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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.

## SUPERPOSED TURRETS FOR OUR LATEST BATTLESHIPS.

It might seem to any outsider who closely followed the action from time to time of the Naval Board on Construction in the matter of the designs for our latest battleships, that it was very far from knowing its own mind; so frequently has it decided on certain plans only to modify them in favor of others totally different. We refer now to the seven latest battleships whose construction has been authorized by Congress. The first three of these, the "Georgia," "Pennsylvania" and "New Jersey," were at first designed to carry their battery of 8-inch guns on the quadrilateral plan which is seen in the ships of the "Oregon" class. Shortly after this action of the Board, Congress sanctioned the construction of two battleships, the "Virginia" and "Rhode Island," and the Board, having in mind the satisfactory performance of the superposed turrets in the "Kearsarge," endeavored to secure unanimity of action in favor of using the superposed turret on these two vessels, and also on the three ships of the "Georgia" class. After a long discussion, in which neither side would give way, a compromise was effected by which it was decided that the "Georgia" class should carry the superposed turret, and that the "Virginia" and "Rhode Island" should be constructed with their 8-inch batteries arranged on the "Oregon" plan. Meanwhile the "Kentucky," another superposed turret battleship, had been tested, and the results so strongly confirmed the high opinion of this type of construction in the navy, that the Naval Board on Construction has thrashed out the question once more, with the result that a majority of the members are in favor of making the two ships authorized this year, and also the "Virginia" and "Rhode Island," conform to the general plan of the three ships of the "Georgia" class.

"'Tis a consummation devoutly to be wished;" for if this be done, the United States, in a few years' time, will possess a perfectly homogeneous fleet of seven battleships of the largest displacement and carrying the most powerful batteries of any ships in the world. No other navy would possess a fleet of seven identical vessels that would compare with it in fighting power. Judged from the point of view of the naval tactician, it is scarcely possible to overestimate the value of such a fleet in determining the issues of a great naval war.

## AN ALUMINIUM TRANSMISSION LINE.

The Niagara Falls Power Company has about completed its second power transmission line between Niagara Falls and Buffalo. The new line parallels the old line as far as Tonawanda, where it diverges and runs over a new right-of-way to Buffalo. It possesses special interest because of the fact that the new cables are made of aluminium. The three-phase current is transmitted by three cables, each composed of thirty-seven strands. The old line consists of six copper cables, each of which has nineteen strands. One advantage gained in the use of aluminium is that the cables being so much lighter, the span between poles, which in the old line is about 75 feet, averages 112½ feet in the new line. On the completion of the aluminium line, the voltage of the current that is transmitted will be raised from 11,000 to 22,000 volts. When the line was first built, the electrical plant was designed with a view to this doubling of the voltage whenever the time was ripe to carry it out and hence no material changes will be necessary.

## A POINT IN BOILER CONSTRUCTION.

A recent issue of our contemporary, The Locomotive, contains some practical advice as to the fitting of the tubes of water-tube boilers. After explaining the na-

ture of the forces tending to draw the tubes from the drum, tube-plate, etc., the writer states that he has found in his experiments that tubes set in plates thinner than those customarily used in water-tube boilers, and merely expanded without being flared or beaded, do not begin to draw out until the pull is from 5,000 to 7,000 pounds. After making allowances for the greater thickness of the usual headers or tube-sheets of water-tube boilers, Mr. Allen concludes that the factor of safety, so far as the pulling out of the expanded tube is concerned, is from 5 to 7. This is assuming that there is no stress thrown on the tube beyond that which is due to the direct pressure of the steam. While this all-important condition is probably very nearly fulfilled in the case of long tubes, it is not usually fulfilled for the nipples which are frequently used for connecting the different parts of the boiler. Moreover, we can reckon on this factor of 5 to 7 only when the material and workmanship are of the best. The tubes must be of proper thickness and the rolling must be carefully and well done.

Another important condition is that the design and construction must be such that the stresses are properly distributed among the tubes that enter any particular sheet or drum, each tube carrying its own proper share of the load. Unequal distribution of load will occur when the tubes are expanded into a flat, unstayed sheet, which forms one side of a box or drum. In this case the pressure tends to bulge the tube sheet, with the result that there is an extra stress upon the outside tubes tending to draw them. This should be guarded against by arranging a sufficient number of staybolts to keep the tube-plate perfectly flat.

## VIBRATION FROM UNDERGROUND TRAINS.

The new underground railway in London has already embarked on a sea of litigation, which promises to be very tempestuous. Householdiers whose property is located above the route of the tunnel are complaining of the excessive vibration which is set up by passing trains. Judging from dispatches from the other side, the trouble is a serious one for the railway company, as the rights of property holders are very securely guarded by English law. The matter has raised a fear in some quarters that the same trouble will be experienced with our own Rapid Transit Subway, although we think the fears are probably unfounded. The vibration from the London trains is due to the extreme weight of the electric locomotives which are used to haul the trains. These weigh something over forty tons each, and the great concentration of load on the drivers might easily produce excessive vibration, especially if the rail joints are poorly designed or constructed. The trains of the New York Subway will probably be operated by motors carried on the axles of the two end cars, as in the new electrical train of the Manhattan Elevated Railways, or else each car will carry its own motors and form an independent unit. In either case there will be no such great concentration of weight as occurs in the London Central Railway. At the same time, it will be well for the engineers of the subway to give special attention to this question of vibration, and make some full-sized tests to determine what system of roadbed will provide the smoothest and most silent track.

## THE ANNUAL REPORT OF THE COMMISSIONER OF PATENTS.

A perusal of the Annual Report of the Commissioner of Patents shows that the affairs of the Patent Office are in a thoroughly satisfactory condition, and that its business is steadily increasing, the total number of patents and reissues being the greatest in the history of this institution. In the year 1900 there were received 39,673 applications for patents, 2,225 applications for designs, 82 applications for reissues, 2,099 for registration of trade-marks, 943 for labels and 127 for prints. Including designs, there were 26,418 patents granted, 81 patents were reissued, 1,721 trade-marks registered, besides 727 labels and 93 prints. The total expenditure for the year was \$1,260,019.62; the receipts exceeded the expenditure by \$90,808.91. The total balance to the credit of the Patent Office in the Treasury on the first day of this year was \$5,177,458.55. The number of patents issued in proportion to the number of citizens was greatest in the case of the District of Columbia, in which one patent was issued to every 1,110 inhabitants. Then followed Connecticut, Massachusetts, Rhode Island, New Jersey and New York, the ratio in the last-named State being 1 to every 1,918. The State to which the least number of patents was granted in proportion to its inhabitants is South Carolina, in which only one out of every 28,517 inhabitants received a patent. With regard to foreign patentees the greatest number or patents was granted to Great Britain, which received 1,088; then came Germany with 1,070. Canada 367, France 341, Austria-Hungary 117 and Switzerland 79, the total

number of foreign patents granted being 3,483. The first patent to be granted by the United States Patent Office under the present series number of letters bore date July 28, 1836, and in that year a total of 109 patents was issued. In 1840 the number of patents and reissues was 473; in 1850, 993; in 1860, 4,819; in 1870, 13,321; in 1880, 13,947; and in 1890, 26,292. There was a decline in the number of issues during the decade until it fell to 20,867 in 1894. From that time on there was an increase in the total number until it reached the figure, in 1900, of 26,499. The largest surplus of any year was in 1883, when it amounted to \$471,005. The smallest surplus since 1861 occurred in 1898, when it amounted to only \$1,538. In 1899 it was \$113,673, and in 1900 it was \$90,808. It is interesting to know that the total number of patents issued by foreign countries up to the close of the nineteenth century was 1,328,309, while the total number of patents issued during the same period by the United States was 674,944, making a grand total of 2,003,253 patents issued in the whole world.

We are glad to learn from the report before us that the examining work of the office has been kept well in hand in the year 1900. On December 31, 1900, 4,982 applications were awaiting action, as compared with 5,392 on December 26 of the previous year. Again on December 26, 1899, thirty-three divisions were examining applications filed within one month, and three divisions those filed within two months; while on December 31, 1900, thirty-five divisions were examining applications filed within one month and one division those filed within five weeks. At both dates substantially all of the divisions were taking up amended cases for action within fifteen days after the amendments were filed. Although during the past six months some of the space in the Patent Office building vacated by the General Land Office has come into the possession of the clerical staff, sufficient room for the necessary work of the office is not yet available. We heartily agree with the statement of the Commissioner that the only solution of the problem lies in the construction of a fireproof building, the whole of it to be used for the accommodation of the Patent Office.

The latter half of the report contains an exhaustive and valuable account of the American Patent Office as such. It reviews the historical and economical phases of the extraordinary growth of the American system. This portion of the report, which is too long to be reproduced in these columns, will be found in full in the current issue of the SUPPLEMENT.

## ENGLAND'S LONG-DEFERRED DECADENCE?

While recently reading some of the famous "Letters of Junius" the Editor came across the following sentence in a letter bearing date December 19, 1767, in which the writer bewails the impending wreck of England's commerce: "The taxes and duties necessarily laid upon trade in order to pay the interest of a debt of one hundred and thirty millions are so heavy that our manufactures no longer find a vent in foreign countries. We are undersold and beaten out of the branches of trade of which we had once an almost exclusive possession. The progress toward a total loss of our whole foreign trade has been rapid; the consequence of it must be fatal." There is something very familiar in the foregoing, and one asks himself whether, a hundred years from now, the columns of the daily press, which are just now so eloquently reiterating these predictions of Junius, will provoke again the involuntary smile which is called forth by the above quotation. Apropos of Great Britain's decadence, there is a most thoughtful and statesmanlike article in the present number of The Fortnightly Review, whose title, "Will England Last the Century?" would be more characteristic if it read "Will England's Predominance Last the Century?" The author, who signs himself "Calchas," evidently believes that she will last the century, though not in her present commanding position. Although it is not distinctly so stated, the author is evidently of the opinion that the struggle of the century will be a scientific, industrial and commercial one. Starting out with the assumption that the decadence of France is inevitable, attention is turned to three countries which are as certainly upon the ascent, namely, the United States, Germany and Russia. Leaving out the third, whose full development cannot be reached in one century, if, indeed, in two, it is asked, as compared with the assured progressiveness of these three expansive powers and the settled decline of France, at what point between decided decadence and spontaneous development does England stand? The British are judged to be a nation in jeopardy, but not in decadence. The efficiency of the nation has been vitiated by the sense of ease that has followed an unexampled prosperity; but in the opinion of the author the drowsiness will disappear when the comfortable cause is gone, and the pressure of American and German competition becomes more constant and pinching. The exact want of the nation is deeper and more scientific cultivation. The