which he extracted gases from its very depths, like drawing water from a deep well with a chain pitcher. His receptacles were sunk to a great depth, and then, by an ingenious arrangement of valves, were opened and closed after taking in gas. These gases will be subjected to special tests, with a view to establishing their relation to the solar emanations and vapors.