

knew before the revolutionary blow was struck that it was imminent. It is said indeed that when the revolutionists suggested September 22nd as the date for the spontaneous uprising of the people the Secretary sagaciously suggested that the Congress of Colombia would not then have adjourned and that it might seem irregular to base a revolution on the omission of the legislature to act when it was still in session and could correct that omission. For this, or some other reason, the revolution was postponed until November 5th. The Colombian minister at Washington kept his government advised of the suspicious activity there of the agents of the Junta and warmly advised the heavy reënforcement of the garrison at Panama. But his home government was slow to follow his advice. When it did move it was checked by the French managers of the railroad.

Colombia's only considerable seaport on the Pacific is Buenaventura and at this point troops were collected to reënforce Panama. Two Colombian gunboats in harbor at Panama were ordered to go after the troops. Coal was needed for the voyage. The only source of coal supplies on the Isthmus was the Panama Railroad which had long made a practice of selling the fuel to all comers. But to the request of the Colombian navy for coal at this time the railroad agent, evidently primed for the occasion, put in a reluctant negative. All his coal was at Colon, and the pressure of commercial business was so great that he could not move it across

the Isthmus in season to be of use to the gunboats. So those troops stayed at Buenaventura and the Junta at Panama went on with its plotting.

Now Colombia tried another plan to reënforce its Panama garrison—or to replace it, for by this time the troops that had been there were won over to the smoldering conspiracy. About four hundred soldiers were sent down by the Gulf and landed at Colon. That they were landed at all seems like a slight error in carrying out the Roosevelt policy, for in the harbor of Colon lay the United States cruiser "Nashville" and gunboat "Dixie" whose commanders had this despatch from the Secretary of the Navy:

"Maintain free and uninterrupted transit. If interruption is threatened by armed force occupy line of railroad. Prevent landing of any armed force with hostile intent either government or insurgent, either at Colon, Porto Bello or other points."

Now there are some curious features about this despatch. On November 2nd, its date, there was no insurrection, therefore no insurgents. If the administration intended to take official cognizance of the



Photo by Underwood & Underwood

THE TWO PRESIDENTS; ROOSEVELT AND AMADOR

activities of the Junta it must have known that the conspirators had no ships and could not therefore plan landing any forces. The order then was plainly designed to prevent Colombia from landing troops in its own territory—a most extraordinary policy to adopt toward a friendly nation. It was furthermore an order equivalent to assuring the success of the foreshadowed revolution, for as there was no way except by sea for Colombia to send



CHOLO CHIEF AND HIS THIRD WIFE

The Chief is said to have poisoned her two predecessors

troops to put down the insurgents, it was evident that for the United States by its superior force to close the sea against her was to give Panama over to the revolutionists.

However 400 troops were landed on the 3rd of November. The commander of the "Nashville" probably thought his orders only operative in case of an outbreak of insurrection and thus far there had been none. It became time for the railroad company to declare its second check—which in this case was checkmate. When the two generals in command of the Colombian forces ordered special trains to transport their men to Panama the agent blandly asked for prepayment of the fares—something above \$2000. The generals were embarrassed. They had no funds. It was of course the business of the road, under its charter from Colombia, to transport the

troops on demand, and it was the part of the generals to use their troops to compel it to do so. Taking the matter under advisement they went alone across to Panama to investigate the situation. There they were met by Gen. Huertas, in command of the garrison who first gave them a good dinner and then put them under arrest informing them that Panama had revolted, was now an independent republic, and that he was part of the new régime. There was no more to it in Panama. The two generals submitted gracefully. The Junta arrested all the Colombian officials in Panama, who thereupon readily took oath of fealty to the new government. A street mob, mainly boys, paraded cheering for Panama Libre. The Panama flag sprung into being, and the revolution was complete.

Out in the harbor lay three Colombian gunboats. Two swiftly displayed Panama flags which by singular good fortune were in their lockers. The third with a fine show of loyalty fired two shells over the insurgent city, one of which, bursting, slew an innocent Chinaman smoking opium in his bunk. The city responded with an ineffective shot or two from the seawall and the sole defender of the sovereignty of Colombia pulled down its flag.



Photo by Prof. Lutz

NATIVE HOUSE AND GROUP AT PUERTA PINAS

At the other end of the line the situation was more serious and might well have caused bloodshed. Col. Torres, in charge of the troops there, on hearing the news from Panama demanded a train at once, threatening that unless it was furnished he would attack the Americans in the town. He had more than 400 armed men, while on the "Nashville" were but 192 marines. In such a contest the Colombians could have relied upon much assistance from the natives. With a guard of 42 marines employees of the railroad prepared its stone freight house for defense while American women and children were sent to vessels in the harbor. The Colombian colonel had fixed two o'clock as the hour for beginning hostilities but when that time arrived he invited a conference, and it was finally agreed that both parties should retire from Colon, while he went to Panama to consult with the jailed generals. During his absence the "Dixie" arrived with 400 marines, and a little later the "Atlanta" with 1000. With this overwhelming force against him Col. Torres recognized that the United States was back of the railroad's refusal of transportation and so yielded.

With his troops he sailed again for Cartagena.

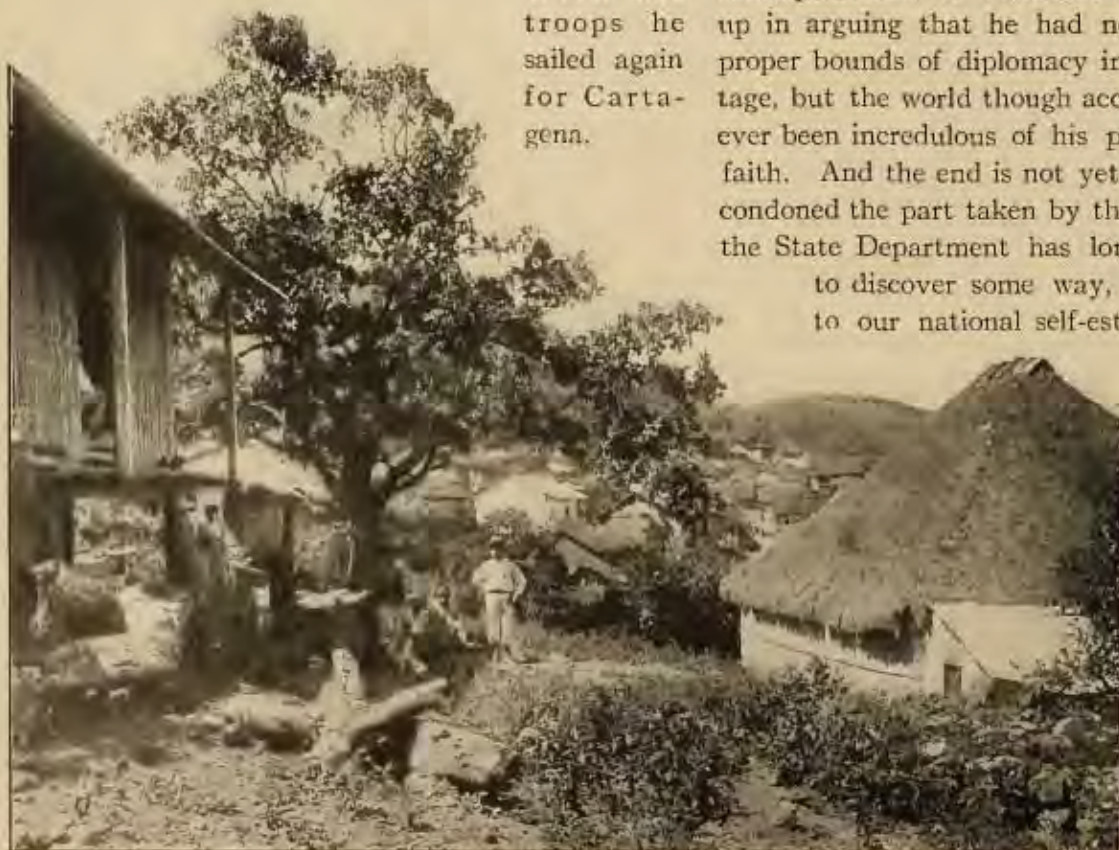
Two days after the revolution—bloodless save for the sleeping Chinaman—the United States recognized the Republic of Panama. Twelve days later, with M. Bunau-Varilla who had by cable been appointed minister to Washington, a treaty was concluded by which



HINDOO MERCHANTS ON THE ZONE

the United States was granted all it desired for the furtherance of the canal project. Much of the subsequent time of President Roosevelt was taken up in arguing that he had not gone beyond the proper bounds of diplomacy in getting this advantage, but the world though accepting the result has ever been incredulous of his protestations of good faith. And the end is not yet. Colombia has not condoned the part taken by the United States, and the State Department has long been endeavoring to discover some way, not too mortifying to our national self-esteem, by which we

may allay Colombia's discontent. And as for that nation it has persistently refused to recognize Panama as independent, one of the results of which has been that the perpetrators of crime on the Isthmus may skip blithely over the line to Bo-



WHAT THEY CALL A STREET IN TOBAGA

gotá or Cartagena and enjoy life free from dread of extradition.

Briefly summarized the terms of the treaty thus expeditiously secured are:

1. The guaranty of the independence of the Republic of Panama.

2. The grant to the United States of a strip of land from ocean to ocean, extending for five miles on each side of the canal, to be called the Canal Zone and over which the United

States has absolute jurisdiction. From this Zone the cities of Panama and Colon are explicitly excluded.

3. All railway and canal rights in the Zone are ceded to the United States and its property therein is exempted from taxation.

4. The United States has the right to police, garrison and fortify the Zone.

5. The United States is granted sanitary jurisdiction over the cities of Panama and Colon, and is vested with the right to preserve order in the Republic, should the Panamanian government in the judgment of the United States fail to do so.

6. As a condition of the treaty the United States paid to Panama \$10,000,000 in cash, and in 1913 began the annual payment of \$250,000 in perpetuity.

Thus equipped with all necessary international authority for the work of building the canal President Roosevelt plunged with equal vehemence and audacity into the actual constructive work. If he strained to the breaking point the rights of a friendly nation to get his treaty, he afterwards tested even further the elasticity of the power of a President to act without Congressional authority.

We may hastily pass over the steps forward. Mr. Cromwell was paid the \$40,000,000 for the French stockholders, and at once there arose a prodigious



CHAME BEACH, PACIFIC COAST

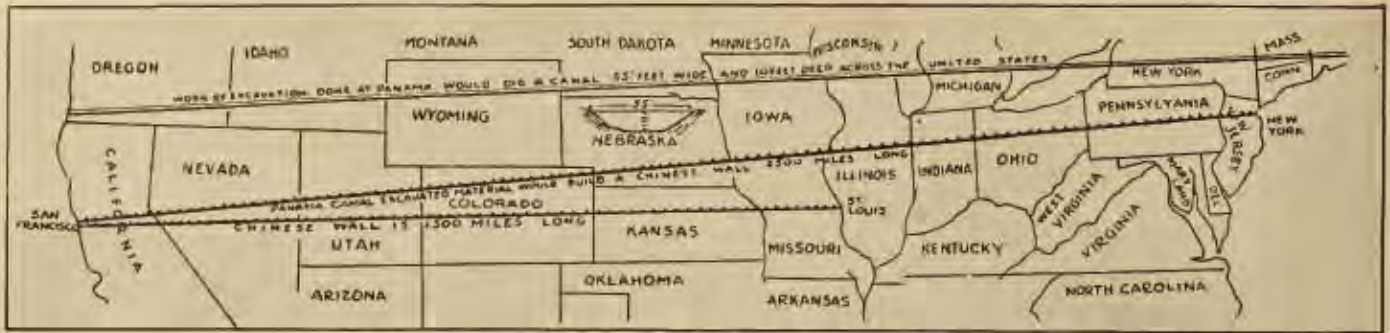
Where sand is obtained for locks on the Pacific division

outry that the Frenchmen got but little out of it; that their stock had been bought for a few cents on the dollar by speculative Americans; that these Americans had financed the "revolution" and that some of the stock was held by persons very close to the administration. None of these charges was proved, but all left a rather bad impression on the public mind. However the United States received full value for the money. April 28, 1904, Congress appropriated the \$10,000,000 due Panama, and with



Photo by Underwood & Underwood

FRENCH DRY DOCK, CRISTOBAL



WHAT THE WORK EXPENDED ON THE CANAL MIGHT HAVE DONE

Build a Chinese wall from San Francisco to New York, or dig a ditch 10 feet deep and 55 feet wide across the United States at its widest part

the title thus clear Lieutenant Mark Brooke, U. S. A., at 7:30 A. M. May 4th, formally took over the territory in the name of the United States. An excellent opportunity for pomp and ceremony, for fuss and feathers was thus wasted. There were neither speeches, nor thundering salutes and the hour was obviously unpropitious for champagne. "They order these things better in France," as "Uncle Toby" was wont to say.

When little more than a decade shall have rolled away after that wasted ceremonial moment the visitor to the Isthmus will gaze upon the greatest completed public work of this or any other past age. To conceive of some task that man may accomplish in future that will exceed in magnitude this one is in itself a tax upon the most vivid imagination. To what great work of the past can we compare this one of the present?

The great Chinese wall has been celebrated in all history as one of man's most gigantic efforts. It is 1500 miles long and would reach from San Francisco to St. Louis. But the rock and dirt taken from the Panama Canal would build a wall as high and thick as the Chinese wonder, 2500 miles long and reach from San Francisco to New York in a bee-line.

We cross thousands of miles of ocean to see the great Pyramid of Cheops, one of the Seven Wonders of the ancient world. But the "spoil" taken from the canal prism would build sixty-three such pyramids which put in a row would fill Broadway from the Battery to Harlem, or a distance of nine miles.

The Panama Canal is but fifty miles long, but if we could imagine the United States as perfectly level, the amount of excavation done at Panama would dig a canal ten feet deep and fifty-five feet wide across the United States at its broadest part.



Courtesy Scientific American

A GRAPHIC COMPARISON

The "spoil" taken from the canal would build 63 pyramids the size of Cheops in Broadway from the Battery to Harlem

New York City boasts of its great Pennsylvania terminal, and its sky-piercing Woolworth Building; Washington is proud of its towering Washington Monument, the White House and the



WHAT THE PANAMA CONCRETE WOULD DO

buildings adjacent thereto. But the concrete used in the locks and dams of the canal would make a pyramid 400 feet high, covering the great railway station; the material taken from Culebra cut alone would make a pyramid topping the Woolworth tower by 100 feet, and covering the city from Chambers to Fulton Street, and from the City Hall to West Broadway; while the total soil excavated in the Canal Zone would form a pyramid 4200 feet or four fifths of a mile high, and of equal base line obliterating not only the Washington Monument but the White House, Treasury, the State, War and Navy Buildings and the finest part of official Washington as well.

Jules Verne once, in imagination, drove a tunnel through the center of the earth, but the little cylindrical tubes drilled for the dynamite cartridges on "the line" (as people at Panama refer to the Canal Zone) would, if placed end to end, pierce this great globe of ours from side to side; while the dirt cars that have carried off the material would, if made up in one train, reach four times around the world.

But enough of the merely big. Let us consider the spectacle which would confront that visitor whom, in an earlier chapter, we took from Colon to view Porto Bello and San Lorenzo. After finishing those historical pilgrimages if he desired to see the canal in its completed state—say after 1914—he would take a ship at the great concrete docks at Cristobal which will have supplanted as the resting places

for the world's shipping the earlier timber wharves at Colon. Steaming out into the magnificent Limon Bay, the vessel passes into the channel dredged out some three miles into the turbulent Caribbean, and protected from the harsh northerners by the massive Toro Point breakwater. The vessel's prow is turned toward the land, not westward as one would think of a ship bound from the Atlantic to the Pacific, but almost due south. The channel through which she steams is 500 feet wide at the bottom, and 41 feet deep at low tide. It extends seven miles to the first interruption at Gatun, a tide water stream all the way. The shores are low, covered with tropical foliage, and littered along the water line with the debris of recent construction work.

After steaming about six miles someone familiar with the line will be able to point out over the port side of the ship the juncture of the old French canal with the completed one, and if the jungle has not grown up too thick the narrow channel of the former can be traced reaching back to Colon by the side of the Panama Railroad. This canal was used by the Americans throughout the construction work.

At this point the shores rise higher and one on the bridge, or at the bow, will be able to clearly discern far ahead

a long hill sloping gently upward on each side of the canal, and cut at the center with great masses of white masonry, which as the ship comes nearer the gigantic locks, pairs by three to a total height of 85 feet.



Courtesy Scientific American

PROPORTIONS OF SOME OF THE CANAL WORK



Courtesy Scientific American

THE "SPOIL" FROM CULEBRA CUT WOULD DO THIS



Photo by Underwood & Underwood

IN A TYPICAL LOCK

The bridge across is temporary, for construction purposes only. Gates are still skeletonized awaiting the steel sheathing

For 1000 feet straight out into the center of the canal extends a massive concrete pier, the continuation of the center wall, or partition, between the pairs of locks, while to right and left side walls flare out, to the full width of the canal, like a gigantic U, or a funnel guiding the ships toward the straight pathway upward and onward. A graceful lighthouse guides the ships at night, while all along the central pier and guide wall electric lights in pairs give this outpost of civilization in the jungle something of the air at night of a brightly lighted boulevard.

Up to this time the ship had been proceeding under her own steam and at about full speed. Now slowing down she gradually comes to a full stop alongside the central guide wall. Here will be waiting four electric locomotives, two on the central, two on the side wall. Made fast, bow and stern, the satellites start off with the ship in tow. It will take an hour and a half to pass the three locks at Gatun and arrangements will probably be made for passengers to leave the ship and walk by its side if desired, as it climbs the three steps to the waters of Gatun Lake 85 feet above.

Probably the first thing the observant passenger

will notice is that as the ship steams into the open lock the great gates which are to close behind her and hold the water which flows in from below, slowly lifting her to the lock above, are folded flush with the wall, a recess having been built to receive them. The chamber which the vessel has entered is 1000 feet long, if the full water capacity be employed, 110 feet wide and will raise the ship $28\frac{1}{2}$ feet. If the ship is a comparatively small one the full length of the lock will not be used, as intermediate gates are provided which will permit the use of 400 or 600 feet of the lock as required—thus saving water, which means saving power, for the water that raises and lowers the ships also generates electric power which will be employed in several ways.

Back of each pair of gates is a second pair of emergency gates folded back flush with the wall and only to be used in case of injury to the first pair. On the floor of the canal at the entrance to the lock lies a great chain, attached to machinery which, at the first sign of a ship's becoming unmanageable, will raise it and bar the passage. Nearly all serious accidents which have occurred to locks have been due to vessels of which control has been lost, by

some error in telegraphing from the bridge to the engine room. For this reason at Panama vessels once in the locks will be controlled wholly by the four locomotives on the lock walls which can check its momentum at the slightest sign of danger. Their own engines will be shut down. Finally at the upper entrance to the locks is an emergency dam built on the guide wall. It is evident that if an accident should happen to the gates of the upper lock the water on the upper level would rush with destructive force against the lower ones, perhaps sweeping away one after the other and wrecking the canal disastrously. To avert this the emergency dams are swung on a pivot, something like a drawbridge, athwart the lock and great plates let down one after the other, stayed by the perpendicular steel framework until the rush of the waters is checked. A caisson is then sunk against these plates, making the dam complete.

The method of construction and operation of these

locks will be more fully described in a later chapter. What has been outlined here can be fully observed by the voyager in transit. The machinery by which all is operated is concealed in the masonry crypts below, but the traveler may find cheer and certainty of safety in the assurance of the engineer who took me through the cavernous passages—"It's all made fool proof".

Leaving the Gatun locks and going toward the Pacific the ship enters Gatun Lake, a great artificial body of water 85 feet above tide water. This is the ultimate height to which the vessel must climb, and it has reached it in the three steps of the Gatun locks. To descend from Gatun Lake to the Pacific level she drops down one lock at Pedro Miguel, $30\frac{1}{3}$ feet; and two locks at Miraflores with a total descent of $54\frac{2}{3}$ feet. Returning from the Pacific to the Atlantic the locks of course are taken in reverse order, the ascent beginning at Miraflores and the complete descent being made at Gatun.



Photo by Underwood & Underwood

LOCK AT PEDRO MIGUEL UNDER CONSTRUCTION

The picture shows strikingly the construction of the locks in pairs, the inner pair being for precautionary purposes

Gatun Lake constitutes really the major part of the canal, and the channel through it extends in a some-

what tortuous course for about twenty-four miles. So broad is the channel dredged—ranging from 500 to 1000 feet in width and 45 to 85 in depth—that vessels will proceed at full speed, a very material advantage, as in ordinary canals half speed or even less is pre-

on the Isthmus. More of the trees are hung with the trailing ropes of vines once bright with green foliage and brilliant flowers, now gray and dead like the parent trunk. Only the orchids and the air plants will continue to give some slight hint of life to the dull gray monotony of death. For a time, too, it must be expected that the atmosphere will be as offensive as the scene is depressing, for it has been found that the tropical foliage in rotting gives out a most penetrating and disagreeable odor. The scientists have determined to their own satisfaction that it is not prejudicial to health, but the men who have been working in the camps near the shores of the rising lake declare it emphatically destructive of comfort.

The unfortunate trees are drowned. Plunging their roots beneath the waters causes their death as infallibly, but not so quickly, as to fill a man's lungs with the same fluid brings on his end. The Canal Commission has not been oblivious to the disadvantages, both aesthetic and practical, of this great body of dead timber standing in the lake, but it has found the cost of removing it prohibitive. Careful estimates fix the total expense for doing quickly what nature will do gratis in time at \$2,000,000. The many small inlets and backwaters of the lake more-



RANGE TOWER AT PACIFIC ENTRANCE

scribed in order to avoid the erosion of the banks.

The lake which the voyager by Panama will traverse will in time become a scenic feature of the trip that cannot fail to delight those who gaze upon it. But for some years to come it will be ghastly, a living realization of some of the pictures emanating from the abnormal brain of Gustave Doré. On either side of the ship gaunt gray trunks of dead trees rise from the placid water, draped in some instances with the Spanish moss familiar to residents of our southern states, though not abundant



BIRD'S EYE VIEW OF PEDRO MIGUEL LOCKS

over will afford breeding places for the mosquitos and other pestilent insects which the larvacide man with his can and pump can never reach, and no earthly ingenuity can wholly purify.

One vegetable phenomenon of the lake, now exceedingly common, will persist for some time after the ocean-going steamers begin to ply those waters, namely the floating islands. These range from a few feet to several acres in extent, and are formed by portions of the spongy bed of the lake being broken away by the action of the water, and carried off

Florida and Louisiana. Conditions in Gatun Lake are ideal for it and the officials are studying methods of checking its spread from the very beginning.

The waters of the lake cover 164 square miles and are at points eighty-five feet deep. In the main this vast expanse of water, one of the largest of artificial reservoirs, containing about 183 billion cubic feet of water, is supplied by the Chagres River, though several smaller streams add to its volume. Before the dam was built two or three score yards measured the Chagres at its widest point. Now the



Photo by Critchlow

THE VEGETABLE MARTYRS

The trees in the district flooded by Gatun Lake are being slowly drowned and will finally disappear

by the current, or the winds acting upon the aquatic plants on the surface. They gradually assume a size and consistency that will make them, if not combated, a serious menace to navigation. At present the sole method of dealing with them is to tow them down to the dam and send them over the spillway, but some more speedy and efficacious method is yet to be devised. However as the trees now standing fall and disintegrate, and the actual shores of the lake recede further from the canal the islands will become fewer, and the space in which they can gather without impediment to navigation greater. Another menace to a clear channel which has put in an appearance is the water hyacinth which has practically destroyed the navigability of streams in

waters are backed up into the interior far beyond the borders of the Canal Zone, along the course of every little waterway that flowed into the Chagres, and busy launches may ply above the sites of buried Indian towns. The towns themselves will not be submerged, for the cane and palm-thatched huts will float away on the rising tide. Indeed from the ships little sign of native life will appear, unless it be Indians in cayucas making their way to market. For the announced policy of the government is to depopulate the Zone. All the Indian rights to the soil have been purchased and the inhabitants remorselessly ordered to move out beyond the five-mile strip on either side of the canal. This is unfortunate as it will rob the trip of what might have

been a scenic feature, for the Indians love to build their villages near the water, which is in fact their principal highway, and but for this prohibition would probably rebuild as near the sites of their obliterated towns as the waters would permit.

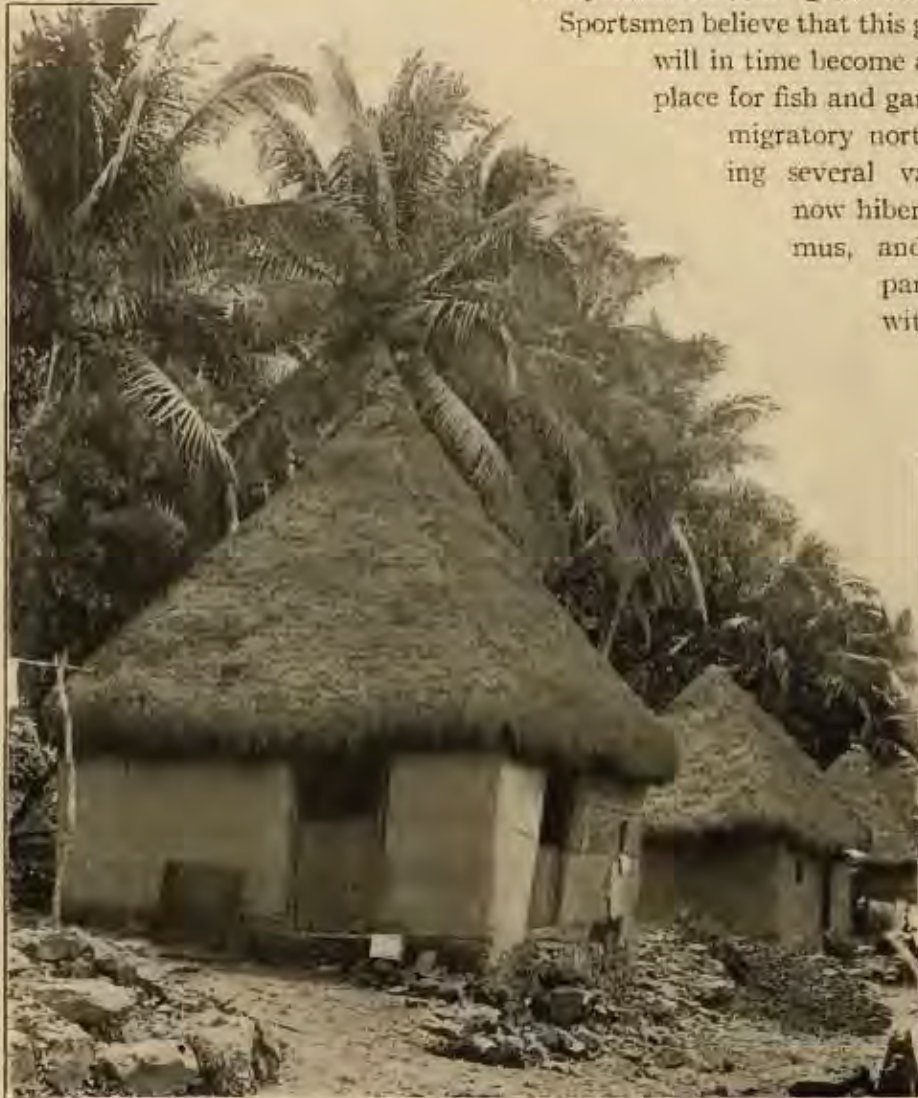
In passing through the lake the canal describes eight angles, and the attentive traveler will find interest in watching the rangelights by which the ship is guided when navigating the channel by day or by night — for there need be no cessation of passage because of darkness. These range lights are lighthouses of reënforced concrete so placed in pairs that one towers above the other at a distance back of the lower one of several hundred feet. The pilot keeping these two in line will know he is keeping

however are stocked with compressed acetylene which will burn over six months without recharging. The whole canal indeed from its beginning miles out in the Atlantic to its end under the blue Pacific will be lighted with buoys, beacons, lighthouses and light posts along the locks until its course is almost as easily followed as a "great white way."

Sportsmen believe that this great artificial lake will in time become a notable breeding place for fish and game. Many of our migratory northern birds, including several varieties of ducks, now hibernate at the Isthmus, and this broad expanse of placid water, with its innumerable

inlets penetrating a land densely covered with vegetation, should become for them a favorite shelter. The population will be sparse, and mainly as much as five miles away from the line of the canal through which the great steamers will ceaselessly pass.

During the period of its construction that portion



NATIVE STREET AT TAROGA

to the center of his channel until the appearance of two others on either port or starboard bow warns him that the time has come to turn. The towers are of graceful design, and to come upon one springing sixty feet or more into the air from a dense jungle clustering about its very base is to have a new experience in the picturesque. They will need no resident light keepers, for most are on a general electric light circuit. Some of the more inaccessible

of the canal which will lie below the surface of Gatun Lake was plentifully sprinkled with native villages, and held two or three considerable construction towns. Of the latter Gorgona was the largest, which toward the end of canal construction attained a population of about 4000. In the earlier history of the Isthmus Gorgona was a noted stopping place for those crossing the neck, but it seems to have been famed chiefly for the badness of its ac-

comodations. Otis says of it, "The town of Gorgona was noted in the earlier days of the river travel as the place where the wet and jaded traveler was accustomed to worry out the night on a rawhide, exposed to the insects and the rain, and in the morning, if he was fortunate regale himself on jerked beef and plantains."

The French established railroad shops here which the Americans greatly enlarged. As a result this town and the neighboring village of Matachin became considerable centers of industry and Gorgona was one of the pleasantest places of residence on "the line." Its Y. M. C. A. clubhouse was one of the largest and best equipped on the whole Zone, and the town was well supplied with churches and schools. By the end of 1913 all this will be changed. The shop will have been moved to the great new port of Balboa; such of the houses and official buildings as could economically be torn down and reerected will have been thus disposed of. Much of the two towns will be covered by the lake, but on the higher portions of the site will stand for some years deserted ruins which the all-conquering jungle will finally take



THE Y. M. C. A. CLUB HOUSE AT CATUN

for its own. The railroad which once served its active people will have been moved away to the other side of the canal and Gorgona will have returned to the primitive wilderness whence Pizarro and the gold hunters awakened it. Near its site is the hill miscalled Balboa's and from the steamships' decks the wooden cross that stands on its summit may be clearly seen.

Soon after passing Gorgona and Matachin the high bridge by which the railroad crosses the Chagres at Gamboa, with its seven stone piers will be visible over the starboard side. This point is of some interest as being the spot at which the water was kept out of the long trench at Culebra. A dyke, partly artificial, here obstructed the canal cut and carried the railroad across to Las Cascadas, Empire, Culebra and other considerable towns all abandoned, together with that branch of the road, upon the completion of the canal.

Now the ship passes into the most spectacular part of the voyage—the Culebra Cut. During the process of construction this stretch of the work vied with the great dam at Catun for the distinction of being the most interesting and picturesque part of



Photo by Underwood & Underwood

GAMBOA BRIDGE WITH CHAGRES AT FLOOD

For contrasting picture showing the river in dry season, see page 192

the work. Something of the spectacular effect then presented will be lost when the ships begin to pass. The sense of the magnitude of the work will not so greatly impress the traveler standing on the deck of a ship, floating on the surface of the canal which is here 45 feet deep, as it would were he standing at the bottom of the cut. He will lose about 75 feet of the actual height, as commanded by the earlier traveler who looked up at the towering height of Contractors Hill from the very floor of the colossal excavation. He will lose, too, much of the almost barbaric coloring of the newly opened cut where bright red vied with chrome yellow in startling the eye, and almost every shade of the chromatic scale had its representative in the freshly uncovered strata of earth.

The tropical foliage grows swiftly, and long before the new waterway will have become an accustomed path to the ships of all nations the sloping banks will be thickly covered with vegetation. It is indeed the purpose of the Commission to encourage the growth of such vegetation by planting, in the belief that the roots will tie the soil together and lessen

the danger of slides and washouts. The hills that here tower aloft on either side of the canal form part of the great continental divide that, all the way from Alaska to the Straits of Magellan divides the Pacific from the Atlantic watershed. This is its lowest point. Gold Hill, its greatest eminence, rises 495 feet above the bottom of the canal, which in turn is 40 feet above sea level. The story of the gigantic task of cutting through this ridge, of the new problems which arose in almost every week's work, and of the ways in which they were met and overcome will necessitate a chapter to itself. Those who float swiftly along in well-appointed steamships through the almost straight channel 300 feet wide at the bottom, between towering hills, will find the sensation the more memorable if they will study somewhat the figures showing the proportions of the work, the full fruition of which they are enjoying.

At Pedro Miguel a single lock lets the ship down to another little lake hardly two miles across to Miraflores where two more locks drop it down to tide water. From Miraflores the traveler can see the great bulk of Ancon Hill looming up seven miles



Photo by Underwood & Underwood

WORKING IN CULEBRA CUT

The picture is taken at a comparatively quiet time, only two dirt trains being visible



Photo by Underwood & Underwood

MIRAFLORES LOCK IN MARCH, 1913

This lock is in two stories with a total lift of 56 $\frac{3}{4}$ feet; the Pacific tides rise in the canal to the lower lock

away, denoting the proximity of the city of Panama which lies huddled under its Pacific front. Practically one great rock is Ancon Hill, and its landward face is badly scarred by the enormous quarry which the Commission has worked to furnish stone for construction work. At its base is the new port of Balboa which is destined to be in time a great distributing point for the Pacific coast of both North and South America. For the vessels coming through the canal from the Atlantic must, from Balboa, turn north or south or proceed direct across the Pacific to those Asiatic markets of which the old-time mariners so fondly dreamed. Fleets

of smaller coastwise vessels will gather here to take cargoes for the ports of Central America, or for Ecuador, Colombia, Peru and other Pacific states of South America. The Canal Commission is building great docks for the accommodation of both through



NAOS, PERICO AND FLAMENCO ISLANDS TO BE FORTIFIED

and local shipping; storage docks and pockets for coal and tanks for oil. The coaling plant will have a capacity of about 100,000 tons, of which about one-half will be submerged. One dry dock will take a ship 1000 feet long and 105 feet wide—the width of the dock itself being 110 feet. There will be also a smaller dock. One pier, of the most modern design, equipped with unloading cranes and 2200 feet long is already complete, and the plans for additional piers are prepared. The estimated cost of the terminals at Balboa is \$15,000,000.

The Suez Canal created no town such as Balboa is likely to be, for conditions with it were wholly different. Port Said at the Mediterranean end and Aden at the Red Sea terminus are coaling stations, nothing more. Geographical considerations however are likely to give to both Balboa and Cristobal—particularly the former—prime importance as points of transshipment.

The machine shops long in Gorgona and Matachin have been removed to Balboa, and though since the completion of the canal the number of their employes has been greatly decreased, the work of repairing and outfitting vessels may be expected to maintain a large population of mechanics. The administration offices now at Culebra will also be moved to Balboa, which in fact is likely to become the chief town of the Canal Zone. Here is to be an employes' club house, built of concrete blocks at a cost of \$52,000. Like the other club houses established during the construction period it will be under the direct administration of the Y. M. C. A. The town of Balboa, and the club house will be in no small degree the fruit of the earnest endeavor of Col. Goethals



THE OLD PACIFIC MAIL
DOCKS AT BALBOA

to build there a town that shall be a credit to the nation, and a place of comfort for those who inhabit it. His estimate presented to Congress of the cost and character of the houses to be furnished to officers of various grades and certain public buildings may be interesting here. The material is all to be concrete blocks:

Governor's house.....	\$25,000
Commissioners' and high officials' houses, each.....	15,000
Houses of this type to have large center room, a sitting room, dining room, bath, kitchen and four bed rooms.....	
Families drawing \$200 a month.....	6,000
Families drawing less, in 4-family buildings..	4,000
Bachelor quarters, for 50.....	50,000
Besides these buildings for personal occupancy Balboa will contain—unless the original plans are materially modified:	
Hotel.....	\$22,500
Commissary.....	63,000
School.....	32,000
Police station and court.....	37,000

When Col. Goethals was presenting his estimates to Congress in 1913 the members of the Committee on Appropriations looked somewhat askance on the club-house feature of his requests, and this colloquy occurred:

"The Chairman: 'A \$52,000 club house?'

"Col. Goethals: 'Yes, sir. We need a good club house, because we should give them some amusement, and keep them out of Panama. I believe in the club-house principle.'

"The Chairman: 'That is all right, but you must contemplate a very elaborate house?'

"Col. Goethals: 'Yes, sir. I want to make a town there that will be a credit to the United States government.'"

Looking out to sea from the prow of a ship entering the Pacific Ocean you will notice three conical



BEGINNING OF NEW BALBOA DOCKS

islands rising abruptly from the waves, to a height of three or four hundred feet. To be more precise the one nearest the shore ceased to be an island when the busy dirt trains of the Canal Commission dumped into the sea some millions of cubic yards of material taken from the Culebra Cut, forming at once a great area of artificial land which may in ensuing centuries have its value, and a breakwater which intercepts a local current that for a time gave the canal builders much trouble by filling the channel with silt. The three islands, Naos, Flamenco, and Perico are utilized by the United States as sites for powerful forts. The policy of the War Department necessarily prevents any description here of the forts planned or their armament. Every government jealously guards from the merely curious a view of its defensive works, and the intruder with a camera, however harmless and inoffensive he may be, is severely dealt with as though he had profaned the Holy of Holies. Despite these drastic precautions against the harmless tourist it is a recognized fact that every government has in its files plans and descriptions of the forts of any power with which it is at all likely to become involved in war.

It may be said, however, without entering into prohibited details, that by the fortifications on the islands, and on the hills adjacent to the canal entrance, as well as by a permanent system of submarine mines the Pacific entrance to the canal is made as nearly impregnable as the art of war permits. The locks at Miraflores are seven miles inland and the effective range of naval guns is fourteen miles, so that but for the fortifications and a fleet of our own to hold the hostile fleet well out to sea the very keystone of the canal

structure would be menaced. Our government in building its new terminal city at Balboa had before it a very striking illustration of the way in which nations covet just such towns. Russia on completing her trans-Siberian railroad built at Port Arthur a terminal even grander and more costly than our new outpost on the Pacific. But the Japanese flag now waves over Port Arthur—and incidentally the fortifications of that famous terminal were also considered impregnable. Perhaps the impregnable fort like the unsinkable ship is yet to be found.



Photo by Underwood & Underwood

THE PACIFIC GATEWAY

The gun points to canal entrance; high hills in the background are beyond the canal

At Balboa the trip through the completed canal will be ended. It has covered a fraction over fifty miles, and has consumed, according to the speed of the ship and the "smartness" of her handling in locks, from seven to ten hours. He who was fortunate enough to make that voyage may well reflect on the weeks of time and the thousands of tons of coal necessary to carry his vessel from Colon to Balboa had the canal not existed.

From Balboa to the ancient and yet gay city of Panama runs a trolley line by which the passenger, whose ship remains in port for a few days, or even a few hours, may with but little cost of time or money visit one of the quaintest towns on the North American continent. If the climate, or the seemingly ineradicable sluggishness of the Panamanian do not intervene the two towns should grow into one, though their governments must remain distinct, as the Republic of Panama naturally clings to its capi-

tal city. But seemingly the prospect of a great new port at his doors, open to the commerce of all the world, where ships from Hamburg and Hong Kong, from London and Lima, from Copenhagen and from Melbourne may all meet in passing their world-wide ways, excites the Panamanian not a whit. He exists content with his town as it is, reaching out but little for the new trade which this busy mart next door to him should bring. No new hotels are rising within the line of the old walls; no new air of haste or enterprise enlivens the placid streets and plazas. Perhaps in time Balboa may be the big town, and Panama as much outworn as that other Panama which Morgan left a mere group of ruins. It were a pity should it be so, for no new town, built of neat cement blocks, with a Y. M. C. A. club house as its crowning point of gaiety, can ever have the charm which even the casual visitor finds in ragged, bright-colored, crowded, gay and perhaps naughty Panama.



Photo by Underwood & Underwood

COMPLETED CANAL AT COROZAL

CHAPTER VIII

THE FORMATIVE PERIOD



AMERICAN control of the canal, as I have already pointed out, was taken over without any particular ceremony immediately after the payment to Panama of the \$10,000,000 provided for in the treaty. Indeed so slight was the friction incident to the transfer of ownership from the

French to the Americans that several hundred laborers employed on the Culebra Cut went on with their work serenely unconscious of any change in management. But though work was uninterrupted the organization of the directing force took time and thought. It took more than that. It demanded the testing out of men in high place and the rejection of the unfit; patient experimenting with methods and the abandonment of those that failed to produce results. There was a long period of this experimental work which sorely tried the patience of the American people before the canal-digging organization fell into its stride and moved on with

a certain and resistless progress toward the goal.

In accordance with the Spooner act President Roosevelt on March 8, 1904, appointed the first Isthmian Canal Commission with the following personnel:

Admiral John G. Walker, U. S. N., *Chairman*,
Major General George W. Davis, U. S. A.,
William Barclay Parsons,
William H. Burr,
Benjamin M. Harrod,
Carl Ewald Gunsky,
Frank J. Hecker.

In 1913 when the canal approached completion not one of these gentlemen was associated with it. Death had carried away Admiral Walker, but official mortality had ended the canal-digging careers of the



Photo by Underwood & Underwood

TUNNEL FOR THE OBISPO DIVERSION CANAL

others. Indeed under the rule of President Roosevelt the tenure of office of Isthmian Commissioners was exceedingly slender and the whole commission as originally designed was finally abolished being replaced by one made up, with one exception, of officers of the army and navy. The first commission visited the Isthmus, stayed precisely 24 days, ordered some new surveys and returned to the United States. The most important fact about its visit was that it was accompanied to the scene of work by an army surgeon, one Dr. W. C. Gorgas, who had been engaged in cleaning up Havana. Major Gorgas, to give him his army title, was not at this time a member of the Commission but had been appointed Chief Sanitary Officer. I shall have much to say of his work in a later chapter; as for that matter Fame will have much to say of him in later ages. Col. Goethals, who will share that pinnacle was not at this time associated with the canal work. Coincidentally with the Commission's visit the President appointed as chief engineer, John F. Wallace, at the moment general manager of the Illinois Central

Railroad. His salary was fixed at \$25,000 a year. In telling the story of the digging of the Panama Canal we shall find throughout that the engineer outshines the Commission; the executive rather than the legislative is the ruling force. The story therefore groups itself into three chapters of very unequal length—namely the administrations as chief engineers of John F. Wallace, from June 1, 1904, to June 28, 1905; John F. Stevens, June 30,

1905, to April 1, 1907, and Col. George W. Goethals from April 1, 1907, to the time of publication of this book and doubtless for a very considerable period thereafter.

Each of these officials encountered new problems, serious obstacles, heartbreaking delays and disappointments. Two broke down under the strain; doubtless the one who took up the work last profited by both the errors and the successes of his predecessors.

It is but human nature to give the highest applause to him who is in at the death, to immortalize the soldier who plants the flag on the citadel, forgetting him who fell making a breach in the outer breastworks and thereby made possible the ultimate triumph.

Wallace at the very outset had to overcome one grim and unrelenting enemy which was largely subdued before his successors took up the work. Yellow fever and malaria ravaged the Isthmus, as they had done from time immemorial, and although Sanitary Officer Gorgas was there with knowledge of how to put that foe to rout the campaign was yet to be begun. They say that Wallace had a

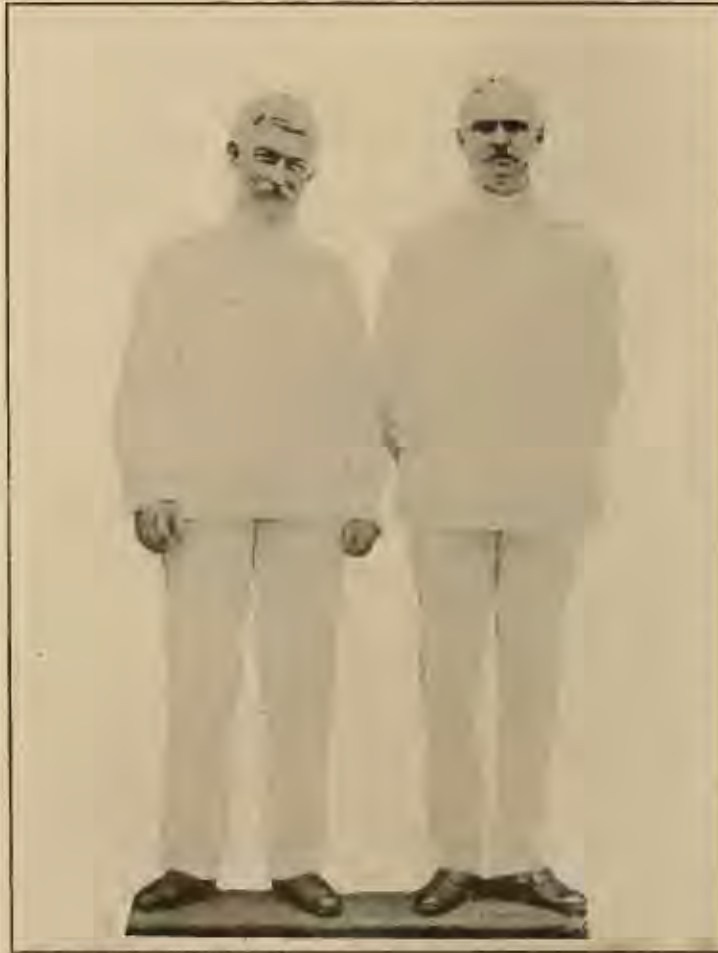


Photo by Underwood & Underwood

THE TWO COLONELS

W. C. Gorgas and George W. Goethals, whose combined work gave the canal to the world

lurking dread that before he could finish the canal the canal would finish him, and indeed he had sound reasons for that fear. He found the headquarters of the chief engineer in the building on Avenida Centrale now occupied by the United States legation, but prior to his time tenanted by the French Director-General. The streets of the town were unpaved, ankle deep in foul mire in the rainy season, and covered with germ-laden dust when dry. There



A WALK AT ANCON

being no sewers the townsfolk with airy indifference to public health emptied their slops from the second-story windows feeling they had made sufficient concession to the general welfare if they warned passersby before tilting the bucket. Yellow fever was always present in isolated cases, and by the time Wallace had been on the job a few months it became epidemic, and among the victims was the wife of his secretary.

However, the new chief engineer tackled the job with energy. There was quite enough to enlist his best energies. It must be remembered that at this date the fundamental problem of a sea level *vs.* a lock canal had not been determined—was not definitely settled indeed until 1906. Accordingly Engineer Wallace's first work was getting ready to work. He found 746 men tickling the surface of Culebra Cut with hand tools; the old French houses, all there were for the new force had been seized upon by natives or overrun by the jungle; while the French had left great quantities

of serviceable machinery it had been abandoned in the open and required careful overhauling before being fit for use; the railroad was inadequate in track mileage and in equipment. Above all the labor problem was yet to be successfully solved. In his one year's service Wallace repaired 357 French houses and built 48 new ones, but the task of housing the employees was still far from completed. Men swarmed over the old French machinery, cutting away the jungle, dousing the metal with kerosene and cleaning off the rust.

Floating dredges were set to work in the channel at the Atlantic end—which incidentally has been abandoned in the completed plans for the canal though it was used in preliminary construction. The railroad was reëquipped and extended and the foundation laid for the thoroughly up-to-date road it now is. Meanwhile the surveying parties were busy in the field collecting the data from which after a prolonged period of discussion, the vexed question of the type of canal should be determined.



IN THE HOSPITAL GROUNDS

Two factors in the situation made Wallace's job the hardest. The Commission made its headquarters in Washington, 2000 miles or a week's journey away from the job, and the American people, eager for action, were making the air resound with cries of "make the dirt fly!" In a sense Wallace's position was not unlike that of Gen. McClellan in the opening months of the Civil War when the slogan of the northern press was "On to Richmond," and no thought was given to the obstacles in the path, or the wisdom of preparing fully for the campaign before it was begun. There are many who hold today that if Wallace had been deaf to those who wanted to see the dirt fly, had taken the men off the work of excavation until the type of canal had been determined and all necessary housing and sanitation work had been completed, the results attained would have been better, and the strain which broke down this really capable engineer would have been averted.

Red tape immeasurable wound about the Chief Engineer and all his assistants. Requisitions had to go to the Commission for approval and the Commission clung to Washington tenaciously, as all federal commissions do wherever the work they are commissioned to perform may be situated. During the Civil War days a story was current of a Major being examined for promotion to a colonelcy.

"Now, Major," asked an examiner, "we will con-

sider, if you please, the case of a regiment just ordered into battle. What is the usual position of the colonel in such a case?"

"On Pennsylvania Avenue, about Willard's Hotel," responded the Major bravely and truthfully.

The officers who directed Wallace's fighting force clung to Pennsylvania Avenue and its asphalt rather than abide with Avenida Centrale and its mud. So too did succeeding commissions until Theodore Roosevelt, who had a personal penchant for being on the firing line, ordered that all members of the Commission should reside on the Isthmus. At that he had trouble enforcing the order except with the Army and Navy officers who made up five-sevenths of the Commission.

How great was the delay caused by red tape and absentee authorities cannot be estimated. When requisitions for supplies reached Washington the regulations required that bids be advertised for. I rather discredit the current story that when a young Panamanian arrived at Ancon Hospital and the mother proved unable to furnish him with food, the doctor in charge was officially notified that if he bought a nursing bottle without advertising thirty days for bids he must do so at his own expense. That story seems too strikingly illustrative of red-tape to be true. But it is true that after Col.



Photo by Underwood & Underwood

FRENCH COTTAGES ON THE WATER FRONT, CRISTOBAL

Gorgas had worked out his plans for furnishing running water to Panama, and doing away with the cisterns and great jars in which the residents stored water and bred mosquitoes, it took nine months to get the iron pipes, ordinary ones at that, to Panama. Meanwhile street paving and sewerage were held up and when Wallace wired the Commission to hurry he was told to be less extravagant in his use of the cable.



PAY DAY FOR THE BLACK LABOR

No man suffered more from this sort of official delay and stupidity than did Col. Gorgas. If any man was fighting for life it was he—not for his own life but that of the thousands who were working, or yet to work on the canal. Yet when he called for wire netting to screen out the malarial mosquitos he was rebuked by the Commission as if he were asking it merely to contribute to the luxury of the employees. The amount of ingenuity expended by the Commission in suggesting ways in which wire netting might be saved would be admirable as indicative of a desire to guard the public purse, except for the fact that in saving netting they were wasting human lives. The same policy was pursued when appeals came in for additional equipment for the hospitals, for new machinery, for wider authority. When-

ever anything was to be done on the canal line the first word from Washington was always criticism—the policy instantly applied was delay.

Allowing for the disadvantages under which he labored Mr. Wallace achieved great results in his year of service on the Isthmus. But his connection with the canal was ended in a way about which must ever hang some element of mystery. He complained bitterly, persistently and

justly about the conditions in which he was compelled to work and found in President Roosevelt a sympathetic and a reasonable auditor. Indeed, moved by the Chief Engineer's appeals, the President endeavored to secure from Congress authority to substitute a Commission of three for the unwieldy body of seven with which Wallace found it so hard to make headway. Failing in this the President characteristically enough did by indirection what Congress would not permit him to do directly. He demanded and received the resignations of all the original commissioners, and appointed a new board with the following members:

Theodore P. Shonts, *Chairman*,
Charles E. Magoon, *Governor of the Canal Zone*,
John F. Wallace, *Chief Engineer*.

Mordecai T. Endicott,
 Peter C. Hains,
 Oswald H. Ernst,
 Benjamin M. Harrod.

As in the case of the earlier commissioners none of these remained to see the work to a conclusion.

This commission, though similar in form, was vastly different in fact from its predecessor. The President in appointing it had directed that its first three members should constitute an executive committee, and that two of these, Gov. Magoon and Engineer Wallace, should reside continuously on the Zone. To further concentrate power in Mr. Wallace's hands he was made Vice-President of the Panama Railroad. The President thus secured practically all he had asked of Congress, for the executive committee of three was as powerful as the smaller commission which Congress had refused him. In all this organization Mr. Wallace had been consulted at every step. He stayed for two months in Washington while the changes were in progress and expressed his entire approval of them. It was therefore with the utmost amazement that the President received from him, shortly after his return to the Isthmus, a cable requesting a new conference and hinting at his resignation.

At the moment that cable message was sent Panama was shuddering in the grasp of the last yellow fever epidemic that has devastated that territory. Perhaps had Col. Gorgas secured his wire netting earlier, or Wallace's appeals for water pipes

met with prompter attention it might have been averted. But in that May and June of 1905 the fever ravaged the town and the work camps almost as it had in the days of the French. There had been, as already noted, some scattered cases of yellow fever in the Zone when the Americans took hold, but they were too few and too widely separated to cause any general panic. The sanitary authorities however noted with apprehension that they did not decrease, and that a very considerable proportion were fatal. It was about this time that the Commission was snubbing Col. Gorgas because of his insatiable demands for wire screening. In April there were seven cases among the employees in the Commission's headquarters in Panama. Three died and among the 300 other men employed there panic spread rapidly. Nobody cared about jobs any longer. From all parts of the Zone white-faced men flocked to the steamship offices to secure passage home. Stories about the ravages of the disease among the French became current, and the men at work shuddered as they passed the little French cemeteries so plentifully scattered along the Zone.



Photo by Underwood & Underwood

IN WALLACE'S TIME
 Sanitation work in Panama City

The sanitary forces wheeled out into the open and went into the fight. Every house in Panama and Colon was fumigated, against the bitter protests of many of the householders who would rather face yellow fever than the cleansing process, and who did not believe much in these scientific ideas of the "gringos" anyway. An army of inspectors made house to house canvasses of the towns and removed, sometimes by force, all suspected victims to the iso-