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ELECTRICAL EQUIPMENT OF THE PARK AVENUE TUNNEL.

The New York Central Railway Company is just now engaged in carrying out much needed improvements in their New York terminal station at 42d Street, and it is probable that before winter there will be placed at the disposal of the public waiting-room and other terminal facilities, which will be fully up to the standard set by the leading railroad companies of the world. Now, that the directors have remedied one great defect at this station, it will be the earnest hope of the traveling public that they will take in hand another and even more serious drawback, which is painfully evident to every one who enters or leaves New York City over the lines of the New York Central, or the New York, New Haven and Hartford Company. We refer to the two miles of tunnel beneath Park Avenue which forms the approach to the Grand Central Station. The tunnel is, at all times, a source of inconvenience to the traveling public, and it is not stretching the point too far to say that during two or three months of the year it is atrociously uncomfortable. It is not an uncommon occurrence, during the summer months, when the temperature is between 90° and 100° in the shade, and the humidity near the saturation point, for outgoing and incoming trains to be stopped by signal within the tunnel itself. This delay, we are willing to believe, is not due to any carelessness or poor management on the part of the railroad company, but to the fact that an enormous amount of travel and switching of trains has to be accommodated in a yard that is altogether too small to accommodate it. Whatever the cause, the fact remains that every day crowded trains are delayed in the tunnel, sometimes for several minutes together, when the cars, owing to the sulphurous gases with which the tunnel is filled, have to be tightly closed. The resulting temperature and atmosphere within the cars is positively unique. It can scarcely be equaled, and certainly cannot be surpassed, on any railroad in the world. The nearest approach to it, is, or rather was (for they have made the necessary change to electricity), on the underground railways of London; but there is this difference, that while the air in the London railways was sulphurous, it never approached the intolerable humidity and heat to which travelers through the Park Avenue tunnel are exposed during at least three months of the summer.

If the windows and ventilators of the train could be kept open, there would be a considerable measure of relief; but this is impossible so long as steam traction is employed and hundreds of locomotives are filling the tunnel with poisonous fumes. There is, however, a remedy which is perfectly practicable, and which consideration for the health and comfort of its patrons should lead the New York Central Railroad to adopt without delay. We refer to the electrical equipment of the line from the Grand Central Station up to the Mott Haven yards, beyond the Harlem River. Hitherto, when this improvement has been suggested, the directors and engineers of the company have replied that the art of electrical traction for heavy trains was not sufficiently developed to enable them to undertake its installation with any certainty that it would be a practical success. That may have been true in the past, but it is not true to-day. The success of electrical traction in the Belt Line tunnel at Baltimore, on certain sections of the New Haven Road itself, and in the underground tunnels of London, proves that the day has come when the New York Central Railroad Company may safely undertake a work which can no longer be regarded as an experiment.

We have spoken of the extraordinary discomfort to the passengers who pass to and from the Grand Central Station; but there is another section of the public whose claims are too numerous and just to be ignored. We refer to the residents in Park Avenue and in the neighborhood of the Forty-second Street yard, who have a perfectly reasonable ground for complaint in the noise and dirt occasioned by the continual switching that is inseparable from the handling of the immense amount of traffic that enters this station. All the smoke and dust and most of the noise, attached to the present system of switching with steam locomotives, would be avoided by the use of electric traction; and while the equipment of this yard with its complicated cross-overs and switches would be a matter calling for considerable thought and skill, there is no reason to suppose that it is beyond the power of any first-class electrical engineer of to-day.

AN IMPORTANT PATENT SUIT.

On May 8, 1879, an application was filed by George B. Selden, of Rochester, N. Y., for a patent on a "road locomotive," the power of which was derived from a hydrocarbon-motor. For years the specification and drawings remained in the Patent Office; and not until November 5, 1895, were letters patent finally issued. The long interval between the filing of the application and the granting of the patent, although remarkable, is not uncommon; for interference proceedings or shrewd maneuvering on the part of attorneys may delay the issuing of the patent. Had Selden received a patent in 1879, he could hardly have derived any benefit from the practical application of his invention, in view of the state of the motor-carriage industry at that time. As it is, however, his invention promises to give automobile manufacturers no little concern. The scope of Selden's claims, and the fact that he seemed to be a pioneer in his particular field of activity—indeed, the Commissioner of Patents has even stated such to be the case—induced the Columbia and Electric Vehicle Company to purchase the patent. For that reason the company has begun an infringement suit against two of its rivals, the outcome of which is awaited more or less anxiously by many, if not all, manufacturers of petroleum vehicles.

Whether the Selden patent be valid or not, is a question which can be definitely answered only by the courts. Certain it is, that if the charge of infringement be sustained, the shops of many an automobile maker will be closed.

It is not the particular type of engine used by Selden upon which the suit is based; indeed, if the truth must be told, the engine would now be considered antiquated. Although a particular type of motor was described, Selden did not limit himself to that type. As he himself stated, any liquid hydrocarbon motor of the compression type might be used. He did, however, claim to have been the first to employ in combination with a carriage driven by a hydrocarbon motor a clutch mechanism interposed between the driving shaft and the propelling wheels, by means of which mechanism it was possible to throw the motor and the driving-axle in and out of gear. Selden saw the inconvenience of extinguishing the ignition flame in order to bring the carriage to a standstill. The necessity of starting up the motor by hand rendered the provision of a device, whereby the carriage could be stopped, although the motor were still in operation, of no little importance. He, therefore, introduced the clutch which, it may be safely said, constitutes the cardinal element of his invention. The arrangement is covered in the first and broadest of his claims, which reads:

"The combination with a road-locomotive, provided with suitable running-gear including a propelling-wheel and steering mechanism, of a liquid hydrocarbon gas-engine of the compression type, comprising one or more power cylinders, a suitable liquid-fuel receptacle, a power-shaft connected with and arranged to run faster than the propelling-wheel, an intermediate clutch or disconnecting device and a suitable carriage-body adapted to the conveyance of persons or goods."

It has been stated that a shaft arranged to run faster than the propelling wheels and an intermediate clutch or disconnecting device was never known before the date upon which Selden filed his application. The suit will be watched with much interest by the profession, as there is a good deal of difference of opinion as to the general line of defense that will be taken up by this defendant.

RAIL-JOINTS AND STREET NOISES.

Speaking of the contribution of railroad traffic to the sum total of city noises, reminds us that the present form of rail-joint contributes a large share to the general din of street and railway travel. In spite of the many excellent forms of rail-joints that have been brought out in the past ten years, such a thing as a noiseless joint has yet to be produced. Evidence of this fact can be found in listening to the "anvil chorus" which marks the progress of a train on the Manhattan Elevated Railway, where the blow which is given by every wheel as it passes the joints may be heard many blocks away; and yet the Manhattan Railway has been fitted exclusively with a joint which is acknowledged to be one of the very best on the market! In the case of the Manhattan Company, it is only fair to say, the noise is greatly intensified by the metallic structure of the viaduct, which acts like a huge sounding board.

The concussion which is produced whenever a wheel passes a joint is due to the fact that as a wheel leaves the end of a rail, that rail end is depressed below the end of the rail against which it abuts, and consequently the wheel, in passing to the rail ahead, strikes it a blow which has considerable longitudinal effect in it. Hence, the loud clangor which accompanies the passage of the train over a stretch of track with "loose" or "low" joints, a clangor which increases in direct ratio to the poor quality of the track.

If ever the inventor shall succeed in producing a joint that is literally "as strong and stiff" as the body of the rail itself, this trouble will vanish and we shall have a practically silent track. Some of the best joints upon the market come, theoretically, up to this mark; but when they are placed in the track, and are subjected to the hammering action of the enormously concentrated loads which characterize the modern engine and train, it is not long before the well-known click begins to be noticeable, giving warning that the failure of the joints has commenced, and that a deterioration has set in which no amount of subsequent care on the part of the section gang can prevent. During the past few years we have watched with great curiosity the behavior of the joints on certain sections of the underground trolley lines in this city and on certain trunk railroads which have their terminus here. The rails in each case weigh from 100 to 107 pounds to the yard, and the joints are well spliced and heavy; yet it has never been more than six to nine months before the hammer-like blow of the wheels, as they passed the joints, began to be audible, and each year's traffic has shown a slow but certain deterioration in their resisting power. Theoretically, the perfect remedy is to be found in abolishing joints altogether and welding the rail ends. Could this be done, and carefully done, when the rails are first put in, we see no reason why the difficulty should not be solved altogether, and for good. And we suggest that while the Metropolitan Railroads are making the vast improvement of putting in the third-rail and abolishing the locomotive, they should also try the welded joint on a mile or two of their track, to see whether they cannot at least modify, if not altogether abolish, the loud hammering which marks the passage of their trains.

RESOURCES AND IMPROVEMENTS IN CHINA.

China is essentially an agricultural country. Horticulture is a favorite pursuit and fruit trees are grown in great variety. Sweet barley, maize and millet and other cereals, with peas and beans, are chiefly cultivated in the north, and rice in the south. Sugar, indigo and cotton are cultivated in the southern provinces, and opium is a crop of considerable importance. Tea is cultivated in the west and south. The culture of silk is equal in importance to that of tea. The mulberry tree grows everywhere. There are cotton mills at Shanghai and silk is wound from cocoons in Shanghai, Canton and elsewhere. All of the eighteen provinces contain coal and China may be regarded as one of the first coal countries in the world. Iron ores are abundant and copper is plentiful in certain districts. The commercial intercourse of China is quite considerable, trade being carried on with the principal countries of the world, including the United Kingdom, Germany, France, Russia and the United States. The great source of revenue for the provinces is the duty on goods coming overland from the adjacent provinces.

Until February, 1898, no foreigner could travel in the Empire except at certain designated points, usually the treaty ports, but since that time all foreigners who have passports, may visit any part of the Empire on pleasure or business. The roads in China are poor and only a few are paved, and for this reason the greater part of trade is carried on by means of numerous canals and other waterways. The country is irrigated by great rivers, and intersected by a system of canals which is more than six hundred years old. The canals are badly managed and are in a state of decay.

Less than five hundred miles of railway have been constructed in China, but a very complicated system has been projected, and Government concessions have been given for the purpose. It is likely that as soon as the present trouble in China is adjusted, that this country will be the scene of great activity in railway building. In all, concessions have been given for 7,500 miles of railway. This will include connections with the Chinese Eastern Railway, the railways to Shanghai, Hankow, Canton, and Mandalay. As the country is 3,500 miles long from north to south, possessing a varied climate, productive soil, and great natural resources, it will be seen that there is a vast field for enterprise in railway building, and European countries and the United States are only desirous of seeing a stable and friendly government established before they begin to invest their capital in vast railway enterprises which cannot but prove to be profitable investments.

All the principal cities of the Empire have telegraph service. An arrangement was made with the Russian telegraph authorities in 1892 by which communication was established between Peking and Europe. The apparatus and methods used in telegraphing in China are of the most primitive description. The Chinese have no alphabet, but each word has a sign. In order to telegraph them, each sign has to be numbered, and the number is sent by wire. The receiving clerk refers

to his tables and translates the number into the Chinese signs. The tables resemble logarithm tables, the signs being printed in vertical columns and each column containing 20 signs, and as there are 10 columns, there are 200 signs to the page. There are 49 pages to the complete book, consequently there are 9,800 numbered signs. Each square contains a sign for a word. The sender must write his message in Chinese on a blank form; this is then converted into numbers, and they are telegraphed.

The average length of the words is four letters, but the words frequently run to ten or twelve letters.

The postal system of the Empire is still in a primitive condition. It is carried on under the direction of the Minister of War, by means of post carts and runners. There are 8,000 offices for post carts in the eighteen provinces, and there are 2,040 offices for runners scattered over the Empire. There are also many private postal couriers, and during the winter the foreign customs office maintains a service between Peking and the outposts.

THE NEW AGRICULTURE OF THE TROPICS.

The agriculture of the tropics differs widely from that of the temperate zone, but the same general principles of culture, improvement of plants by careful selection, and systematic conversation of the fertility of the soil, apply to both. In the tropics nature is supposed to do most of the work, while the farmers merely plant and harvest. The natives of most hot countries are content to accept this version of farming, and hence live a life of idleness with little thought for the morrow. In spite of their neglect of the trees, vines and plants that yield fruit, they rarely suffer from famine or lack of food, unless their crops be destroyed by hurricanes or floods.

But while tropical agriculture is easily compared with farming in more northern countries, it has never been completely successful without the systematic application of scientific principles. Part of the "white man's burden" has been in the tropics to revolutionize agriculture. Without proper agricultural implements, lacking the means and knowledge to develop the soil and plants, the natives have made no improvement on their antiquated methods.

The possibilities of tropical agriculture are only faintly understood to-day; but an idea of what the future may hold in store for scientific farmers can be gathered from the advances already made by the English, Dutch, German, and Americans in the tropical lands which they have occupied. Before white men settled in tropical America the sugar industry was in the most primitive condition. Machinery for extracting the juice of the cane was unknown, and the plants were semi-wild growths that yielded a very small percentage of sugar. English, American, and German settlers immediately proceeded to develop a higher type of sugar cane, and to invent machinery that would simplify the work of obtaining the sugar. The improvement of the sugar-cane plants and the invention of adequate machinery have added hundreds of millions of dollars of wealth to tropical America, and have given regular employment to the natives.

Rice and cotton are two other typical plants of the tropics which have come under the control of the white farmers. In our own Southern States these crops have been so improved within the memory of the present generation that the yield of every acre has been tripled and the quality of the products improved fifty per cent. The culture of both rice and cotton in the United States by Americans and in Egypt by Englishmen is systematic and intensive. Machinery supplements farm labor, and adds millions of dollars to the value of the crops. The improved cotton plants of to-day represent almost distinct types from those cultivated by the natives in other lands.

The coffee plant originally cultivated by the aborigines of the tropics were inferior producers of a bean so poor in quality that it would now hardly be tolerated in any household. The bean was small and without flavor, and the scraggy plants yielded small, uncertain crops. The Dutch farmers cultivated and improved the plants in Java until a standard was reached which has not yet been surpassed. Brazil abounded in coffee plants, which the natives indifferently cultivated until white men came and showed them how to make their plants grow coffee better in quality and larger in quantity. Brazilian coffee is likely to meet a formidable rival in Porto Rican coffee in the near future if American farmers apply the same care to the development of the crop that they have bestowed upon other tropical plants that have fallen into their hands.

When California and Florida came into our possession we had no territory that was even semi-tropical in climate or products; nevertheless, these two States gave the American farmer an opportunity of showing his skill in tropical horticulture. The wonderful orange groves of the two States, with their abundant crops of the finest fruits in the world, the extensive orchards of olives, figs and nuts, the great vineyards, the ranches and plantations of bananas, lemons, grape fruit, and scores of tropical and semi-tropical fruits, testify to the skill and success of Yankee farming in tropical or semi-tropical zones.

Fruit-culture in the tropics is at present in the most primitive stage; except in a few notable instances, these tropical products are grown just as nature first produced them. Little or no attempt has been made to double the yield or to improve the quality. The policy of the native farmers has been to do no more than was actually necessary. In view of the changes in the tropical geography of the world wrought by recent wars, the question of the future of the agriculture and horticulture of these lands is rapidly assuming great importance. If the possibilities of the soil and climate under improved culture and the application of farming implements and machinery are all that leading scientists claim, the world's food supply ought to be doubled and tripled in the next decade or two.

According to scientific horticulturists, these improvements will be along two lines. The first will be the improvement and development of the soil so that its utmost capacity can be measured. As in the north, the earth will be fed and not simply robbed of its fertility. An acre of pineapples, bananas, or cocoanuts under a good system of culture should produce twice as many fruits as it does to-day. Modern machinery and farm implements will help the crops in thus utilizing the fertility that has been buried in the subsoil for thousands of years. The loosening of the top soil, and the consequent freeing of the imprisoned nitrogen, should stimulate the growth of the trees and plants so that they will assume a greater size and productivity.

But while intensive methods of agriculture and horticulture in the direct line of cultivating the soil will have marvelous effects, the greatest improvements are looked for in the improvement of the plants and products by careful selection, hybridization, and grafting. Our horticulture owes much to these simple processes. The white men have brought from the tropics plants which have been adapted to cold climates. If the same methods are employed to improve the tropical plants in their own homes the results must be even greater. This has already been demonstrated in the banana, cocoanut, pineapple, and orange groves of South and Central America. The new plantations of cocoanut trees in Central America are not only producing larger crops than the old ones, but the nuts are far superior in size and quality. An American syndicate operating fruit farms in Central America has already shipped an improved variety of pineapple north that almost equals the famous London hothouse pineapples. The bananas are so susceptible to improvement that horticulturists do not hesitate to predict that they will soon be produced twice the size of those now imported. But quality as well as size is considered. The development of the "lady finger" bananas is now in course of rapid progress, and this delicate fruit will have a flavor in the future that will be beyond compare.

We are just on the threshold of developing the world's crop of fruits. In the temperate zones the grains, cereals, and cattle have reached a higher stage of evolution than any other products; but the day for the fruits of the tropics is dawning. From South and Central America, from the islands of the Pacific and Atlantic, from equitorial Africa, and from the lands of the Orient, streams of tropical fruits will in the near future pour into Europe and America in return for the cereals, meats, and products of the colder climes. Under modern agricultural methods, an abundance of fruits for the whole world can be raised in these warm regions at a cost so low that none need be so poor as to go without them. The importance of this change of food supply upon our national diet will be of interest to those engaged in the physiological study of the civilized man. With rich nourishing tropical fruits so cheap, our meat diet among the poor, at least, must decline. The effect upon the physical and mental characteristics of the race will be interesting. One of the chief drawbacks to the more rapid spread of vegetarianism is said to be due to the insufficient variety of our common fruits and vegetables. The cultivation and development of the fruit crops of the tropics by white settlers must inevitably tend to remove this restriction.

In the tropics the people are largely vegetarians. It would not be so difficult to spread and popularize the principles of vegetarianism in a land where one's meal might well consist of a dozen different varieties of luscious and nourishing fruits, nuts, and vegetables.

G. E. W.

INDICAN.

Indican may be obtained from indigo leaves in colorless, spear-shaped crystals by treating an aqueous decoction with barium hydroxide, filtering off impurities, and removing excess of the base with carbon dioxide; the filtrate is evaporated to dryness, and the crude residue extracted with methyl alcohol, adding ether to the extract to precipitate the last traces of foreign substances. The solvents are then distilled off, and the final residue dissolved in water, the solution being allowed to deposit the glucoside. It crystallizes with $3H_2O$, melts at 51° C., and passes into a gummy mass at 100° C. When dried in a vacuum over sulphuric acid, indican loses its water of crystallization, and then melts at 100° to 102° C. Analysis seems to indicate the formula $C_{14}H_{17}NO_6$. The glucoside is moderately soluble in water, acetone or the alcohols, and has a bitter taste. When air is passed through a solution of indican in dilute hydrochloric acid containing a little ferric chloride, 91 per cent of the glucoside is converted into indigotin, a certain amount of indigo red being simultaneously produced.

AS OTHERS SEE US.

The vagaries of American journalism is a favorite theme with the Transatlantic editor, especially at such times as for want of a fresher topic he must fall back upon his list of stock subjects for an inspiration. It is possible that now and then we, on this side of the water, do allow imagination to trespass upon the domain of fact; but never, surely, have we eclipsed the performance of our contemporary. In a representation of the scene of the Hoboken fire, published in one of the leading English illustrated weeklies, the Hudson River is shown to be spanned by two colossal bridges, one at Twenty-third and the other at Fifty-ninth Streets. Where the imagination of the artist received its stimulus we cannot tell—though we might hazard a guess—but certainly this view was not drawn "upon the spot," or even "from a photograph."

The two structures referred to exist only upon paper. That at Twenty-third Street was designed some dozen years ago, by Gustav Lilienthal; the Fifty-ninth Street bridge bears a slight resemblance to the design drawn up by an army board of engineers for a 3,000-foot cantilever, with a view to estimating its cost in comparison with the cost of a 3,000-foot suspension bridge. Badly as these two bridges are needed, the cost is prohibitive; for not even the most sanguine promotor dares to assert that their revenues would cover the interest on the initial outlay of from $110,000,000 to $140,000,000 for bridges, real estate and terminals.

THE PRESERVATION OF WILD ANIMALS OF AFRICA.

A convention was signed at London, on May 19, 1900, for the preservation of wild animals, birds and fish in Africa. The contracting parties are the Queen of England, the Emperor of Germany, the King of Spain, the King of the Belgians, the President of France, the King of Italy, and the King of Portugal. The zone within which the provisions of the convention apply is bounded on the north by the twentieth parallel of north latitude; on the west by the Atlantic Ocean, and on the east by the Red Sea and by the Indian Ocean, on the south by the line following the southern boundary of the German possessions in Southwestern Africa. The contracting powers declare that the most effective means of preserving the various forms of animal life existing in a wild state within the zone is the prohibition of hunting and destruction of vultures, secretary birds, owls, rhinoceros, giraffes, gorillas, chimpanzees, mountain zebras, wild asses, white-tailed gnus, elands, and the little Liberian hippopotamus.

The convention also prohibits the hunting and destruction of the young of elephants, rhinoceri, hippopotami, zebras, antelopes and gazelles, ibexes and chevrotains. The killing of the same species when accompanied by their young is also prohibited. Limited numbers of some of the animals may be killed, and lions, leopards, hyenas, hunting dogs, otters, baboons and other harmful monkeys, large birds of prey, owls, crocodiles, poisonous snakes and pythons may be killed. It is prohibited to hunt the wild animals within the zone except by persons who are holders of licenses issued by the local government, which are revocable in case the provisions of the convention are not carried out. Nets and pitfalls for taking animals are not allowed, and dynamite and other explosives must not be used for taking fish. Particular attention is given to hunting and killing young elephants, and all elephant tusks weighing less than twelve pounds are to be confiscated, provided that the animal was not killed before the convention goes into effect. The eggs of ostriches are also protected, but the eggs of the crocodile, poisonous snakes and pythons are to be destroyed. The contracting parties undertake to apply as far as possible, each in their respective positions, measures for encouraging the domestication of zebras, elephants, ostriches, etc. The convention was duly signed in London, and after having been ratified by the powers shall remain in force for fifteen years.

The preservation of animals in Africa will interest all who care for natural history, or for the animals which inhabit the immense forests and deserts of this great continent. Rapacious gatherers of hides or ivory bid fair to exterminate certain classes, and they are assisted in their endeavors by hunters who often shoot innocent, valuable animals in large quantities for mere sport. With proper care Africa can become a great game preserve for the world, where hunters may go and enjoy their pursuit with reasonable chances of success, but the wholesale destruction of animals by either sportsmen or professional hunters is to be deplored.