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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

PRESENT CONDITION OF THE NEW YORK TUNNELS.

So extensive are the ramifications of subway construction beneath Manhattan Island and the adjoining rivers, that it becomes increasingly difficult to keep in close touch with the progress of the work on the individual enterprises. The approaching close of the year renders timely a survey of the progress of this work, and an approximate estimate of the time of its completion. Commencing then, with the most important of the schemes, that of the Pennsylvania Railroad Company, the present conditions are that the two tunnels under the Hudson River have been completed as far as the driving of the tubes is concerned, and there remains now the work of carrying the supporting piles down to bed rock and the lining of the tubes with two feet of concrete. It is expected that these two tunnels will be in condition for the passage of trains by the autumn of 1908. The four tubes which the company is building below the East River are known as tubes A, B, C, and D. The most difficult portion of the driving, in which there has been a great amount of delay due to the obstruction of wharves and docks, has been accomplished. Tube A has been constructed for 180 feet, tube B for 1,100 feet, tube C for 700 feet, and tube D for 1,000 feet. The tunnels are being driven from both sides of the East River, and it is expected that all four of them will be put through before the close of 1907, and that they will be concreted up and in condition for use during the following year. The work on the crosstown tunnels connecting the river sections is proceeding without any serious difficulty, and they are expected to be completed by the end of next year.

The Hudson Companies have been making remarkable progress with their four tunnels. The two tunnels from Jersey City to Morton Street were completed several months ago, and the Cortlandt Street tunnels have been advanced about 3,200 feet beyond the Jersey shore. The Morton Street tunnel has been driven up to Sixth Avenue, and north along the avenue to a point between Ninth and Tenth Streets. This tunnel will be extended to Thirty-second Street, where it will end in a commodious terminal station. It is anticipated that this section, with the branch below Ninth Street to Astor Place, will be ready for service toward the close of the year 1907, and that the Cortlandt Street tunnel will be completed about twelve months later.

The Steinway tunnel, which is being built from the Grand Central Station, Manhattan, to Long Island City, is also making remarkable progress. About four weeks ago the headings which were being driven from Manhattan and from a shaft sunk in Man-o'-War's Reef in the middle of the river met, and at the present writing considerably more than one-half of this tunnel has been completed. Unless some unforeseen obstacle arises, this tunnel should be driven through early in February of next year, and should be ready for use by the late summer or early autumn.

The first of the East River tunnels to be completed will be that of the Rapid Transit system, extending from the Battery to Brooklyn. The bore was broken through on the northerly tunnel two weeks ago, and connection will be established next month between the two headings of the south tunnel. There will then remain only the work of completing the concreting and track-laying, to put this tunnel in condition for service, and it is probable that in April or May of next year trains will be running from Manhattan to the Flatbush Avenue station in Brooklyn. When we bear in mind the inherent difficulties of this tunnel work, due either to the depth at which it has been carried on below the water, or the treacherous nature of the material which has been encountered, it will be agreed that the contractors and the companies are to be congratulated upon the great progress which has been made, and upon the promise of such early completion.

THE PRESIDENT'S MESSAGE ON THE PANAMA CANAL.

The President's message on the Panama Canal, the full text of which, with illustrations, is published in the current issue of the SUPPLEMENT, is one of the most satisfactory documents of the kind that have issued from the present occupant of the White House. President Roosevelt wisely refrains from any critical discussion of the strictly technical features of the problem, and confines himself to a lucid description of what he saw, and the impressions which he received, during his three days' visit to the Isthmus. The value of this diary, for such it is, lies in the fact that the people of the United States, to whom through Congress it is now given, have an abiding faith in the clear-sightedness, the impartiality, and absolute integrity of purpose, with which President Roosevelt approaches every subject that becomes, like this, the subject of his immediate personal investigation.

The visit was particularly well-timed. "I chose the month of November for my visit," says the President, "partly because it is the rainiest month in the year, the month in which the work goes forward at the greatest disadvantage, and one of the months which the medical department of the French canal company found most unhealthy." Furthermore, the visit followed close upon the publication of a series of articles and pamphlets which tended to discredit the work which was being done by the Isthmian Canal Commission, and give the impression that in sanitation, construction, and administration, this gigantic enterprise was rapidly approaching a *debacle* as disastrous as that which marked the close of the operations of the first French company.

Although the SCIENTIFIC AMERICAN was prepared to find that, in the preliminary work at Panama, there had been a certain amount of that confusion and misdirected effort which seem to be inseparable from the inception of all great enterprises involving the collection, redistribution, and setting in motion of vast bodies of men and supplies, we have always felt satisfied that the great ability and unquestionable integrity of the professional men who had been selected to control this work, were a guarantee that the preliminary work was being well done and the foundations being laid for a successful execution of the task. Therefore, it is particularly gratifying to us, as it will be to all Americans whose patriotism is of a broad stamp, to find that, as the result of his personal inspection of the work, the President is satisfied that the country is getting its full worth for the large sums of money which are being expended. "The wisdom of the canal management," he says, "has been shown in nothing more clearly than in the way in which the foundations of the work have been laid. To have yielded to the natural impatience of ill-informed outsiders, and to have begun all kinds of experiments in work, prior to the thorough sanitation of the Isthmus, and to a fairly satisfactory working out of the problem of getting and keeping a sufficient labor supply, would have been disastrous. . . . The only delay has been the necessary delay until the 29th day of June, when Congress definitely and wisely settled that we should have an 85-foot level canal. Immediately after that the work began in hard earnest, and it has been continued with increasing vigor ever since. When the contracts are let, the conditions will be such as to insure a constantly increasing amount of performance."

A well-deserved tribute is paid to the manner in which Dr. W. C. Gorgas has worked out the problem of sanitation, upon which the success of the whole work absolutely depended. "After two years of our occupation the conditions, as regards sickness and the death rate, compare favorably with reasonably healthy localities in the United States." Drainage, the removal of the dense tropical vegetation, careful sanitation, and the judicious use of quinine, have combined to abolish the mosquito and protect the canal force from the ravages of malaria and yellow fever. "Among the 6,000 white Americans, including some 1,200 women and children, not a single death has occurred in the past three months, whereas in an average city of the United States the number of deaths for a similar number of people in that time would have been about thirty from disease." Further on, the President says that Corozal, formerly one of the most unsanitary places on the Isthmus, where there is a big hotel filled with employees, for the last six months has a record of less than one per cent a week admitted to the hospital. "Yet this healthy and attractive spot was stigmatized as a 'hog wallow' by one of the least scrupulous and most foolish of the professional scandalmongers who, from time to time, have written about the Commission's work."

The work of improving the terminal cities proceeds apace. In the city of Panama 90 per cent of the streets that are to be rebuilt are already paved with an excellent brick pavement laid in heavy concrete. Colon, at the other end of the canal zone, is being graded, and a new reservoir capable of holding 500 million gallons of water is about completed, together with the distribution mains for supplying the city. The President rode through the streets of Colon after two days of heavy downpour of rain, and found that the streets "taken as a whole were undoubtedly very bad; as bad as Pennsylvania Avenue in Washington before Grant's administration; but," he says, "all the men to whom I spoke were a unit in saying that the conditions of the Colon streets were 100 per cent better than they were a year ago."

The police force consists of over 200 men, one-fifth of whom are white. "With one exception all the white men I questioned had served in the American army, . . . and belonged to the best type of American soldier." In view of the fact that many of the white and colored employees have brought their families with them, schools have been established. "The schoolrooms were good, and the teachers had taken a pride in their work and in their pupils." Saloons were altogether too numerous, but "the new high-license law which goes into effect January 1 next will probably close four-fifths of them."

The President found that the great task of securing and caring for the laborers and other employees has been well done. At present there are 6,000 white and 19,000 colored employees engaged on the work. Nearly 5,000 of the white employees are Americans, and "they represent, on the average, a high class." They are employed chiefly on the steam shovels, as engineers and conductors of the work trains, and as machinists and carpenters in the shops. The President inspected the living quarters personally, talked with the men themselves and with their wives and families, and found that "the houses themselves were excellent, and the conditions satisfactory." Of the day laborers, the Spaniards appear to be doing the best work. A steady effort is being made to secure Italians, but "for the present we shall have to rely, in the main, for the ordinary unskilled work, upon colored laborers from the West Indies and upon Chinese labor." Summing up, the President says: "From my own experience I am able to say that more care has been exercised in housing, feeding, and generally paying heed to the needs of the skilled mechanics and ordinary laborers in the work of this canal, than is the case in the construction of new railroads, or in any other similar private or public work in the United States proper."

Speaking of the question of the Gatun dam, the President found that "the ablest men on the Isthmus believe that this problem is certain of solution along the lines proposed, and that the dam will show less seepage than the average natural mountain range." There has been a rapid increase in the amount of material taken out of the Culebra cut, and even during the last three months of the rainy season there has been steady progress, as is shown by the fact that in August 242,000 cubic yards were excavated, in September 291,000 cubic yards, and in October 325,000 cubic yards. At the close of the rainy season the increase in the rate of excavation will be even more rapid.

The plan for letting the whole work by contract, "in its essential features was drafted, after careful and thorough study and consideration by the Chief Engineer, Mr. Stevens, who while in the employment of Mr. Hill, the president of the Great Northern Railroad, had personal experience of this very type of contract." Under this contract a premium will be put upon the speedy and economical construction of the canal, and a penalty imposed upon delay and waste. If no satisfactory bids can be secured, the government will do the work itself.

In conclusion, it is gratifying to learn that this great national undertaking is free alike from graft and politics. Of this vital question, the President says: "After the most painstaking inquiry, I have been unable to find a single reputable person who has so much as heard of any serious accusation affecting the honesty of the Commission or of any responsible officer under it. . . . The Commission breathes honesty as it breathes efficiency and energy. Above all, the work has been kept absolutely clear of politics."

It has been found that there are certain favored localities in Florida where the sandy soil has been naturally enriched in a singular way, and become especially adapted to the growing of orange trees. One of these localities is at Orange Bend in Lake County. Under the sandy vegetable loam there is a soft tenacious clay of fine texture, which was probably transported from the hills of Alabama and Tennessee, and deposited in a depression of a shallow sea which once covered the Florida peninsula; and underlying this clay at a depth of seldom more than three feet is a deposit of marl of a kind that is of very rare occurrence, there being very few such deposits in the State. It is *nummulite* marl, so named because the shells that it contains resemble coins. Their average size is about that of the old silver half-dime. The special value of this marl as a fertilizer is due to the presence of this coin-like shell, and especially to the animal substance that held the whorls of the shell together. This substance was almost pure phosphate material, and it gave to the soil in large quantities one of the most important constituents of orange-tree food. The tap roots of the orange trees easily penetrate to this marl bed, and thereby enable the trees to nourish themselves.