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NEW YORK, SATURDAY, MAY 28, 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 regular space rates.

INCREASING RAILROAD FATALITIES.

The latest accident report of the Interstate Commerce Commission opens with a statement of the number of killed and wounded on the railroads of the United States during the last quarter of 1903, which, in its bald and succinct enumeration of losses, reads not unlike a statement of killed and wounded sent from one of the battlefields of the Far East. There is one striking point of difference, however, and that is that the casualties, although the record covers only three months, far exceed in magnitude the total number of killed and wounded since the opening of the Russo-Japanese war. We give the opening sentence of the report in the exact words in which it describes what is at once a supreme national tragedy and an abiding national disgrace: "The number of persons killed in train accidents during the months of October, November, and December, 1903, as shown in reports made by the railroad companies to the Interstate Commerce Commission, under the 'Accident Law' of March 3, 1901, was 446, and of injured, 3,178. Accidents of other kinds, including those sustained by employes while at work, and by passengers in getting on and off the cars, etc., bring the total number of casualties up to 14,485, or 1,166 killed and 13,319 injured."

We have not the figures for the total number killed and wounded thus far in the eastern war; but we think it is pretty safe to say that the grand total will fall considerably short of 14,485; and, mark you, these statistics cover but ninety days, which is about three weeks' less time than the present duration of the war.

This record for the last quarter of 1903 has certain features which render it distressingly memorable. It includes the worst passenger train accident, judged by the number of fatalities, that has occurred in this country for fifteen years, and it records also six terrible accidents which caused among them 106 deaths and 196 injuries, in consequence of which the present Bulletin contains the greatest number of fatalities of any published since the Interstate Commerce Commission began to gather these statistics. Indeed, the number killed in this three months is more than three times the average number killed during the nine preceding quarters. Only four other train accidents have occurred in this country which have caused as many deaths as that which took place last year in Pennsylvania, when 65 people were killed. One of these occurred in 1888 at Mud Run, Pa., when 66 people lost their lives; another was the disaster at Chatsworth, Ill., in 1887, when 85 were killed; then in 1876, there were 80 deaths by the collapse of a bridge at Ashtabula, Ohio; the other accident exceeding the recent disaster in the number of killed was that at Camp Hill, Pa., in 1856, when there were 66 fatalities. Although the large increase in fatalities during the period now under review was caused by a few extremely disastrous accidents, the huge total for the quarter of nearly 15,000 casualties represents an enormous number of collisions and derailments, 1,832 of the former and 1,179 of the latter, making a total of 3,011 accidents in a single quarter of the year.

The report gives some details regarding the most fatal of the accidents, and the quarter in which the blame is to be placed. From this it appears that the derailment that occurred on the Pennsylvania Railroad, with 65 fatalities, happened to a passenger train which, when running at 45 miles an hour, struck some heavy timbers which had broken loose from a lumber car and were projecting over the adjoining track. The cause of the accident is reported as "carelessness on the part of employes of the lumber yard in not selecting stakes of good quality and size to make the load secure, and failure of the car inspectors to detect this defect." Another collision, resulting in the death of 32 passengers, was blamed to "negligence on the part of the men in charge of both the trains involved." The foremost train, which was behind time, was stand-

ing in the station, and an express was due. The rear flagman waited until he had assisted the passengers to alight before he went back to give warning, and then had only gone back 200 feet before the express was upon him. The engineer of the express could have seen the local train's red lights on the last car at a point 2,800 feet to the rear. Another collision, in which 18 were killed, was due to the fact that, in a heavy storm of wind and snow, a signal light had been extinguished. Here the blame was on the engineer of the colliding train for not coming to a stop to learn why the light was not burning. In two other collisions involving the loss respectively of 17 and 16 people, the first was caused by failure of the brakeman to flag the following train, and the other by the conductor and engineer of a passenger train disregarding the rule to run through a yard with speed under control, with the result that the train collided with a switching engine. And so the record runs, the collisions being due almost invariably to neglect or carelessness on the part of the employes. This would seem to indicate that the fault is to be charged to the human element more than to the materials of modern railroading. Or in other words, if we would seek for the explanation of the enormous excess of accidents in this country over those of European systems, we must look for the explanation more in the temperament of the people than in the character of the roadbed, rolling stock, and regulations.

THE JAPANESE DISASTER AT PORT ARTHUR.

The destruction of a 15,000-ton battleship is an irreparable loss, no matter how rich and powerful be the nation that suffers. Not merely does it mean the absolute loss of property valued at from six to seven million dollars, but it leaves a gap in the defenses of the nation which, for the time being, and indeed for many years to come, must remain unclosed. Particularly is this true of that gallant little fleet of half a dozen battleships to which the initial successes of the Japanese forces are due, and without which not a man or a gun could have been landed upon the Asiatic main. We say this advisedly; and we commend the statement to the serious consideration of that happily limited section of Congress, which would have us believe that the day of the battleship has passed, and the era of the torpedo boat and fast cruiser has opened. A fleet without battleships would be in the position of an army without a base; particularly where the operations are of an aggressive character, and carried out hundreds of miles from a friendly port or dockyard.

When the war opened, Russia, with her fleet of seven battleships, and a numerous complement of armored and protected cruisers and destroyers, backed by the seemingly impregnable naval bases of Port Arthur and Vladivostok—to say nothing of the formidable fleet that was nearing completion in European waters—seemed to hold a practically secure position. The hope of Japan lay in its fleet of six battleships. With remarkable audacity and skill she planted this squadron in front of Port Arthur, where it formed a floating base for the operation of cruisers and torpedo boats, which latter, by a swift dash at the opening of the war, so far crippled the enemy as to give Japan the command of the sea. One immediate result of the Russian reverses was the determination to dispatch the Baltic squadron for the relief of Port Arthur; and from the moment that this was determined upon, it became doubly imperative upon the Japanese admirals to maintain the blockade of Port Arthur and hold the whole Russian fleet with the least possible amount of risk to their battleship squadron, already too small for the gigantic tasks that confronted it during the coming months, and possibly years, of the war. It has been a matter of surprise that Admiral Togo should have conducted his victorious operations with so little loss in ships and men; particularly in view of the fact that Port Arthur is known to contain a numerous torpedo-boat fleet, and that the mining of the waters has been carried out with a recklessness that promised to be as dangerous to friend as to foe. At last the inevitable has happened, and one of the finest of Togo's battleships, the "Hatsuse," has been sunk by one or more of the floating mines with which the waters of the Liao-tung peninsula are strewn. So suddenly did this great ship go down that only 300 out of her crew of 750 were saved. On the same day and within a few hours of this disaster the Japanese cruiser "Kasuga," in a deep fog off Port Arthur, rammed the cruiser "Yoshino," the latter sinking so rapidly that only 90 out of her crew of 300 men were saved. The loss of the cruiser is unfortunate, but it is insignificant compared with the loss of such a magnificent ship as the "Hatsuse," which shared with the "Mikasa" the distinction of being one of the largest battleships afloat in any navy.

The "Yoshino" was a protected cruiser of 4,150 tons displacement and 15,000 horse-power, built in England in 1892. Her speed was 23 knots, and she mounted four 6-inch guns, eight 4.7-inch guns, and twenty-two 3-pounders. Her armored deck was 4½ inches thick, and she carried five torpedo tubes.

The "Hatsuse," built at Elswick in 1899, carried four 12-inch, fourteen 6-inch, and twenty 3-inch guns, and was fitted with four submerged torpedo tubes. She was protected by a belt of Harvey nickel-steel, 9 inches thick amidships and 4 inches at the ends, and her deck was 4 inches thick on the slopes. Her 12-inch guns were protected by 14 inches of armor on the barbettes and 10 inches on the hoods. The battery of 6 inch guns was carried in casemates protected by 6 inches of armor. She was practically a sister ship to the "Shikishima." With a maximum supply of 1,500 tons of coal and a trial speed of over 19 knots, the "Hatsuse" was about as fine a sample of modern battleship construction as could be found.

The effect of this double loss will be to revive the spirits of the Port Arthur garrison and fleet, and instill new life into the project of sending the European fleet to the Far East. This, if the Black Sea ships be included, may easily consist of eight first-class battleships, and these with the three that are supposed to be still intact at Port Arthur, would give a preponderance, supposing Port Arthur can hold out for another few months, that must be giving the Japanese government most anxious concern.

RUSSIAN NAVAL GUNS.

BY FRED T. JANE.

Russian guns—the more modern ones, at any rate, which are practically Schneider-Canets—have, like the Belleville boiler and several other products of French genius, the reputation of being "very complicated." This is the verdict usually passed upon them by those whose technical acquaintance with artillery is confined to other types. Like the Belleville, their "complications" upon closer acquaintance turn out to be the result of practical experience, and they are complicated only because novel. Actually, Russian guns are simple enough to work, and the only thing about them puzzling to those of other nationalities is the duplication of safety devices specially provided for sailors whose general average of intelligence is below that of the men of most other nations. In this thing alone do the newer Obuchoff models differ from the French Schneider-Canet pieces on which they are modeled.

The result is some slowing of fire, because before the gun can be discharged, at least two, and occasionally three, safety devices have to be loosed. This is essentially a drawback, regarding the guns as guns, but by no means so when the Russian bluejacket is taken into account. One man is usually detailed to release these safety devices; if he fails, the gun cannot be fired, as there is no contact. All chance of firing with the breech improperly closed is, therefore, avoided by human instead of automatic mechanism. As a Russian sailor is normally liable to be somewhat erratic, there is no question of the advantages secured.

The standard guns in the Russian fleet are as follows:

The 12-inch of 40 calibers; weight, 59 tons; muzzle velocity, 2,500 foot-seconds; muzzle energy, 32,000 foot-tons. This piece has a nominal penetration of 15½ inches Krupp cemented at 3,000 yards with capped A. P. shell, the same as that of the United States Mark III, 10-inch, built for the "Washington" class. It is mounted in the "Retvizan" and "Czarevitch." For the "Borodino" class, a 64-ton 12-inch has been designed, but it is doubtful whether it exists as yet. It has the same velocity (service), but fires a 1,200-pound projectile instead of a 732-pound one, and it has a correspondingly increased energy. The nominal velocity is 3,000 foot-seconds.

The "Poltava" class, the "Sissoi Veliky," and all other battleships carrying 12-inch guns, down to and including the "Sinope," carry a 35-caliber, 12-inch gun. Its weight is 56 tons, its initial velocity 1,942 foot-seconds (service), energy 19,200 foot-tons, shell 732 pounds. It is, of course, an old-type gun. Its penetration is for a 12-inch gun very small. The velocity is poor, and the piece is considerably inferior to the Japanese 12-inch gun. The rate of fire of this piece is slow.

A more powerful piece and a better gun is the 10-inch of 45 calibers, carried by the "Peresviet" class and the "Apraksin" and "Rostislav." Its ballistics are inferior to those of the United States 10-inch Mark III, but it is superior to the "Iowa's" gun, being able to penetrate 13-inch Krupp armor at 3,000 yards. As a gun, it is the finest heavy piece in the Russian service, and its rate of fire and accuracy are both good. It was seriously contemplated a few years since to have this piece only, its results being so superior to those of the 12-inch 35-caliber gun. It weighs 38 tons, and has a velocity of 2,500 foot-seconds at the muzzle. It keeps up the velocity well; but the exact weight of the projectile is not known. It is somewhere about 500 pounds. Velocities of, or over, 3,000 foot-seconds have been accredited to it; but these are merely trial results. Its defect is that the penetration is poor at long ranges, where the velocity drops, and the relatively light projectile tells against it.

The "Gromoboi" and "Bayan" carry a 45-caliber rapid-fire 8-inch gun. Its mechanism is somewhat

tardy, and the rate of fire only about once a minute; but the gun is excellently constructed, and has very fine ballistics. It weighs 20 tons, fires a 250-pound projectile, and has velocities up to 3,000 foot-seconds, though the service velocity is lower than this. Its service penetration is about 8 to 9 inches of Krupp armor at 3,000 yards. The new 7-inch is the United States gun it most nearly resembles in power; but its energy is better on account of the heavier projectile.

The 6-inch rapid-fire is of 45 calibers, and fires shell of both 111 and 88 pounds weight. The service velocity is 2,460 foot-seconds, and the weight of the gun about 7 tons. It is nominally equal to 6 inches of Krupp armor at 3,000 yards. Its rate of fire is moderate. In the latest ships it is mounted in a completely circular shield inside the casemate. The "Czarevitch" carries this gun on a twin mounting, as do the "Poltava" class. This mounting has given very satisfactory results as such mountings go. They always leave something to be desired. The 4.7-inch is a piece of 45 calibers about on a par with corresponding pieces in other navies.

All these guns have the Schneider-Canet breech mechanism, which is not equal to the Welin for rapidity, though less liable to derangement. A Russian innovation is a carrier below the breech block, so that when the latter is opened, its weight is not thrown on the hinges. The mounting details and rifling follow the Canet system.

Most Russian ships have electric hoists. Their guns all use nitro-cellulose smokeless powder. The projectiles are capped armor-piercing shell, and common shell. No solid shot is used, as the Russians claim to find their capped armor-piercing shell equally penetrative. High explosives are not yet introduced. Fuses are the weak point in Russian gunnery.

Newspaper reports have made the aiming very bad; but enough account was not taken of the range at Port Arthur. There are some very good shots in the Russian fleet, and the average gunnery officer is efficient. He is able, and often acts as captain of a gun, as do other officers. Where the Russian fleet came to grief was in the fact that gunnery was totally neglected by Admiral Stark, who devoted his time to battle evolutions of the parade ground type.

In conclusion, mention may be made of a few other guns in the Russian service. A 9-inch piece exists in some small coast defenders and armored gunboats. It is an obsolete gun, of which little is known and still less is worth knowing. There is also an old 8-inch in the "Rossia" and "Rurik." It is 35 calibers long, and its highest velocity is 1,922 foot-seconds. Its penetration is poor and its firing slow—it is less penetrative, in fire, than modern 6-inch guns.

THE MOTHER OF EXHIBITIONS.

BY HERBERT W. HORWILL.

In the centuries before the nineteenth, the nearest approach to an international exhibition appears to have been the Frankfort fairs of the sixteenth century. Henry Estienne, the scholar, describes this institution as "the epitome of all the markets of the world." But it is from an event within the memory of many persons now living that the fairs at Philadelphia, Chicago, Buffalo, and St. Louis trace their genealogy. The mother of all such displays was the exhibition held in London in 1851. This was itself an outgrowth of a series of exhibitions of art manufactures held by the Society of Arts, at the suggestion of its secretary, Mr. F. Whishaw, from 1847 to 1849. These consisted merely of a collection of articles made in the British Isles; and the Prince Consort, who was president of this society, improved on the experiment by making the bolder proposal that there should be brought together an exhibition representing the skill of the whole of the civilized world. It is surely one of the curiosities of history that such democratic institutions as these exhibitions are considered to be should have owed their impulse not to any popular movement whatever, but to a suggestion that came from Buckingham Palace, and that needed all the weight of royal influence to overcome the obstacle of popular indifference and opposition.

On June 30, 1849, the matter was laid before a meeting of the Society of Arts called by the Prince Consort at the palace. On October 17 of the same year, the leading bankers and merchants in the city of London were consulted. On January 3, 1850, there was taken the important step of the appointment of a royal commission to be responsible for managing the venture. Its members were Henry Cole (afterward secretary of the Science and Art Department), C. W. Dilke (father of the present baronet), Robert Stephenson, and Digby Wyatt. One of its secretaries was Stafford Northcote, distinguished later as a cabinet minister and Conservative leader in the House of Commons. Northcote's exertions in connection with this project did much to bring on the physical weakness which afterward lessened his effectiveness as a statesman. The exhibition also owed much to Lyon Playfair, the scientist, whose biography shows that at one time his tact prevented the whole undertaking from coming to grief. Playfair's special skill was in organization and in the ap-

plication of scientific discovery to industrial improvement—talents which found special opportunities of exercise in this connection.

The scheme was fully launched on March 21, 1850, at a Guildhall banquet to which the Lord Mayor invited the chief officers of state, the foreign ambassadors, and the mayors of the provincial towns. The principal speaker was the Prince Consort himself, who asked their co-operation in the attempt "to give the world a true test, a living picture, of the point of industrial development at which the whole of mankind has arrived, and a new starting point from which all nations will be able to direct their further exertions." The reception of the proposal at this dinner was gratifying, but to obtain the active assistance of those whom the guests represented was a wearisome task. The forces of old-fashioned Toryism in Parliament, and the press, deliberately set themselves to ruin the whole thing. The most violent opponent in the House of Commons was a certain Col. Sibthorp, who especially feared the demoralization of the national character that would ensue from the visit to England of a large number of persons from the Continent. "Take care of your wives and daughters; take care of your property and your lives," was the warning he passionately and sincerely addressed to his fellow countrymen. The Times was dead against the plan, and Punch did its best to turn it into ridicule. In one of Leech's cartoons the Prince Consort was represented as "The Industrious Boy," holding out a cap on which was inscribed, "Please remember the exposition."

As the various details of the scheme developed, its opponents attacked them in turn. There was, for instance, the question of the site. The government first offered the area included in Somerset House, but this was obviously much too small for anything on the scale projected. The Prince suggested Hyde Park. An outcry arose against the spoiling of one of the most delightful spots in the metropolis. A petition sent to the House of Lords against the use of the park received the support of Lord Brougham, and a resolution to the same effect was introduced into the Lower House also. In a letter of the Prince's to Stockmar, dated June 28, 1850, he says: "The exhibition is now attacked furiously by the Times, and the House of Commons is going to drive us out of the park. There is immense excitement on the subject. If we are driven out of the park, the work is done for. Never was anything so foolish." In a letter to the Duchess of Kent, dated July 4, there is a similar reference, from which it appears that the opposition party were urging that if such a nuisance must take place, a site should be found for it in the Isle of Dogs—a dismal swampy region further down the river, occupied to-day by the West India and Millwall docks. Happily, on the same date as the second of these letters, the Parliamentary opponents of the Hyde Park site were defeated in a division, and that difficulty was overcome.

Then came the problem of finance. In view of the strength of the antagonism to the scheme, the Prince wisely forbore making any attempt to secure an appropriation from Parliament, and trusted entirely to the public spirit of his supporters. Mr. Samuel Peto, with his partners in the well-known banking firm which bore his name, led the way on July 12, 1850, by the offer of \$250,000 to a guarantee fund. Ultimately the actual subscriptions toward the cost of the exhibition amounted to \$375,000, and the guarantee fund to \$1,000,000. The undertaking was so entirely experimental that there was no knowing whether the whole of this sum would not be required to meet the cost.

Both site and money having been obtained, the way seemed clear for the prosecution of the work. But just at this point the commission was confronted by one of the most puzzling situations in the history of the movement. In what kind of structure should the exhibits be housed? Out of two hundred and thirty-three plans submitted, not one appeared satisfactory. Each of them contemplated the erection of a huge brick building, which would have justified all the protests that had been made against the defacement of the park. At the last moment light came, not from a professional architect, but from a gardener. Joseph Paxton, whose solution of this problem made him famous, was the son of a Bedfordshire farmer. In his youth he drifted from place to place in pursuit of his occupation as gardener. In 1826, at the age of 25, he was on the point of emigration to this country, as his earnings were only eighteen shillings (four and a half dollars) a week; but he happened to attract the attention of the Duke of Devonshire, who made him superintendent of the gardens at Chatsworth. Later he was promoted to be responsible for the woods and forests on the estate also. In 1840 he completed the erection of the Chatsworth Conservatory, the largest of the kind hitherto constructed. One day, while waiting for his train at a railway station, and reflecting upon the difficulty of the exhibition commissioners, he was suddenly struck by the idea that an adaptation of the conservatory system would get them out of their *impasse*. Sitting at the table of the waiting room, he hurriedly sketched on a piece of blotting paper a rough outline of a build-

ing, and within nine days completed a set of plans which were immediately accepted. The essential feature of his scheme was that the structure should be, not of brick, but of glass and iron, with the exception, of course, of the flooring and joists.

Paxton's plans were accepted on July 16, 1850. The actual building operations commenced on September 26. The contractors were Messrs. Fox and Henderson, to whom it was agreed to pay \$399,000, or \$750,000 if the building was retained as a permanency. The exhibition structure, which covered eighteen acres, was in the form of a parallelogram 1,851 feet (corresponding to the number of the year) by 408, with a projection on the north 936 feet long. Col. Sibthorp's kindly prayer that lightning or a hailstorm might destroy the building while in course of construction was not answered. By New Year's Day it was complete, and was handed over to the commissioners.

What especially impressed the imagination of those who inspected the building was the sight of giant elms, former ornaments of the park, which rose toward the roof without any more obstruction than if the space on which they stood were still uncovered. On February 12, 1851, the building was opened to exhibitors for the reception of their goods.

Even when this stage had been reached, the malcontents had not all been converted. From a letter of the Prince Consort's as late as April 15, it appears that there were predictions that foreign revolutionists would use the opportunity to upset the monarchy and establish a republic, and that the confluence of so great a multitude would cause an outbreak of plague. The apprehension was as great in some circles on the Continent as in England. Mr. Sidney Lee, in his biography of Queen Victoria, notes that the wish of the Queen and her husband that all national rulers or their representatives should be their guests on this occasion, had to meet the fear of many foreign sovereigns lest the assembly of several crowned heads in one place should be an incitement to the attempts of conspirators. It was with great difficulty that the Prince of Prussia was persuaded to accept an invitation to be present with his son. The Prussian minister in London wrote home that a number of madmen had already assembled, and intended to work irretrievable disaster by interrupting the succession to the Prussian throne. Lord Granville suggested to the diplomatic colony in London that on the opening day they should present an address to the Queen in recognition of the fact that the object of the exhibition was not purely British, but international, but they declined to do so.

The opening ceremony on May 1, 1851, was naturally awaited with the greatest anxiety by the promoters of an undertaking which had been regarded with so much doubt in some quarters and open animosity in others. It was a brilliant success. One of the most interesting descriptions of the event may be read in the "Letters of Dean Stanley." He speaks of what happened immediately the public were admitted as "one of the most ridiculous scenes I ever saw." Nobody stayed to look at a single exhibit, but everyone made his way, first at a trot and then at a full gallop, to the transept, where the Queen was presently to appear and declare the exhibition opened. As the crowd entered from several doors on each side of the building, this throng converging at racing speed upon the center must indeed have provided a comical spectacle to those who were not in too great a hurry to look around them. The opening ceremony itself was dignified and impressive. In all the assembly the persons to whom the success or failure of the exhibition meant most were the Prince Consort, by whose initiative it had been undertaken and who had staked upon it his influence in the country; and the Queen herself, so closely affected as she always was by everything that concerned the welfare or honor of her husband. It is little wonder that Stanley describes her as flushed with a kind of excitement he had never witnessed on any other human countenance. Never before, too, says Stanley, had he seen her look so thoroughly regal. Still possessing a youthful capacity for a quick response to outside impressions—for she was then only in her thirty-second year—she spoke of it afterward as the proudest and happiest day of her life. No disaster or even disturbance marred the celebration. There were 25,000 persons in the building at one time, and 700,000 lined the route of the royal procession between the exhibition and Buckingham Palace, yet there was not one accident or police case.

The tide of public opinion had now turned. In the reaction, forecasts of revolution and disorder were succeeded by the most extravagant forecasts of millennial peace, which would directly result from the friendly meeting of citizens of many nations. How was it possible that those who had thus learned to associate in the gentle rivalry of invention and industrial skill could ever again draw the sword against one another? The Crimean war, three years afterward, was the answer to these imaginations, to say nothing of later conflicts which have embroiled in deadly struggles almost every leading power represented at

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