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"THE BIGGEST IN THE WORLD."

Although there is no particular merit, there is a vast amount of interest and curiosity attaching to the mere element of "bigness" in engineering construction. Judged on the ground of the skill and ingenuity required, there is as much credit to be given to the mechanic who builds a watch of the size of a ten cent piece as to his brothers who shape and assemble the parts of a giant locomotive, steamship, or bridge. Mankind, however, perhaps because it realizes its own material littleness in comparison with its natural surroundings, has a preference for magnitude, and it would seem that to say of a structure that it is the biggest, longest, tallest, or most bulky of its kind in the world is to give it the very best credentials for an immediate introduction to popular favor.

We are noted for big things in America, and it is probable that there are in this country more structures, both in civil and mechanical engineering, that can claim the distinction of being "the biggest in the world" than in all the rest of the world put together. And yet we very much doubt whether in any single case it can be said that the mere element of bigness, as such, has been a controlling factor. The tendency toward concentration is based upon sound economic principles, and if our buildings are taller, our power stations and transportation systems on a vaster scale, our locomotives and cars far heavier than those found elsewhere in the world, it is because, in our industrial pursuits, we have been working along certain predetermined lines which have led to operations and constructions of a vast and unprecedented scale.

As a matter of fact, we are too practical a people to allow any sentimental or spectacular considerations to govern our designs or, indeed, exercise the slightest influence upon them. We have not built an Eiffel Tower and it is not likely that we ever shall. Huge machines like the Pittsburg locomotive, which we illustrate this week, are big because we have found that it pays to make them big. The Pittsburg Consolidation weighs nine tons more than the Great Northern mountain locomotive, not because the Carnegie Steel Company wished to "beat the record" by possessing the biggest freight engine in the world, but for the very practical reasons that the company wished to haul their freight at the least possible cost per ton, and the clearances of the road on which it was to run and the strength of the bridges it would have to cross allowed a locomotive of this size and weight to be used.

It is natural that this superb machine should attract much attention, and it was seemingly inevitable that the locomotive expert of our esteemed contemporary The London Engineer should turn his analytical eye upon it, and rebuke its obtrusive and unnecessary dimensions in a two-column editorial. Under the title of "Monster Locomotives," he complains that "clever, irresponsible amateurs continually write letters urging on British railway companies the necessity—which they assume to exist—for the adoption of American railway methods in this country." The complaint is well founded, for, as we showed in a recent issue, the restrictions to size on English roads, in the way of low bridges, narrow tunnels, and bridges of limited carrying power, are such as to prohibit the use of the huge express and freight engines which are common in this country.

Our contemporary falls, however, into the common error of supposing that we take pleasure in building big locomotives for the mere sake of their bigness. "Is there," it asks, "much or anything to be gained by making locomotives more powerful than they are now—not as regards the mere conduct of traffic, but in a way that concerns the locomotive regarded merely as a machine?" Consciously or unconsciously, the writer has here stated the broad line of distinction between the methods of English and American locomotive builders. We have always designed our engines with a strict regard to "the mere conduct of traffic," and have troubled ourselves very little with the performance of the locomotive "regarded merely as a machine." We have found that the locomotive with

liberal grate surface, large heating surface, free steam passages, and drivers of moderate dimensions will haul the greatest loads for the least expense of operation. Coal consumption is only one of many items of expense, and hence we have cared very little whether the type burnt 20 pounds or 70 pounds of coal to the mile in doing its work, so long as this ultimate economy was secured. The school which The Engineer represents is, or rather has been, too much occupied with the performance of "the locomotive regarded as a machine," and in its desire to build locomotives that would show a small coal bill and good laboratory results, they have taken altogether too narrow a view of the question. Slow piston speed, a mild exhaust, small fuel consumption, and smokestacks that emit no smoke, not to say unburnt coal, are theoretically very desirable; but when they mean "short trains" and double expenses for train crew, the practice from the standpoint of economical operation is certainly extravagant.

THE PROPOSED NEW MONITORS.

Unless Secretary Long and Congress take up the matter of a further appropriation for modifying the original designs, the country will be committed to the folly of building four vessels of the discredited monitor type. The Naval Board, acting under the instruction of the secretary to improve the monitor plans to the extent of removing the objectionable monitor features, has decided, after conferring with the four shipbuilding firms which had secured the contracts, to improve the vessels by lengthening them 27 feet, thereby increasing the coal supply from 200 to 400 tons and providing better accommodation for the officers and men. The displacement, moreover, is to be raised from 2,700 to 3,000 tons.

Now, while this is good as far as it goes, it does not go far enough. The monitors are monitors still, with the most vicious features of that antiquated type still existing, and the others merely modified. The improved (?) vessels will have the same low speed of 12 knots (trial speed, equal to eight or nine in service), they will sit monitor fashion, squat upon the water, and most serious defect of all, they will be the same "jerky" rollers, rendering accurate shooting an impossibility.

How the Board, with Admiral Sampson's condemnation of the type in its hands, should still persist in the advocacy of monitors, pure and simple (for such the amended boats will be), is something past finding out.

If it is found that with the amount appropriated it is impossible to build four coast defense vessels, with fair speed and seaworthy qualities, the obvious course, having in mind the failure of the monitors in the war, is to draw up new plans and request a further appropriation to cover the increased cost.

It is sincerely to be hoped that the same farsightedness which led Secretary Long to urge the increase of speed in our latest battleships will cause him to push forward the matter of a further appropriation for the modification of our new coast defense vessels.

DEATH OF JOHN KEELY.

With the death of John W. Keely, one of the most curious delusions of the nineteenth century passes away. Over thirty years ago Keely announced that he had discovered a mysterious power of immense capabilities of industrial application, and ever since that time he has been more or less in the public eye. For a generation scientific men have laughed at the news of the wonders of Keely's discoveries, but Keely died before he had ever given a satisfactory demonstration that his ideas could be successfully adapted to commercial use. One part of Keely's invention was certainly practicable. He understood thoroughly the art of getting money upon schemes which would have turned the head of that early adventurer, John Law, in his Mississippi Schemes. The capitalization of the Keely Company was \$5,000,000, and, so far as his counsel knows, no statement has been left by Keely that discloses the secret of his motor, and the only legacy of the corporation may be the mechanical apparatus in the Keely workshop, minus the secret by which it might be operated.

In some respects Mr. Keely was a remarkable man. He was an expert in the theory and art of music, and he was not only an instrumentalist, but a composer as well, and was, by reason of his attainments in this line, enabled to find the primary element of his alleged discovery. This was supposed to be a relation or affinity between the forces of nature and harmonic forces. He said he discovered a sympathetic vibration connecting the waves of sound with the disturbance in molecules of matter, and also found in the process of this peculiar disturbance an energy unknown to the sphere of dynamics.

His first experiments were made with drops of water in a vacuum. The first mechanical property he developed from this series of experiments was the force of adhesive attraction, which he assumed, in his own statements, to be related to the polar currents of the earth. Next he alleged that he had developed the force of propulsion, revealing a positive as well as negative energy. Just as the chemical separation of the molecules of water produce electro-magnetism, he

adopted the theory that he could disintegrate molecules by the sympathetic vibration of tones producing a subtle and higher force correlated with magnetism. He made startling propositions relative to the rotation of planets, etc., and many other equally wild and chimeric ideas.

About twelve years ago he abandoned his experiments upon the molecules of water as the basis of his tests and directed his attention to the molecules of the air. He stated that he could produce a dynamic energy of 10,000 pounds to the inch in a Torricellian vacuum. He gave some experiments at the Sandy Hook Proving Grounds, in 1888, in the presence of a number of skeptics. Keely declared he could exhaust the air from a tube, getting a vacuum very nearly perfect, and could thus generate a force that could fire a gun or move tons of matter. Whatever the substance was that Keely carried in his steel tube, it was apparently inexhaustible, which militated against the idea that he used compressed air.

Keely devised an enormous number of mechanisms to aid in convincing skeptics that this mysterious atomic energy could be put to practical use. He died without effecting this purpose, and whether the mass of the manuscript which he left will be of any value or not, remains to be seen.

Keely surrounded himself with a halo of mystery and worked for a long time in the most absolute secrecy, making extravagant claims and promises as to the miracles which he would perform with his mechanism "inter-etheric liberator." Here is a specimen of one of the bulletins which regularly emanated from the laboratory. In 1875 he proposed, in about six months, to run a train of thirty cars from Philadelphia to New York, at the rate of a mile a minute, with one small engine. He said:

"I will draw the power all out of as much water as you can hold in the palm of your hand. A bucket of water contains enough of this vapor to produce a power sufficient to move the world out of its course. An ordinary steamship can be run so fast with it that it would be split in two."

Keely used to give astonishing exhibitions at his laboratory, which mystified everyone. The wand of the prestidigitateur and the slate of the medium were exchanged in his person for a couple of tuning forks and a violin bow. He struck his tuning forks and set a brass ball running at 600 revolutions a minute. He would rasp a violin bow over a tuning fork and the apparatus would raise a heavy weight, the power exercised, he said, being equal to a pressure of 25,000 pounds to the square inch.

Some of those present at the séances, which occurred in 1885, thought that they had witnessed miracles, others concluded that they had been humbugged. Some of the stockholders were not satisfied that they had not been duped, and, very naturally, they wanted the mysteries explained. Legal proceedings were instituted, and on November 17, 1888, Keely was committed to jail for contempt of court in refusing to obey an order to explain the workings of his machine to a committee of experts. He did not, however, remain in jail very long. To the very last he never failed to get financial support, which enabled him to live very comfortably and pay for all his experiments.

The SCIENTIFIC AMERICAN regularly took up the claims of Keely and exposed the fallacy of the principle upon which they were based.

CONDITIONS IN PORTO RICO.

United States Consul Hahna, at San Juan, Porto Rico, writes to the Department of State as follows:

"I am receiving hundreds of letters from all classes of people in the United States, asking about Porto Rico. Most of these persons say they intend coming to Porto Rico for work or to go into business, and they want to know all about the country. To go into detail and answer all these hundreds of letters would require the services of several clerks; but I have said to nearly all these inquirers that no American seeking work should come to Porto Rico. I have also said to business men in the United States that, in my opinion, they would be disappointed if they came here now to establish themselves; that the time had not yet arrived for an American to go into business in Porto Rico. I believe the time will come when this will be a good field for the investment of American capital, and when nearly all kinds of business conducted in an American style will be profitable; but that time will not come until the island has American government, until the laws of the United States are enforced and tariff changes made. Then, I believe, this island will take on new life; but our people who think of doing business in Porto Rico should be made to understand that the existing high duty on American products prohibits their shipping building material, machinery for factories or plantations, etc., or establishing any kind of business with profit. Most of our business men who have come here simply look the island over, pronounce it rich and possessing golden prospects for the future, but decide that it is too early to invest. The American press should inform our merchants and business men of the true situation."