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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

American states alone have subscribed $2,700,000 for their share.

I have been in correspondence for six months or thereabouts with electrical people in all parts of the world relative to the holding in Chicago in 1893 of an international electrical congress. I have arrived at a point in our correspondence and negotiation at which I can say the project is in the way of being successful beyond our highest hopes. We look for the presence in Chicago at that time of the ablest men in the greatest profession now in existence. The Europeans have promised to have their very highest authorities with us.

T. C. Martin said: Two and a half years ago, at least, at any rate before it was known that the World's Fair would go to Chicago, and when some of us still fondly hoped that it would not, the American Institute of Electrical Engineers, taking time by the forelock, appointed a committee to secure the holding of an Electrical Congress or conference in this country. A congress was then about to be held in France, at Paris, at the exposition, and we sent delegates to that congress. Those delegates—some of our most prominent electrical engineers and inventors, among them being Mr. Edison, Prof. Elihu Thomson and others of that rank—extended in the name of the Institute to the delegates to that Electrical Congress an invitation to attend such a congress in this country during the Columbian Fair year. The invitation was received and accepted.

THE GRAND FALLS OF LABRADOR.

Dispatches to the Associated Press bring intelligence of the complete success of the Bowdoin College scientific expedition to Labrador in search of the Grand Falls of that region.

The schooner Julia Decker arrived at Hawkesbury, C. B., Sept. 11, having on board the members of the Bowdoin scientific expedition. The results of the trip to Labrador have far exceeded the hopes of the projectors. Grand Falls have been discovered and photographed, and, though not as high as reported, present a beautiful sight. The total fall is upward of 500 feet, divided into one fall of 200 feet and six rapids and cascades varying from 100 feet to 25 feet.

The exploring party of four men, all graduates of the college, headed by Austin Cary, left their schooner on Sunday, July 26. They were provided with two Rushton boats and all the modern instruments for measuring heights and distances.

Their success in navigating the river far exceeded their expectations, and such good progress was made that on August 8 they had passed Lake Waminikapou and had reached a point five miles in advance of the furthest point reached by Mr. Holme in 1888. At this place, on account of a disabled arm, Mr. Young and a companion were obliged to turn back, reaching Rigolet on August 21.

Messrs. Cary and Cole proceeded on toward the falls, which had been reported to be distant fifty miles. After going a short distance they were obliged, on account of the rapidity of the current, to leave their boat and make the journey on foot. From this point their progress was necessarily very slow, the woods being very thick and the mosquitoes and black flies almost unbearable. The explorers found the falls to be much further away than they had expected, but on August 13, after a three days' tramp, their labors were rewarded by a deafening roar in the distance. Their provisions were now nearly gone, stores having been cached on the way up, but they pushed resolutely on to the height of the Labrador plateau called "The Height of Land." It is this plateau which is the source of the stream, and the descent of the river to the sea forms the falls and rapids.

As they neared the falls a magnificent sight spread before them. The spray, which was visible for twenty miles, rose in a cloud from the descent of the water, and the solid rock beneath their feet trembled perceptibly. From the falls the water flows through a cañon formed of arcnaen rock, the sides of which rise to a height of 500 feet and are heavily wooded at the top. Through this cañon the water flows with terrific force, making it absolutely impossible for any boat to live in such a sea. The height of the falls has been exaggerated, and, while presenting a grand and beautiful sight, the falls measure only 200 feet in the perpendicular. The rapids increase the total altitude of the falls to 500 feet.

Above the falls the width of the river is 500 yards, narrowing until it reaches the falls to a width of only 50 yards, when it plunges with a terrific roar over the rapids and falls into the narrow gorge below. Mr. Cole descended to the foot of the falls and succeeded in obtaining some good photographs of them. Having completed the observations of the falls, the explorers kept on a few miles above to the Height of Land, were, from a peak christened by them Mount Hyde Bowdoin, they had a fine prospect of the surrounding country. The plateau is nearly all wooded, with a thick, though not large, growth of soft timbers.

At this point, their provisions being all but gone, they set out for a return. On reaching the point where they left their boat, they found that the camp fire which they had built had consumed their boat, and with it their whole stock of provisions, a gun, and an octant. There position was now somewhat critical. Three hundred miles on a river heretofore unexplored, with no boat, no help, and no provisions until they would reach their first cache. They set bravely to work, however, and with a small hatchet for their only implement, constructed a small raft, binding the logs together with spruce roots. On rafts made in this way they traversed the 300 miles to the mouth of the river, enduring the greatest hardship.

Their only weapon was a small revolver, for which they had but twenty-five cartridges. With it they shot a few squirrels, making a meal on each animal. On the way down five different rafts were constructed, the making of which, in their wasted condition, consumed a great amount of time and energy. They reached the vessel Sept. 1, receiving a royal welcome from their friends.

The falls which they have discovered are reported to have been seen by two employes of the Hudson Bay Company, but no authentic account of any such discovery has been given. The successful result of the expedition is due wholly to the heroic efforts of Messrs. Cary and Cole. and Bowdoin College may well be congratulated by her sister colleges for the addition which she has made to the heretofore scant knowledge of the geography of Labrador.

LEPROSY.

Leprosy, that "unclassified fossil in the paleontology of disease," as Sir Morell Mackenzie aptly terms it, though far more prevalent throughout the world at present than it was a century ago, is still, by medical men, a shunned and neglected contagion. I use the word *contagion* advisedly, and in the sense of "an infection," as given it by lexicographers. Though New Orleans and San Francisco have their leper colonies and lazar houses, though the appearance of sporadic cases is not uncommon in our northeastern cities, still in the United States, as elsewhere in Anglo-Saxondom, the disease continues to be regarded and treated as incurable, and as only to be put out of sight and out of mind. Notwithstanding our regular trade with the West Indies, New Brunswick, Mexico, the Sandwich Islands, China, and India—all of these being forcing-houses from which the disease is supplied to the world at large—the medical profession in this country continues to ignore the disease, and only appears to be aware of its existence when the detection of one or two cases is announced in some center of population, as recently happened in the case of the two Chinamen in New York. Then the theories advanced are only limited by the number of doctors who rush into the arms of the interviewers, and the almost total ignorance which they exhibit is detected by most of their readers, though it is most apparent to one who has for a time dwelt in countries where leprosy abounds.

That leprosy has become firmly fastened in the Western World, and is no longer to be regarded as the scourge of "Bible lands" alone, is only too evident to any resident or leisurely traveler in tropical America; and even among the Creoles of Louisiana, the Chinese of California, the Scandinavians of Minnesota and Wisconsin, and the Mormon converts from the Sandwich Islands at Salt Lake, the disease now has a hold that is likely to be most difficut to overcome. Its very rapid spread throughout the countries under Anglo-Saxon rule has been pointed out by many English and German writers of note. When so eminent a specialist as Sir Morell Mackenzie says that "it is impossible to estimate even approximately the total number of lepers now dying by inches throughout the world, *but it is certain that they must be counted by millions*," and then adds, "That leprosy has spread considerably in recent times there can be no manner of doubt. . . . The seeds of leprosy take something like half a century to mature, and there is every prospect that unless the natural evolution of the scourge can in some way be prevented, a terrible harvest will be reaped *before many years are past*," it is time that our National Board of Health or some competent authority should begin a systematic and thorough inquiry into and examination of the disease.

But four centuries have passed since there were 250 lazar houses in England alone, over 2,000 in France, and probably about 11,000 throughout all Europe. Then laws governing lepers were as carefully framed and as rigidly enforced as any on the statute books. In Oahu, near Honolulu, the advance guard of the coming scourge was first observed by Dr. Hillebrand in 1853. The disease was not officially recognized until 1859, when only a few cases were known to exist. Yet in six years the known cases had increased to 230 by government count, and the situation was becoming so serious that in the following year the segregation settlement at Molokai was opened. Since that over 3,500 cases have been received there; the place has become world famous by reason of the self-denial, the life and the wretched death of the Belgian missionary priest, Joseph Damien de Veuster, commonly called "Father Damien." Going as a volunteer to minister to both the bodily and mental wants of these isolated wretches, starting in the prime and very flower of perfect manhood, but a short time had elapsed before we hear him beginning his address to his little flock with the words "We lepers." Yet a few years more and the sad story is ended, as he writes in his last letter to a friend, "I try to carry without much complaining and in a practical way the long foreseen miseries of this disease." It is inconceivable that Damien and his assistants should not avail themselves of every known appliance, treatment, and precaution whereby to avert the dangers of the contagion, yet, picked as they were from the healthiest volunteers, we find his death soon followed by the attack of his chief assistant, the doctor in charge, and of 66 *kokuas*, or helpers, 26 are known to have contracted the disease, and in nearly a score more it is reasonably suspected. In the West Indies the disease has been rapidly extending its ravages for at least 75 years back. In that space of time, in Trinidad, leprosy has increased nearly four times as rapidly as the population. In British Guiana there was, two years ago, one leper in every 250 of the inhabitants, their death rate was 16 per cent, and the disease was reported by the chief medical authority to be "spreading with great rapidity." Mr. Edward Clifford, who has given much attention to the present rapid spread of the disease, is confident that 250,000 cases is a moderate estimate for India. The present state of affairs in China beggars description and defies computation. In Canton alone one lazar house contained 900 lepers in 1887, and 2,600 victims were known to be at large in the city. Do not these facts point in one direction? Are we to calmly await such another outbreak as Europe saw between the 8th and the 13th centuries, when the disease in certain years slew its tens of thousands and became so prevalent among the better classes that the Order of St. Lazarus, governed only by lepers, with its chief house in Jerusalem, numbered its chapter houses by the scores throughout Europe, and at last became one of the wealthiest bodies of the time, so great was its power to extort alms from all classes? No doubt the diet and the habits of life to-day are far in advance of that of five centuries ago, but the examples of the difficulty that is experienced in stamping out the contagion, even under the most favorable sanitary conditions, are ample; and while Norway's experience in the last 50 years has taught us what segregation, reasonable diet, and extreme cleanliness will do, it has also proved that time and eternal vigilence are potent factors in this problem. Why then shall we wait for the rapid increase of the disease in the more favored localities in this country—an increase that is bound to come in time if the present reign of neglect continues?

H. P.

Locomotive Explosion.

At Oyster Bay, Long Island, on September 9, the boiler of a 46 ton passenger locomotive exploded, killing the engineer and fireman and one brakeman. The body of the engineer was thrown two hundred feet away to the south of the track, while that of the fireman was thrown a hundred and fifty feet to the north, and the body of the brakeman was thrown over and twenty feet to the rear of the train, which consisted of three cars. The brakeman was on the tender, and the engineer and the fireman were in the cab, the train standing at the depot just ready to start, when the explosion occurred. The crown sheet of the firebox, with a portion of the cab, were thrown about a hundred and fifty feet away, while the locomotive was left in a nearly vertical position, its front portion being partially forced into the ground. The explosion was evidently in the water chamber over the firebox, but its cause is unexplained, although it is reported that the dead engineer had said the riveting in the crown sheet and some of the outer plates of the firebox was defective. The locomotive was built in 1889 and had been overhauled a few months ago.

Producing Marbled Surfaces.

This method, by Soren C. Madsen, of Sleepy Eye, Minn., is as follows: Place a piece of clear glass over a sensitized surface (paper or otherwise). Then sprinkle on the upper surface of the glass, in irregular patches, sand, broken glass, and broken smoked glass, with the smoke partially rubbed off in places. This material must be so distributed as to leave the surface of the glass almost clear in spots and nearly opaque in others. Then expose to the direct undiffused sunlight, or artificial light, and the marbled appearance will be produced or printed on the sensitized surface.

Converting Iron into Steel.

W. Hodge says this process is a modification of the ordinary method of cementation, and differs from it in the substitution of carbonized or partially charred spent tan for the charcoal generally used. It is claimed that the resulting steel is not blistered and that the grain of the iron bars is not deleteriously affected, so that the reheating or remelting is unnecessary. Articles of wrought iron may also be case-hardened by this process.