I first stood there in January, 1907, and returned in April, 1908. The impressions obtained were very different on these two occasions. In January, 1907, after two and a half years of American occupation, what struck me most was the enormous mass of material which had been removed by the French companies, and the comparatively insignificant appearance of the American excavations, which could readily be distinguished from the older work, already coated with vegetation. It was then that I began to appreciate the heroic labours of the French engineers, whose achievements under circumstances of great difficulty are being daily more and more appreciated and praised by their successors. Turning to study the progress of work, I watched with delight the operations of the 100-ton steam shovels, which at a distance, when the human hands are not seen, appear endowed with volition, and remind the spectator of elephants at work. The cars were loaded with surprising celerity, and the dirt-train was hauled off to the distant dump by an old Belgian locomo-
part of the machinery taken over from the New Company. But this is a branch matter--it is the work of the Panama Railroad Company, and not the Panama Canal and other, cry-baby business. I thought that every other word would originate and result from the Department of the Treasury. But I have been well and truly prepared for the machinery of organisation. When the stoppage occurred for the movement of the work was not caused by the inevitable state of circumstances of progress or the want of machinery, but, as I have learned, was the result of the inability of superintendence. Hereof interior managers understood the cause of stoppage, but the management did not. In the aggregate, therefore, that the responsible head of the company was not, perhaps, the fault lies.

In the meantime, what is gaged patience to keep my feet about me, the West Indies being as yet a wilderness, and the East Coast of South America lying in perfect desolation.

While I had been here before, we had no news of the battles, nor any coming news of the battles, until near the morning,
imperfect in many respects, great results had evidently been achieved by the auxiliary services. The Department of Sanitation had already made the Isthmus healthier than most equatorial countries, food and quarters were excellent, law and order were well maintained.

On the first day of my second and prolonged visit, April, 1908, fifteen months later, I went at once to the same spot on the Culebra Cut opposite to Golden Hill and again surveyed the scene of operations. The change was enormous. The gorge below me was greatly enlarged, the shape of the hills altered, the face of the landscape changed. As I gazed into the deep trench below, the thought flashed across my mind, "If my life be spared a few years longer, I will sail through this on a ship."

The reason of the great change was readily apparent: organisation had now been perfected. In the first place, the whole width of the cut was laid down in railway tracks, tier above tier at the different levels, so that the view was like the approach to the metropolitan terminus of one of the world's
great railways. Up and down these tracks there came and went without ceasing the spoil-trains, now composed of larger trucks than formerly, with new and ingenious devices for rapid unloading. The number of steam shovels visible was much larger than in 1906, yet they were kept constantly busy, and all the time the drilling machines were at work boring holes for charges of dynamite, and gangs of men were completing the preparations for explosions in other holes already made.* Yet if the eyes were raised for a moment from the busy scene below, they rested on a silent wilderness of tropical forest, stretching unbroken to the horizon. I stayed until, at the approach of sunset, the work of the shovels ceased, and hundreds of men swarmed out of the Cut, and sought their quarters and the evening meal. But all was not over for the day, for now, when the Cut was cleared, the shot-firing began. At intervals there occurred a deafening explosion, the earth trembled as

* During 1908 no less than one million dynamite charges were exploded.
in a considerable, but preternaturally short, earthquake, and masses of rock rolled down the slopes, disintegrated and ready for the shovel-man when he should arrive next morning. I paid many visits to the Cut, between Empire and Pedro Miguel, but oftenest at Culebra itself. The sight never palls, and is one of the wonders of the world. The Pyramids are another wonder of the world which in common with many thousands in all ages I have thought it worth going to see—but to go to Culebra is as if one were privileged to watch the building of the Pyramids. Yet how few go to the Isthmus on purpose to see these things, and, mirabile dictu, how few Americans! How is it that this people, so enthusiastic in all that relates to national achievement and addicted to foreign travel, does not include the Isthmus among its many recognised places of pilgrimage? Of the Americans whom I met on the Zone there was scarcely one who had come voluntarily for pleasure. The hotel accommodation, it is true, is limited, but it is more than sufficient for
present needs, and is good, as hotels in the tropics are reckoned. Moreover, Panama is now one of the healthiest places in the Equatorial Zone. English tourists going out to the West Indies by the Royal Mail are generally able to cross the Isthmus and see something of the work while their ship is unloading at Colon; but I would venture to suggest, to such of these as care to follow the world's progress, that they should make arrangements beforehand to step off at Colon, cross to Panama, put up there, visit thence the Canal works at various points, and proceed by their next ship. The West Indian tourist season coincides with the dry season on the Isthmus. At Panama the mosquito is almost an extinct animal, and though the heat there is sometimes trying, a run up to Culebra brings one to a dry and bracing atmosphere where a fresh breeze is almost always blowing.

The steam shovel is the principal agent of excavation. It scoops out loose soil directly, but the basaltic rock has to be broken up first by blasting. One shovel
will load 1,200 cubic yards of such materials upon the cars within the working day of 8 hours, an amount equal to 600 two-horse loads.

For accelerating transportation railway trucks provided with flaps are used, which make of the whole train a single platform. At the rear of the train is a plough which can be drawn by a wire rope attached to a drum carried on a special car in the fore part of the train. When the train arrives at the dump the drum is started, and the plough, advancing, clears the 320 cubic yards of earth and rock from the 16 cars in 7 minutes. This is the Lidgerwood Unloader.

Another important piece of machinery is the track-shifter, which picks up and relays the railway lines of the ever-shifting spoil-tracks. This remarkably successful contrivance was invented by an employee on the Isthmus, and is moreover manufactured there in the great workshops at Gorgona.

From Bas Obispo to Pedro Miguel, which constitutes the Cut, is a distance of about 9 miles, and excavation is so planned that a summit is maintained at Lirio, near Culebra,
about half-way between these two points. On the north slope are* 21 steam shovels, loading cars on 14 tracks. These, when loaded, are hauled down-grade to the northern dumps at Tavernilla and elsewhere, or to the site of the Gatun dam, which is also a dump. Nearly 4,000 cubic yards of rock are carried to the dam daily, a distance of about 24 miles. The return up-grade is made with empty cars. On the southern slope about the same number of steam shovels are at work, the spoil being taken to the southern dumping grounds on the Pacific side, including the trestle dump for the breakwater to Naos Island. The spoil-trains follow one another at intervals of about three minutes, and if, from any cause, delay occur, the steam shovels, and indeed the whole process of excavation, is brought to a standstill. Any cause of delay is therefore reported at once by telephone to the Superintendent of Transportation at Empire, and all energies are at once directed to clearing the way. On the Isthmus everything gives way to the spoil-

* This is for July, 1908.
FROM CULEBRA, EASTWARD TO DISTANT HILLS.

FROM CULEBRA, EASTWARD ACROSS THE CUT.

[To face page 92.]
train, as in a city to the fire-engine. An excellent lesson both in the complexity and urgency of the transportation is afforded by a run through the Cut on a motor trolley in company with the Superintendent of the Department of Excavation. Constantly shunted from one track to another, and occasionally having to retreat, much ingenuity is required to thread a way among the spoil-trains, but even the almost invaluable time of the Superintendent himself is sacrificed rather than any delay should occur to the "dirt" train, as it is usually called. It is this dirt which stands between the American nation and the realisation of their long cherished scheme, and nowhere is the classical definition of dirt as "matter in the wrong place" so appropriate as on the Isthmus.

Let us now see how much matter has been removed, and how much dirt remains which has yet to be removed. I will give first the totals of what has been got out in both dry and wet way, both in the Canal prism itself and for auxiliary works.
THE PANAMA CANAL AND ITS MAKERS

Total Excavations in Connection with the Panama Canal.*

By the French Companies about ... 81,548,000
By the American Isthmian Canal Commission up to the end of June, 1908 ... 40,923,533

122,471,533

Much of the work of the French Companies, however, consisted in dredging out sea-level channels at both ends of the Canal, whereas the principal American work has been rock-excavation in the Culebra Cut—or the Cut, as it might equally well be called. The figures relating to the Cut are:

Excavation between Bas Obispo and Pedro Miguel, i.e., "The Culebra Cut," 9 ½ Miles.

By the French Companies ... 22,600,000
By the American Commission to end of June, 1908 ... 20,125,185
Total excavated in the Cut ... 42,725,185
Remaining to be excavated ... 37,973,063

80,698,248

* Canal Record, July 8, 1908.
so that at the end of last June the Cut was half cut through, one quarter having been done by the French Companies and one quarter by the American Commission.*

This statement by itself, however, would give a very inadequate idea of the rate at which the excavation is now proceeding, for of the total taken out by the Commission since 1904, 11,000,000 cubic yards were due to the work of the 12 months prior to June last. It will be seen from what has gone before that the rate of progress is now even greater than in the year June, 1907—May, 1908, for the daily output from the Cut for July, 1908 (55,427 cubic yards), works out at 1,441,102 cubic yards, allowing 26 working days of that month, which, moreover, is a wet month, when work is much retarded.

On the Date of Completion of the Canal.

Colonel Goethals, Chief of the Commission,

* The total excavation for the prism of a sea-level canal was calculated by the Board of Consulting Engineers at 231,026,477 cubic yards.
when examined early in 1908 at Washington, declined to bind himself to a date for completion, or to an estimate of cost; nevertheless, it is not difficult to calculate the date of completion from the actual rate of progress on the assumption that all goes well. The year 1915 is thus arrived at by the authorities for the calculated, though not promised, completion. This is based primarily upon the rate of excavation possible under the restrictions imposed by the narrow gorge along which the spoil has to be transported. It has been also calculated that the constructive works, the locks and dams, would require about the same time as, but not longer than, the excavations. This just balance between the time required for the two elements, excavation and building, was one of the arguments employed in favour of the 85-foot-level canal, as securing "the utmost practicable speed of construction" * which could be obtained in a canal "afford-

* See address by President Roosevelt to Board of Consulting Engineers, September 11, 1905. Report of the Board, p. 12.
CULEBRA CUT, EASTWARD TO GOLDEN HILL.

SCARPED FACE OF GOLDEN HILL.

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ing convenient passage for vessels of the largest tonnage."

One of the most impressive features on the Isthmus at the present time is the great workshop at Gorgona, where repairs of all kinds are done, and large machines such as the track-shifter are actually built. As I passed from machine shop to boiler shop, smith shop, car shop, pattern shop, and so on, I felt myself back among the circumstances of one of the great manufacturing towns, and forgot for the time my actual surroundings. It was with a feeling akin to surprise that, on quitting the foundry, I found myself on the fringe of the tropical forest, now darkening with the shadows of the swift-descending sun. I may here note by the way that the furnaces of the foundry produced considerable relief from the effects of the tropical heat, which that day was somewhat oppressive.

Relaying the Panama Railway.
Reference to the map at the end of the
volume will show how considerable is the task of reconstructing the Panama Rail-
road—what embankments have to be formed, circuits made, and (near Milaflores) a tunnel bored. The track, too, is being doubled, and the rolling stock has been greatly improved. The passenger cars are both comfortable and relatively cool, and the double journey from Pacific to Atlantic Ocean and back again can be pleasantly performed between luncheon and dinner. Much of the verdant forest land on which I have gazed with so much delight from the windows of the cars will soon cease to be land at all. It will be drowned beneath the waters of Lake Gatun; virgin forest, cultivated patch, squatter’s hut, villages, and even small towns will disappear, their sites submerged by water, and presently to be covered by the silt of rivers.
THE MEN ON THE ISTHMUS
CHAPTER IV

THE MEN ON THE Isthmus

West Indian Labour.

The success of sanitation, and the modern facilities for storage of food, have greatly simplified the task of obtaining an adequate supply of navvies for the pick and spade work. In the United States the American-born, particularly the majority who are of Anglo-Saxon stock, now form an aristocracy of labour, and for the last fifteen years or so have performed but little of the pick and spade, or ordinary navvy’s, work. In the Southern States the unskilled labour is mainly performed by the American negro. Elsewhere the pick and spade work is done by new immigrants, some of whom settle,
and some go home with their savings. They are largely from Southern and Central Europe, many being Italians, and in the extreme West there are Japanese also.

The Commission, however, did not recruit in the United States, in order not to disturb the labour market there, but sought elsewhere for the supply of unskilled labour.

At first they relied almost entirely upon the West Indian negro, who formed the majority of the navvies employed under the French Companies. The Commission, however, were profoundly dissatisfied with the result. In December, 1906, they reported that—

"Another year's experience with negro labourers from near-by tropical islands and countries has convinced the Commission of the impossibility of doing satisfactory work with them. Not only do they seem to be disqualified by lack of actual vitality, but their disposition to labour seems to be as frail as their bodily strength."

Nevertheless, they are still employed in undiminished numbers on the Isthmus, and
WEST INDIAN LABOURERS AT GATUN.

SPANISH LABOURERS AT CULEBRA.

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the tone of the authorities towards them has changed. This change is noticeable both in the official publications and also in the conversation of the foremen immediately in charge. With regard to the latter, I found a great difference of tone between January, 1907, and April, 1908.

The improved relations with the West Indians is due to two causes, relating to the alleged lack of vitality and of industry respectively. The lack of strength was found to be due largely to improper diet, and most of the West Indians are now provided with proper cooked meals, as is done in the case of American and European employees. In order to ensure their profiting by this provision, however, the charge for meals in the case of West Indians is deducted from wages. The result of supplying a nourishing diet has been a marked increase in working strength as shown by output.

In respect of disposition to labour there has also been an improvement. This is shown both by the absence of animadversion in later official reports, and also by the
changed tone of the foremen and other Americans in immediate control of the West Indians, when questioned on the subject. In January, 1907, I heard little but disparagement, while in April, 1908, a much more favourable account was given. To one who has seen something of both the United States and of the West Indies, the reason for the improved state of affairs was easily understood, viz., the American foremen and others in charge had begun to understand the type of men with whom they were dealing. Accustomed to the character of the American negro, and to the conventions which regulate intercourse with the coloured man in the United States, they did not at first recognise that the West Indian was a distinct type, and accustomed, at any rate in the British Colonies, to very different social relations towards the white man. The handling of a gang of negroes from the tropics is an art which has had to be learnt.

The Barbadians are reported to be, generally speaking, the best of the West Indian workmen, except the men from some of the
country districts of Jamaica, who are their equals. Although the climate and products of the Isthmus are so similar to those of their own islands, comparatively few of these employees settle there, but return to the homes they love so well. It cannot but be gratifying to an Englishman to find that those who come from the British islands are proud of their citizenship and pleased to greet him as a fellow-subject.

There are about ninety negro policemen on the Zone, most of whom were originally trained by English officers in the Jamaica Constabulary. They are highly spoken of by the Chief of Police, who finds that they know both when to arrest and when not to arrest. They are also of much service to the new arrivals of their own colour, who refer to them for all information.

The ordinary West Indian labourer receives 10 cents gold (about 5d.) per hour and free quarters. Deducting the 30 cents per diem charged for meals, he receives 50 cents (2s. 1d.) for an 8-hour day, besides food and lodging.
The total number actually at work on the Isthmus has been—

June 30, 1907.
On the Canal Works ... ... 14,606
On the Panama Railroad ... ... 4,979

Total ... 19,585

and on June 30, 1908, the number on the Canal Works alone was 16,078.

The total number on the roll is, of course, considerably more than 20,000, as there are necessarily absentees every day owing to sickness, accident, or other cause.

European Labour on the Isthmus.

In 1906 the number of European labourers on the Isthmus was insignificant, and the Commission, at that time profoundly dissatisfied with the West Indians, issued invitations for proposals to furnish 2,500 Chinese labourers, with the privilege of increasing the number to 15,000.* Nothing

STEAM SHOVEL EXCAVATING SOIL AT CULEBRA.

STEAM SHOVEL UNLOADING INTO DIRT CAR.

[To face page 106.]
came of this scheme, however, while, on the other hand, the already improved, and still improving, conditions on the Isthmus enabled the Commission to obtain a largely increased supply of European labour. While the supply of West Indians was maintained constant, or only slowly increased, the additional force required was therefore obtained from Europe. The following figures show this:

*European Labourers actually at Work on*

<table>
<thead>
<tr>
<th>Date</th>
<th>European Labourers at Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 30, 1906</td>
<td>500</td>
</tr>
<tr>
<td>June 30, 1907</td>
<td>4,317</td>
</tr>
<tr>
<td>June 30, 1908</td>
<td>4,913</td>
</tr>
</tbody>
</table>

A few Russian and Baltic folk came, but appeared unable to stand the work, and the few French who arrived did not take to pick and spade. The majority were from Greece, Italy, and Spain, each of these countries sending at first about the same number. The Greeks proved to be physically inferior to the Italians and Spaniards, and their number in April, 1908, was only about 300.
The Italians, physically excellent, and standing the climate well, were found somewhat intractable. A large proportion were migrant labourers, who had become somewhat prone to collective action when dissatisfied, and their numbers in April, 1908, had been reduced to 500 or 600.

The Spaniards, mainly Galicians and Castilians, were found to be quite equal to the Italians in physique and health, and to give far less trouble, a fact which is attributed partly to the circumstance that most of them came directly from their villages. They are reported to be sober, patient, civil, and quick to learn. The number employed in April, 1908, was about 5,000, so that the Spaniards constituted about five-sixths of the European force, which numbered in all slightly over 6,000. The figures given above for those at work on certain days are considerably less, there being always a number absent from one cause or another.

That the Spaniard is not oppressed by the tropical heat was apparent to me when watching gangs at work near mid-day at about the
hottest time of year, viz., the last weeks of the dry season, towards the end of April. Clothed in European kit, wearing velveteen trousers and with only a cap for head-covering, these men showed no signs of distress, or even discomfort. They showed, in fact, less sign of being heated than Americans of apparently British or other Northern descent engaged upon less laborious work.

The ordinary European labourer, in addition to free quarters, receives 20 cents gold per hour, or $1.60 per 8-hour day; more when working overtime. He is charged 40 cents per diem for his three meals, served in the European mess, which leaves $1.20 as a minimum net wage per diem, or a little less than 30s. per week; but many earn more, and it should not be difficult under these conditions for a labourer to save £5 a month. I was informed of one instance of a Spanish labourer saving £10 per month, but such virtue must be rare.

The Spaniard shows no sign of settling upon the Zone. Sometimes he goes on to
railway work in Brazil; more often he returns home with his savings.

Skilled Labour on the Isthmus.

The skilled labour on the Isthmus has from the outset been mainly done by white Americans, but there are still on the "Gold Roll," as it is termed, some Europeans. New rules reducing the maximum length of leave have, however, made these posts less attractive to those whose homes are at a greater distance, and by an order of February 8, 1908, all future appointments on the Gold Roll shall be American citizens, if the special services required can be obtained in the United States; and in the event of any reduction of force, preference shall be given to American citizens.

The duties being various, the pay necessarily differs, but, taking free quarters into account, is higher than in the United States, as is of course necessary in a distant and tropical land. Since the industrial difficulties of 1907-8 there has been considerable competition for these billets. An 8-hour day
is established by law for employees on the Gold Roll, the quarters are excellent, and the three meals a day provided at a fixed charge are up to the standard of a good hotel. Indeed, the opportunity to share these meals, supplied in large airy rooms, screened by gauze but open to the breeze, made my task on the Isthmus much lighter. From almost any part of the Canal I could reach one of the Commission "hotels" for meal-time, and for 50 cents (2s. 1d.) obtain better food than I have generally been able to get in the tropics at a much higher price. I took pleasure also in my company, for, if I may be permitted to say so, the skilled mechanic of the United States has always seemed to me a most attractive representative of his nation; and here particularly so, where one is in touch with his work. Moreover, each man's job on the Isthmus is part of a vast undertaking, the progress of which he can watch, which fires his enthusiasm, and makes him feel that he has a reward beyond his wage in the privilege of participating in national achievement.
I should like in this place to add a word of tribute to the great courtesy and kindness which they show towards ladies, a circumstance which did much to render pleasant the excursions which my wife took on the Isthmus, sometimes in my company and sometimes alone.

The number of Americans on the Gold Roll in January, 1908, was about 6,000, the total number of employees on the rolls of the Commission and of the Panama Railroad being then approximately 43,000. The total number of employees actually at work on January 29, 1908, was

On the Canal works ... ... 25,367
On the Panama Railroad ... ... 6,557

Total ... 31,924

The Responsible Officials and the Scheme of their Organisation.

The responsibility for Canal construction under the conditions laid down by Acts of Congress is vested in the President of the
MARKS OF STEAM SHOVEL’S TEETH.

THE SHOVEL LOADED WITH SOIL.

[To face page 112.]
United States, within the limits of the money which has so far been voted. The President appointed a Commission in 1905 to carry out the work. The first chief engineer appointed was Mr. John F. Wallace, who arrived on the Zone June 28, 1904, accompanied by Colonel Gorgas, U.S.A., head of the Sanitation Department. Mr. Wallace was in favour of a tide-level canal. In April, 1905, the President appointed a second Commission in place of the first, with a changed personnel,* but Mr. Wallace was retained as chief engineer, and, moreover, became a member of the second Commission.

He, however, resigned, June 26, 1905, and his place was taken by Mr. John F. Stephens, who arrived on the Zone July 27th. At this time there was panic throughout the Isthmus† owing to the prevalent sickness, and resignations were so numerous that it

* Colonel Gorgas, head of the Department of Sanitation, has remained, however, through all changes. See post, Chapter V.
† See Report of the Governor of the Canal Zone, 8
was difficult to carry on work at all, and engineering operations were partly suspended for a time. When the sanitary conditions improved, however, work was resumed with vigour. This second Commission proposed that the work should be put out to contract, and bids were invited. It was under this Commission that the 85-foot-level canal became law. Mr. Stephens was in favour of this form. He resigned early in 1907, his resignation taking effect on April 1st, and at the same time the President for the second time reorganised the Commission.

The third Commission, appointed April 1, 1907, which is that under which the work was being carried on at the time of my second visit, differs from its predecessors in that its members are resident on the Zone. Thus the members of the Commission are the actual executive, the chairman of the Commission being himself chief engineer.