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 Monthly (Established 1885)..... 2.50 "
Scientific American Export Edition (Established 1878)..... 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, New York.

NEW YORK, SATURDAY, OCTOBER 3, 1903.

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.

THE FUTURE WATER SUPPLY OF NEW YORK CITY.

The expert commission which was appointed to examine into the question of the available sources of water supply for New York city, and the best methods of conserving and utilizing the same, has made a preliminary report to the Board of Estimate. The commission states that in spite of the decrease in the waste of water by consumers in New York, it is necessary, in view of the rapid growth of the city, that steps be taken immediately to secure a larger supply. According to the preliminary estimate of the eminent engineers who have made this investigation, immediate provision should be made for storing and introducing into the city an additional daily supply of 200,000,000 gallons, to be delivered by gravity at an elevation of 300 feet above mean tide level. The cost of this portion of the scheme, including the necessary dams and aqueduct, will be $50,000,000. Acting on the advice of the Corporation Counsel, the investigation was confined entirely to those streams of water which lie within the State of New York, and the commission discovered that there are three available sources of supply. First, from certain of the eastern tributaries of the Hudson; secondly, from a portion of the eastern tributaries combined with the headwaters of Esopus Creek on the easterly side of the Catskill Mountains; and, thirdly, by pumping and filtering water taken from the Hudson River, at a point a few miles above Poughkeepsie. Although any one of these sources can be developed to maintain a constant supply of 500,000,000 gallons daily, the Commissioners are unanimous in recommending the upland waters in preference to water taken from the Hudson River, although they admit that the latter can be made pure by filtration and, indeed, must be regarded as the ultimate reserve for the demands of the more distant future. It is recommended that in any case the city begin at once the construction of filters, both for the present Croton water supply and for all other waters taken from surface streams. The surveys upon which the report is based include about 125 miles of aqueduct location extending from Jerome Park reservoir to the site of the proposed reservoirs, and comprising 80 miles of surface aqueduct following the contour of the ground, 40 miles of aqueduct in tunnel, and about 5 miles of large steel pipe siphons. Although the works that it is recommended to put in hand at once contemplate an additional supply of not over 200,000,000 gallons a day, for obvious reasons the aqueduct has to be built of sufficient size to accommodate the ultimate 500,000,000 gallons daily capacity of the larger scheme, when it shall have been fully developed. The controlling feature as regards speed of construction will be the great line of aqueduct; and as this will take at least five years to complete, it is recommended that immediate steps be taken to initiate this greatly needed work. The conclusions of the report will be found in full in the current issue of the SUPPLEMENT.

The recommendation that immediate steps be taken to increase the water supply of New York is one that will commend itself to every one who has studied the situation. The present margin of consumption over supply is none too large; and when it is remembered that New York adds to itself every year a population equal to that of a first-class city, the urgency of the case is at once apparent. Whatever is done should be done on the most liberal scale. It has too often transpired that water supply provisions that looked overbountiful when they were projected, have proved meager in proportion to the ever-accelerating growth of the municipalities that they supply. This 500,000,000-gallon aqueduct looks like a gigantic scheme; but the growth of this city is gigantic; and it would take a bold prophet to set a limit to water demands of the future metropolis of the world.

PIPE GALLERIES VS. UPTURNED STREETS.

A contemporary has estimated that on July last, exclusive of the excavations for the subway, there were thirty-two miles of open trenches in New York city. Large as the estimate is, it is probably rather under than over the mark, for it is undeniable that the condition of the streets of this, the metropolis of the Western Hemisphere, is not merely a source of untold annoyance and loss to the citizens of the city, but is a positive blot upon a municipal administration which should be a pattern for the world at large and not a by-word and a reproach. It is to the credit of the Rapid Transit Commission and its engineers that the original plans of the subway contemplated the construction of pipe galleries; and it was simply because of the vicious obstruction of certain Tammany politicians in other departments that the subway plans were abandoned and the pipes laid above the roof of the subway, a few feet below the street surface. But although the mischief has been done on the 20 miles of road now approaching completion, there is no reason why a properly constructed gallery should not be built on either side of every new branch of the subway that is contemplated in the plans for future enlargement of the system. In any case, subways or no subways, there is absolutely no excuse for the shocking condition in which our streets are left when a section of the subway is completed, or the street surface is taken up for the laying or repairing of gas, electrical, or water mains. We presume that there is a clause in the Rapid Transit contract, and a statute in the city laws requiring that when the street surface is broken up for any cause whatever, it shall be restored at once on the completion of such work to as good condition as it was when the work was opened. As a matter of fact contractors and other disturbers of the street surface seem to be permitted to leave the street in just whatever condition of disrepair they may please, with the result that scores of miles of our thoroughfares are left in a disfigured condition for months after the job of pipe laying, sewer construction, etc., has been completed. We commend this matter to the attention of the Rapid Transit Commissioners and the Commissioner of Public Works.

AT LAST, THE SIDE-DOOR PASSENGER CAR.

For many years the SCIENTIFIC AMERICAN has been an urgent advocate of the use of a modified form of side-door passenger car for suburban service. It is a well-understood fact among railroad men that the speed of suburban service, other things being equal, is dependent upon the quick starting and stopping of the trains and the speedy discharge and taking on of passengers. The first has been solved by the electric motor, and the solution of the second lies in the substitution of the side-door for the end-door car. There is no company in America that has had such wide experience in heavy suburban passenger service, or has given so much intelligent thought to the problem, as the Illinois Central Railroad. More than a decade ago, when they had to make special provision for handling the millions that traveled between Chicago and the World's Fair, they designed and built a special side-door passenger car, which was a revelation to travelers in the speed with which it could be emptied and filled, and the marked effect it had upon the frequency of the train schedule and the average speed of the trains. The lesson learned in that successful experiment was not forgotten, and the same railroad has now brought out a large standard passenger coach for suburban service, capable of seating a hundred passengers, and constructed with a dozen side doors, one opposite each pair of seats. By the courtesy of the officers of the road, we are enabled to present in the current issue of the SUPPLEMENT an illustrated description of this interesting and, as we think, epoch-marking car. While we refer our readers to the article in the SUPPLEMENT, we may mention here that the carrying capacity of the new car, per foot of length, is 55 per cent greater than that of the standard end-door cars now in use. The experience gained in the few days that the cars have been in service has shown that their capacity and speed of loading and unloading is greatly in advance of that of the standard type. A careful timing at one of the intermediate suburban stations showed that from one of these cars forty-six passengers were unloaded in two seconds, about half of whom were lady passengers that were riding upon the new type of car for the first time. Contemporaneously with the improvement in the passenger-handling ability of the car, careful attention was given to the subject of indestructibility by fire or collision, and the construction, with the exception of the inside and outside finish, is entirely of steel. The under frame consists of four 9-inch steel I-beams, the end sills and car framing being also steel channels and I-beams, and the whole metal under framing is covered with a continuous steel floor of ¼-inch plating. The framing of the sides and roof is of steel, and heavy vertical steel trusses are provided in the walls of the car at each end, which will effectually prevent that most frightful cause of death and maiming in collision known as telescoping.

We have drawn special attention to this car because it is our belief that just now, when the extension of the Rapid Transit facilities of this and other large cities are being so thoroughly reorganized and reconstructed, it will be the greatest pity in the world if the capacity of these systems should be limited by an over-conservative adherence to the end-door type of car with its congestion of passengers and its too-slow loading and unloading at stations. In the car under consideration the objections to the English car have been met and cleverly eliminated, the seats, which are arranged transversely of the car, being placed down the center of the car, and two side aisles provided, which extend for the full length of the car. This arrangement allows a passenger to board the car immediately opposite any point on the platform where he may be standing, and look for a vacant seat while the train is in motion, thus avoiding the only cause of delay on the otherwise speedily loaded and unloaded English car. The side doors are so arranged that they may be opened individually by those who wish to leave the train, and shut collectively by the brakeman from the platform.

THE 60,000 HORSEPOWER PLANT AT THE WORLD'S FAIR.

BY LIEUT. GOLFREY L. CARDEN, R.C.S.

The floor space in the Machinery Hall of the World's Fair, St. Louis, 1904, has been applied for some four times over. It is now practically finished and the adjoining Steam, Gas, and Fuel Building is over 60 per cent completed. This latter building is a steel, fire-proof structure, measuring 326 by 300 feet. The total length of Machinery Hall is 1,000 feet and along more than one-half of this distance will be found prime movers constituting the power plant of the Exposition.

It was originally supposed that 40,000 horse power would suffice to perform all the functions devolving upon a power plant at the Exposition; but more than 60,000 horse power is now planned for installation in the Machinery Building, and of this amount a trifle more than 50,000 horse power has been assigned work in the service of the World's Fair.

In a previous number of the SCIENTIFIC AMERICAN, a list was given of the prime movers of the larger sizes entering into the power plant proper, and in reverting to that description it is only necessary to remark that the principal units will comprise gas engines, high-speed steam engines, and turbine engines from various parts of the world. One offering comes from as far east as Stockholm, while still another unit comes from a point as far west as San Francisco. The locations of the prime movers have been definitely decided upon, and the work of installing will commence during the coming month. As planned by Mr. Thomas M. Moore, chief of the machinery department, there has been allotted a good reserve of power for each particular line of work, and the units utilized in common service will be found grouped together. Take for example, the Intramural Railway. This road has a length of about seven miles and is a double track trolley system throughout, with standard gage and standard type of open cars. The motor equipment, the brake equipment, and the power plant for the operation of the road all constitute exhibits, and one of the units of the power plant comes from San Francisco, another from as far east as Berlin. The Intramural Railway power plant will be located in the central portion of Machinery Hall and the prime movers in this plant are as follows: (1) A 1,750 B. H. P. Oechelhauser system gas engine (100 R. P. M.) built and exhibited by A. Borsig, Tegel-Berlin, and supplied with gas from a producer plant built and exhibited by Julius Pintsch, of Berlin; (2) a 900-horsepower Corliss type steam engine (85 R. P. M.) built and exhibited by the Murray Iron Works Company, of Burlington, Iowa; (3) a 750-horsepower modified Corliss steam engine (100 R. P. M.) built and exhibited by the Lane & Bodley Company, of Cincinnati, Ohio; (4) a 600-horsepower four-valve steam engine (150 R. P. M.) built and exhibited by the Harrisburg Foundry and Machine Works, Harrisburg, Pa.

In addition to the foregoing it is proposed to utilize a tangential water wheel built and exhibited by the Abner Doble Company, of San Francisco, Cal. The combination will consist of a steam pump built by the Jeanesville Iron Works Company, which is planned to deliver 1 200 gallons of water per minute at a pressure of 300 pounds; the water is conveyed through a pipe line and delivered against the tangential water wheel. This latter will be directly connected to a Crocker-Wheeler generator. The water wheel will be incased in plate glass, and when making 900 revolutions per minute 1,000 horse power will be developed. Incidental features will be a Lombard governor on the water wheel and a Venturi meter measuring the water delivered through the pipe line.

All of the generators for the prime movers of the Intramural power plant will be of the Crocker-Wheeler