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## SCIENTIFIC AMERICAN SUPPLEMENT

## No. 820.

**For the Week Ending September 19, 1891.**

Price 10 cents. For sale by all newsdealers.



## QUICK TRAVELING HALF AROUND THE WORLD.

The triumphs of modern engineering skill in facilitating travel by land and sea seem to follow each other in such quick succession that only a mild sort of surprise is generally manifested at the most remarkable achievements, and results which would have been deemed impossible half a generation ago are accepted as but natural sequences in our progress. The steamer Empress of Japan left Yokohama, August 19, and made the voyage thence to Victoria, British Columbia, in 9 days 19 hours and 24 minutes, which was by many hours the best previous record across the Pacific. The officials of the Canadian Pacific Railroad were so pleased with this achievement that they determined to forward the English mails brought by the steamer by means of a special train, which left Victoria at 1 P. M. on August 29, and made the time to Rockville, on the St. Lawrence River, in 77 hours and 20 minutes. The average speed for this distance of 2,803 miles was only about 36 miles an hour, but the record is a good one when it is remembered that there are many heavy grades and the regular time taken for express trains is nearly six days. When the mails were transferred across the St. Lawrence, they were taken by a special train on the New York Central road, which made the distance of 353 miles from that point to New York City in 6 hours and 58 minutes. The average speed of this run was a little over fifty miles an hour, and it is said that in one portion of it ninety-five miles were covered in ninety minutes. When the mails arrived at New York City, they were quickly transferred to the steamer City of New York, which was just on the point of sailing, and the steamer made the voyage from New York to Queenstown in 5 days 22 hours and 50 minutes, equaling the best previous eastward record across the Atlantic. The passage from Yokohama to Queenstown was thus made in twenty days, the distance being about ten thousand miles by the route traveled, and considerably over half way around the world in the latitudes on which the route lay.

## NATIONAL ELECTRIC LIGHT ASSOCIATION.

The fourteenth convention of this organization met in Montreal on the 7th inst., nearly 300 persons, mostly members and all connected with the electrical industry, being present. Addresses were made by President Huntley, by Prof. Bovey, of McGill University, chairman of the citizens' executive committee of the city of Montreal, Mayor McShane, of Montreal, Sir Donald A. Smith, Sir William Dawson, Principal of the McGill University, and United States Consul Knapp.

H. W. Leonard, of New York City, read an interesting paper entitled: A Central Station Combining the Advantages of Both the Continuous and Alternating Current Systems.

To overcome the difficulties now experienced, he laid down the following conditions as necessary:

1. We must supply a continuous current for the central portion of a town during the daytime when power is required.

2. We must supply the outlying districts with an alternating current during the night time when lighting is required.

3. We must not operate the alternating system under conditions of light load when its efficiency is very low.

4. We must be able to supply current for lighting continuously throughout the twenty-four hours of the day.

5. We must have but one set of conductors in any consumer's place.

In order to meet the above conditions I propose the following:

1. Wire all consumers upon the standard three-wire systems.

2. Connect all consumers upon standard three-wire mains.

3. Arrange the network of mains so that the central section of the network can be disconnected from the outlying sections through the agency of switches.

4. Install three-wire feeders to supply the central portion of the systems at full load, and install 1,000 volt primary wires and alternating current converters with a three-wire secondary circuit to supply the outlying section at full load.

### ELECTRIC RAILROAD CONSTRUCTION AND OPERATION, AND A CONSIDERATION OF THEIR CONNECTION WITH CENTRAL STATION INTERESTS.

BY C. S. FIELD, NEW YORK.

We hear asked sometimes, by laymen, the question: "What speed can electricity obtain in railway work?" The able consideration of this subject in several papers, and practical experiments as well, enables us to reply very briefly but confidently to this inquiry, that speed and power in electric railway traction are only limited by roadbed construction; in other words, any speed is obtainable within the range of possibility, with the maintenance of proper track.

A type of engine which we believe is going to be largely used on this class of work, as well as lighting work, is one that will come in between the high speed engine and the Corliss, and which will combine many of the advantages of both. Such an engine has been sought for by many engineers, and has been attempted by a number of builders. To-day, however, we cannot find it on the commercial market. This engine, in units of 500 horse power, would run at a rotative speed of about 140 or 150 revolutions and with a piston speed of about 650 to 700.

A very striking paper was:

### CENTRAL STATIONS OPERATED BY WATER POWER.

BY G. A. REDMAN, SUPERINTENDENT BRUSH ELECTRIC LIGHT COMPANY, ROCHESTER, N. Y.

Streams that have had no pecuniary value heretofore are now being utilized for the purpose of running electrical machinery, yet at the same time the supply of water is diminishing, caused by the destruction of forests, and water right owners in various parts of the country are devising means of storing water during the rainy seasons to furnish a supply during the dry season; also storing it in the day time for night use. One large water right owner in western New York, during the months of July and August, places flash boards two and one-half feet high on top of his dam, at an expense of $100, and stores up for night use the water which is not necessary for him to use in the day time, thereby saving in the two months a coal bill of $2,100.

The Johnstown, N. Y., Electric Light Company have improved their water power at the Cuyadota Falls by erecting a dam 34 feet high on top of the falls, giving them a total head of 75 feet and nearly doubling the amount of power.

A survey of the upper Genesee River, between Mount Morris, N. Y., and the celebrated Portage Falls, has been made during the past year for the purpose of establishing a reservoir that will furnish the city of Rochester 30,000 horse power more daily during the entire year than they have at present.

The earliest forms of water wheels were the paddle and flutter wheels that only utilized the impulsive action of the water; these were followed by simpler wheels of the reaction type and others.

We now have the improved forms of the Leffel, Victor, Lesner, Success, and many others. There is a demand for the best and most economical turbine that can be manufactured.

Turbines should be built to secure the delivery of the water upon the turbine without checking the velocity of the water more than one-third, and permit the free discharge of same after passing through the turbine, and to work with as good efficiency under part gate as under full gate, and to be made of the best phosphor bronze, to stand the wear and tear under high heads.

Where a station is situated on the bank of a river, it is best to take the water from the river by means of a raceway, with the head-gates parallel with the flow of the water, and at times of a freshet or running of anchor ice, it will more than pay any expense incurred by so doing.

We have two governors in use in our office building under a low head of 16 feet, and they govern the turbines under all circumstances in quite a satisfactory manner.

The decided advantage of a water power station over one run by steam power is not only one of economy in the saving of the expense of coal, but the station and apparatus can be kept cleaner and cooler, thereby saving considerable in expense of repairs, and it is also far more pleasant for the employes.

The Brush Electric Light Company, of Rochester, purchased the entire lower falls of the Genesee River (which is about two miles from the business center of the city) some nine years ago. At that time it was looked upon by many as a piece of folly to think of running dynamos there, on account of the distance from the business center of the city and the dampness around the falls. Notwithstanding the adverse opinions, they erected two buildings on the west side of the river, above and near the brink of the falls, and put in two 30½ inch, two 20 inch, and one 40 inch turbine, the first four mentioned turbines under 94 feet head and the latter under 28 feet head, with a total of 2,500 horse power. After running this power for five years they built a new station and leased their old power to different parties for pulp and flour mill purposes.

### ELECTRICITY AT THE WORLD'S FAIR.

J. A. Hornsby, a representative of the World's Fair, said that there is to be an electrical building, 700 feet long by 350 feet wide, having 240,000 square feet of floor space, and to cost $650,000 under contract. It is to be in the Italian renaissance architecture. Electric launches will be there, and an electric railway will traverse the ground. There will be a 24,000 horse power plant—a large one, that you gentlemen well know. The distribution from here will be in three directions. From this plant will be served 8,000 arc lamps, 8,500 incandescent lamps, and 4,000 horse power for operation of the machinery belonging to exhibitors. The exposition company will spend $26,000,000, the United States government $1,500,000, the States and Territories have already subscribed $5,000,000—two or three special State exhibits. This is not including $5,000,000 which have been subscribed by foreign governments for the maintenance of their exhibits. The South