

CHAPTER XXXIII

THE CANAL IN OPERATION

DREDGING IN CULEBRA CUT—MIRAFLORES DIKE BLOWN UP—DESTRUCTION OF GAMBOA DIKE—FIRST OPERATION OF THE LOCKS—DESPERATE BATTLE WITH CUARACHA SLIDE—FIRST VESSELS THROUGH THE CANAL—PASSAGE OF THE "ANCON" FROM OCEAN TO OCEAN—THE CANAL OPENED TO COMMERCE—REPATRIATION OF LABORERS.

IN the summer of 1913, when the steam shovels were getting down to grade in Culebra Cut, the chairman and chief engineer began his plans for opening the canal. Already that stretch of the sea-level channel between Gatun and the sea was under water, and the major portion of the Pacific channel also was navigable. There was some water in the twenty-odd mile stretch between Gatun and Gamboa, but the nine-mile stretch between Gamboa and Pedro Miguel and the one-mile section between Pedro Miguel and Miraflores was dry.

A quantity of slide material and about 600,000 cubic yards of earth other than slide material was yet to be removed. Some of the engineers wished to keep the water out and finish Culebra Cut "in the dry." But several considerations led Colonel Goethals to pursue the opposite course. First of all was the fact that the date fixed for opening the canal was January 1, 1915, and he realized that if his operating force was to be organized and trained and the machinery put through the shaking-down process before that date, it was necessary to get the canal under water as soon as possible. Experience at Gatun also had indicated that the counteracting weight of water tended to hold slides in check, and it seemed wise to utilize this force at Culebra. Moreover, dredging had proven so much cheaper in handling such material as that still remaining in the cut that considerations of economy were on the side of putting the dry sections of the canal bed under water. The Secretary of War approved the recommen-

dations of the chief engineer, and arrangements were perfected for blowing away the last barrier and carrying the waters of Gatun Lake into Culebra Cut.

While these arrangements were being perfected the last dry sections seaward from Miraflores and Gatun, respectively, were being put under water. On Sunday, August 31, the last dike that barred the sea from Miraflores was blown up. Great well drills had bored 541 holes in the dike, and in these holes was tamped home 37,000 pounds of high percentage dynamite. A tiny creek, possessing the pretentious name Rio Grande, was dammed, and its waters were forced to flow into the big ditch between the dike and the Miraflores locks. By the time the day arrived for blowing up the dike, the creek had carried enough water into the section of the canal inland from the dike to protect the lock gates when the barrier was destroyed.

All the plans for the explosion were under the direction of Division Engineer H. O. Cole, an expert in such work. He had so perfectly proportioned the amount of dynamite to the task it was to perform that the barrier was shattered exactly as desired. After the gigantic explosion, which was attended by very little noise, a man with a shovel went out on the dike and dug a trench across the loosened earth of the crest. A tiny stream of sea-water, for it was high tide, began flowing through the trench. Forty minutes later the trench had broadened to a gap thirty feet wide, and a torrent of water was madly leaping down the dike and rushing toward the locks. One hour and twenty-five minutes

after the tiny stream trickled through the trench there was an opening in the dike 400 feet wide, and the water had filled up the channel to sea-level.

About the same time, suction dredges were set to work eating away the last barrier that shut out Gatun from the sea.

Steam shovel operations ceased in Culebra Cut September 10. The last steam shovels working on the bottom were No. 204, manned by H. S. Hayes and A. E. Alexander; and No. 226, manned by Albert H. Geddes and W. I. Hudson. They dug their last dipperfuls of earth about 10:30 A. M., and immediately thereafter the last of the quarter of a million dirt trains that had run out of Culebra Cut, in charge of Engineer E. C. Bean and Conductor E. A. Donnelly, was drawn out by faithful old engine No. 260. For another day steam shovel No. 210 remained in the cut, at the toe of Cucaracha slide, fighting an unequal battle to keep the tracks clear.

With the end of the dry excavation work came the clearing up of the cut. On schedule time all was in readiness for turning water in on October 1. Four two-foot pipes extending through the Gamboa dike from Gatun Lake into Culebra Cut were opened on that date, and water began to fill in the section of the cut between the dike and Cucaracha at the rate of about 1.6 feet a day.

October 10 was the date set for blowing up Gamboa dike, which had served a long time both as a barrier against the waters of the Chagres River and as an embankment over which the trains of the Panama Railroad crossed the canal. The dike had been drilled full of holes, a third of which had received charges of dynamite. A cable connection through Galveston was established between the White House and Gamboa, and when President Wilson pressed a button at the White House it closed a circuit at Gamboa. This tripped a weight attached to the handle of a switch, throwing the switch and firing the enormous blast. Half an hour later a cayuco,

or native canoe, passed through the gap.

The locks were ready for operation before water was admitted to Culebra Cut. Indeed, the Gatun locks were operated for the first time two weeks before water communication was established between Gatun Lake and Culebra Cut. On Friday, Sept. 26, the sea-going tug *Gatun* presented herself as a candidate for the honor of being the first vessel to be lifted from the level of the Atlantic Ocean to the level of Gatun Lake. Hundreds of persons had gathered to witness the performance. When the water in the lower lock was brought to sea-level, the *Gatun*, with flags flying and whistles blowing, steamed into it, amid the resounding cheers of the onlookers. With the lock mechanism working perfectly, the tug was lifted up its three successive steps, twenty-eight and one-third feet each, and brought to the level of Gatun Lake. The next day she was let down again with equal success.

The day before Gamboa dike was blown up a number of dredges were lifted up from the sea to Gatun Lake, to begin the final act in the conquest of Culebra Cut. The Miraflores locks were first tried on October 14, and here, also, all the gloomy forebodings as to unwieldy gates and the like were quickly dispelled. The Pedro Miguel locks were ready for their tryout at the same time, but they had to await a water supply from Culebra Cut, which could be provided only when the engineers were able sufficiently to master Cucaracha slide as to permit the waters of Gatun Lake to pass by.

Cucaracha fought a very grim battle. The engineers tried to blast away the end of its toe, so that the water could creep past, along the west bank of the cut. A ton and a half of dynamite had no effect, and successive smaller blasts were fruitless of results. Dynamiting was then abandoned, and men with shovels working day and night, in eight-hour shifts, were set to digging a trench. Hydraulic sluicing was also tried, but it was a disappointment. Then blasting was resumed, with a charge



1. Culebra Cut.
2. Steamer Ancon passing through Culebra Cut.





of dynamite so heavy that the explosion shook the houses for miles up and down the canal, in many cases throwing articles from shelves as though there had been an earthquake. Still Cucaracha was unconquered. At last it was decided to bring a pipe-line suction dredge and pump water across the slide. A freshet in the Chagres helped matters considerably, and a few days later the water in the section of the cut between Cucaracha and Pedro Miguel became deep enough to permit the use of the locks at the latter place. This enabled the dredging fleet on the Pacific side to come to the spot, as those of the Atlantic side had done, and Cucaracha, attacked on its front, rear, and both flanks, began to yield.

As the water rose in Gatun Lake it was found that two saddles or depressions between the hills bordering the lake were so low as to present the possibility of overflow. The surface at the lowest point at the Cano saddle was 87.4 feet above sea-level—about the height of the normal high-water-mark in the lake. It was decided to build embankments along the crests of the saddles, which would bring them up to the same height as Gatun Dam. The fill at Cano is 900 feet long, 15 feet wide at the top, and 45 feet at the base. The other saddle, half a mile east of Gatun, needed filling for a distance of only 350 feet.

The first steam vessel to pass through the canal from end to end under its own power was the crane-boat *Alex. LeValley*, belonging to the dredging fleet. It had come up from Cristobal and was engaged at work in Culebra Cut. On the morning of January 7, 1914, it was sent to the Pacific entrance, thus completing the first full transit of the Isthmian highway by a steam vessel.

January 27, 1914, was an important date in canal history. On that day President Wilson signed the executive order putting into effect the reorganization of the canal government, to become effective April 1. Two days later Colonel George W. Goethals was appointed the first governor of the Panama Canal.

The first handling of a ship by the towing locomotives was on April 1, 1914. May 9 witnessed the first operation of the automatic control board, which makes it next to impossible for a lock operator to fall into error. The board has a system of indicators which shows the position of every important part of the lock mechanism throughout the operation. Little lock gates, drawn to scale, move over a blue marble slab representing the water in the lock chamber. The valves that open the culverts in the side and center walls are represented by a shutter moving up and down behind a glass screen, and the water level is shown in tubes on a scale of one inch to the foot. The operator is forced by an interlocking system to perform in proper sequence each act required to send a vessel through the locks.

The first commercial business handled by the canal was a shipload of sugar from Hawaii. The American-Hawaiian steamship *Alaskan* could not use the Tehuantepec route for the transfer of its cargo, on account of the war in Mexico, so it went to Balboa instead. There it was met by the tug *Mariner*, with several barges in tow. The tug and its tow left Cristobal at 6 A. M. on May 19th, reaching Balboa at 6:40 that evening. This was the first continuous ocean-to-ocean trip through the Panama Canal by any vessel. The entire 12,300-ton cargo of the *Alaskan* was thereupon lightered through the canal by the *Mariner*.

On August 15, 1914, the canal officially opened for commerce. On that day at 7:10 A. M., according to a prearranged schedule, the *Ancon*, one of the big cement-carrying steamers of construction days, left her berth at Cristobal with about 200 distinguished guests aboard, and in nine hours and forty minutes completed the passage from sea to sea.

The cablegram which Secretary of War Garrison sent to Colonel Goethals upon the successful passage of the *Ancon* found an echo in every American heart. It was as follows:

"On behalf of the government and the people of the United States I express to you and through you to all concerned in the achievement, the intense gratification and pride experienced today. By the successful passage of vessels through the canal the dream of the centuries has become a reality. Its stupendous undertaking has been finally accomplished, and a perpetual memorial to the genius and enterprise of our people has been created. The fully earned and deserved congratulations of a grateful people go out to you and your colaborers."

The canal was now formally open, and ships in unexpected numbers began to come. The honor of being the first war vessel to go through the canal fell to the little torpedo boat destroyer *Teniente Rodriguez*, of the Peruvian navy, which was returning to home waters from the Amazon.

The first foreign vessel to go through the canal was the *Daldorch*, a cargo steamer carrying wheat from Tacoma, Wash., to England. The *Daldorch* had intended to sail around South America, but was ordered to go through the canal, owing to the outbreak of the European war. She passed through the canal on August 22, and saved about forty days at sea thereby.

The battle with Cucaracha slide continued through the summer of 1914. There were dredges of all sizes and descriptions

at work. Among them were the fifteen-yard dipper dredges *Gamboa* and *Paraiso*, gathering up from twenty to thirty tons of material at a dipperful; the ladder dredge *Corozal*, with its endless chain, carrying fifty-two buckets, each large enough to hold twelve men; and a number of suction dredges handling twenty-inch streams of liquefied mud. These dredges made and kept the channel clear.

On the 14th of October, 1914, however, a new menace put in its appearance. Three-quarters of a million cubic yards of material came sliding down into the cut north of Cucaracha, making a rear attack on the dredging fleet. Fortunately the fleet saw what was coming and quickly drew back from Cucaracha far enough to get north of the new slide. Timely action saved the day, and in less than a week the traffic that had been interrupted was restored.

During 1914 the great task of repatriating the common laborers that had built the canal was carried forward. In sixteen months the net emigration from the Isthmus was 20,400. Among these emigrants were more than 16,000 actual workers on the canal. The common laborers who desired to return home were sent at the expense of the United States. However, many thousands of the West Indian negroes went to the banana plantations of the United Fruit Company, where they are now employed.

CHAPTER XXXIV

THE CANAL GOVERNMENT

EARLY FRICTION WITH NATIVE GOVERNMENTS—UNITED STATES ACQUIRES SOVEREIGN POWERS—CONFLICT BETWEEN CIVIL ADMINISTRATION AND CANAL ENGINEERS—CIVIL GOVERNOR'S POWERS CURTAILED—SELF-GOVERNMENT OF THE CANAL ZONE PROPOSED—CONGRESS PROVIDES PERMANENT GOVERNMENT WITH A GOVERNOR EXERCISING UNUSUAL AUTHORITY—SCOPE AND PLAN OF THE PERMANENT GOVERNMENT OF THE PANAMA CANAL.

THERE were four forms of government in the Canal Zone during the ten years from April, 1904, to April, 1914. Of these, three forms of government have been tried since American occupation in 1904.

When the Americans went to Panama, there was no separate government over what is now the Canal Zone. The French had been sorely handicapped by the fact that they were nothing more than a corporation operating in the republic of Colombia, and amenable to the civil and military rule of that country. They were under the direct rule of the province of Panama and the indirect rule of the Bogotá government. Whenever either of these governments wanted any favors from the French Company, their police and other powers over the canal strip were used in such a way as to enforce compliance with their demands.

When the United States undertook the work, the first requisite was full control of the territory. The treaty, therefore, granted to the United States sovereign powers over a five-mile strip on either side of the center line of the canal, reaching from one side of the isthmus to the other, but excepting the cities of Panama and Colon. Coupled with this exception, however, was a provision that the United States should always retain sanitary control of these cities, one the capital and the other the second port of the republic. A further provision granted to the United States the right to preserve order in these cities whenever necessary.

The history of the construction period shows the wisdom of those who thus profited by the experience of the French with the Colombian government. The Panamans were friends of the work, and realized its importance, alike to the United States and to Panama. But in their zeal to promote their own immediate interests they were sometimes led to lose sight of more important concerns.

The first government which the United States set up on the isthmus was administered by a governor appointed by the President of the United States. It was a civil government financed and operated by the United States and ruled by one of its officials. The population paid no taxes and had no voice in the government. The governor of the Canal Zone was a member of the Canal Commission, but he was independent of that body to a great extent in administering civil affairs.

As might have been expected, with the government of the Canal Zone largely independent of the commission, friction soon began to develop. The engineers wanted all matters of civil government considered with prime reference to the welfare of the construction work, and when it appeared that this was not being done there was a protest. The result was that not a great many months passed before there was a new form of government—one in which the administrator was not a governor, but merely a member of the Canal Commission, heading the department of civil administration.

In this way the Canal Zone was ruled

during most of the construction period. The arrangement worked very well. It is true that there was once a head of the department, who, after having been on the isthmus for many months, addressed a body of engineers, telling them that the day was soon to dawn when "the Atlantic and the Pacific would mingle their waters in Gatun Lake"; and it is also true that there was once a head of that department who inspired hostile attacks upon the man who had been commissioned to build the waterway. But in spite of occasional incompetence the system of government devised for the Canal Zone was successful.

Under this civil government were placed the postal establishment, the court system, the police and fire departments, the customs service, the roads, the schools, the prisons, and other matters of lesser importance. The United States built the water and sewerage systems of Panama and Colon under an agreement that it should be repaid in water rents covering a period of fifty years, and the cost of paving the streets of the two cities was to be repaid in ten years. The Canal Zone government was the collector of these funds. The head of the department of civil administration received \$14,000 a year for his services.

When the time came to determine the character of a permanent government of the zone, it was proposed by some legislators that the strip should be thrown open to settlement, and that the little colony should possess the right of local self-government. They supposed that the country could be made a prosperous farming community and they minimized the military necessities and strategic value of the canal.

Fortunately Congress turned a deaf ear to these proposals. It realized that the commission plan had been a failure, and that the canal had been successfully built only by the concentration of virtually the whole power of government in the hands of one man. Moreover, a populated Canal Zone would have required large expenditures for sanitation and health

preservation. A glance at the cost sheets of the canal reveals the fact that Uncle Sam spent nearly \$17,000,000 for health purposes at Panama during the first ten years of American occupation. This expenditure included, of course, the cost of hospitals and free medical attendance for the employees of the canal and a few other items, such as employment of chaplains and the disposal of the dead.

Congress not only decided against a commission form of government for the Panama Canal, but it went to the opposite extreme and provided a one-man government of the strongest type, subordinating the governor of the canal only to the President and the laws; and it gave the canal authorities the right to declare the zone practically one great military reservation.

The law for the permanent government of the canal ratified and confirmed all executive orders as valid and binding until Congress should determine otherwise. This provision included the famous executive order concentrating the powers of the Canal Commission in the chairman and chief engineer. After Mr. Wilson came into office, some of the members of the commission thought it an opportunity to change the organization on the canal and secure an equal voice in its affairs. They were ready to carry their fight to the White House when their attention was called to this provision. It is barely possible that there might have been a third chief engineer going the way of Wallace and Stevens but for that paragraph.

The law provides that the President shall govern and operate the canal through a governor and such other persons as he may deem competent to assist that official. Upon the recommendation of Colonel Goethals, the salary of the governor was fixed at \$10,000 a year. He had built the canal on a salary of \$15,000 a year, while his predecessors had received \$25,000 and \$30,000 respectively. Yet he modestly suggested that his salary was as large as he was entitled to ask for, and he discouraged a movement to have the salary

of the governor fixed at \$15,000 a year while he was the incumbent.

The governor of the Panama Canal is given jurisdiction and control over the civil government, with power to appoint magistrates, constables and notaries, to make rules touching the right of any person to remain on the Canal Zone, and to exercise other unusual functions.

The law significantly provides that when war exists or is imminent, the President shall designate an officer of the United States army to assume and exercise exclusive jurisdiction over the canal and the Canal Zone. It was this provision that saved the canal from having its military character entirely subordinated to its commercial uses. It had been almost decided to place the canal in control of a civilian under the Department of Commerce. As the law stands, the canal is under the War Department; and, while the canal will be operated for commercial purposes in normal times, it will always be kept ready for the fateful day which every American hopes may never dawn, but for which the nation dares not be unprepared.

In carrying out the law providing for the permanent government of the Panama Canal, President Wilson, on January 24, 1914, nominated George W. Goethals as first governor of the canal. He was confirmed February 4, and the new government went into operation April 1.

Colonel Goethals had urged that the change from the construction government to the operative government should be made in such a way as to cause the least possible friction. He proposed that the change should be an evolution, and that the persons who had "made good" during the construction work should be preferred in filling positions under the new régime. And he practiced, when he became governor, what he had preached when he was at the head of the commission. He promptly assured the people on the Canal Zone that the new government was to be a development of the old, an adaptation

of the existing organization to meet the new needs.

The new government, in its details, is based upon an executive order issued by President Wilson, January 27, 1914, and embodying the recommendations of the head of the commission. The Governor is in supreme control, subject to the supervision of the Secretary of War. A Department of Operation and Maintenance is provided for, which has charge of the completion of the canal, and its operation, including the operation of the terminal facilities. The Purchasing Department is charged with the purchase of all supplies, which are turned over to the Supply Department. The latter department, also, has charge of the maintenance of commissaries, hotels and messes; it assigns quarters, maintains the buildings of the zone, and recruits and distributes the unskilled labor for the canal. The Accounting Department, under the immediate supervision of the auditor, has charge of all accounting work. A Health Department succeeds the Department of Sanitation. It takes over the operation of the quarantine service, the sanitary control of the Canal Zone, the sanitary relations between the United States and the cities of Panama and Colon under the treaty, and the operation of the hospitals and charitable institutions. The position of executive secretary is created, and he is given the administration of all those affairs which formerly were administered by the head of the Department of Civil Administration. He has charge of the time-keeping system in force on the canal; of all matters relating to post offices, customs, taxes and excises, except the collection of moneys; of police, prisons, fire protection service, schools, libraries, clubs and the land office. The files and records of the canal are under his supervision, as are, also, matters pending between the canal and the Panama government. He has custody of the official seal of the canal.

Later executive orders established a

Washington office, laid down the plan for the organization of the new judiciary, provided rules for the collection of tolls and the operation of the terminal facilities, etc.

When the work of reorganization began, it was carried out with the purpose of causing the least inconvenience to those who had to leave the isthmus on account of the gradual closing-down of the construction work. Employees were permitted to accumulate eighty-four days leave to their credit, and silver employees were repatriated at the expense of the canal. By the first of January, 1915, affairs had been placed on a permanent basis; the new judiciary system was in operation; and Governor Goethals had begun to look forward to the day when he

could pronounce the canal finished and in successful operation.

On March 4, 1915, the President responded to the desire of the American people by recognizing the right of Colonel Goethals and his principal lieutenants to receive substantial promotion as a reward for their labors. The President nominated Colonel Goethals to be a major-general; Brigadier-General Gorgas to be a major-general; Colonel Harry F. Hodges to be a brigadier-general; Lieutenant-Colonel William L. Sibert to be a brigadier-general; and Civil Engineer Harry H. Rousseau was raised to the rank of a rear-admiral of the Navy. The Senate confirmed these nominations on the same day—a signal honor.

CHAPTER XXXV

BUILDING THE FOUNDATIONS

HOW MR. WALLACE BECAME CHIEF ENGINEER—SCOPE OF JURISDICTION—SANITATION OF PANAMA AND COLON—PROVIDING LIVING QUARTERS—OVERHAULING FRENCH EQUIPMENT—COST-KEEPING SYSTEM INSTALLED—PLANS FOR SECURING LABOR—EXPLORATIONS AT BOHIO AND GATUN—MR. WALLACE FAVORS A SEA-LEVEL CANAL—REORGANIZATION OF COMMISSION—WHY A LOCK CANAL WAS SELECTED—YELLOW FEVER EPIDEMIC—SOCIETY AT PANAMA—FRICTION OVER LABOR SUPPLY—HOW COÖPERATION OF PANAMA RAILROAD WAS SECURED—EXCESSIVE RAILROAD RATES—CIVIL SERVICE RESTRICTIONS—FOUNDATIONS FOR CANAL FINALLY LAID—MR. WALLACE RESIGNS.

BY JOHN F. WALLACE.

THE first intimation I had of my name being considered in connection with the position of chief engineer of the Panama Canal was the following letter which I received from Mr. William Barclay Parsons:

At Sea, between Cuba and Colon,

April 3, 1904.

My dear Mr. Wallace:

On this trip from New York to the Isthmus the Commission has been giving earnest consideration to the selection of a chief engineer, realizing that a very great measure of our success will depend on that official.

The man for this position must possess exceptional qualifications. He must not only be an engineer, but must also be an administrator and executive. He must have mature judgment, and yet energy of accomplishment. He must be well known and favorably known. Among those who have been considered as so qualified naturally your name occurs, and the Commission desires to know whether if a tender of this position were made, it would be seriously considered by you. Owing to a previous professional engagement with the British Government I will be obliged to leave Panama in advance of the other members of the Commission and will arrive in New York on April 19th so as to sail for England on April 26th. The other members of the Commission and I would very much like to have you and me to meet to talk this matter over so that I could communicate with them prior to my leaving for Europe. Would it be possible for you to be in New York some time between the dates mentioned, on say the 21st or 22d of April? If you can do this we can discuss the whole thing and I can give an answer to my associates.

I can imagine that you will be disinclined to think of severing your connection with the Illinois Central, but on the other hand you would attach

your name to the greatest piece of construction ever undertaken.

Hoping that you will be able to meet me, I am,

Yours sincerely,

WILLIAM BARCLAY PARSONS.

Pursuant to the suggestion of Mr. Parsons, I had an interview with him in New York, in which he explained to me the desire of the other members of the Isthmian Canal Commission as well as himself to secure my services as the principal representative of the commission on the isthmus, in full charge of all matters connected with the construction of the canal, with the title of chief engineer.

Mr. Parsons stated that as the commission was charged with the responsibility for the construction of the canal under the direction of the President, and as it was necessary for the commission, the duties of which would be largely administrative and legislative, to keep in close touch with the President and the legal, financial, and executive departments of the Government, it was thought wise at a recent meeting of the commission on the isthmus to put the actual execution of the work under the charge of an administrator with the title of chief engineer, in order to obtain that prompt action, unity of purpose, and efficient execution which could only be accomplished through a single executive whose authority under and responsibility

to the Isthmian Canal Commission should be properly balanced.

Mr. Parsons explained that on taking an informal ballot I had been the choice of such a large majority of the commissioners that it was decided to consider me for the position; and on account of his having to go to Europe he had left the isthmus a week earlier than the commission and had been delegated to take the matter up with me in a preliminary way and find out if I would be willing to confer with Admiral Walker and the commission on the subject upon their return to the City of Washington.

On the following Wednesday, May 4th, I visited Washington and had a conference with Admiral Walker and the commission, in which the communication made to me by Mr. Parsons was confirmed and the further explanation made that it desired not only the services of a technical engineer, but an administrator and executive with engineering knowledge and experience, preferring a man of my type and qualifications familiar with business methods used in the conduct of large enterprises, rather than to select an engineer who might have better technical qualifications alone.

At this meeting I did not accept the position, but outlined my views in regard to the authority that should be delegated to me and my responsibilities to the work, and laid particular stress on the fact that I could not give satisfactory service unless I was given an absolutely free hand in the conduct of the work; that I could not be expected to take orders or instructions from any individual member of the commission, but that the commission should decide matters of policy and organization relating to the general plan and conduct of the work, and its instructions should come to me, through the chairman, in the form of resolutions passed by the commission, and that my communication with the commission should be through Admiral Walker, its chairman.

In connection with my employment I want to say that Admiral Walker took

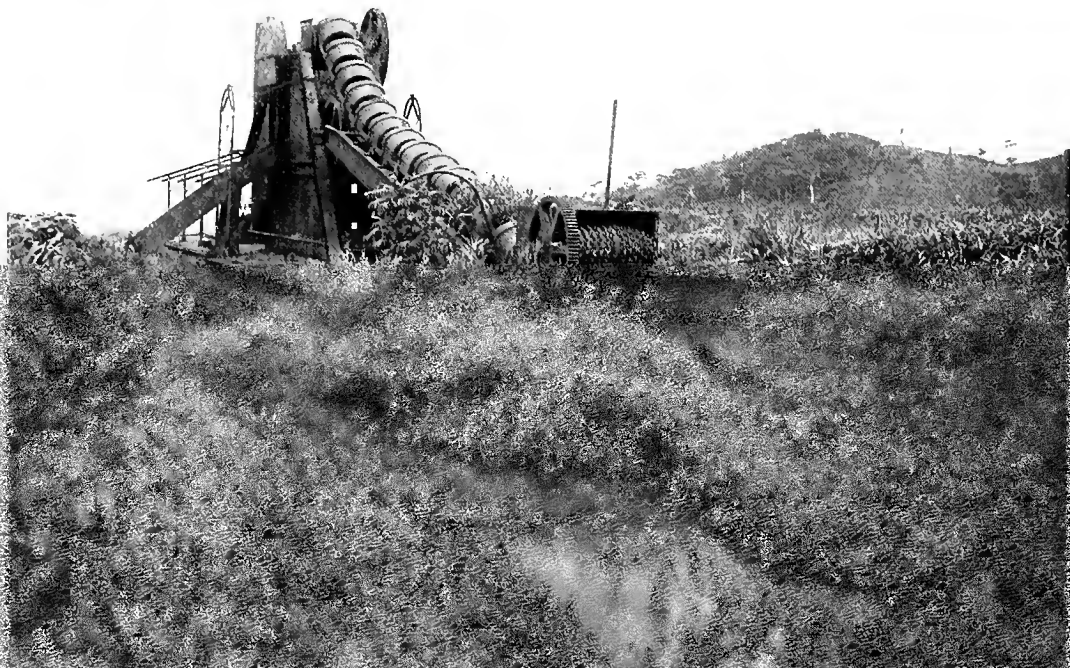
particular pains to state that my tenure of office and obligations in undertaking the work were as outlined in a letter of instructions on this point which President Roosevelt had communicated to the commission, from which I quote the following:

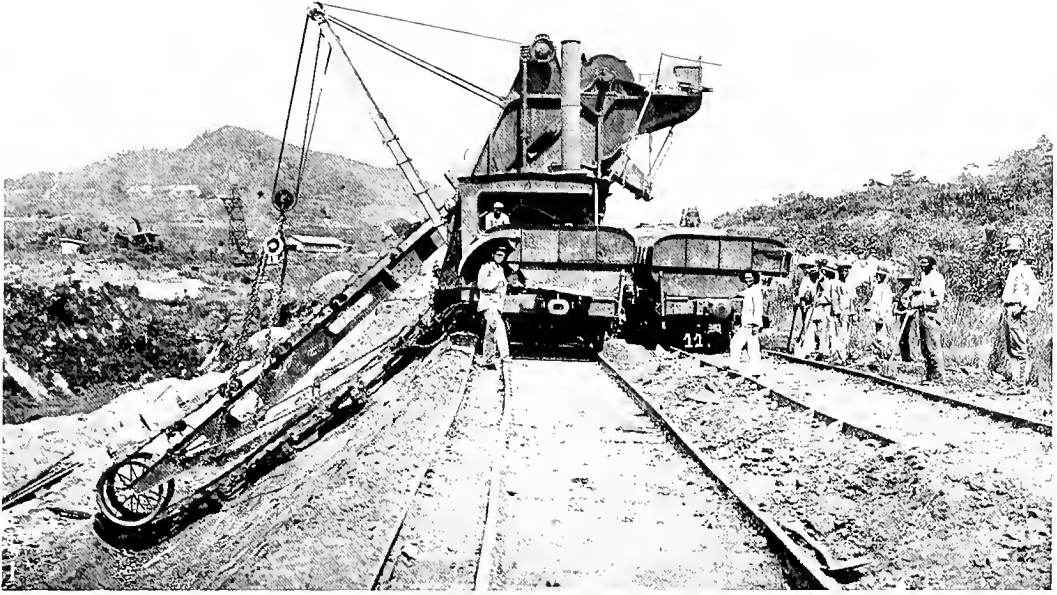
"I believe that each one of you will serve not merely with entire fidelity, but with the utmost efficiency. If at any time I feel that any one of you is not rendering the best service which it is possible to secure, I shall feel called upon to disregard alike my feelings for the man and the man's own feelings, and forthwith to substitute for him on the Commission some other man whom I deem capable of rendering better service.

"Moreover, I shall expect if at any time any one of you feel that the work is too exhausting and engrossing for him to do in the best possible manner that he will of his own accord inform me in order that I may replace him by some man who to the requisite ability joins the will and the strength to give all the effort needed. But so long as you render efficient service of the highest type in the work you are appointed to perform you may rest assured of my hearty support and backing in every way.

"These are the conditions under which you have been appointed and under which I shall expect you to proceed. I shall furthermore expect you to apply precisely the same principles in the choice and retention of the subordinates who do the work under you as I have applied to your choice and shall apply in your retention."

The admiral particularly impressed upon my mind the fact that no tenure of office could be conferred upon me by the commission except under the conditions mentioned in the President's letter above quoted, and that at any time I felt I could not perform my duties in harmony with the policy of the administration, or for any reason felt that I could not fully support that policy, the obligation rested upon me to resign, in which views I fully concurred.





1. In the days of the French.
2. Culebra Cut in the latter days of the Americans.



Upon my arrival on the isthmus I immediately placed Mr. Carleton E. Davis in charge of all work connected with water supply, sewerage, street paving, and other physical work necessary to be carried on in connection with such plans for sanitation as the commission might adopt as the result of recommendations of Colonel Gorgas and myself, it being understood that the chief engineer should have charge of the physical execution of the larger sanitary work and that Colonel Gorgas's department should have charge of the sanitary policing and such other sanitary work as could be conducted directly by and under his department. On account of the prevalence of yellow fever on the isthmus at this time, preparation for proper health protection was considered essential and paramount.

In this connection, it was necessary that an abundance of pure water should be provided for the various towns and settlements along the line, proper sewerage systems established, and in Panama and Colon that the streets should be properly paved.

Within three weeks after my arrival on the isthmus a general scheme for a water supply at Panama was devised, and Engineer Davis and his staff, under my general directions, immediately set to work and prepared plans for the water supply for Panama and for Colon, also a sewerage system for Panama as well as street paving.

A site for a reservoir was selected west of the Panama Railroad line in the vicinity of Culebra Cut, and an old reservoir which had been constructed under the French was enlarged and plans made for a secondary reservoir in the immediate outskirts of Panama. During August complete plans and specifications for the water supply were submitted to the Isthmian Canal Commission for approval.

This was followed by plans for a sewerage system, and for the street paving of Panama.

As soon as the plans were approved by the commission actual construction com-

menced, and all of the work with the exception of the street paving, the material for which had not arrived, was practically completed during my administration.

General Davis, Colonel Gorgas, and myself all considered these sanitary works as fundamentally essential to enable Colonel Gorgas to eliminate the plague of mosquitoes, which the medical department considered to be the chief, if not the sole method of yellow fever transmission.

Coincident with these works, Colonel Gorgas with a force under his immediate direction, started an extensive campaign of fumigation, the draining of marshes, cleaning up of vegetation, and other means for the elimination of mosquitoes.

The importance of the water works, however, consisted in the fact that the principal supply of water during the dry season, in both Panama and Colon, was provided through the storage of rain water in cisterns, most of which occupied the interior courts of residences and business houses. In these reservoirs the species of mosquito which transmitted yellow fever was constantly breeding, and the elimination of these mosquitoes was impossible as long as these cisterns were maintained.

At that time Panama had absolutely no sewerage except a few individual sewers that emptied directly into the harbor, and a sewerage system could not be established and made efficient without an abundance of water supply to flush the same. Again, the sanitary department found it very difficult to keep the streets free from accumulations of filth and garbage without a smooth surface that could be readily cleaned and flushed with an abundance of water.

It may be of interest to note that while I was assured by the authorities in Washington that my requisitions would be promptly filled for the water and sewer pipe necessary to make this installation—which could have been made within ninety days after the receipt of the material, and might have prevented the series of epidemics which occurred during the fol-

lowing dry season—they were not filled in a way that enabled the principal water main to be laid and put in use until some eight months later.

One of the first difficulties which I met in the initial organization was the fact that it was necessary to provide suitable and sanitary living quarters for the men before any large force was brought on the isthmus. It was a difficult matter to properly adjust the relation between the new forces necessary to start the initial organization in various parts of the work, and also to prepare sanitary quarters for the men who were brought to the isthmus to perform this service.

A building department was at once organized and put in charge of Mr. M. O. Johnson, with a staff of building mechanics necessary to rebuild the French quarters and to provide new quarters.

Under his supervision the hotel at Corozal was planned and constructed and also the one at Culebra, and a large number of buildings for quarters for the various officers, members of the staffs and the employees of all grades.

Another difficulty encountered was the inability to get requisitions filled for the proper wire netting which the sanitary department considered necessary to protect the men from the attacks of mosquitoes.

Here it might be well to mention that at Colon and Panama it was necessary to protect the employees from yellow fever mosquitoes, whose radius of action was small and which seldom went beyond the boundaries of the houses in which they bred, and in the outlying districts between Panama and Colon, as well as in Panama and Colon, to protect them from the kind of mosquitoes which transmitted malaria, which was considered by the sanitary department as fully as important as protection from the yellow fever mosquitoes, the malarial mosquitoes having a larger radius of movement and invading the settlements from their adjoining breeding places in the swamps.

It was not until several successive epidemics of yellow fever had occurred that the authorities at Washington finally awoke to the fact that our requisitions for the material necessary for these preventive measures must be fully and promptly filled, the great pressure from Washington on the chief engineer being to commence active operations in the actual excavation of material, due to the constant clamor of the American press to "make the dirt fly."

The first construction operations that were undertaken were at Culebra. We had come into possession of a large amount of machinery used by the French company, —dredges, excavators of various types, steam locomotives, dump cars, and all sorts of construction appliances and apparatus. It was the desire of the commission to experiment sufficiently with this material to determine its economic efficiency or inefficiency before finally adopting or discarding it.

As it was impossible to provide the work with entire new equipment before active operations commenced and as it was desirable to gradually train and build up a force, the work of excavation was at first carried along upon the lines followed by the French company, utilizing the native labor then available and gradually organizing the work and engaging American superintendents and foremen, in order that they might be trained to the utilization of such labor as was available and become acclimated and familiar with the conditions that were to be contended with.

At the start I devised a system of cost keeping in order to get a standard of comparison that would enable me to gauge the results of the various men and collections of men, the preference as to methods of handling work, and the efficiency of different kinds of machinery. Therefore, all costs were reduced to a cubic yard basis and costs were carefully kept of every detail of operation—the cost of explosives, cost of loosening and excavating material, cost of loading, cost of transportation, cost of disposition, and the cost of all the

various elements of supervision and the maintenance of equipment, track and appliances, on the basis of the cubic yard.

This method, amplified, improved and extended, I understand has been carried on throughout the entire work.

This system enabled me to gauge the results of all the elements, both personal and material, connected with the work, and to determine the relative efficiency of the different kinds of French appliances with each other as well as with American machinery and appliances, which were later installed after their superior efficiency was determined.

After a few months of experimental work the data accumulated enabled me to decide on the superiority of the modern American steam shovel, the use of American flat and dump cars, the adoption of the American railroad method of unloading by machinery, also the employment of machinery for the spreading of banks, and so on.

Specifications for machinery were prepared on these lines and large orders placed therefor in the United States, but delivery was slow and but a small portion was delivered for some months after I left the work. The slowness in getting requisitions approved and material furnished, as the result of cumbersome governmental methods in vogue, seriously hampered the preparatory work.

These data also enabled me to determine the relative economy of hauling excavated material short distances up steep gradients to nearby dumping grounds as against the long haul with low gradients to distant dumping grounds, and also as to the relative value and economy of spreading over wide areas and dumping from low heights, as against concentrating the excavated material for high dump disposition.

Various other important factors in regard to economic efficiency were developed by this system of costs. Where the experimental work was carried on at a high unit-cost, the information obtained was valuable in showing what not to do and

what appliances and methods were uneconomical as compared with others which were more economical.

Even in regard to such minor matters as the construction rail furnished by the French company, which came in very short lengths on the theory that these short lengths were easily handled in the construction of temporary tracks, our experience developed that the American practice of using rails thirty feet or more in length, on account of their greater flexibility and the ease with which they would take the necessary curvature in being temporarily shifted from one position to another, as against the short kinks made by the stiff rails used by the French, due to their short length, and the diminished derailments resulting therefrom, finally justified us in discarding the use of the short French rails.

The same thing applied to the various dump cars, locomotives, dredges and excavators that had been used by the French company.

These preliminary operations, while not large in quantity, enabled us to shape up the work in such a way as to render the operations afterward carried on more economical and efficient. They also enabled me to gauge the rate at which excavation could be carried on by the different units of machinery and the various operating organizations, and were the basis of estimates which were later made as to the cost and time required to complete the work.

During this period the force at Culebra was gradually increased and organized and eventually became the basis of the expanded organization which was afterward used by my successors. All of this preliminary and experimental work had a much greater value than that expressed by either the quantities of material removed or the cost thereof.

In the meantime the work of providing quarters for men and building up and strengthening and getting a balance between the various departments of the work,

was carried on. Also the work engaged in by various parties of engineers to determine the character of the stratification and the geological formation under the route of the canal, and to outline the watershed of the Chagres and tributary valleys, was very essential and important in order to arrive at final determinations that had to be made in connection with the plans.

When I first took charge of the work on the isthmus I had no other thought in mind than simply the carrying out of the plans as outlined by the original Walker Commission, upon the estimates of which the Spooner Bill was based, which provided the authority and the appropriations for the construction of the canal.

The essential feature of this plan was an intermediate lake confined above Bohio by a dam at that point, at which the bed rock was supposed to be approximately 118 or 120 feet below sea level, the elevation of this lake to be about 90 feet above sea level, to be approached as in the plan finally adopted by three locks of approximately 30 feet lift on each side of the summit lake.

Extensive diamond drill borings at Bohio developed the fact that bed rock at Bohio was 168 feet below sea level instead of 118 or 120 feet as shown by the original borings made under the first Walker Commission, and that next to the bed rock was a continuous bed of open sand and gravel through which there was a constant flow of sub-surface water.

In considering alternate plans for this work my attention was next directed to a paper published by Mr. Charles Ward, which proposed a dam at Gatun, the site finally adopted by the Isthmian Canal Commission. I, therefore, caused extensive borings to be taken at the site of this dam.

I found two sub-surface gorges at this point, which had evidently been scoured out during past ages, one of which extended some 250 feet below sea level and the other 200 feet below. The contents of these gorges were sand, gravel, clay and quick-

sand, and all sorts of detritus, at various depths, in which there seemed to be a free movement of water.

The plan of Mr. Ward, provided a proper foundation could have been found for the Gatun dam, presented some very attractive features. One was that his elevation of sixty feet above sea level seemed to me to provide the most economical level and the best division between the expense of construction of locks and dams and the excavation of the summit cut.

Finding that the bed rock gradually sloped from an unknown depth at Colon to at least 250 feet below sea level at Gatun and 168 feet at Bohio, and to approximately sea level at Gamboa, I finally came to the conclusion that I could not consistently recommend to the commission any plan which would involve the construction of either locks or dams or other structures, foundations for which could not be carried down to bed rock, or which would permit a flow of water below the foundations of the structures, which might create difficulties that at some future time would be disastrous to the enterprise.

Based on this conclusion, which I considered fundamental, I gradually came to a state of mind in which I was inclined to recommend that no plan be adopted that could not be eventually transformed into a sea-level canal, provided the future demands of traffic and future conditions should justify it, but as I realized the complications that such a recommendation would make and the controversies that would ultimately grow out of it, I refrained from transmitting my views to the commission until February, 1905, when three members of the commission, consisting of Governor Davis, Mr. Wm. Barclay Parsons, and Professor Wm. H. Burr, were appointed a committee to take the matter up with me on the isthmus and obtain from me a definite report and recommendations.

At this time my views were crystallizing upon the construction of a dam at Gamboa, where the foundations could be carried

to solid rock in a practical manner and at reasonable cost, and the creation of a lock canal having an elevation of approximately sixty feet above sea level, fed by a lake to be confined by the dam above Gamboa.

However, realizing that several years of work could be carried on in the excavation of the cut at Culebra and in other preparatory work, and that no time would be lost by reserving a decision as to the final type of canal, I was averse to making any positive recommendations to the commission until our surveys, examinations and experimental work had been carried on to such a point as to enable sufficient data to be obtained so that a wise decision could be finally reached.

On account of the large amount of excavation necessary to be performed at Culebra which would be common to any and all plans, I did not consider that this line of policy would in any way retard or delay the completion of the canal under any plan that might thereafter be adopted.

The committee of the commission above referred to returned to Washington, and, based more on the facts gathered by it while on the isthmus through my instrumentality than on the views or recommendations expressed in the preliminary reports and estimates which I made to the committee, recommended the construction of a sea-level canal.

Within a few weeks after the commission made their recommendation to the President through the Secretary of War, the members thereof, with the exception of Major Benjamin M. Harrod, were removed and a new commission created, with Mr. Theodore P. Shonts as chairman, and of which I was made a member. Mr. Charles E. Magoon was also appointed on this commission and was made governor of the Canal Zone, and Chairman Shonts, Governor Magoon, and myself constituted the executive committee, to which was delegated the full powers of the commission.

On account of the reorganization necessitated by the appointment of a new commission, I was temporarily recalled to the

States, and while in Washington was called into conference by General Peter C. Hains and General Oswald H. Ernst, new members of the commission, who endeavored to draw out my ideas in regard to the final plan and tried to impress upon me the necessity of not recommending any plan that would require any change in the Spooner Act, which was the basic authority under which the work was being carried on and which contemplated a lock canal and the use of an intermediate artificial lake.

It might be well here to refer to some earlier history, in order to explain how the plan of an intermediate lake came to be originally considered in connection with the project.

It will be remembered that when the first Walker Commission was formed it was for the purpose of considering the most feasible of the various canal routes across the isthmus, and that the two principal competitive routes at that time were the Nicaragua route, which was backed by what was known as the Maritime Canal Company, and the Panama route, which the French Company controlling it desired to dispose of to the United States Government.

The controlling feature of the Nicaragua route consisted of a natural lake about ninety or ninety-five feet above sea level, which necessarily had to be approached by two sea-level sections with a series of locks on both the Pacific and Caribbean slopes.

It was suggested to the Walker Commission that in order to make a proper comparison between the Panama and Nicaragua routes and to place the two enterprises upon the same basis, some plan should be adopted that would enable the estimates to be made with some degree of parallelism.

Out of this grew the conception of the creation of an artificial lake at Panama, at approximately the same level as the natural lake at Nicaragua, in order to place the two enterprises on an equivalent basis, the same unit prices being used for excavation and for the construction of locks and dams and dredging.



A little later, in February, 1906, I was called before a committee of the United States Senate, when I again had an opportunity to express my views and submit to a cross examination thereon, in connection with other engineers who were familiar with the project, some of whom held views in accord with my own and others contrary thereto.

As long as I thought there was any opportunity of having the sea-level canal plan considered I was its advocate. However, after the administration had concluded to adopt the present plan and the decision was finally made, I considered it my duty as a loyal citizen to avoid further agitation of the subject. I simply note the above in order to place my original views on record with some of my reasons therefor.

During my residence on the isthmus we were much embarrassed by repeated outbreaks of yellow fever. Although the sanitary department introduced a thorough and efficient system of quarantine and used every possible effort to eliminate the fever, they were hampered by a lack of proper support from Washington until the fact was finally borne in upon the authorities there that improved sanitation and the elimination of yellow fever was a paramount necessity before the work could be successfully prosecuted.

When the authorities finally realized the seriousness of this situation and proper support was given to Colonel Gorgas and the officials in charge of the canal, the conditions were speedily remedied.

Personally I was never discouraged by the yellow fever situation, as I had had more or less experience with it in the South during my connection with the Illinois Central Railroad.

During February I had a light attack of fever which my family and the natives of Panama considered to be yellow fever, and thereafter I considered myself immune; but during my administration we lost quite a number of important employees, including Mr. Johnson, the supervising

architect, the effect of which was very depressing on the organization as a whole.

As it was the policy of the commission which originally appointed me to preserve pleasant relations with the native element in Panama and Colon, and as it was felt that some social recognition should be given to encourage a friendly attitude on the part of these people, I occupied the residence in the heart of the City of Panama, which had been used by the managing director of the French company. The first night I slept in Panama I occupied this residence and continued to occupy it until my connection with the work ceased.

During the summer of 1904 Admiral Kenny, who was the treasurer of the Isthmian Canal Commission, occupied this residence with me during his stay on the isthmus. I also had with me Mr. William J. Karner, who was my office engineer.

My household staff consisted of a butler who had been with the French administration, a Martinique negress as cook, a Spanish house boy, and a personal valet who was half Spanish and half Irish.

During this summer Mr. Karner was taken down with the fever and taken to the hospital. During his illness he was waited on by my valet, who was later removed to the hospital, and he was followed by the cook, leaving Admiral Kenny, the French butler and myself as the remaining occupants of the house.

Later we secured the services of a Chinese cook who had served under Admiral Walker in Nicaragua. In a few days he was also taken down with the fever and removed.

However, all of these patients finally recovered and returned to their duties.

The residence I occupied, the old Casa Dingler, derived its name from being the residence of M. Dingler, who was considered the most efficient of the French chief engineers, and who occupied the residence with his wife, a son and a daughter. A short time after his arrival his son died of the fever, and later his daughter, and then his wife. This so depressed M. Dingler that he dropped into a state of melancholia.

The family had all been enthusiastic horsemen and each member of the family was provided with mounts brought over from France. After the death of the last of the family, his wife, M. Dingler took his horses up into one of the mountain ravines and shot them, then returned to France and later died in an insane asylum.

To this house I brought my wife in November, 1904, and set up a social center in the heart of the City of Panama. As General Davis, the governor of the zone, was a widower, and John Barrett, the American minister, was a bachelor, our house naturally became the social American center of Panama, and throughout our stay we cultivated and maintained social relations with the leading families on the isthmus.

On November 27, 1904, Secretary and Mrs. Taft made a visit to the isthmus and were our guests for ten days. During this time the first American reception was given at our residence that ever occurred on the isthmus.

At this time Admiral Goodrich and his fleet were in Panama harbor and at this reception were the various naval officers from the fleet, the marine officers from Culebra, and numerous army officers detailed in various positions on the canal work, also the officials of the Panama Republic, the bishop of the Catholic church, the consular representatives of the various foreign governments with their wives, and the leading families of Panama and Colon. The interesting feature was the cosmopolitan characteristics of the people in attendance, representing almost every nationality, at least in that part of the world, and various grades of official rank, politics and religion.

Secretary Taft's visit, with the social activities which grew out of it, and the creation of an American social center, did much to establish harmonious relations between the Panamans and the American element, and I think to some extent made our relations with these people easier to handle.

One of the greatest difficulties we had to contend with was the securing of the necessary labor, both skilled and unskilled. The higher grades were of course obtained by importing Americans from the United States. The backbone and sinew of the force, however, had necessarily to be recruited from among those people and those races that were accustomed to work in a tropical climate.

It was at first considered that Jamaica would be the best source of supply. In an attempt, however, to secure a sufficient force from there we were met by prohibitory regulations upon the part of the Government of Jamaica, which endeavored to impose a tax and conditions so burdensome that they could not be complied with.

On the return of Secretary Taft and William Nelson Cromwell from the isthmus the British Consul, Sir Claude Mallet, a representative from Minister Barrett's office, Mrs. Wallace, and I, accompanied the Secretary on the cruiser *Columbia* to Jamaica, where in response to a cable communication we were met by the Governor of Jamaica and escorted to the King's House, his official residence.

Secretary Taft, after introducing me to the governor and explaining the object of my mission and after some preliminary discussion of the conditions, sailed for the United States, leaving me at Jamaica to endeavor to arrive at some understanding with the governor.

After remaining in Jamaica six days and being cordially entertained by the governor we returned to Colon on the U. S. S. *Dixie*, which touched at Jamaica for coal on her way to Colon, without having accomplished the full purpose of my mission, finding that the only way we could secure labor from Jamaica without submitting to burdensome conditions was to make such gradual acquisitions to our force as might voluntarily come to us from that source of their own initiative.

I then sent various labor agents to other adjoining countries, but owing to the regulations of the Treasury department

was not able to advance them money for their own necessary expenses and the transportation of the laborers which they secured, without which it was impossible to obtain them. In some cases, however, I advanced the money personally.

In this connection I finally sent Mr. Wm. J. Karner to Barbados and made an arrangement with a British steamship company to transport the laborers to Colon, and then upon the rendition of a bill by the steamship company to the Isthmian Canal Commission, certified by the chief engineer, Lieutenant Geo. C. Schafer, the disbursing officer of the Treasury department, arranged to pay for the transportation.

At first this enabled me to secure a moderate supply of labor.

Unexpectedly, due to some ruling of the Treasury department, Lieutenant Schafer declined to pay further bills for transportation. This resulted in the British steamship company notifying their captains touching at Barbados not to transport any more laborers unless their transportation was paid in advance, which, as I had not been able to secure funds for that purpose, cut off this source of supply until Governor Davis came to my rescue and provided funds out of the treasury of the Zone Government, over which he had absolute control, his treasury being afterward reimbursed by the Isthmian Canal Commission upon properly approved bills.

Upon a forcible presentation of the case, however, being made to the commission and by it to the authorities at Washington, Mr. Karner was finally appointed a disbursing officer of the Treasury department and was provided with the necessary funds to take care of the transportation of laborers from Barbados, which from that time on was the principal regular source of supply.

In the meantime negotiations were carried on with a view of obtaining a supply of Chinese labor. This, however, was opposed by the authorities at Washington on account of political considerations, and

also by the authorities of Panama, as they did not desire an importation into the Canal Zone of Chinese, who would afterward drift into Panama and Colon and become in the opinion of the Panamans undesirable citizens, due to the fact that the Chinese who had been left on the isthmus at the close of the de Lesseps régime had gone into various lines of trade that were considered competitive.

In June, 1904, when I arrived at Panama, the force in the engineering department consisted of 165 men paid in gold and 1,324 paid in silver, a total force at that time of 1,489 men.

When I left the work, the force employed in the department of construction and engineering consisted of 1,100 men paid in gold and 5,500 natives, negroes and others paid in silver, a total working force of approximately 6,600.

When I first arrived on the isthmus I found it difficult to secure from the authorities in charge of the Panama Railroad, on account of its peculiar organization methods, that degree of coöperation that I considered necessary to properly carry on the canal work, as the railroad was of course one of the principal instrumentalities to successful work.

Ninety-seven per cent of the stock of the Panama Railroad at that time was owned by the United States Government, and while the members of the Isthmian Canal Commission were directors of the railroad, it was directly controlled by a vice-president located in New York and by a general manager under him, also located there. The resident authority on the isthmus in charge of the Panama Railroad was Colonel J. R. Shaler, who at that time was over seventy years of age. He was a perfect type of Southern gentleman, and so far as he was concerned was anxious and more than anxious to do everything possible to assist me in my work. The executive work under him was under the control of Mr. H. G. Prescott, his assistant superintendent, who was also desirous of rendering me all assistance possible.

The first difficulty I had with the railroad was when I desired some frog and switch apparatus placed in the line of the road in order to connect with tracks that led into an engine house in which were stored a number of Belgian engines in good condition, which I desired to transport to Culebra to be used on the canal work.

The putting in of this switch and making a connection with the old tracks required only a few hours work.

I was informed that Colonel Shaler was without authority to make this change without consulting New York, and that under his instructions he did not desire to request the authority by cable and would have to take it up by letter, which would require about three weeks to receive an answer.

With the intimation, however, that if the connection was not made by the railroad force inside of twenty-four hours I would do it with my own force, although this might be considered an unwarranted interference with the operations of the Panama Railroad, I prevailed upon Colonel Shaler to perform the service, and I presume he took the matter up by cable and received the necessary authority.

This incident is only cited as one out of many where it was difficult to secure proper coöperation from this source, on account of organization methods, which while proper for routine operations were not suited to the new situation and conditions.

After a vigorous attempt to get control of the Panama Railroad, I finally in April, 1905, secured a position on the board of directors of the road and was elected vice-president and general manager of the Panama Railroad and steamship line, and thereafter during my continuance on the work had full and complete control of both the railroad and the steamship line as far as their operation was concerned.

During this time I also planned to reconstruct the Panama Railroad as a double track road with improved dock and wharf facilities and reëquip it with proper equipment.

During my connection with the work I suggested the simplification of the tariffs of the Panama Railroad. Mr. Jos. L. Bristow, since elected U. S. Senator from Kansas, was detailed to visit the isthmus and examine into the situation and report. I explained to him my views in full and in detail, and they were embodied in a report which he afterward made and which is part of the government records.

In this report I suggested a modification in the rates of transportation across the isthmus, on a basis that would at least approach the rate per ton which would be charged on the world's commerce after the completion of the canal; the practical doing away with classification, and the collection of all railroad tariff charges from the steamships which either delivered freight to or received freight from the Panama Railroad; and the throwing open of this avenue of transportation to the world's commerce on some equal and uniform basis.

The existing rates over the Panama Railroad at that time were almost prohibitive, and were dependent not only upon the classification of the freight but also upon the origin thereof and the final destination, the theory evidently being to charge all the traffic would bear for transportation between the east and west coast, based on the comparative cost of carrying the freight by the route through the Straits of Magellan.

The most striking example of this was the rate on coffee from Costa Rica, which as I recall it now was at that time \$6.00 per ton for the rail transportation of less than fifty miles.

The theory upon which I recommended this innovation in the reduction of rates was based on the provision of improved methods for the handling of freight, the construction of adequate terminal facilities, improved methods of handling from cars, and on the provision of modern equipment, so that the number of tons of freight handled per train might be increased.

At that time the maximum capacity

of freight cars was ten tons, and as the freight was sorted on each side according to destination, a great many loaded cars were handled across the isthmus with only one or two tons of freight to the car. This reduced the amount of tonnage per train so that it increased the cost, which was one of the arguments the railroad traffic officials used against the reduction of rates.

My principal reason, however, for the utilization of this means of transportation before the completion of the canal and during its construction, and reducing the rates, was to encourage the opening up of this line of transportation to the commerce of the world, in order to build up a business prior to the opening of the canal, so as to reduce the length of time after the canal was completed in which this tonnage would be increased to such an amount as would place the canal on a paying basis.

I recommended \$2.00 a ton, without regard to classification, as a proper rate.

One of the objections raised to my suggestion was that this would create a disturbance in through transcontinental rates. My natural answer to this was the inquiry as to the purpose for which we were constructing the canal. The reply was that during the ten years that would be required for the completion of the canal, the transcontinental lines would have time to meet the new conditions.

In answer to this I developed the fact that while the actual rate paid for freight across the isthmus was concealed in the proportions of the through rate between west and east coast points and between origin and destination, and was not expressed in so many dollars per ton, as far as traffic between New York and San Francisco was concerned the Panama Railroad's proportion of the rate gave a revenue that averaged less than \$2.00 per ton considering all classes of freight. This against the fact that coffee from Costa Rica had to bear a charge of \$6.00 a ton.

It was my understanding with Admiral Walker and the Isthmian Canal Com-

mission that civil service rules would not be put into effect in regard to the Panama work until after the preliminary organization was made effective, and then only under such regulations as would be practically adapted to this work.

On November 17, 1904, I received a cablegram advising me that the Isthmian Canal Commission had been placed under civil service rules, which was confirmed by the following letter:

Washington, D. C.
November 17, 1904.

Mr. John F. Wallace, Chief Engineer,
Isthmian Canal Commission, Acon, Canal Zone.

Dear Sir:

I beg to advise you that under date of November 15, 1904, the President signed the decree placing the Isthmian Canal Commission under civil service rules, and I enclose herewith a copy of the classification of this commission, with a list of the exceptions made thereto, for your guidance.

Very respectfully,
J. G. WALKER,
Chairman of Commission.

I remonstrated with the chairman of the commission on this order and requested him to take the matter up with the President, which he declined to do.

At that time Senator Kittredge was on the isthmus and I explained this situation to him thoroughly and suggested that I be permitted to have a conference with the civil service commissioners, in order to formulate such regulations as would enable the system to work out in a practical way.

Senator Kittredge succeeded in securing a suspension of the immediate application of the order, and when Commissioner Greene and Chief Examiner Snyder, of the civil service commission, visited the isthmus I went over the situation with them on the ground and a modification of the original order was finally arranged between us, which, although it did not fully meet my views, was a step in the right direction; but many difficulties afterward arose in its application.

It is needless to say that this work was of such a peculiar nature, in a foreign country, and conducted under such strenuous

conditions, that to whatever extent the civil service rules were made to apply to it they were to that extent an impediment to the efficient and economical conduct of the work.

One incident that occurred in the later application of these rules was in connection with a requisition I made for a certain number of track foremen. After several weeks of waiting one foreman was finally furnished me, who, upon being placed in charge of a gang of track laborers to put in a switch, confessed that he knew nothing about track work and that his only experience as foreman had been in a bicycle repair shop.

The utter impracticability of selecting expert technical or mechanical help qualified to render efficient and effective service in a tropical climate thousands of miles away from headquarters, should be apparent to every practical man.

While I have always been in accord with a short working day, the strict enforcement of the eight-hour day under the legal requirements in force in the United States interfered seriously and must have since added materially to the estimated cost of the work.

To those familiar with constructive operations it will be realized that a large amount of work was needed prior to the commencement of work hours and also subsequent thereto, in preparing for the day's work and in straightening matters up thereafter. This particularly applied to work in the transportation department.

Without a great loss of efficiency, trains could not be permitted to stand at the exact point that they occupied on the stroke of the hour, and the cleaning up of transportation work after the day's work and preparation for it before it commenced necessitated more or less overtime work upon the part of employees in this department. Other parts of the work were similarly affected thereby, although the essence of the eight-hour day for the mechanic or the laborer employed at individual effort could be observed.

The various difficulties and drawbacks enumerated above have not been mentioned with any view of criticism of individuals, but simply to call attention to the difficulties of supervision from Washington, by officials of the Government departments, of constructive work, particularly in a foreign tropical country, and on work of this character where such unusual conditions existed and unforeseen complications arose daily, which in order to secure efficient and economical results had to be handled and decided upon by some authoritative agency on the spot.

Even in the history of our own Civil War the immediate success of the earlier and able generals in charge of campaigns was partially nullified, not through their own acts or their inability to understand or cope with the situation, but through the lack of a proper appreciation of the conditions and necessities surrounding the field of operations and the pressure, through the press and otherwise, of an impatient public, as well as the failure of the administration and public to appreciate at the start the necessity of concentrated authority and the lack of patience to calmly wait for the accomplishment of the necessary preparation in order that the foundations for more effective work in the future might be accomplished.

The foundations of all great structures are hidden from sight, and only the architectural effect of an imposing building resting thereon appreciated.

Nevertheless without the foundations the final structure could not be erected, and without any expectation of public appreciation either at present or in the future, I felt in my own conscience that my compensation would consist in the personal feeling that during the strenuous period of preparation at least a foundation of ideas in organization and plans had been made, and that the misunderstandings which I may have had with the administration and those above me at least made the way easier for my successors.

I do not feel it necessary to attempt to

analyze or to express to the public the complexity of causes which led up to my resignation, further than to say that my controlling motive was not due to any desire to better myself in a financial way or to obtain through the offering of my resignation any personal consideration.

While it might have been temporarily postponed if more frankness had been exercised in the consideration of the matter, both by the administration and myself, owing to certain irritating circumstances to which undue importance was probably attached by all concerned, still the con-

ditions surrounding the work and the policy of the administration seemed to me then, and still seem even with the reflection that has come with the years that have since passed, to make it necessary for me to sever my connection with the work, as it seemed utterly impossible for the administration, uninfluenced by outside interference, to take at that time the proper view which was essential for the efficient conduct of the work, an attitude to which the administration finally came and due to which the eventual successful completion of the work has been obtained.