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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.

PUSHING A GOOD PRINCIPLE TOO FAR.

The opposition to the construction of an elevated loop through the east side to connect the Williamsburg and Brooklyn bridges is a clear case of pushing a principle, good in itself, to harmful extremes. The widespread objection to the construction of any more elevated railroads on Manhattan Island is a sound one, being based upon considerations of the health and comfort of the people and the architectural and æsthetic appearance of New York city, both of which would be further menaced by the erection of additional structures of this kind.

The proposal to build the Delancey Street elevated loop, however, contains an explicit proviso that the structure is to be considered as a purely temporary expedient for relieving the traffic congestion at the termini of the two bridges, and that as soon as a subway loop can be constructed to take its place, the elevated structure is to be removed.

It is not denied that the construction of the loop would be a disfigurement for the time being of the streets through which it would pass, or that it would be something of an obstacle to street traffic, or that it would seriously shut out light and air from the buildings. Against these drawbacks, however, is to be set off the enormous advantage that would immediately ensue to the many millions who travel between Brooklyn and Manhattan. Traffic movements would be expedited, the present congestion largely broken up, and the well-recognized evils that arise from the fact that the Manhattan end of the Brooklyn bridge, and to a less extent of the Williamsburg bridge, is a terminus, would be entirely removed.

FUEL AND WATER CONSUMPTION ON THE "LUSITANIA."

Since the launch of the "Lusitania" the British technical press has devoted an unusual amount of attention to this remarkable ship. One of our contemporaries, basing its calculations on the contract indicated horse-power of 65,000, estimates that this will mean a consumption of not less than 435 tons of steam per hour, and a corresponding consumption of 50 tons of coal in the same time. This would work out at a total of 1,200 tons per day. On the ground that for the economical working of the turbine it is necessary that the vacuum should be very high, it is estimated that about fifty times as much water must be passed through the condensers as the steam that is delivered to them, or say, 22,000 tons of water per hour, or 528,000 tons per day. For the combustion of the coal 700 tons of air must pass through the furnaces every hour, or 21,000,000 cubic feet.

These calculations of our contemporary Engineering are based upon what is probably a closely correct estimate of the coal consumption. The writer had the good fortune to spend many hours in the engine room of the "Deutschland" on the occasion of one of her record-breaking trips when she showed an average indication of over 37,000 horse-power and an average daily consumption of 672 tons of coal. This, it will be observed, is a smaller ratio of total coal consumption to total horse-power than is estimated for the "Lusitania"; but as the "Deutschland" burned only 1.3 pounds of coal per horse-power per hour for the main engines, and the marine steam turbine, at least in its larger sizes, makes greater demands on coal, we think the estimate of 1,200 tons of coal per day for the "Lusitania" will prove to be very near the mark. For a five-day trip this would call for a bunker capacity of not less than 7,000 tons—for some margin must be left for contingencies of breakdown, in which the time of passage might be greatly extended.

CANALS AS RATE REGULATORS.

In the field of transportation there is a decided revival of interest and activity in interior canal construction. Before the advent of the railroad the canal formed the most serviceable means for the transport of freight between important centers of industry. It

had the advantage over the freighting wagon of being able to carry material in considerable bulk and at lower cost; moreover, under average conditions, it was a more rapid method of transportation. Although the canal interests maintained an active competition with the early railroads, the all-important question of time decided the question in favor of the latter and canal traffic declined, many of the lines falling into disrepair and finally into disuse.

The decadence of the inland waterway has been more complete in some countries than others, for in France and Germany there came, in course of time, a revival of activity and a new era of construction which has brought canal traffic up to the position of importance, both as a regulator of rates and an important auxiliary to the railroads, which it should properly fill. The canal system of Great Britain, on the other hand, has declined until it consists of a few inadequate and little-related lines, which are too ill-equipped and too insignificant to exert any serious influence upon the freight traffic at large.

At the present time a royal commission is engaged in an inquiry into the canal system of the country; but such commissions move slowly, and the necessity for individual action has led the individual interests of the great manufacturing counties of middle and northern England to take action at a conference held at the invitation of the Birmingham Chamber of Commerce. The points under consideration were, first, that in order to provide healthy competition with the railroads, it was desirable that a complete system of through communication by water should be provided between centers of commercial, industrial, or agricultural importance and between such centers and the sea; that in view of its national importance, such a system should be acquired and controlled by the government, or by a public trust in which the government should have the controlling vote; and that in either case the sinking fund and interest on capital expenditure should be guaranteed by the government. The scheme should prove sufficiently attractive to private capital to render any appeal to the government unnecessary; indeed, it is questionable whether to the heavy burden which it already carries, the national budget could add this additional heavy obligation.

Here in the United States, our canal system was never developed to the extent that obtained in Europe. The development of the country to its present proportions has taken place side by side with that of its railroad system; indeed, it may truly be said that our stupendous development in agriculture, commerce, and industry, has been made possible by the railroad. With the cheaper and more quickly constructed railroad available there was no inducement to undertake the construction of costly canals; and if we except the notable Erie Canal, and a few others of less importance, the railroads have been practically free from canal competition. The enlargement of the Erie Canal, which is now being actively prosecuted, is destined to raise that waterway to something of the importance that it possessed in its most flourishing days; and it is reasonable to expect that its success in regulating rates and redirecting traffic into the natural channels from which it has been turned by arbitrary discrimination, will prove a powerful stimulus to the extension of canal systems between the principal manufacturing and industrial centers of the country. Foremost among these will probably be the waterways connecting the Pittsburg district with the Great Lakes and the Great Lakes with the Gulf.

WITH THE BALTIC FLEET AT TSUSHIMA.

Accurate detailed information by eyewitnesses who are technically qualified to speak concerning the behavior of war material in great engagements is never available to the public until many months after the event. The Russo-Japanese war, and particularly the naval side of it, has been no exception; and it is only recently that independent outside observers have been making public the result of their experience and observation.

By far the best account of this kind that has come to our notice was published in the last issue of the Proceedings of the United States Naval Institute, by Lieut. R. D. White, of the United States navy. In an introductory note the Lieutenant states that the account is compiled from information obtained from one who was present on one of the ships of the Russian fleet at the battle. As this observer had no station in battle, he was selected to observe and record the various events as they occurred, a duty which "he performed with admirable care and accuracy." Although for obvious reasons the writer does not give his name, he states that "his willingness to speak on the subject with honesty and without prejudice, his keen appreciation of the military strength and weakness of ships built and building, his power of observation in general and in detail" and his mastery of the principles of modern naval construction and warfare, lend to his statements the greatest value in the strong light they throw upon the theory and practice of modern naval

design and construction. We cannot do more than briefly review this article in the SCIENTIFIC AMERICAN, but the full text with its illustrations will be found in the current issue of the SUPPLEMENT.

The morning of May 27, 1905, is described as dawning raw and cheerless on the Baltic fleet as it steered for Tsushima Straits. The Russian sailors are spoken of as a hopeless band of men, huddled around the fire-room hatches or seeking shelter in some favoring lee about the deck, while a spirit of pessimism seemed to pervade the whole fleet. As day was breaking, a Japanese cruiser loomed through the fog, and the clicking of the wireless instruments on the Russian ships intimated that a message was being sent to Togo giving the position of the Russian fleet. Strange to say, no attempt was made to intercept or break up this message. Soon afterward the Russians sighted one of the Japanese armored cruisers, which for two hours kept abreast of the Russian battleships on the starboard side at a distance of about 8,000 yards. The fleet entered the battle at a speed of 9 knots and this was its standard speed throughout the engagement. When the Japanese fleet was sighted, it consisted of twelve ships in line ahead standing almost directly across the Russian course. The observer on the Russian ships speaks of their formation as being faultless and their speed sixteen knots an hour, a disparity in speed which seems almost incredible and must, of course, account largely for the baffling and overwhelming tactics displayed by the Japanese throughout the battle.

Without following the course of the conflict as seen from the Russian ship, we draw attention to some of the salient features. As the Japanese column cleared the path of the Russians, they turned and steamed parallel in a directly opposite course to that of the enemy and "then, judging his time with beautiful exactness, Admiral Togo countermarched and brought his entire fleet into action, opening fire at six thousand yards' range. As each ship made the turn, she opened fire on the battleship "Oslyabia" with results that were fearfully destructive. The forward turret was put out of action when she had fired only three shots. A shell striking the embrasure beneath one gun jammed the gun in its full elevation and by the force of its explosion lifted the top of the forward turret. The water line of the "Oslyabia" from the forward turret to the bow was unarmored. Five high-explosive shells each made an enormous hole in the bow plating, and the water, entering, brought the ship down until her three-inch battery gun ports were awash. Three twelve-inch shells striking in succession an armor plate on the water line amidships, first loosened, then tore it off, and finally opened a huge hole in the side of the ship. In one hour after the opening of the engagement the "Oslyabia" turned over and sank.

Early in the action a shell entered the embrasure in the forward turret of the "Suvaroff" and, exploding, ignited several bags of powder, with the result that the roof of the turret was blown off and landed on deck, leaning against the turret. These two embrasure accidents emphasize the necessity for using port shields to guard this vulnerable spot; and we are glad to note that in our later ships an excellent design of very heavy port shields has been fitted to the guns of the main battery. As further showing the terrific destruction of modern high-explosive shell, it is recorded that all the forward shell plating of the battleship "Suvaroff" above the armor belt was shot away nearly as far aft as the turret, causing the vessel to resemble a monitor, and at 2:25 P. M. (the firing opened at 1:55 P. M.) she left the line, ablaze fore and aft and unable to withstand longer the terrific bombardment. With the "Oslyabia" and "Suvaroff" gone, the "Alexander III," sister to the "Suvaroff," received the concentrated fire of the Japanese fleet at a range of from 5,100 to 5,600 yards, and she was forced to turn to the eastward in the effort to escape it.

A remarkable and very disconcerting fact noted by the observer was the number of fires that broke out on board the new Russian battleships, and this in spite of the fact that woodwork had been eliminated as far as possible, in accordance with modern theories. On one of the new ships, the "Orel," thirty-four different fires broke out during the day. Several fires occurring in the hammocks stowed just forward of the bridge, drove the occupants from the conning tower. Hawsers proved to be exceedingly troublesome, catching fire easily, producing much pungent smoke, and being difficult to extinguish. One of these, burning abaft of the bridge, again drove all hands from the conning tower. The smoke also was drawn by the blowers into the forward fire room, and this compartment had to be abandoned. This last contingency is one surely that no naval architect had ever contemplated. The smoke also filled the port forward six-inch turret with smoke, which penetrated to the lower decks, causing consternation there. Another curious fact developed in the fight was that there was great danger of fire in the war-paint on the side plating of the ships; for when the "Alexander III" fell out the