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NEW YORK, SATURDAY, JANUARY 27, 1900.

## A NEW ERA IN CITY TRANSPORTATION.

The gentlemen comprising the Board of Rapid Transit Commissioners of the city of New York have at length achieved the formidable task of devising a suitable plan of rapid transit and securing a contractor who was able and willing to undertake the construction for a sum that would not exceed the constitutional limit of the city's indebtedness.

The amount of the successful bid, \$35,000,000, is a vindication of the estimates of William B. Parsons, the chief engineer of the commission, whose estimate of \$35,000,000 was made before the present rise in the price of steel and the passage of the eight-hour labor law,—modifying factors which must have entered largely into the estimates of the successful bidder.

The fact that the road is to be built by John B. McDonald has given general satisfaction, mainly for the reason that he has already had wide experience in the construction of heavy engineering works which are more or less of the character of the Rapid Transit Tunnel. He constructed the celebrated Belt Line Tunnel in Baltimore, and is now engaged in building to the north of this city the large artificial basin known as Jerome Park Reservoir, a task involving the excavation of over six million cubic yards of material, of which the greater proportion is rock. It is the intention of the contractor to sublet the tunnel in several sections and open up work simultaneously along the whole length of the line. If this is done, we see no reason why the contract, great as it is, should not be completed in the estimated time of three years.

When the road is opened, New York city will possess an entirely new system of transportation, with a capacity second only to that of the elevated roads, and superior to all existing systems in the number and speed of its express trains. It will furnish an essentially long-distance service, the bulk of its trains making stops only at the more important stations. It will thus assist in effecting a much needed separation of the enormous volume of passenger traffic that flows up and down Manhattan Island into two distinct classes—the short-distance and the long-distance, the former gravitating to the local trains of the elevated roads and to the surface trolley roads, and the latter to the elevated express trains and to the rapid transit tunnel.

Starting with a loop at the City Hall Park, the first seven miles of the tunnel will contain four tracks—two for express and two for local trains. This portion will lie either beneath or close to the main arteries of street traffic, following the route of Elm Street, Fourth Avenue, Forty-second Street, and Broadway to One Hundred and Fourth Street, where the system will divide into two two-track lines. One of these will bear to the right beneath the northwest corner of Central Park, and will extend beneath Lenox Avenue and the Harlem River to Westchester Avenue and the Bronx Park. The other will be carried beneath Eleventh Avenue and by way of the Kingsbridge Road to a terminus on the Harlem River near Spuyten Duyvil.

The route as thus laid out and forthwith to be built will be extended, no doubt, in the near future. As it stands, the most serious defect is that it stops short of the important section of the city lying between the City Hall and the Battery. The original plans of the commission contemplated a terminus at the latter place; but the bitter opposition of the owners of property in lower Broadway, coupled with the desire of the commission to keep the estimated cost within the debt limit of the city, led to the abandonment of this important section of the original plans. We think that steps should be taken at once looking to the construction of this portion of the tunnel, the removal of the loop from the City Hall Park to the Battery, and the ultimate extension of the road to Brooklyn by means of a tunnel beneath the East River.

The outlook for future transportation facilities in this city is certainly very bright. By the time the tunnel is completed the elevated roads will be electrically operated, and the main lines of the Metropolitan and Third Avenue surface roads will be simi-

larly equipped. To this must be added the undoubted effect of the large service of automobile cabs and buses that is promised in the near future.

## THE AGRICULTURAL OUTLOOK IN PUERTO RICO.

At present very little in the way of plant products is exported from Puerto Rico outside of coffee, sugar, and tobacco. All other crops are considered unworthy of the serious attention of the planters, their cultivation being generally left to the desultory efforts of the most ignorant of the population. There has been little attempt at the improvement of varieties, either by selection or by the introduction of superior seed. Much of the fruit and vegetables sold is of a very inferior quality, quite unsuitable for export. Notwithstanding the numerous books and magazine articles which have been published, there is very little definite information available concerning the agricultural conditions and economic plants of that island.

It having been decided that our Department of Agriculture should assist the more enterprising farmers, both Americans and Puerto Ricans, in experiments, which many of them have already undertaken, in order to find out what new crops suitable for our markets can be grown there, Mr. O. F. Cook was sent, as a Special Agent, by Secretary Wilson to ascertain what species and varieties are now to be found there, in order that the department might be able to secure others likely to be of use in improving and extending the agricultural industries. Mr. Cook has just made his preliminary report.

We are paying over \$200,000,000 for tropical plant products, a large part of which could be furnished by Puerto Rico and the Philippines. For bananas, for instance, we paid in 1898 over \$5,500,000, mostly to Jamaica and Central America. In Puerto Rico the banana has scarcely been considered as an article of export. It has been planted principally for shade in the coffee plantations, and is of unsalable quality. The variety almost exclusively imported into the United States is not generally cultivated. As the conditions for commercial banana growing are very favorable, it may be expected that attempts in this direction will soon be made.

The soil and climatic conditions are exceedingly diverse; it is probable that a wide range of products can be secured, at least for local consumption. Oranges, limes, and other citrus fruits, European grapes, and other semi-tropical fruits and vegetables can be produced in the drier parts of the island; while from the moister parts vanilla, cacao, mangoes, and other more strictly tropical plants can be exported. In the meantime it is of great importance that the existing industries be improved. Sugar lands are receiving attention from American capitalists, and large modern factories are being built. Coffee, the chief product of the island, is perhaps that in which the greatest expansion is possible. Over \$13,000,000 worth of coffee has been exported in a single season from Puerto Rico in spite of methods of cultivation of the most primitive character. Instead of seedlings grown in nurseries, those which spring up by chance, already weak and spindling, are used. This, together with the overcrowding and lack of proper care, brings the average crop down to one-third or less of what might be obtained through better methods. There is a large amount of land suitable for coffee culture, not now planted. If this industry were properly developed, Puerto Rico might supply quite half of the enormous quantity consumed by the United States, our imports in 1898 being valued at over \$65,000,000.

The fact that Puerto Rico contains no large unoccupied areas has led some observers to represent the entire island as thickly populated. This is not the case; while a large part of the available land has been at some time under cultivation, there are many districts in which not more than 10 per cent of it is now in use, except for stock raising, which may properly be called the most popular agricultural industry at the present time. For men without capital or experience in the industries of tropical countries, there are no openings in Puerto Rico. Puerto Rico is unique among the West Indies in the possession of a large white population capable of furnishing labor for carrying out local improvements and of taking part in advancing civilization. This is because of the delightful climate, where the European can live, work, and thrive. A more advantageous point of contact with the tropics could scarcely have been selected.

## "TIME IS MONEY."

The meetings held in connection with the recent International Commercial Congress at Philadelphia, dealt very freely with the questions of the methods employed by manufacturers in Europe and in the United States, and one of the most practical and useful among the many papers bearing more or less directly on this question was read by Mr. W. C. Barker, of New York. While it is impossible to review at any length the whole paper, we draw attention to an important distinction made by Mr. Barker between American and European methods in striving to arrive at the same ultimate economy. It seemed to the

speaker, as the result of his observations abroad, that the European manufacturers lay it down as a cardinal principle that "time" is of no value, sacrificing "time" to save outlay in new and improved plant. They employ old machines, tools, etc., and speed their machines to suit the movement of the poorly paid workmen. The American manufacturers proceed on the principle that "time is money," and, therefore, they spend money freely to save time. They do not hesitate to buy the most improved machines to replace their existing plant from time to time, and they speed up their machines so as to turn out the greatest possible amount of work, and employ the best men that money can buy to operate them.

As a concrete illustration of these two diverse methods, the speaker told of a visit he made to a large manufactory of agricultural machinery in Europe, where he saw "the old single-spindle boring machinery and the single-chisel mortise, boring one hole and cutting one side of a mortise at a time." The manager of the works was "greatly surprised to learn that American manufacturers used gang boring-machines, boring all parallel holes through a piece at one movement, and gang mortisers cutting all parallel mortises at one stroke." In the floor room of the same factory he found them using a rope and pulley attached to a drop-hammer running in upright guides, the machine being worked by hauling the hammer up by hand and allowing it to fall. This was their trip-hammer. The statement that in America power hammers were used, striking 100 to 150 blows per minute, produced positive astonishment.

At the same time the manager of the works seems to have been perfectly well aware of the true key to the difference between methods in the old and in the new worlds, attributing the conservatism of the European manufacturer and his workmen to the influence of tradition and environment, whereas the invention and mechanical genius of the average American was considered to be the outcome of the fact that his ancestors found themselves surrounded with new conditions that required new methods of thought and action, while "their descendants have each kept on thinking out new ways and methods of doing things ever since."

## A WISE DECISION.

At the last meeting of the Naval Board of Construction the various plans which have been drawn up for the armament of the new battleships of the "New Jersey" type were under consideration, and the main question debated was that of the installation on these ships of the double-decked or superposed turret. The SCIENTIFIC AMERICAN has always urged the wisdom of awaiting the results of the forthcoming gunnery trials of the "Kearsarge" and "Kentucky," both of which carry the superposed turrets, before deciding to use this much debated form of construction on the new battleships. We are glad to note that at the meeting referred to it was decided to await the tests of the "Kearsarge," and only adopt the double-decked turret in case the results were satisfactory.

Of the several alternative plans for distributing the armament of the new ships presented by Rear-Admiral O'Neil, most of which have been described in this journal, it was decided to adopt that one known as type A, which was illustrated in the SCIENTIFIC AMERICAN of September 9, 1899; this plan of armament to be followed only in the event of the tests of the "Kearsarge" being unsatisfactory. The type A scheme of redistribution removes the 8-inch guns from the 13-inch turrets and places them in two turrets amidship, one on either beam. The secondary battery consists of ten 6-inch rifles in broadside on the main deck and four 6-inch rifles on the superstructure.

## COMPARATIVE COST OF HORSE AND AUTOMOBILE.

A village resident in one of the English counties has communicated to a local journal an estimate of the relative cost of keeping an automobile and horse and carriage. He arrives at an economy in favor of the motor of \$47.75 on the total expenses for the year, and he does it thuswise: The cost of the horse is \$115, and of the dog-cart \$135; the interest on which outlay, at 4½ per cent for one year, is \$11.25; the keep of the horse, at \$2.50 a week (it must be remembered that these prices are for keep in a country village), and license and shoeing, bring up the total expense for the year to \$159. This he compares with a five-horse power automobile costing \$850, the interest on which, at 4½ per cent for the year, is \$38.25. Adding to this a tax of \$21 and expense of \$52 for fuel (petrol in this case), at the rate of 75 cents for 35 miles, and 25 cents for the same distance for lubrication, he reaches a total annual expense of \$111.25.

It will be noticed that in the above estimate there is no repairs account, an item which we think the average unskilled automobilist of the future will find to be, perhaps, the most serious of all, outside of fuel. In this case, however, the automobilist was something of a mechanic, possessing a lathe, a vise, etc., and he was equal to making all ordinary repairs himself; moreover, he argues that in any case the accidents that