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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. Householders 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

material is not exhausted and it exists to be developed; since there is a stronger smack of the vigorous barbarian than any suggestion of morbid exhaustion in the English character. "Calchas" yearns for a German Kaiser, believing that British politics do as much to paralyze national enthusiasm and to confuse rational effort as the Kaiser does to stimulate the ideas and concentrate the action of his people; indeed, the writer is of the opinion that if the British nation could be taken in hand for ten years by a benevolent despot, with a genius for constructive statesmanship, no nation would prove a more profitable subject.

To any one who is acquainted with the habits of the English people of all ranks, it will be agreed that the author speaks with a true judgment of the situation when he says that the weakness of the British, as compared with their two greatest competitors, is the difference in the view which is taken of the relation between pleasure and work. The German, with his thorough, intellectual interest in his own line takes more pleasure in work than in play. The American goes with irresistible vigor into both work and play, while the average Briton thinks far too much of sport while at his job. The situation is admirably summed up in the statement that to the nation which is supreme in the scientific spirit will supremacy in the twentieth century belong, and if England is to remain an international ignoramus, and to be dependent more and more upon America and Germany for her electricians and chemists, and for all the newest appliances in her oldest trades, the wavering balance in which the future of the country hangs must drop downward. It is considered that America cannot be prevented in any case from attaining, at some period during the twentieth century, the industrial leadership of the world, and that the real task of Great Britain and her best chance of success, if she is thoroughly awakened in time, will be in the struggle with Germany for the second place.

The writer finds considerable satisfaction as regards the future in the fact that the immense lead which Great Britain at present possesses, which is considered to be in itself a solid and enormous asset, if rightly understood and utilized, should enable that country to fight a formidable defensive struggle in the endeavor to make the inevitable encroachments more gradual than the Pan-German mind imagines, and to hold its own for all sufficient periods of power and prosperity until the reconsideration of the British outlook a hundred years hence. It is pointed out that the total volume of British exports and imports is still half as much again as that of Germany, and twice that of the United States; and the reader is reminded that it takes time for the swiftest pursuer to reduce a long lead.

#### THE UNSCIENTIFIC CHARACTER OF CHINESE PLAY.

BY ISAAC TAYLOR HEADLAND.

Little has been written thus far on Chinese play, and what has been written has been for the most part a mere reference to children's games in the treatment of other, perhaps more important, subjects.

The games of all peoples may be divided into two general classes. First, those which arise from a natural disposition or need for exercise or entertainment, which need may be either mental or physical, and is the same among all peoples. Second, those which are the product of inventive genius for the purpose of a more scientific mental or physical development of the race. Up to the beginning of the nineteenth century there were few complicated games invented in Europe, and none in Asia, cricket dating from about the beginning of the eighteenth, and baseball from the middle of the nineteenth, century.

All Chinese games, unless we except chess—and I think we need not except even that—are to be classed in the category of natural productions. These spring from various instincts, such as the parental or protective instinct which is inherent in every boy and girl. For its development every people have dolls prepared for their girls and games for both girls and boys. One of the most interesting Chinese games of this kind is

##### THE HAWK CATCHING THE YOUNG CHICKENS.

The children stand one behind the other, having their largest and most kindly disposed boy or girl in front, who protects them from the hawk. The hawk comes to snatch away the chickens, but the line of small chicks swing around from side to side, while the old hen spreads her wings and keeps between her brood and the hawk.

Another instinct is curiosity—or hunting and catching—a disposition which, in the child, originates all kinds of blindfold games, and is not very different from that which induces the anatomist to dissect a body, the botanist a flower, or the cat to put her paw in a mouse-hole.

Closely akin to this is the guessing instinct, which, in China as elsewhere, has originated a large number of games, many of which are similar to those played in Europe and America, though, so far as can be deter-

mined, there is no trace of either having borrowed from the other. One of these games is

##### POINTING AT THE MOON OR STARS.

The children form themselves into a ring, with one of their number blindfolded in the center. As the ring moves around they sing:

I point at the moon or stars as they pass.  
It may be a laddie, it may be a lass;  
But, whether a laddie or lass that I sing,  
His duty is clear—to come into the ring.

The ring stops and the boy points. If his finger should be directed toward the vacant space between two boys, the ring moves again, but if directed toward a boy, he takes the place of the one blindfolded.

Other instincts are those of striking, pounding, kicking, hopping, bumping, and the games which illustrate them are both as numerous and as interesting as those which are played by our own children; while other instincts, such as that of exclusion, are represented by games corresponding to our tit, tat, toe, or e-ne-me-mi-ne-mo.

There are certain parts and conditions of the human body which are peculiarly adapted to being played with or to call forth games. These are the fingers, and all the various positions in which they may be placed; the toes, the five senses, and the tickling of the neck and the knee, and so we have various games corresponding to our "Little Pig went to market," "Knock at the door," "This is the church and this is the steeple," etc.

Every boy has a desire to excel, whether it be in the matter of quickness of reaction, activity, exertion, strength or ingenuity. And so, in China, as elsewhere, we have games which contribute to all these compound or complex mental and physical qualities. They pitch cash very much as we pitch quoits. Two boys hook their fingers together and pull until they break apart, after which they both exclaim "Honor!" The one who says it first is entitled to an obeisance on the part of the other as a penalty for being too slow. In the matter of the development of physical strength they have games in which there are all the elements of danger to be found in our baseball; these are the pitching of the stone lock, the use of the great stone dumbbells, and the man-wheel, which require the exercise of all the muscle the boys possess, and contribute to its development as well as our own games.

Closely allied to their games, and based on the same natural instincts and principles, are contortions and acrobatic performances. For this purpose the Chinese invoke the friendly aid of a tree limb, or, in the absence of a tree, two boys hold a carrying pole on their shoulders, and a third goes through all the contortions natural to boy life—"skinning the cat," hanging by his heels, toes, legs, arms or hands. He learns to bend over backward, picking up a handkerchief with his teeth, and two boys double up together in such a way as to make a cart-wheel and roll about the court.

All these games, it will be seen, are simply outgrowths of natural dispositions and needs. None of them represent anything like the inventions of our own complicated sports. Indeed, while the games played by Chinese children are in many cases very interesting, in few cases are they complex. They have nothing which corresponds to our complicated inventions, such as cricket, football, baseball, croquet, golf and a hundred others, which, by the way, are the result of the most modern inventive genius, and were not known or but little played in the time of our grandfathers. They are of the age of electricity, steam, photography, stenography and a thousand other kinds of scientific progress not known a hundred years ago—the distinguishing characteristic of the nineteenth century, the greatest of all centuries in the matter of scientific invention.

One of these games, played by boys from eight to eighteen, contains a moral element I have never seen in the games of any other people. It is what they call

##### KICKING THE MARBLE.

They have two marbles an inch or more in diameter, one of which they put upon the ground and shove with the foot. Then the other is put down, and one boy tells the other to put it north (south, east or west) of the first. If he shoves it so as to hit the other and still go in the position indicated, he wins double and is entitled to two kicks. If he simply goes in the position indicated, he wins and is entitled to one kick. When he is through, he tries to leave the two balls in such position that they will be difficult to kick. If, however, he makes the position too difficult, the other says, "I will not kick; you may kick," and he is thus compelled to play his own difficult game—or, like Haman, hang on his own gallows. The game is one well worthy of the Chinese, and one of the most widely popular games of any played in the north.

These games, like everything else Chinese, are a further proof of the practical nature of the Chinese and their almost complete lack of the inventive faculty. The reason for this could easily be shown by a

short review of their methods of education, which contribute to the development of memory to the exclusion of reason, imagination and invention.

#### SCIENCE NOTES.

Greenwich time has been adopted officially by Spain, and the hours are numbered from one to twenty-four as in Italy.

Constantinople was visited with a severe snowstorm on January 16. The tramways were stopped and traffic on the railways was interfered with.

In Winona, Minn., there have been nine hundred cases of smallpox, and some of the surrounding cities have established a quarantine against the infected city.

The official report of the financial department of the Paris Exposition shows a loss of only \$400,000. The expenditures amounted to \$23,300,000, and the receipts amounted to \$22,900,000.

It is estimated that the amount of money that was disbursed on January 3, 1901, in interest and dividends amounted to not less than \$175,000,000. About half this amount goes to savings bank depositors.

The brother of Andree, the missing aeronaut, despairing of his brother's return from the Arctic regions, has finally opened his will. The tenor of it shows that the explorer hardly expected to return.

A movement is on foot to mark the place of Commodore Perry's landing at Yokohama, Japan, with a suitable memorial. It is probable that it will take the form of a lighthouse on the dangerous Plymouth Rocks at the entrance to Uraga Bay, the beacon to be surmounted by a bronze figure of the commodore.

The year 1900 was an excellent year for fruit in Switzerland, and a manufacturing firm in the canton of Aargau decided to erect a plant for utilizing the apple crop. Machinery was put in for peeling, coring and slicing apples. The baking was accomplished by placing the slices on trays which were something like gridirons, one being placed over another in the ovens. An electric motor was used to warm the air for the baking.

Rare Egyptian papyri are to be distributed among American universities and museums. Antiquities collected by the Egyptian Exploration Fund are distributed among American institutions pro rata according to their subscriptions. Columbia University, Vassar College, Hamilton College, Yale University and the Metropolitan Museum of Art will receive papyri. They are all numbered and described and are sometimes given in facsimile in the volumes issued by the Fund.

The special agent of the United States Department of Agriculture in charge of the Experiment Station at Sitka, Alaska, reports that there is not the slightest doubt that grain can be matured almost anywhere in Alaska. He obtained samples of perfectly ripe barley, oats, wheat and rye from several points in the interior, even far north. These grains were grown and matured during 1900. With one exception they grew from seed accidentally scattered and grown wild. If the grain will grow and mature without culture, it is reasonable to suppose that it will grow and improve if properly planted. Flax was also grown at Sitka. It attained a height of more than three feet. Matured seed are produced, and a fiber of excellent quality. There is no doubt that flax would be an excellent crop to raise.

The British Museum has recently come into possession of a mummy which is generally believed by the experts, who have been privileged to examine it, to be the most ancient yet discovered. This addition is of unique value, in view of the fact that it conveys a more comprehensive idea of the origin of the ancient Egyptians than has ever yet been obtained from similar relics. Upon this point there has always been a wide divergence of opinion among archaeologists. The mummy was taken from a neolithic grave. It is the body of a man about 5 feet 9 inches in height. Upon the scalp is a remaining lock of hair which suggests that it was originally of a fair color. The hands and feet are small, and from the intellectual formation of his head it is conceded that he must have belonged to a superior race. The result of Egyptological investigations declares that the mummy is that of an aborigine of Egypt, which was conquered by an Asiatic invasion about 3000 B. C., and which afterward intermingled with the conquering race, thus constituting the foundation of the race known as Egyptians. The grave from which the body was taken out was an oval cavity in a sandstone rock, and covered with a number of large slabs of stone. Ranged round the body were the usual flints and earthenware pottery. It was found impossible to remove the grave of the body together with the mummy, so an exact replica of the tomb was made, and the body now reposes in a case in the Egyptian gallery of the museum in exactly the same position in which it was found.