

Scientific American.

ESTABLISHED 1845

MUNN & CO., - - - EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS TO SUBSCRIBERS

One copy, one year, for the United States, Canada, or Mexico \$3.00
 One copy, one year, to any foreign country, postage prepaid, £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845).....\$3.00 a year.
 Scientific American Supplement (Established 1876)..... 5.00 ..
 Scientific American Building Edition (Established 1885)..... 2.50 ..
 Scientific American Export Edition (Established 1873)..... 3.00 ..

The combined subscription rates and rates to foreign countries will be furnished upon application.

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, SEPTEMBER 16, 1899.

RAPID TRANSIT BY THE GRACE OF THE POLITICIANS.

At last it begins to look as though New York city were to be provided with its rapid transit system, so sorely needed and so earnestly advocated by what is practically the entire voice of the press and the people. At recurring intervals in the past when everything has seemed ripe for the commencement of the work, the whole scheme has been discredited, cloaked, and spirited away from public view by one of those many dexterous, slight-of-hand performances whose secrets are known only to those within the innermost circle of municipal politics. For the past few months the question of New York rapid transit has been so utterly dead that it seems to have passed entirely from the public mind; yet suddenly, without any preliminary warning, the scheme is brought out again with much blare of trumpets and promise of speedy performance.

Amid all the rapid transit discussion that has been aroused, one looks in vain for a single new argument in its favor, or a solitary reason why it should be a greater necessity to-day than it was last year or in any of the long years that have passed since the question was first mooted. This most important municipal question has formed the subject of numerous articles in the SCIENTIFIC AMERICAN, which in common with the technical and general press of this city has pointed out the necessity for the system and the entire feasibility of the plans drawn up by the engineers of the Rapid Transit Commission. As a matter of fact, the arguments were long ago made, and to repeat them is to tire one's readers with wearisome reiteration. This great city needs rapid transit; it has asked for it; its engineers have laid out a feasible plan; it is rich enough to pay for it and there is not the faintest question as to its being at least self supporting, and yet with all these facts in its favor, the greatest municipal problem of the leading city in the new world is being made the sport of a few political adventurers, who seem to have the power to promote or delay it without the least regard for the urgent needs and expressed wishes of the citizens.

OUR FASTEST BATTLESHIP.

It is with great satisfaction that the SCIENTIFIC AMERICAN turns from the subject of our proposed slow-going cruisers to record the excellent speed that is being shown by our latest battleships. Last week we drew attention to the fact that the "Alabama" in a preliminary builders' trial had made an average speed of 16.3 knots over a 23-mile course, a maximum speed of 17.2 knots having been made with the wind and tide, and a speed of 15.43 knots against them. On this occasion the "Alabama" did not carry any of her guns, and a large amount of her armor had not yet been bolted on, so that she was probably from 1,500 to 2,000 tons short of her trial displacement of 11,525 tons. At the same time she was undoubtedly very foul as the result of being afloat for over a year at the Cramps' shipyard. It is reasonable to expect that on her official trial, with a clean bottom and under the favorable conditions of the best of coal and expert stokers, she will be capable of repeating the performance in spite of her greater displacement.

The good showing of the "Alabama," however, has been eclipsed by that of the "Kearsarge," one of the pair of fine battleships that is nearing completion at the yards of the Newport News Shipbuilding Company. This vessel has also been afloat for over a year, the date of her last visit to drydock being August 8, 1898, and on the occasion of her informal trial she carried the whole of her armor, together with the heavy guns of the 13-inch and 8-inch batteries, the only weights not carried being those of the 5-inch guns of the intermediate battery. Hence her displacement and draught were only slightly below what they will be at her official trial. Under these conditions the ship made by log during half an hour's steaming under forced draught a speed of 17.25 knots an hour.

The trial was made in water whose depth varied between ten and twelve fathoms, and it is a well understood fact (though only discovered a few years ago in

the trials of some high speed cruisers) that a difference of fifteen or twenty fathoms in the depth of water on a trial course will have a very marked effect upon the speed of a deep draught warship. Hence it is reasonable to expect that when the "Kearsarge" is put in trial trip shape, she will be capable of maintaining an 18-knot average over the deep-sea trial course. If she does this, our latest first-class battleship will easily be our fastest, the "Iowa" coming next with a trial speed of 17.03 knots per hour.

WORK OF THE INDUSTRIAL COMMISSION.

The Industrial Commission, which commenced its autumn session on the 5th of this month, in Washington, is equally deserving of the title "Industrious Commission," it would seem. Having divided itself into various sub-committees, its work of gathering information of vital import has gone on continuously during the heated term, while the whole force of special stenographers attached to the commission have been equally busy preparing the testimony, thus taken, for the government printers. This will make a report, soon to be issued, of incalculable value in all matters concerning the industrial condition of this country. One of the first witnesses of chief magnitude to appear early at this session will be John D. Rockefeller, who, it is not unnaturally believed, is the possessor of much knowledge likely to be valuable to the commission. It is now proposed that the commission will visit Chicago, late in September, to investigate the so-called "Grain Elevator Trust" of the West. This is one of the trusts believed by many to be beneficial and a necessity if a foreign market for American cereals is to be maintained against Russian and South American inroads. As many, with socialistic tendencies, on the other hand, believe such maintenance of American supremacy should be furthered by federal bureaus and that the trust is, in fact, a detriment to the Western farmer, it is thought that the commission here enters upon one of its most vital lines of inquiry.

TRADE WITH OUR NEWLY ACQUIRED TERRITORIES.

The Bureau of Statistics of the Treasury Department at Washington has just given out a resumé of the export and import figures of the trade between this country and our newly acquired territories or temporary dependencies that is both interesting and encouraging to the friends of American commerce. Even in the reciprocity years of 1892 to 1894, in which the exports from this country in those directions were greatly increased, the totals were not as large as those of the recently ended fiscal year, with all its disadvantages of active warfare. To Puerto Rico our exports are nearly 25 per cent in excess of the average of the past decade; to Cuba they are nearly 50 per cent greater; to the Hawaiian Islands over twice as great; and to the Philippines more than three times as much. The exports to these islands made necessary by the support of our military establishments and by the considerable shipments in aid of the temporarily destitute are not included in these figures; they are only those of the legitimate increase of commerce. Naturally, as a result of war, and especially so in Cuba and the Philippines, the imports from these lands to us fell off very considerably during 1898; but the healthy resumption of trade relations is shown by a small increase as compared with last year in Hawaii; nearly 20 per cent in the Philippines; almost 50 per cent in Puerto Rico; and over 66 per cent in Cuba. These are most gratifying trade reports.

THE "SHAMROCK" AND HER CHANCES.

When the "Shamrock" poked her long nose through the early morning mists off Sandy Hook at the close of her fourteen-day trip across the ocean, it was found that if she embodied any striking novelties of construction they must be hidden away below the waterline or beneath the shelter of her canvas-covered aluminum deck. In her sail plan she is the typical English cutter, with such variations as always characterize the boats of Fife, her talented designer. The most notable features of the hull, or that part of it that can be seen, are the exceptionally high freeboard (between 5 and 6 feet) and the great beam of the boat at the quarters. The advantage of these features was evident in her preliminary trials off Sandy Hook, when she reached in a fresh breeze from Sandy Hook Lightship to the Scotland Lightship, a distance of 4½ miles, in 19 minutes and 10 seconds—a speed of 13 knots—without putting her lee rail below the water. Like the "Vigilant," she appears to be at her best when sailing "on her uppers." On the same day, when close-hauled and sailing within four points of the wind, she made by log a speed of just under 11 knots an hour, and before the wind her speed by log was a trifle over 12 knots.

Now, in judging of these performances, which may be taken as reliable, it must be borne in mind that the yacht was not carrying her racing canvas, that her bottom has not been cleaned for nearly two months, and that she gave the experts who were watching her the impression of having a considerable reserve of power, even at the high speeds of twelve and thirteen

knots. The preliminary trials establish the fact beyond question that in "Shamrock" we have to meet a boat that is remarkably fast in fresh to strong breezes.

In her trials in a light breeze, on the other hand, the visitor failed to make such a good impression, and seemed to lack that ability to slip away at the first suggestion of a breeze which is such a conspicuous feature in "Columbia." This may be accounted for in part by the possible foulness of her bottom, which, while it would not greatly affect her speed in a fresh breeze, would retard her greatly at slower speeds, where wave-making ceases and skin-friction becomes the chief element of resistance. But though the larger sails spread which she is to carry will also increase her light weather speed, the present indications strengthen our impressions, formed from her races with "Britannia," that "Shamrock" is not by any means a light-weather boat.

Curiously enough the conditions appear to be reversed, if anything, in "Columbia," for while she is practically held by "Defender" in a fresh breeze, she begins to walk away from the older boat with an excess of speed which steadily increases with the lightening of the wind.

The present indications are that on days when the winds are light or of moderate strength "Columbia" will win by a comfortable margin; while on days when the winds are fresh to strong the "Shamrock" may be the first to finish, particularly over a triangular course. We base this conclusion on the facts that in crossing the Atlantic under reduced rig, the "Shamrock" on one occasion covered 288 miles under her own sail in the twenty-four hours in a rough sea. This is an average speed of twelve knots an hour, and the performance certainly suggests that in the smoother seas off Sandy Hook, with a clean bottom and racing canvas aloft, and in a whole-sail breeze, she could reach around a triangular course at a speed of 13 to 13½ knots an hour.

But we must remember, on the other hand, that the very features which enable the boat to "carry on" in a blow will hold down her speed in light airs; and the experience of the past decade on the Sandy Hook courses proves that on five days out of seven in October the winds will probably be light. Hence it looks as though the cup were likely to stay on this side of the water for at least another twelve months.

ARTIFICIAL SILK.

The production of artificial silk has for some time past attracted the attention of experimenters in France, and it has been used with success to replace natural silk in certain fabrics. The Count du Chardonnet, who claims to be the first to have successfully carried out the process, exhibited some fine specimens of artificial silk at the Paris Exposition of 1889. Since then he has perfected his system, and at the present time a factory of considerable importance is in operation at Besançon, under the direction of M. Tricano. This factory is now capable of producing 150 kilogrammes of artificial silk per day.

Natural silk is largely made up of a body called "fibrin," together with other substances such as gelatin, albumen, wax, coloring matter, fatty and resinous matter, etc., the cellulose of the mulberry leaf being thus transformed by the silkworm. The nature of these transformations is of course unknown, and in order to produce a substance resembling silk, a method is adopted by which the cellulose furnished by cotton is used as a base. The cotton, having been transformed into nitro-cellulose, or guncotton, by treating it with nitric and sulphuric acids, this latter is dissolved in a mixture of ether and alcohol, and the resulting collodion is filtered under pressure.

In order to be successfully used for the production of artificial silk, it is found that the collodion must be allowed to "age" for a certain period of time, the reason of which has not been definitely settled; however, it is certain that the collodion, on being allowed to stand, undergoes certain modifications by which it is better fitted for the purpose. It is then run into cylinders, which have capillary holes in the bottom, and the collodion is forced out of these holes under a pressure of forty to fifty atmospheres. It comes out in the form of white cylindrical filaments; these are united to form threads, which are put up in skeins and all traces of alcohol or water which they may contain are removed. In this state, however, the threads are extremely inflammable, partaking of the nature of guncotton, and to remove this difficulty they must be "de-nitrated," that is to say, the cellulose must be brought back into its normal condition. This part of the process, which is indeed an essential one, involves considerable difficulty, and has been experimented upon for some time by M. du Chardonnet and others. However, a process has at last been arrived at which accomplishes this in a satisfactory manner. The details of this process have not as yet been made public; but it is certain that by this operation white silky threads are produced, which are not appreciably more inflammable than natural silk. The skeins which have been made up of these threads are then dyed by immersing them in a heated bath of basic aniline color.