

ENGINEERING.

The Quebec Bridge Board of Engineers has called for bids for the removal of the wreckage of the old bridge and building the new substructure.

The Roosevelt dam on the Salt River project of the United States Reclamation Service in Arizona, at the end of September lacked only fifteen per cent of completion.

What is said to be the largest belt in the world has just been completed. It is 240 feet long and 6 feet wide; it has three-ply thickness, and the cost was \$5,800; 540 hides were used in the construction.

In round numbers there are 1,250 street and inter-urban railway companies in America, with a total of 35,000 miles of single track and 75,000 passenger cars. The total number of passengers carried annually is 10,000,000,000, and the gross annual income is \$440,600,000.

The monthly report of the passenger-train performance on the New York steam railways for August last shows that 65,312 trains were operated, of which 87 per cent were on time at the division terminals, as against 62,397, or 78 per cent, which were on time in August, 1908.

Continued rains throughout the Isthmus of Panama has resulted in two slides, which occurred in the Culebra cut. The occupants of the houses near by have been removed to safer quarters. The Chagres River has flooded large tracts, and in a number of places the railroad is under water.

The French War Office has recently acquired an automobile which is capable of being instantly changed from a land to a water machine. It has a speed of 40 kilometers on land, and 12 kilometers while in the water. It can carry four persons, and is actuated by a 14-horse-power motor.

In an address before the American Civic Association, Mr. Herbert M. Wilson, chief engineer in the United States Geological Survey, places the annual damage and waste by smoke in the United States at \$500,000,000 in the large cities alone, or about \$6 to each man, woman, and child of the population.

A gasoline car is being given a trial on the road leading to the estate of the late Mr. Harriman at Arden. The experiment is considered an important one, and it is thought results will prove that the gasoline-propelled car can be used as economically as one propelled by steam on short branches.

Suit was begun in Pittsburg on November 16th by the Krupp steel-manufacturing interests against an American steel-manufacturing concern for infringement of certain patent rights involving the manufacture of armor plate. The testimony relative to the patents used by the defendant concern was given behind closed doors.

The first boats built especially for the 1,000-ton barge canal arrived in New York a short time ago. They consist of a steam-power boat and five barges. They brought down on their first trip a cargo of 83,000 bushels of oats. At present there are only 2,000 canal boats of all sizes in New York State, and of these only 400 are of the first class; even these are rapidly wearing out.

A curious test was recently made on a manganese-steel bank safe by experts. The safe withstood fifteen charges of nitro-glycerine. The explosion of the last charge threw the safe over backward, and blew off the outer layer of the door. It was found that the inner part of the door, however, was but little affected. Unless some more effective method can be tried for opening safes of this type, they may be considered for the time being to be burglar-proof.

An article in *Le Génie Civil* states that seventy-eight electric furnaces now exist in the steel works of the world, of which thirty-five are on the induction and forty-three on the arc principle. Fourteen are Kjellin furnaces, eleven Stassano, ten Röchling-Rodenhauer, three Elektrometall Society (Sweden), and one each Colby, Hiorth, Keller, Schneider, and Wallin. There is a steady and marked tendency to increase the capacity of these furnaces, some of those already constructed holding as much as eight to ten tons.

The first regular passenger train through the Pennsylvania Railroad tunnels from Harrison, N. J., under the North River, across Manhattan Island, and under the East River to Long Island City, made the trip on November 18th. This announced the practical completion of one of the most important achievements in American railroading. As the tunnels have not been electrified as yet, the train was pushed through the tunnels by a locomotive. The train was filled with officials, and time was allowed to thoroughly inspect the work, which will have cost nearly \$160,000,000 by the time all is completed. All the tunnels will not be open to the traveling public for several months to come. It is probable that the section between the Manhattan station and Long Island will be open to the public by March 1st next, and that the whole tunnel will be open by June, 1910.

ELECTRICITY.

The Chicago City Council has recently passed an ordinance requiring that in cases of a delay of over ten minutes on surface or elevated lines, fares must be refunded to the passengers.

Our Vice Consul General in Calcutta calls attention to the opportunities in India for the sale of small electrical installations in country places. He describes a small plant consisting of a dynamo driven by an oil engine and a storage battery, which is arranged to operate thirty lights and eight electric fans. He urges American electric companies to investigate the subject, as there is a large opening for such installations.

The Spiez-Frutigen section of the Bernese Alpine Railway is about to be electrified. The power will be obtained from a pair of turbo-generators at Spiez, generating 6,400 horse-power at 15,000 volts. The line will be provided with two locomotives and three motor cars, each car weighing 55 metric tons. The motor cars will be required to take a load of 240 tons up a grade of 1.55 per cent, or a load of 160 tons up a 2.7 grade at about 30 miles an hour.

A very convenient device for cleaning incandescent lamp globes that are out of reach has recently been put on the market. It consists of a pole provided with a pair of rubber-covered jaws, which may be closed onto the lamp by pulling a cord. The lamp globe may then be unscrewed from its socket. The jaws remain closed until a second cord has been pulled. In cases where the lamps do not project vertically downward the device is applied to a pole, which is jointed so that the jaws may be inclined to fit over the lamp.

Central Park, New York, is to be illuminated with 1,477 electric lamps in place of the 400 gasoline lamps now in use. Three reasons have been given for this change. In the first place, the park is insufficiently illuminated at present; secondly, the use of gasoline has resulted in the destruction of grass around each lamp post, due to dripping or leakage; and finally, the lamplighters have worn paths across the turf from one lamp to another. The use of electricity will not require unsightly overhead wires, as the circuits will be contained in armored cables placed underground.

The introduction of tungsten lamps is doing much to advance the use of electricity on farms. It is possible for the farmer with a small plant, driven either by a gasoline engine or by damming a small stream, to obtain sufficient current to light his house and barn with this economical type of incandescent lamp. The use of electricity on the farm, by the way, is growing and, as pointed out by the Electrical World, farmers will in time come to consider electricity a necessity. Then it will be found profitable to establish central generating stations for farming districts to take the place of the small individual plants now being installed.

Experiments have been made in Switzerland showing that the higher altitudes provide exceptionally favorable locations for wireless telegraph receiving stations. Messages coming from points within a radius of two thousand miles have readily been picked up in the Alps. This is probably due to the fact that there are few intervening objects between these elevations and the sending stations which would be apt to interfere with the Hertzian waves. It has always been difficult to send messages across the Alps, or even from one part of Switzerland to another over the high altitudes, for the reason that the mountains absorb much of the energy.

Action has not yet been taken by the Chicago City Council on the question of enforcing the electrification of Chicago's railroad terminals. The employees of the railroad are raising objections to the proposed ordinance. They point to the fact that electrification would increase the danger to railroad men, particularly in the freight yards, claiming that it would be impossible to switch cars without having men standing on the car roofs, and here they would be liable to come in contact with sagging trolley wires; while if the third-rail system were used it would always be a source of danger, even though protected. One of their principal objections, however, is that they would be in danger of losing their positions.

According to an article in Harper's Weekly, one cent's worth of electricity will make four cups of coffee, or cook a steak, or boil two quarts of water, or make a Welsh rarebit, or operate a 7-inch frying pan for twelve minutes, or an electric griddle for eight minutes, or an electric broiler for six minutes, or run a sewing machine for three hours, or an electric flat-iron for fifteen minutes, or a luminous radiator for eight minutes, or a heating pad for two hours, or a foot warmer for fifteen minutes, or a massage machine for four hours, or a curling iron once a day for two weeks, or a dentist's drill for an hour and a half, or an electric piano player for an hour, or vulcanize a patch on an automobile tire, or keep a big glue pot hot for an hour, or brand electrically 150 hams, or raise a passenger elevator five stories a minute, or raise 250 gallons of water 100 feet high, or raise ten tons 12 feet high in less than one minute,

SCIENCE.

King Victor Emmanuel recently visited the Baths of Diocletian, which it is proposed to isolate and restore on the occasion of the celebration of the fiftieth anniversary of the proclamation of United Italy. The king has approved the project to re-pristiniate the plan of Michael Angelo, who adapted the ancient ruins to the present church instead of building a new façade, as was originally intended. Thus the ruins will remain untouched. The sum of \$160,000 has been provided to meet the expense of the necessary work.

The Duke of the Abruzzi has presented the "Stella Polare," the whaler which he purchased for the expedition to Franz Josef's Land, to the Riceratorio Navale di Roma, an institution founded by the Naval League with the object of training young men both for the merchant marine and the royal navy. The "Stella Polare," which is at present at Spezia, soon will be brought up the Tiber to Rome and will be anchored off the port of Ripagrande, where it will be used for training students of the Riceratorio.

A physician who has made a careful study of the effects of roller skating has shown that excessive indulgence in this sport frequently results in flat feet, defective development of the leg muscles, and impairment of the gait and carriage of the body. Roller skating is especially injurious to growing children, whose muscles, bones, and joints are still in process of development. The muscles used in walking, especially those of the feet, remain inactive in roller skating, while other muscles are overworked. Hence the body becomes more or less deformed, especially in the case of young girls, who fail to acquire their normal grace and beauty of form.

The American Museum of Natural History has acquired about two-thirds of a skeleton of a ceratopsian, a newly discovered species of which the triceratops or dinosaur is a member. The skeleton's size is about the same as the triceratops, which it resembles generally. The discovery of this remarkable prehistoric animal was made by Barnum Brown of the museum staff, who has just returned with an expedition from Montana. The Laramie formation in which the skeleton was found is estimated at 3,000,000 years. This species of dinosaur was an herb eater and walked on four feet. Its measurements, if it is the same as a triceratops, should be about twenty-three feet long and about seven feet wide.

Within the next few months radium will be manufactured in London. Hitherto the world has had to depend upon Continental laboratories for its radium. The new factory has been constructed according to the requirements of Sir William Ramsay, who has devised a method of radium extraction which will, it is claimed, enormously reduce the time now needed for the elimination of the non-radio-active elements of pitchblende. The more elementary properties of radium in the domain of medicine are becoming fairly well known, and hopes are not yet abandoned that by its immediate means one at least of the great and fast-growing curses of modern life may ultimately be arrested. It is, in the first instance, for therapeutic purposes that the new English manufactory is now being built.

Lendenfeld has made moving pictures of the flight of insects, with exposures of 1/42,000 second. Cranz has made a cinematographic study of the action of weapons and projectiles, employing for illumination electric sparks of a duration of one ten-millionth of a second, and obtaining pictures of 400 successive phases of the operation of the firing mechanism of an automatic pistol, although the entire operation occupied only about one-tenth of a second. On the other hand, Kohler has made a series of Roentgen ray photographs of the movements of respiration, the time of exposure of each photograph being 15 seconds, during which the breath was held. The photographs, after suitable reduction, were joined together in a continuous strip, which when used in connection with a cinematographic projecting apparatus, gave a moving picture of the respiratory process.

About two years ago Rutherford discovered that charcoal made from cocoanuts possesses the property of absorbing at ordinary temperature and retaining for a long time the gaseous emanations of radium, thorium, and actinium. Dr. Shober of Philadelphia has attempted to make practical use of this property for medical purposes, especially for the internal application of radio-activity. Attempts to use water as a vehicle of the emanation had failed, because water loses its radio-activity very rapidly. The experiments with coconut charcoal have given very satisfactory results, both qualitatively and quantitatively. The charcoal is entirely neutral and permanent, and can be administered internally with perfect safety. It can be made very easily and cheaply, has 200 or 300 times the radio-active absorptive capacity of water, and retains its activity for at least two weeks. The administration of the new preparation is very convenient and affords the possibility of producing, in equal or greater degree, all the effects of radio-active spring water.