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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.

NEAR COMPLETION OF THE FIRST HUDSON RIVER TUNNEL.

During the past eighteen months the work of completing the first Hudson River tunnel has made such rapid progress that only about one hundred yards remains to be excavated, before the Manhattan heading is reached. Some time in March it is likely that the officials of the New York and Jersey Railway Company will be able to make the trip—on foot, of course—from Manhattan to New Jersey below the bed of the Hudson River. Now that the ledge of rock which was encountered a few months ago, not far from the Manhattan shore, has been cut through, the shield is being driven forward at a speed that is remarkable for this class of excavation, as much as 26 feet having been covered in the twenty-four hours. A little to the south of and parallel with the tunnel that is now nearing completion, is the second tunnel, the excavation of which commenced in November of last year. The new shield that is being used on this work will progress very much faster than did the old shield, and this for several reasons. In the first place, the diameter is considerably less, and therefore the number of cubic yards to be taken out in a given distance is reduced; secondly, the excavation is taking place entirely through silt, with no rock to hinder progress; and, thirdly, the shield itself is of more modern design, more convenient to handle, and is fully seventy per cent more powerful. Already it has been pushed forward more than 1,300 feet beneath the river, and it is likely the average estimated speed of 30 feet per day will be realized if no unforeseen contingency arises.

CORROSION OF ARCHITECTURAL STEEL.

Although the report of the Insurance Experiment Station in Boston on its recent tests of steel corrosion, under conditions approximating those of steel columns in modern buildings, confirms the results of previous tests of this character, the subject is of such supreme importance that we give herewith a brief digest of the facts. Of course, the value of such experiments depends upon the correctness of the assumption that a severe trial of a short duration gives us the data from which we can argue as to the results of a less severe test, extending over a far greater period. Each specimen of steel was cleaned and incased in Portland cement concrete of varying composition. After the concrete had set for twenty-four hours in air and seven days in water, the specimens were exposed to as severe tests as could be devised, and after various lengths of time the cement casings were broken, and the steel specimens were cleaned, weighed, and measured. The conclusion is reached that if structural steel is incased in a sound covering of good concrete, it is proof against corrosion for a period of years which is so long as to make the subject of more interest to our great-grandchildren's children than to us. In other words, steel, properly covered with concrete, may be expected to last until changes in the laying out of the city, or the substitution of yet more modern construction, necessitates the removal of the building. Obviously, the life of the costly office buildings, hotels, and warehouses that are being erected in such profusion, depends not so much upon the work of the steel-maker, as upon the particular "boss" who has to watch the mixing of the cement and its application to the skeleton steelwork.

EQUABLE TEMPERATURE IN THE SUBWAY.

To those who have a natural prejudice against subway or tunnel travel, there will be a decided compensation in the comparatively equable temperature that will prevail in the New York Subway. During one of the waves of extreme cold that visited the city this winter, the chief engineer had the temperature taken at stated intervals at the street level and in the tunnel below. It was found that on January 5, when the thermometer on the street near the City Hall was one degree above zero, in the Subway below it registered 41 degrees. On the day previous, at nine o'clock in the morning, when the street temperature was 7 degrees in City Hall Park, it was 40 degrees in the Subway below. Other tests showed that when outside temperature fell anywhere below 32 degrees, it averaged about 40 degrees in the tunnel. On the other hand, it has been found that the average temperature of the tunnel in the summer time is about 65 degrees. It is scarcely necessary to explain that the sudden changes of temperature which mark the climate of New York city have not sufficient time to affect the envelop of steel, concrete, and earth surrounding the tunnel, before there is a return to normal conditions. During the winter there must necessarily be a gradual fall of the average temperature in the tunnel; but cold air that is carried in through ventilating openings and at station entrances is compensated for by the radiation of heat from the warm mass of the ground through which the tunnel is cut. In the summer time, the heat that enters the tunnel is absorbed by the same medium; and the indications are that there will be an average difference of 20 degrees between the street and the tunnel temperatures throughout the year.

AN IMPERIAL FLOATING EXHIBITION.

A movement is on foot in Great Britain to institute a moving exhibition, which will at once remind American readers of our exhibition railroad cars, which are occasionally sent out for the purpose of introducing the natural resources of some particular State to the country at large. The scheme referred to is to dispatch a steamer loaded with specimen products of British industries on a tour of the world, the itinerary providing for a call at thirty-two colonial and foreign ports. It is expected that the exhibition will fulfill the double purpose of enabling buyers through the world to personally inspect the manufactured goods of Great Britain, and of bringing the representative of each exhibiting firm in contact with prospective customers and giving them an opportunity to learn in detail what are their peculiar requirements. The itinerary of the steamer includes the ports of Africa, India, Ceylon, Straits Settlements, China, Japan, Australasia, South America, West Indies, and Canada. It is estimated that the round-the-world trip will last about seven months. Although the idea of a floating exhibition on such an ambitious scale is novel, the broad principle is one that is already recognized in this country, and our merchants and commercial bodies will do well to keep in touch with the movement, and ascertain from the American Consul at each port how far it fulfills its purpose.

RELATIVE STRENGTH OF THE NAVAL POWERS.

The navies of the world are in a state of such progressive development, that it is difficult at any given time to state exactly what is their relative strength. In the case of two rival powers which have a number of battleships and armored cruisers under construction, it is quite possible that the balance of strength between the two depends entirely on the forwardness of the work on these new vessels. One nation may be building upon a methodical plan, which insures the delivery of so many vessels each year, while the other may be building in a desultory fashion; in the one case the new ships may be within a year of completion, in the other they may be two or three years behind time.

If we estimate the relative strength upon the basis of the total number of battleships, armored cruisers, and scouts—that is to say, all warships above 1,000 tons displacement—that are actually completed, we find that Great Britain comes first with a total of 201 ships completed, of 1,516,000 tons displacement; France second with 96 ships, of 576,000 tons displacement; Germany third with 73 ships, of 388,000 tons displacement; Russia fourth with 43 ships, of 315,000 tons displacement; United States fifth with 35 ships, of 295,000 tons displacement; Italy sixth with 38 ships, of 259,000 tons displacement; and Japan seventh with 31 ships, of 206,000 tons displacement. All of these navies, however, have a large building programme in hand; and taking them in their order, the names of the countries and the total tonnage of ships under construction are as follows: Great Britain, 351,000 tons; United States, 322,000 tons; France, 180,000 tons; Russia, 139,000 tons; Germany, 118,000 tons; Italy, 70,000 tons; and Japan, 10,000 tons.

Now it is evident that if these new ships could be completed at once, there would be a great change in the relative standing of the navies, for the United States has under construction a larger aggregate of tonnage than that of the whole of her completed navy as it stands to-day. The relative order of strength in such a case and the total tonnage displacement would be as follows: Great Britain, 1,867,000 tons; France, 756,000 tons; United States, 616,000 tons; Germany, 506,000 tons; Russia, 499,000 tons; Italy, 329,000 tons; Japan, 253,000 tons. It will thus be seen that the United States moves up from fifth to third position, with a long lead over Germany. It is interesting to note, by the way, the great preponderance of the strength of the English-speaking naval powers, Great Britain and the United States. In regard to the British navy, it is noteworthy that at her present rate of building she is greatly exceeding the mark of strength which she is popularly supposed to have set herself, namely, that her navy shall equal the combined strength of any two continental navies. As a matter of fact, were the present building programmes completed, her navy would equal in tonnage that of the three most powerful continental navies, France, Germany, and Russia, and would have 117,000 tons to the good at that; while a combination of the British and United States navies would give a total of 2,484,000 tons, which would be within 10,000 tons of equaling the total tonnage of all the other navies of note in the world, including that of Japan. On the side of the English-speaking combination, there would be the great advantages of a common tongue and great size and speed of individual ships, while a world naval combination would suffer from the enormous disadvantage of being heterogeneous in speech, race, and in the classification of its ships. We confess that while we had a general impression of the naval predominance of the English-speaking race, we were not prepared to find that the development of the navies of the two countries had so greatly outrun that of the rest of the world. To these considerations may be added the fact of the incalculable strategic advantage that the countries possess in a chain of coaling stations and dockyards scattered throughout the high seas, that would give them incomparable facilities of refuge, repair, and replenishment in the event of a world-wide conflict.

THE GRANTS OF THE CARNEGIE INSTITUTION.

The last annual meeting of the trustees of the Carnegie Institution was noteworthy for the fact that the sum of $200,000 was set apart for scientific research during the fiscal year of 1902-1903. The institution has been working silently since its inception, but none the less effectively. The grants which have been made may be considered as a most fitting recognition of scientific services rendered by the foremost living savants. Even he whose interest in science has made him familiar with the current work of many investigators, will doubtless find among the list of men who have thus been honored many whose names are unknown to him, but whose work is for all that worthy of encouragement.

It is impossible in this brief space to enumerate all the grants which have been made; for these, the reader must be referred to the last three numbers of the SCIENTIFIC AMERICAN SUPPLEMENT, in which all the awards are given, together with a brief abstract of the scientific work done by each investigator who has been honored.

We may be permitted, however, to call attention to a few scientists, the brilliancy of whose work has been bedimmed in the glamor of the more startling discoveries which have attracted the world's attention. Among the grants made to men who are not so well known to the world as they ought to be, may be mentioned that to Mr. Lewis Boss for investigations upon the motions of brighter stars, and of all stars of whatever magnitude supposed to have motions as great as ten seconds per century, and any other stars that were especially well determined prior to 1850. The sum of $5,000 awarded to him was not too much for so extensive an investigation. Prof. George E. Hale's grant of $4,000 was well spent on the photographic study of stellar parallaxes with a 40-inch telescope. When it is considered that 114 plates containing about 350 exposures have been obtained, some idea of the value of the work may be gleaned.

New tables of the moon are urgently required for the purposes of astronomy and navigation. For a long period the problem of constructing and perfecting such tables has been delayed by an unexplained discordance between the observed motion of the moon and the motion which should result from the action of all known bodies upon it. The exact cause of this discordance cannot be recorded, because the observations made from 1750 to 1850 have never been worked up and compared with the tables. By the aid of a grant from the Carnegie Institution, Prof. Simon Newcomb was enabled to take up this work with results that will be of benefit not only to science, but to commerce as well.

Among the larger grants, must be recorded that of $10,000 to Dr. Robert Fletcher, of the Army Medical Museum, for preparing and publishing the "Index Medicus." Established in 1879, under the direction of Dr. J. S. Billings and Dr. Robert Fletcher, the Index was discontinued in 1899 for lack of pecuniary support. The scope of the work is broad. It contains in classified form, month by month, reference to everything published throughout the world which relates to medicine or public hygiene.

It is particularly gratifying to note that Prof. H. N. Morse, of Johns Hopkins University, has been awarded