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NEW YORK, SATURDAY, MAY 7, 1904.

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 reg lar space rates.

COMMEMORATION OF THE LOUISIANA PURCHASE.

The huge industrial exposition on the banks of the Mississippi, which has now opened its gates to the world, is a worthy commemoration of one of the most important steps in the development of the United States. In view of the vast extent of the country—over one million square miles—which was acquired from the French government; the splendid field which it opened for the restless energy of the young republic; and the unparalleled growth in prestige, population, and wealth that has followed, it was necessary that any national commemoration of the anniversary of the Louisiana purchase should be carried out upon a scale that was commensurate with its intrinsic importance, and with the splendid results to which we, the posterity of a hundred years later, are the fortunate heirs.

That the St. Louis Exposition will be worthy of the event which it commemorates is shown by the vast scale upon which it is laid out, the architectural magnificence of the individual buildings, and the well-considered and harmonious plan upon which they are grouped. If mere size is to be taken as a standard of merit, the St. Louis Exposition will surely justify its existence. In point of area it covers no less than 1,240 acres, which invites comparison with the 733 acres of the Chicago Exposition, the 336 acres required for the Paris Exposition, and the 300 acres of the Pan-American Exposition at Buffalo, all three of which do not much more than equal the area of the present Exposition grounds at St. Louis. So again, if we compare the total area that is actually roofed over by the various buildings, great and small, we find that while Chicago had 82 acres, Buffalo 15, and Omaha 9 acres under roof, the main exhibit buildings at St. Louis cover 128 acres. The total cost will reach the huge sum of $50,000,000, of which $15,000,000 has been contributed in equal parts by the United States government, by the city of St. Louis, and by private stockholders. This sum has been swelled by the appropriations of States and Territories, and of the various foreign governments, and by the expenditures by the various exhibitors and concessionaires. The response of foreign governments has been most liberal, Germany and France spending over $1,000,000 each, Brazil $600,000, while Great Britain, Mexico, China, and Japan each are spending over half a million dollars. The individual buildings themselves are on a scale commensurate with the exhibition itself. The Liberal Arts and the Mining and Metallurgy buildings each cover a space of 750 by 525 feet. The Government Building, conspicuous by its splendid burnished dome, covers 800 by 260 feet. The Palace of Manufactures and the Palace of Varied Industries each extend 525 feet in breadth by 1,200 feet in length. The Transportation Building, 559 feet in width, is over 1,300 feet in length; while to crown all in point of size, as is fitting, considering that the agricultural interests are the greatest of all interests in the United States, is the building devoted to agriculture, 500 feet in width and 1,600 feet in length.

The men who negotiated for the United States the purchase of the Louisiana territory have left abundant evidence of their farsightedness. They believed in the future growth of the young republic; though whether, in their most sanguine moments, they dreamed of such a growth in population and wealth as we witness to-day, is much to be doubted. In 1803, when the transfer was made, the population of the United States was about 5,500,000 souls, our western boundary was marked by the Mississippi River, and the center of population was about thirty miles northwest of Washington, D. C. In 1820 the population had grown to 9,638,453, and its center was at a point about 16 miles north of Woodstock, Va. The westward migration was so greatly stimulated by the opening of the Louisiana territory, that the center of population moved steadily westward, and by 1840 the 17,000,000 souls in the United States found their center at a point 16 miles south of Clarksburg in the present State of West Virginia. Twenty years later, in 1860, the population had almost doubled, having reached a total of 31,443,321, and its center was to be found at a point 20 miles south of Chillicothe, Ohio, at about the center of the southern boundary of that State. By 1880, the center had moved westward along the southern boundary of Ohio until it lay at the point where the States of Ohio, Indiana, and Kentucky meet, and the total population had grown to a little over 50,000,000 people. Twenty years later the Census of 1900 showed that our population had reached 75,568,686, with its center in the southern suburbs of the city of Columbus, Ohio, or about 240 miles from the city of St. Louis. Judging from the fact that in the last ten years, from 1890 to 1900, the westward progression of the center of population was only about half as much as in the ten years 1880-90, it is questionable whether the center will have moved to St. Louis or to any point on the Mississippi River, before the second centennial of the Louisiana purchase has been celebrated.

BATTLESHIP OR TORPEDO BOAT.

It was inevitable that the unbroken series of disasters to the Russian battleships should stimulate into renewed activity those people who believe that the battleship is a cumbersome and costly type of war vessel, that has outlived its usefulness. This was proved in a recent discussion in Congress, when several prominent members, one of whom at least is closely connected with naval affairs, seriously advocated the abandonment of all battleship construction. The argument adduced was the familiar fallacy that because a ship costing six or seven million dollars can be destroyed in a few minutes by the attack of an insignificant torpedo boat, or sunk by a mine, it would be better to build smaller ships and more of them. "Let us have done with 12-inch guns and foot-thick armor," said one; "give me the fast cruiser and the 8-inch gun, which is big enough to sink any ship afloat."

We are not going to reiterate the well-known arguments in favor of the big battleship. They are as well known to our readers, doubtless, as they are to the gentlemen in Congress, who just now seem to be seized with something of a panic because of the Russian disasters. What we do wish to state, is that while the torpedo boat and the submarine mine have given fresh demonstration of their deadly powers, nothing whatever has occurred to prove that the battleship has outlived its usefulness. The loss of these vessels must be viewed carefully in the full light of the circumstances under which it happened. On the night of the attack at Port Arthur, there is no question that the Russians were totally unprepared. An article published recently in one of our leading dailies, by a correspondent who was on board a passenger steamer that lay with the Russian fleet in the outer roadstead, makes it perfectly clear that an attack by the Japanese on that particular night was not even dreamed of.

The task of sinking these ships, judging from the description, was almost as simple as if the torpedo boats had steamed in among a fleet of anchored merchant vessels in time of peace. In saying this we do not detract one iota from the praise due to the Japanese for their alertness, dash, and skill. We simply wish to emphasize the fact that the torpedoing of the battleships "Czarevitch" and "Retvizan" and the cruiser "Pallada" proves nothing more, as regards the vulnerability of battleships, than that an 18-inch Whitehead torpedo with 200 pounds of guncotton in its nose will, if fired from close ranges of a few hundred yards, most surely disable, if not send to the bottom, any battleship afloat. This has been known for years, and the practical demonstration of the fact on that eventful night in Port Arthur has introduced into the problem of battleship construction not a single factor that was not well known before.

As to the sinking of the "Petropavlovsk," it is not denied that she was sunk by a submarine mine of some kind, and the probabilities are that it was one of several that were laid by the Japanese on the night previous to the disaster. A submarine mine may contain anywhere from 250 to 500 pounds of the most powerful high explosive. It was perfectly well known that contact with such a mine by anything that floats, battleship or what-not, meant almost certain destruction. The "Petropavlovsk" did not turn turtle because of any faults in her design, or any want of a proper margin of stability; she turned turtle because when a huge section of her bottom was blown in, the work of cutting her in two was completed by the blowing up of the magazines. It is little wonder that she went down; and it matters little whether she went down on an even keel, by the head, by the stern, or keel uppermost. It was not that the battleship was weak; but that the mine was strong. The true lesson of the loss of the Russian battleships is that these costly and most formidable engines of war are to be handled with a becoming sense of their inestimable value, and of the terrible gap that is left in the naval fighting strength of a nation if so much as one of them be lost. They are not designed for running in and out of harbors over fields that are mined both by friend and foe. They were never built as floating fortresses for harbor defense. Their place is in the open; they are preeminently deep-sea craft; they are designed to fight where sea room can be had, the perils of the mine do not exist, and the deadly torpedo boat can be fought under conditions that limit its powers. Had the splendid Russian fleet on the night of February 9 been concentrated, as it should have been, in the inner harbor of Port Arthur, it would not have had its wings clipped at the very opening of the war. It would have probably met and fought the Japanese fleet on the open sea, on thoroughly even terms, if not with a slight advantage in weight and numbers, and we have not a doubt that after the hard hammering of a bitterly-fought engagement in the open, the survivors would have proved to be the ships that carried the heaviest guns and the heaviest armor.

The torpedo and the mine, however, have undoubtedly added in this war to their prestige, even among those naval experts who are able to estimate the dramatic incidents of the war at their full value. The most astonishing thing is the comparative immunity with which the torpedo boats seem to have run in under the fire of the forts, whether to attack with the torpedo, or to escort loaded merchant ships for blocking the harbor. What naval men are hoping for is that there may yet be a fleet engagement in which the battleship will be given an opportunity to demonstrate its powers of attack and defense.

SOME INTERESTING FACTS ABOUT THE DEVELOPMENT OF THE EDISON STORAGE BATTERY.

In a lecture delivered before the New York Electrical Society on April 27, Mr. R. A. Fliess, the superintendent of the testing department of the Edison Storage Battery Company, traced the development of the new nickel-iron storage cell from its beginnings up to its present form, in which it is being manufactured. A number of interesting lantern slides were exhibited, showing the cell and the way it was tested in the Edison laboratory, as well as numerous discharge curves taken from the different cells under widely varying conditions. Some half dozen cells on the lecture room table showed the different steps in the development of the present type.

Mr. Edison's first experiments were made with small single briquettes of active material suspended in caustic potash electrolyte in round glass jars. By surrounding a briquette of nickel with a number of briquettes of iron and discharging it, Mr. Edison found he could obtain 1-5 of an ampere hour of current per gramme of nickel, and by reversing the process, 0.23 ampere hour per gramme of iron. These results were arrived at early in 1901 after much experimenting; and the best part of a year, during which some 10,000 tests were made, was spent in refining and improving these active materials in order to increase their capacity. Finally, in the fall of 1901, ½ an ampere hour per gramme of nickel and 0.57 ampere hour per gramme of iron were obtained, whereupon Mr. Edison set to work to build a commercial cell.

The active materials were prepared in sufficient quantity to make up a set of automobile cells, but when the first one was completed and tested, it was found that mixing the active material in bulk and in commercial quantities was quite a different matter from making a little for laboratory purposes, and that consequently the capacity of the first lot of cells was somewhat reduced.

The first machine-made cell was completed in January, 1902. This cell had 9 iron and 9 nickel plates, although the first hand-made cell had twice as many iron as nickel. Twenty of these cells were made and were tested on the road in a Baker runabout, which was first sent out equipped with the new battery on April 3, 1902. These cells, which were of the "C" type, were tested thoroughly after they had driven the runabout 2,488 miles, and, on the test discharge, they gave about 18 per cent in increased capacity. This increase, however, was due to numerous overchargings which they had received when in service, and, on receiving a normal charge afterward, they resumed their normal capacity. This appears to be a good feature of the Edison cell, viz., that if extra capacity is needed, about one-third more can be got out of it if it is given an extra long charge first. Yet this heavy overcharging does not appear to hurt the plates. The "C" type cell was, however, affected by the rates of discharge to a considerable extent. It lost 37 per cent in watt-hour capacity when discharged at five times the normal rate, as against 50 per cent loss by the lead cell at the same rate. This defect Mr. Edison set out to remedy. Another difficulty which was met with at the start was that if hard rubber was used in the cell for separation and insulation purposes, it caused the caustic potash to foam. Rubber had to be abandoned, therefore, for a time, and glass used instead. Flat, enameled, iron clamps were devised for holding the plates together and against the glass rods which were placed between them, while different arrangements of glass tubes on steel plates had to be