THE CANAL

The Isthmus of Panama has an easterly and westerly direction. On the north side of the Isthmus is a bay called Limon Bay; this is two and three-quarters miles wide, and extends inland about four and a quarter miles.

To the east of the entrance lies the island of Manzanillo, on which are the two cities, Colon and Cristobal. Back, or east of the island, is the Bay of Manzanillo, which formerly connected with Limon Bay, but across this narrow neck of water the railway is carried by an earth embankment, thus turning the island into a peninsula. Limon Bay forms the harbor of Colon.

Starting about four miles and a half from the shore line of Limon Bay a channel about forty-one feet deep is being dredged. This channel runs parallel to the shore line at Colon. It is the beginning of the great canal.

Colon, on the railroad schedule, is four and a half miles from Mindi, and Mindi is practically a half mile from the shore line. It is here where the railroad and the canal meet; up to this point the canal channel will be wide and straight. A slight turn is made at Mindi and the digging of the channel continues for about two and three-quarter miles up to Gatun. The distance given for the canal
channel up to this point is 7.15 miles. The distance along the railroad from Colon is given as 7.08 miles.

The canal, up to this point, is at sea level, the tide on the Atlantic Ocean and Caribbean Sea hardly exceeding two feet at its greatest range. Up to Gatun the elevation of the land is not very high, but from this point on to Pedro Miguel (according to railroad schedule 40.72 miles from Colon) is where the high elevations are met and where the dirt must fly.

The enormous amount of excavation necessary to make the entire channel a sea level canal, as well as the time required, were two of the important factors which led to the decision to make a lock canal. Another consideration was the difficulty of controlling the water flow in the Chagres River, flowing into the Atlantic, and the Rio Grande flowing into the Pacific. So a lock canal was decided upon, and they are building it.

I led you up to the town of Gatun, following the canal as planned up to Gatun, because here is a point where the great dam is to be built which will control the waters of the Chagres River and its many tributaries, and will flood many square miles, making a great lake. At Gatun, too, are three great locks to lift the vessels to the higher level.

This great lake is, of course, of various depths, its maximum level above the sea will be eighty-five feet. A channel through this lake must have a depth of at least forty feet, and the line of the canal follows the line of lowest elevations and least excavations. The
channel continues south in a straight line from Gatun for four miles, takes a decided turn towards the southeast for four miles and a half, practically at this point right in the channel of the Chagres River. Again it turns for a mile and three-quarters almost directly east, another turn to the southeast of less than three miles, again to the south for two miles, to the southeast for a mile and a quarter, to the east for two miles and a quarter, northeast a mile, east a mile, a little south of east for three miles and this brings the canal channel past Gorgona Matachin and up to Bas Obispo.

It will be difficult in reading the above twists and turns to grasp the course unless one puts it down on paper, yet it is necessary. I have given the above in detail and in approximate distances in order to answer the question "Does the canal go straight across?" "Why not? Well, how does it go?" Further than this it must also be added that from Gatun to within a few miles of Obispo the channel as dug will not appear as a canal, as there will be the surface of the lake stretching on all sides.

From Bas Obispo to the Pacific Ocean the line of the canal has few turns and follows an almost southeasterly course. The southern or Pacific end of the canal is east of the Atlantic end by approximately 20 miles or more. The Pacific end of the canal is a short distance from Panama. It makes its entrance into the ocean at La Boca and the channel is being dredged to a distance of about four miles to deep water.

Originally it was decided to place a lock at Pedro Miguel (39½ miles from the Atlantic, 10 miles from deep water of the Pacific), have a dam at La Boca, making a lake with a 55 foot level, having also two locks at La Boca. Upon investigation of the foundation
for the dam and for better protection, the plan has been changed. The dam will be at Miraflores, which is approximately 41 miles from the Atlantic end of the canal channel and about 8 miles from deep water in the Pacific.

The locks will be located between Pedro Miguel and Miraflores, and there will be a sea level channel from Miraflores to deep water in the Pacific. The tide in the Pacific has a range of 23 feet. This requires additional excavation on the Pacific end and regulating gates for the tide.
GATUN DAM AND LOCKS

At Gatun the valley of the Chagres River descends to nearly sea level. On either side rise two large hills and in the center is another natural elevation. These natural embankments have been selected for the abutments of this great earth dam, which is to control the flow of the water towards the Atlantic and will make the great lake.

The base of the dam from the lake to the extreme toe towards the ocean will approximate 4,000 feet, but depends upon the characteristics of the material used in its construction, and will be made wider if necessary. The slope of the dam will be one foot in twenty-five on the side away from the lake, but much steeper on the lake side. The crest or top of the dam will be 135 feet high.

Extensive experiments are being carried on to obtain the friction values of different available earths and also to what extent they allow moisture to seep through.

This dam will be over one mile along its crest (about 8,000 feet). Extensive drillings are being made along the length of the dam so that an exact knowledge of the foundation will be known and the work conform to it.
I stood on the trestle forming the lake end of the Gatun Dam and looked at the expense of country that would be covered.

From here I went up to the Offices of the Engineer and from the porch took a photograph of the Dam site, Old Gatun and the beginning of the cut for the Locks.

Turning the Camera further to the right we have a continuation of the excavation for the Locks.

The Spillway is a mile and a half from the office from which the other two pictures were taken. This picture shows Old Gatun from the Spillway and the offices and quarters further back on the high hill.
That portion of Gatun lying within the lake.

The portion of Old Gatun on the site of the dam.
The New Village to which the Residents of Old Gatun are to be Moved.

Two Views. At Work on the Spillway Gatun Dam.
Through the natural hill in the center of this line on which the dam is to be constructed they are making a cut for a spill way. It will be 600 feet wide and be filled with a concrete wall seventy or seventy-five feet high. Approximately 250,000 yards of concrete will be required for the spill way. Regulating gates will be erected on top of this wall of masonry, and the top of the spill way is to be approximately 90 feet high.

The water in the lake is to be 85 feet above sea level. During the rainy season the gates in the spill way will be open and the height of the lake maintained at the desired level. No water will ever flow over the crest of the dam; the flow from the spill way will pass through a channel concreted on sides and bottom, and continued for a sufficient distance to avoid any possible damage to earth dam. The natural hills selected for abutments and spill way furnish a safeguard against earthquakes.

It will require approximately 22,000,000 cubic yards of earth to build the dam, and suction dredges are to be used to throw in the earth. When the height becomes excessive for the pumps on the dredges, auxiliary pumps will be used, operated by electric motors. The lake side of the dam will be covered with rock to prevent action of the waves on the earth. The two extreme edges at the base of the dam are called toes. These are now being built.
The quarters and offices for the employes stationed at the work on the Gatun dam and locks are about one mile from old Gatun and upon a high hill overlooking both dam and locks.

The old town of Gatun lies partly on the site of the dam and partly where the bed of the lake will be. The work is progressing at this point to such an extent that it is only a matter of weeks before the town will have to be moved and another of the quaint landmarks gone; but it looks better in a picture than in reality, so no harm is done. A new town to which the natives are to be moved has been built two miles to the northeast of old Gatun.

The dam has a northeasterly direction, and at its eastern extremity the locks will be located. The locks will lie nearly north and south. An enormous amount of excavation has already been done here through soft rock and red earth.

There will be three locks in duplicate, that is, it will take three locks to lift a vessel from sea level to the 85-foot level, each step approximately a little over 28 feet. By having a duplicate set side by side, vessels can be coming up and going down at the same time. These locks will be 110 feet wide and each chamber 1,200 feet long. The water will be controlled with mitre gates such as are seen in canals all over the world. However, a new type roller gate of unusual construction will be used in the upper locks to prevent any accident caused by the breaking of the other gates. All the machinery for the locks is to be operated electrically when possible.

The rock on the isthmus is not good for concrete, neither is the sand. At Porto Bello, twenty-one miles down the coast, a
Chagres River at Gorgona. Old French Locomotives in the Foreground.
quarry has been located. The stone will be brought up in barges from there. For sand it looks as if it will be necessary to go further down the coast for it.

The walls between the locks will be over 110 feet wide and the walls on the side equally as heavy. One can imagine what a big job it will be. None of this concrete work can be started until all the excavation is finished, but the engineering department is at work on plans for cable ways, mixers' sheds for cement, dumps and platforms for sand and rock; and before the last steam shovel and last blast have made the way clear there will be an erecting gang shoving them for room. Everyone is pushing everyone, and no time is lost anywhere, except when the rain is too much.
A View of Culebra Cut.
A View looking North up the Cut from Paraiso.

THE BIG CUT, CULEBRA

The backbone of the isthmus is near Culebra. At this point the highest elevation on the new center line of the canal before excavation began by the French was 312 feet. At Bas Obispo, about four and a half miles nearer the Atlantic, the elevation was 233 feet.

The French cut down the elevation at Culebra 161 feet and at Bas Obispo 148 feet. These cuts were not wide. When the Americans took hold there remained a depth of 45 feet at Bas Obispo, 111 feet at Culebra and on the barrier at Contractors Hill, just south of Culebra, a depth of 140 feet.

While at points along the entire line of the canal you will see steam shovels at work, it is between Gorgona, about 28 miles from the deep water of the Atlantic, and Pedro Miguel, about 40 miles from the Atlantic, that one sees the great activity of steam shovels, air drills, blasting, track laying and track shifting, and dirt moving.

The line of the Canal up to Gorgona has had little obstruction after passing the locks at Gatun, but the continual ascending character of the country places in the way of the work this barrier of dirt and rock nearly twelve miles along its base and rising to the height of three hundred feet, through which a channel must be cut to a depth within forty feet of sea level. A channel of 600 feet wide at the bottom and ever widening width as the elevation increases,

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until one is almost astounded at the mass of earth that has to be removed. Think of five hundred train loads of dirt being moved every day, trains of sixteen cars, and one realizes how busy the place is.

Out of this big cut at Culebra three hundred and thirty trains are being hauled. About seventy steam shovels were at work along the entire canal; the smallest take up two and a half cubic yards and can fill and dump a shovel full every eighteen seconds. The largest shovels take up five cubic yards. Some shovels will be filled and dumped every sixteen seconds, and if the competition between the various divisions keeps up they will be sure to cut this time down.

The shovels lose time in being moved, as it is necessary to keep them always in working distance of the earth. Time is also lost in waiting for cars, yet no time is lost in moving trains. Many of the cars are dumped by air and many by the Lidgerwood system. This is done by a plow connected by a cable to a steam windlass. The windlass is on a special car placed between the train and the engine. The plow is on the rear car, the cable running over the 16 cars, along top of the earth. As soon as the train reaches the dump, the signal is given and in less than five minutes the cars are empty and off for more dirt.

All along the work, air compressed drills can be seen, drilling for blasting and drilling to obtain the formation of the soil. Records of the work of every steam shovel is kept with accuracy and also of every drill. Comparative reports of steam shovels are published weekly and the efficiency wonderfully increased.
This photograph was taken of Gold Hill from Contractors' Hill, the intervening chasm being the channel of the canal. The picture is intended to convey the magnitude of the cut near Culebra.

This photograph is one showing the side of Gold Hill with a nearer view than the one above. It was the intention to show the sixteen-car train and engine for a comparative picture; three cars and the engine were too far advanced, but by looking at these two pictures an idea can be had of the size of the work.
About one mile North of Paraiso, looking South towards the Pacific Ocean. This was taken from an Elevated Tower in the center of the Cut. Dirt Trains passed this point about every three minutes.

About one mile North of Paraiso, looking North towards Culebra, this was taken from an elevated Tower in the center of the Cut. This with its companion picture at top of page gives at least a stretch of six miles along the line of the Canal excavation.

The illustrations on page 60 were taken at the point where the smoke and steam is arising off in the distance.
In January, 1906, the output per shovel was 363 cubic yards per working day of eight hours; in January, 1908, the average output was increased to 1,084 cubic yards, and in February, 1908, to 1,186 cubic yards. From the interest shown there is reason to believe that this record will be increased.

To walk from one end of this work to another impresses itself upon you. From Empire, one mile north of Culebra, on past Culebra, down to Paraiso, a distance of five miles, the sides of the great ditch loom up in giant proportions, and the towering Gold Hill on the left and Contractors Hill on the right, points just south of Culebra, seem to almost meet the sky; and then you realize what it means when you are told that still over one hundred feet deeper must the ditch go before the water can flow through.

Just south of Gold Hill on the left is Cucaracha. In the fall of 1907 this hill had a landslide and filled up the excavation to a depth of twenty feet, the total amount of material being estimated at 500,000 cubic yards. The soil is of such a nature it looks as though it would keep on doing this for some time to come. This movement first began in 1884 and ceased soon after 1889. Special work is being done to prevent further slides. It is just such things that make this work greater than even it appears to the observer.

At Pedro Miguel, nearly forty miles from the deep water of the Atlantic, the descending elevation of the backbone has gone below the 85-foot level, and at this point the first of the great locks on the Pacific side will be located. At Mirafloros, just one mile further, another dam will be built and between this dam and Pedro Miguel the other two locks will be located. Borings are being made to insure rock foundations for these locks; originally two of these locks and the dam were to be located at La Boca, within four miles of deep water and right on the shore line, but this was abandoned because of engineering difficulties, foundations being poor and, further, the location of the locks inland offered more protection from attacks.

From Mirafloros to deep water the canal channel will have to be dug and dredged to make it a sea level canal.
Steam Shovel making New Cut at Gorgona.
LA BOCA

At the Pacific terminus is the town of La Boca. The canal channel extends four miles out to deep water, but large areas of level land are being made extending out towards deep water, giving the government space for the erection of works of any kind that may be necessary. The original site planned for the dam is also being filled in.

The long piers at La Boca are used by the shipping interests and will be improved. Large ships do not sail from Panama, but from La Boca, which is the port for deep sea going vessels. Panama is about one mile west of La Boca.

La Boca is an important place. But few people live here at present. However, when the canal is open it will be one of the busiest places in the canal zone.
This Picture is made by joining three Photographs. I stood in one position and took succeeding Pictures of the Harbor at La Boca. To the right you see the Pier, and to the Left is where the Government is making land. The Canal will be to the right of the Piers.
The Upper Picture shows the Interior of the Screened Porch, and the Lower Picture gives an exterior View of the same. These are Views of Married Quarters at La Boca.
A Lidgerwood Unloader. The Plow was moving rapidly when this Picture was taken. Men and Camera barely had time to escape from the deluge of earth. This dirt is thrown off so quickly that one does not realize it.

EXCAVATIONS

The French made a total excavation at all points, including what is called the diversion channel, of nearly 82,000,000 cubic yards.

The estimate made on April 1st of 1907 gave approximately 102,000,000 cubic yards to be excavated in the canal channel above, nearly 8,000,000 for lock sites, a little over 2,000,000 for regulating work and diversion channel, and about 3,500,000 to open a construction channel at Panama and to keep the channel open at La Boca.

While in two years and three months the Americans excavated 32,000,000 cubic yards, one year and three months' work had been done when the above estimates were made, so it is safe to say that from April 1st, 1908, nearly 100,000,000 cubic yards have to be removed, but in March of 1908 the total excavation was nearly three and a half million cubic yards. That meant concentrated effort and shows the efficiency attained by the organization. They have gotten into the right swing, and all they need now is the support of the American people.
Canal Cut at Gorgona.
The Business End of a Steam Shovel.
The Panama railroad, which is being used by day for hauling dirt and construction material and by night for freight, was a single track road with a few sidings. The death rate for building this road is variously stated. Often it is said that for every tie there was the life of a man. This would mean 100,000. The most conservative estimate was 2,400. This road has been practically double tracked since the taking over of the property by the American Government, and owing to the plans of the canal, the entire road will have to be rebuilt at a higher elevation and along an entirely different route. The location of the road is settled and work being done on the roadbed.

Work of all kinds and at all points is progressing both in railroad and canal, but no work can be finished until all is finished. All work is so interdependent on other work that the finished result of any one point can only be expected when it is the same at other points; in other words, the canal will practically all be completed at all points about the same time, and if proper support is given by Congress and the people this time will be approximately in the spring of 1915.

The force at work is efficient and energetic and has behind it the spirit and brains of men who are able and intelligent. The way the work has progressed demonstrates to one who investigates that failure can only be due to lack of appreciation upon the part of the people and the support of their representatives in Congress.
On the Isthmus of Panama the Jamaican negro seems to be a discredited individual among a large proportion of the people one meets. It presented a condition of affairs that made the dusky race interesting. I started on my observations in earnest, when the Jamaican Africano who hauled my baggage tried to charge me double price and the carriage man tried the same trick; but then the white cab driver in New York tries the same dodge, so maybe I look easy and throw temptation in the paths of the guileless.

Someone, observing the splendid muscular proportions my tailor so kindly provides, and noticing my stern eye and determined mien, advised me that it cost twenty-five dollars to lick a Jamaican negro and if I did it be sure and get my money’s worth. Well, you know
that under my austere exterior no fiery pugilistic desires are hidden. I always refer my fistic engagements to my manager in that department, and he was busy packing goods some two thousand miles away.

Well, to begin with, I found out that there were a number of negroes who were not Jamaicans, and of course when one is judge he must hear both sides of the case. I put the question to the Jamaican Africano (this word is mine) who drove my "carry all" and his verdict on the case was that only the Jamaican negro was good; all other negroes were lazy. The Jamaican worked hard and saved his money; the others loafed and spent their money foolishly.

While this made the question seem easy, I found the colored guard divided against itself, each more or less dragging down the reputations of the other. The St. Luciens claimed they were the pick of the flock and the rest worse than cold storage eggs. The Barbadoes made the same plea for their island, so on their own testimony each crowd stood convicted by a majority of their own race of not being much good, and 'tis sad to think that I must go to their accusers to find their good points, or cull them out of the rubbish heap myself if I could.

Now I haven't lined up all the points and settled this vexing problem, but I have settled on one point; the word indolent seems to
From Barbadoes. Every Employee of the Canal Commission has a Star Shaped Check on which is Placed his Number. You can see the Check.
fit the case; the colored people, Jamaicans and others, range from the very exceedingly provoking, exasperating, irresponsible indolent, to just plain indolent as compared with the white race.

The reason seems to be in many a pure lack of physical strength and lack of mental development, or mental energy. They seem to be born tired and have a hard struggle to get past the point of doing nothing. One way of getting work out of them seems to be by putting a gang of them under the control of a man who has grasped the salient point that he is dealing with grown people with the minds of children; allow him to teach them how to do one thing, let them respect and fear him as their superior. He will gradually weed out the "no goods" and in many cases instill a pride in others, and eventually secure as much work from two of these men as he would from one white man, and even better, if the work in question was such as not to require great physical strength.

I found this condition true in four different gangs, and in each case the credit was due to the superior mind. One man in charge of a singing crowd of negroes told me that a negro could not talk and work at the same time, but they could sing and work, so he encouraged them to sing. A successful handler of these children of the dark skin cannot be a driver in the ordinary sense of the word; he has to be a diplomat. Most Americans are hustlers and
it grates on them to see three men trying to do the work of one. I saw seventeen negroes pick up a rail that weighed 700 pounds and grunt and groan over it.

I saw two white men move a drill, and the next day saw six colored men doing the same work. This shows the physical deficiency; whether they lack the actual strength or the mental force to exert it I do not know, but I think that they are not really as strong. Illustrating their tired condition, an engineer had a colored fireman. This man was filling the boiler of the locomotive and went to sleep standing up while the water filled the boiler full. Another told me of a colored fireman who, with an iron rake, was spreading out the coal on the fire. He went to sleep at this work, with the end of the rake in the fire. The handle got hot enough to burn through the fellow’s gloves before he awoke. These may be extreme cases, but they were vouched for by several people.

The English have given the colored race educational facilities and one is often astonished at the excellent penmanship of a man as black as ebony. When they have had an education they will speak as precisely as a written composition. Yet, when you hear others talk it sounds more like a man saying the multiplication table with his mouth full of hot mush. And so it is—the swing of the pendulum is wide, from the no good to the some good.
One wise and very successful manager of the colored help who had about fifteen or twenty colored men doing as good work as any white man ever could do, said the first thing to do was not to hire any "drag foot nigger"—watch "how they step" a drag or a shuffle puts them out. He has had two years in shaping up his crowd and he is boss. Another successful man said he had had fifteen years' experience with this kind of help. His crew were nearly as good as white men, but he said the colored mind was incapable of moral courage or responsibility; as soon as you threw responsibility on them they went to pieces.

A man from the southern part of the United States, now working on the canal, who had been in charge of labor in Louisiana, said he had better results from the negro in the States. They could do or would do more work than the Jamaican. Here and there I found hard workers. At the Imperial Hotel the night porter seemed very obliging and efficient, and every now and then I would find some one much above the average; then one gradually begins to learn that one cannot expect so much from them and becomes less critical. If you shout at them or speak quickly they get rattled. Many of them who have the best education are almost impossible. They swell up and are impudent. Yet, you will find among this class men of ability of whom it seems unfair that they should suffer for the deficiencies of their fellows.
Taken at Rio Grande. Laborer and family at home. The
close boards must be considered as a separate
incident. She wanted to be in the picture and she is.

On the following pages is shown four groups, intended to
give an idea of the class of labor that has enabled the Amer-
can foreman to carry out the work of construction.

The women who do housework are the most inefficient of all
classes as far as my limited observation went. Talk about the
question paramount in many households in the United States of
America, then join a circle of housekeepers on the canal zone, and
the latter will give facts that will open the eyes of the ladies on the
visiting committee. Here’s where simple man has to fade, and yet
there are some good ones somewhere, I am sure.

As I said, it costs $25.00 to lick a Jamaican or any negro who
is a British subject. When I asked one man what he was, he said,
“I am from Jamaica, I’m a British object.” He was proud of the
distinction; he did not know the meaning exactly, but he knew, as
he explained, that while you could call him all kinds of names, you
could not “lay hands on his body;” he was a British “object” and it
cost $25.00 to hit; this he knew.

I interviewed one of King Edward’s loyal supporters one hot
afternoon. I had had a hot and dusty climb up a long and winding
trail through the jungle to one of the highest points on the Atlantic
side of the isthmus. In a clearing near the Britisher’s hut I rested
on an upturned tub. The man was interested in my camera, and
though as black as black paint, his speech was excellent English.
He used some quotation from Scripture, and I turned and looked,
saying, "What church do you belong to?" "To the Established Church of England." I followed up this question by asking him if he ever was in the United States, and he answered by saying he had been in New York for a year and had been a "beer slinger." "A what?" said I. "Why," said he, "I served beer at Coney Island." I asked him if he thought that business worked well with the Established Church of England. "Why not? Didn't St. Paul say, 'Take a little for your stomach's sake?" "Yes, but do you? Are you not afraid it will get the best of you?" "Ah, no," says he; "one drink makes a colored man brave, and he's not afraid of any white man; and do you know that two drinks make me so brave that I could spit in King Edward's face?" Here was a man giving testimony which seems almost strange, yet it is one of the vital points. The negro, childish, harmless and incompetent, can be turned into a most dangerous animal by liquor.
European Laborers with American Foreman, Railroad Gang.

Well, to cut it short, do you think, taking the bad with the good, that the American nation could build the canal with the Jamaican negro and others from the adjoining islands? Yes, in time, perhaps, but what time? A hundred years? No, it is only by the influx of the white European labor, and the brains of the American foreman, that the canal can be built. The negro has a place, but he will have to get better or grow fewer and fewer in numbers; the good ones are wanted and the good ones will be kept, and more will be tried, but the lazy, drag-foot, indolent negro so common will succumb to the superior ability and energy of the White European, the East Indian and other classes of labor. The negro had a very exalted idea of his value to the Canal Commission, and became more and more useless until he found that French, Spanish and other European labor was displacing him; but a change is taking place. The colored man, because he is a tropical production, has no cinch on this job. They are working on the canal zone, not loafing, and the loafer must go.
Construction Gang: Americans, Europeans and Negroes.

Construction Gang, mainly Europeans.
Administration Building at Ancon; Headquarters of Sanitary Department in this Building.
SANITATION

The Americans took possession of the canal at Panama in the spring of 1904. The experience of the builders of the Panama railroad had taught those in control of the canal work that unless yellow fever and malaria could be controlled or eliminated it would be almost impossible to complete the canal.

Here was a stretch of country fifty miles long, with the towns of Panama and Colon at the two ends, with a number of smaller towns in between. The sanitary department had not only these two diseases to control, but also had to care for the sick, the disposal of night soil and garbage, examination of food supplies, and general conditions.

At the start if we had had military control work would have progressed more favorably; but the physicians in charge of the
work of sanitation were military men and they have developed sanitation along lines where today their authority is so recognized that things move when they speak. It is not always the brains and the knowledge that bring about desirable results, but it is the power which permits the man or men who know how to enforce the regulations for the greatest good.

It took from May, 1904, to December, 1905, to stamp out yellow fever. In the year 1905 there was a general fear among people, and it was most difficult to get employes, and if the conditions had not changed the canal probably would never have been finished.

The Stegomyia mosquito is the insect that, when it bites a yellow fever infected person, can carry the infection to any number. This was a theory advanced by Dr. Coles Finlary, and maintained by him since 1881. The correctness of the theory was fully demonstrated in Cuba, and Colonel Gorgas, who had charge in Cuba, was assigned to the work on the Canal Zone.
The department had to be organized. Panama was seven days from a base of supplies, and sickness made the hospitals busy. As soon as possible the fight against the causes of the disease began, carried on side by side with the care of the sick. Four hundred men were employed in a fumigating brigade; the cities of Colon and Panama were fumigated.

In Panama the entire city in the year 1905 was fumigated three times, fumigating every individual house, and in addition every block in which a case of yellow fever occurred that block had another dose. Two hundred thousand pounds of pyrethrum, and 400,000 pounds of sulphur, besides other fumigating materials were used. By and by this fumigation began to tell on the *Stegomyia*.

Then the breeding places were attacked; it seems that they breed in water, so by screening or covering all water receptacles this brand of mosquitoes could not breed. And so the great battle of Stegomyia versus Gorgas et al. was won by Gorgas et al., but as a few remaining remnants of the pest may at any time invade the Canal Zone, vigilance is maintained.

A yellow fever suspect is immediately put in a screened room to prevent any possibility of a mosquito biting the patient and carrying the infection. All incoming passengers are examined and the greatest precautions taken. Orders, I found, were tacked up on all shops and I presume notification thoroughly disseminated, that no receptacle or tool capable of holding water can be left in such a position that water may accumulate and form a breeding place. And down on the Canal Zone sanitary orders are orders.

They have a number of doctors on the Canal Zone who are not in the army but are in the service of the government on this canal work, but what has made this work so efficient is the fact that these doctors now can know that they are working along established lines in their profession, and no untoward outside influence is working against their medical skill.

There is another mosquito, its name is Anopheles. It is responsible for malaria. It breeds in clean water where grass and algae grow. This mosquito does not fly farther than one hundred to two hundred yards. The work to do is to destroy its breeding places as far as possible, so around laborers' camps and villages every attempt is made, but it is impossible to do anything with swamps and the great stretches of country on each side of the canal. If one goes out hunting or on a jaunt through the jungle he is just as liable to pick up a bit of malaria as anything else. (The "Anopheles" will bite in the daytime as well as night. They are found in shady places, so it is difficult to keep people from being infected by this malaria mosquito.)

The sanitary department advise the taking of three grains of quinine every day. This is considered to put the individual in such a condition that the parasite of malaria will not thrive in the blood.

To kill breeding places, all laborers' camps and settlements are drained by concrete ditches or sub-soil drains. Everything is done
Nurses' Quarters at Colon Hospital. The Picture on the right shows the Water in Front. The one on the left shows the Water Front Filled in. Work of Filling in Low Spots is going on in many places all over the Canal Zone.

to prevent standing pools of water or ditches where grass and vegetation will grow, and this requires careful work and constant supervision. The heavy rainfall and the luxuriant growth of tropical vegetation make the work all the more difficult.

Every month shows new places to take care of, new conditions, change of camps, progress in work, all requiring the most careful watching of the sanitary inspector, and the follow-up work of the sanitary brigade; houses to be screened, depressions to be filled, spaces around camps and villages to be cleared and land mowed, cleaning ditches, oiling, and making new ditches and grading. Then the canal prism, that is the big ditch, has to be watched, for water will accumulate in low spots after rainfall.

The sanitary department has also the drinking water to care for, and the country from which this water comes, the water shed, is guarded for cleanliness by strict laws, and you want to look out you don't break them. Laws are made for the sake of health and they are enforced. Health is the preeminent asset of the Canal Zone and must be preserved, and the "must" is in big type.

In March, 1907, the sanitary department reports 36,387 employees on the pay roll and 122 deaths, and in March, 1908, with 43,276 employees on the pay roll and 45 deaths. In March, 1907, 1,576 cases of malaria among employees admitted to the hospital; in March, 1908, only 533. In March, 1907, among the causes of death were 9 from typhoid fever, 53 from pneumonia, 16 from malarial fever and 12 from tuberculosis. In March, 1908, one death from typhoid fever, five from pneumonia, nine from malarial fever and three from tuberculosis. Each year shows an improvement over the previous year.

Bubonic plague exists along the west coast of South America and as far north as San Francisco. Here again our sanitary department were aware of the work and precautions necessary. It has been
A View from the Rear of the Imperial Hotel, showing How One-Half of the Street has been Filled in. Work is Progressing on the Other Portion. The Track is a Temporary one, put there in order that the Earth and Rock can be brought in from the Canal Excavations.

ascertained the plague is carried by rats and the infection spread by a species of flea that infests the rat.

Any ship leaving an infected port has pretty stiff quarantine regulations; they have to be fumigated and disinfected upon leaving the port, and certain kinds of cargo are prohibited, especially food products attractive to rats. Then the vessel is held for a sufficient time to make the total time from the date of fumigation to be six or seven days. And do they live up to it? Well, you may be sure they do, and if not strictly up to the letter of the law, they are fumigated again and stay in quarantine six days.

In a few months rats will be scarce on the Canal Zone. The bubonic plague has existed in ports from which shipping comes for four years. In the fall of 1905 there were two cases of bubonic plague. The sanitary department acted quickly and effectively. Today a rat exterminating battle is on. Rat poison was tried, but rat traps are the thing, and after rats are caught they are cremated. A
large number of traps were ordered and are now doing work. When one considers what these doctors in the sanitary department have to think of it makes your head swim; they are rat catchers, bug killers, garbage removers and incinerators, sewer diggers, special police, fumigators, food supervisors, ditch cleaners, and jungle cleaners.

And this is not all. In Colon they have ordered the raising of the street levels and the filling in of the depressions under the houses. They have paved the streets in Colon and Panama.

You will see people going to one of the many street hydrants and drawing pure, fresh water, all sanitary regulation and suggestion, and the water is free.

When the work of sanitation goes beyond the functions of doctors’ forces and becomes a construction and engineering feature, the engineering department take it up and do the work.

The sanitary department has demonstrated its value. It exists so that others may live and enjoy life, so others may work and the great task completed. What the sanitary department does is not for the glory of its doing, but that others may use their faculties and abilities to the fullness of their powers. It is the servant of the people and as the wisdom of its efforts become more and more apparent, every employee of intelligence on the Canal Zone becomes a part of the sanitary department.
Boiling their Beds to Rid them of Bugs.

INCIDENTS OF SANITATION.

I saw a number of colored men standing around an iron tank about seven feet long and four feet wide. The tank was raised about ten inches or more from the ground, and underneath it was a wood fire. The tank was filled with boiling water. Nearby was a negro sleeping house. In these houses the bunks are oblong metal frames with canvas stretched in the center; this forms a comfortable bed in this hot climate. These bunks are easily taken down.

On the grass were a number of these bunks that had been wet and were drying in the sun. Others were being brought out and dumped into the boiling water. When I inquired what they were doing they said, "Cleaning house." You see the bugs get bad and we can't sleep, so we just boil them and they are all right, and they were.

I sat down to a table and thought the bottom of the table legs looked queer. Each leg was set in a tin can and the can partially filled with oil. When I asked the reason, the answer was to keep the ants off the table.

The maid used to oil the joints and crevices in my iron bedstead at Colon, and when I said why, she replied: "It is better so." And it must have been as she said, because I was comfortable. Fleas bother some people very much, but I did not have any trouble with them.
A lady and I visited the hospital at Ancon. It is located on the hills back of Panama; the air is fresh as they get a breeze nearly all the time. The beauty of the location is difficult to describe; it is pleasing to the eye as you approach along the ascending drive-way, and the view of the surrounding country is equally as impressive.

The buildings are of frame with porches. The illustrations give a better idea of the construction of the buildings.

There is a general office. It was here we called and met the General Superintendent, Major Phillips, from these offices, under the guidance of the Major, we visited the store house where supplies of all kinds were kept; dishes, clothing, shoes, linen and all hospital necessities. In a separate building drugs and medicine were stored, and a regular shipping department arranged to fill orders from the different wards. We saw quinine tonic by the barrel; this is sent in quantities along the canal to stations when required.

They have wards for Americans, both surgical and medical; separate wards for European white, and also separate for colored and separate wards for women. Twenty-one wards in all for these purposes. The operating room department, is a separate building thoroughly equipped with all the latest surgical appliances and X-Ray apparatus; and near there is a complete medical library, and in this same building is kept a history of all the cases passing through the hospital. In addition to the store room and distributing room for drugs, there is a complete laboratory.

In addition there is a building for tuberculosis patients, and a new building was just being completed for contagious diseases, but
they have only had one case and that a case of measles. This building was noticeably small.

Under the jurisdiction of this hospital there is a separate department for insane, in which all the insane of the Isthmus, both the Republic of Panama and the Canal Zone, are taken care of. This has eleven separate buildings. Some buildings are divided into cells, others regular hospital style. The men and women are kept in different buildings, and the whole is enclosed by a high fence. At the present time 160 patients are there, mostly colored.

The hospital has a large central kitchen where all the food is prepared. The wards have subsidiary kitchens, and the food is distributed to these places where it is heated when necessary. This takes a great burden off the individual wards and seems to be a desirable arrangement. The central kitchen distributes food to all kitchens attached to quarters; these kitchens are equipped with gasoline or electric stoves to keep this food warm until served. These kitchens were furnished with ice boxes to keep such food as required a cool place.

Besides the homes for the officials, there are bachelor quarters for male employees of the canal commission, who may be assigned to them. A general mess for men; delightful quarters for the female nurses, which include dining room, sitting room, library, separate bedrooms for each nurse, wide piazza or veranda, commanding a beautiful view and a fine breeze; and we must not forget the garden at the nurses’ quarters, one lady making a specialty of collecting orchids.

Some of these buildings are old French houses which have been renovated; others are new. The drainage and water supply is as
Three Views of Hospital Grounds on Hill at Ancon. These Grounds are at a High Elevation.
near perfect as engineering skill can make. All buildings are perfectly protected by screens against flies and mosquitoes. The laundry is a steam laundry with about eighty employees; the latest machinery and devices used. This laundry does work for the hospital and also does private washing for employees of the commission. The Hospital washing, however, is kept entirely separate from all others. (Hospital wash is sterilized.)

The greatest courtesy was extended and every opportunity offered for close inspection. One is impressed with the discipline, neatness, and cleanliness of all parts of the hospital, and also with its desirable location high above the sea level. To walk up to any of the wards is a warm climb, but the view and the breeze repays one for the effort.
ANCON AND THE TIVOLI HOTEL

Ancon adjoins Panama, and the Tivoli Hotel is the largest thing in Ancon. It is like a large summer hotel in the States, only it is different. It is owned by the Commission, or rather by the United States, and has been opened to the public. You are charged from $3.50 up, for room only, 50 cents for breakfast, $1 for lunch, $1.25 for dinner in the evening.

You kick vigorously or mildly at the meals, according to your disposition, for the cooking is very poor; oh very poor. You don’t mind the price of the room so much if you have been in Colon for a time, you know that you have to pay for rooms everywhere, and that the Tivoli have fine ones.

After you try a few meals at Hotel Central, in Panama, you do not kick so hard at the Tivoli Hotel meals. You begin to realize for some reason or other that outside of the private families, where the wives do the cooking, that the art of preparing food is a lost one. I had four meals as the guest of one of the employees at his home. His wife did the cooking; she couldn’t get a cook. Well, those were the best meals I had on the Isthmus. I had two other good meals, one as the guest of an engineers’ mess, and one that I had prepared specially.

You begin to find out that it is harder to do some things on the Isthmus than it is in the States, and that is to get cooks and help for hotels, and you feel very grateful at last that the Commission opened the Tivoli Hotel. Of course, you feel grieved to find that there
are some very fair rooms for a dollar and a half a day, that you didn’t know of until you were departing, but this hotel, which is a vital necessity, must be run as a business proposition. It is used as a meeting place for the people along the canal, and is a lively place on Saturday night.

It has had one good effect upon the Panama Hotels—they have to do something to compete, and that something is to give their patrons service.

The sanitary conditions of the Hotel Tivoli are excellent, and it is as clean as the best hotel in the States.

At the Tivoli Hotel, Ancon, on Saturday evening, February 29th, a flower dance was given. It was the first dance given by the Ancon Women’s Club, and was a very pleasant affair. The guests of the Hotel were invited, and I accepted the invitation. Men and women from all along the Canal came in to Ancon that night, and many dress suits were brought out for the occasion. The summer dresses and flower decorations were quite unique to think of when just a short time before, snow and cold breezes were my companions.

These Women’s Clubs are causing much discussion. The representative of the “Women’s Federation of Clubs,” in the United States, came down to the Canal Zone and organized a number. The Ancon’s Women’s Club, composed of the women of Ancon, was organized in the early part of 1907. The objects of the Club are social, literary and educational. They have business meetings once a month and other meetings for pleasure as directed by the officers.

On Friday, I spent the afternoon at Empire and attended a minstrel show given by the Thespian Club, a Woman’s Club, all Canal Zone talent. The entertainment was a great success, and
The View from my Room at the Tivoli, over Ancon.

it was astonishing to observe the talent exhibited by the women and the few men friends that assisted. The people here feel the lack of entertainment, and they are filling the gap, to a certain extent, by their own efforts.

The Women's Clubs are growing, and doing good work.
Interior View of Rooms in a Commission House at Culebra.
The best Meals I ate while in the Canal Zone were those prepared by the Wife of one of the Men stationed at Culebra, and whose Home was in one of the Commission Houses. The Food that is Sent to the Canal Zone is good, and when prepared by a good Cook it is appreciated.
OLD PANAMA

Old Panama, in the seventeenth century, was one of the wealthiest cities in the world. The city was reputed to contain over twelve thousand buildings, many of them stone. There were monasteries and a magnificent hospital. The wealth of old Panama excited the envy of the world.

Towards the close of 1670 Henry Morgan, the buccaneer, with a following of about two thousand men, made a nine days’ march across the isthmus, attacked the city and gained complete control. The beautiful city was sacked and destroyed by fire. This fire happened two hundred and thirty-eight years before I crossed the isthmus (February, 1908).

A friend and I visited old Panama together. He had been on the isthmus a year and had never seen it, and I was told that I must not miss it. The best way to reach it, some people will tell you, is to ride over on horseback, but a carriage was good enough for us, and perhaps for our comfort was better. We drove through the outlying district of this, the real Panama of today, and along a smooth country road for a mile or more, past some comfortable residences, and then struck off across the open fields where here and there faint wagon tracks indicated the way. After three miles of this traveling we entered the jungle. Our carriage could go but
a very limited distance. An eighth of a mile walk along the trail brought us to the beach. The shore spread out like a horse shoe, the tide was out and the shelving, sandy beach, fringed at its water’s edge with a black, shallow ridge of mud, stretching for a quarter of a mile out to sea, made a unique picture.

The ruins we were to see were nearly a mile from the point where we had reached the shore. It was 11 o’clock, and the sun shining overhead made the walk through the heavy sand hot and tiresome. We reached the ruins, consisting of the tower of a church, St. Augustine, and many ancient stone walls. All approaches were covered with jungle growth. We found two others on the same errand as we, and compared notes. The place is historic, but the next time anyone mentions it I will advise him to read some old book of legends, look at a few pictures and let it suffice.

There is a tunnel in the old tower, and in days made dim by the many years that have passed, but kept fresh by ancient history, a priest buried much treasure, precious stones and gold under the old tower. Everyone who visits the place finds gold or jewels. One man, we were told, found a ruby, which he sold in New York for two thousand dollars. No one seems to know the name of this man. I might mention that none of the four who visited the place on March 1st, 1908, found anything except ticks and fleas and discomfort.
Ruins of Old Panama. Tower of the Church St. Augustine.
Old Stone Wall, ruins of Panama.

Commercially, Old Panama was great. The few stone walls, old foundations, and its church ruins are monuments of an adventurous people, and even in their day, more than two centuries ago, the idea of an isthmian waterway was considered.

On the return the tide had turned and we had to hasten or get our feet wet. This tide comes in about thirty inches or more an hour. Between tramping on jelly fish and chasing away sand flies, the return was very interesting. We lingered long enough to take snap photographs of a Spanish family on a picnic, a hunter, and a thirty-inch shark and a fisherman.

The wife of the Spanish man and mother of five children was doing a little fishing with an old felt hat, and caught a half dozen small fish several inches long. We would see large fishes jump from the water, and half-naked men would wade thigh deep and cast nets. Evidently this shore is good fishing.

On our return to town we passed a board enclosure. A crowd of Panamanians were coming out, and we counted no less than six game cocks, carried by their respective owners. One excited individual held up his bird and cried out in English, "He win."

Right on top of this crowd we came to another but different collection, women and children only. They were throwing water over each other. I jumped from the carriage to take a photograph, but no sooner had I left my seat than a bucket of water was thrown
View of opening in Tower at its base, showing thickness of Walls.
over my companion and my turn was next. Our driver became excited, and was as eloquent as his vocabulary would permit. Two native policemen advanced—notice, I say advanced—they did not run. They would have detained us for a conversation, but the impression conveyed was that the people were only playing and meant no harm. It was the first of the month, everybody was happy, and we were not the only persons who were wet. The people continued to chase each other. We drove out of range and watched them for a few minutes, and then continued to our hotel, where a late luncheon awaited us.

In the afternoon we went to the ocean side, in New Panama, the Panama of today, and watched hundreds of pelicans fly and dive and fish. They were so numerous and so many would dive at once that it looked as if someone were throwing stones in the water. These pelicans seemed to catch a fish every time they dove. The water along the shore must be alive with small fish, like the waters near the shore of Old Panama.
An Old Bridge crosses a Stream near the beach. It is at the opening of the Trail through the Jungle. We stepped across the Stream on our trip at eleven a.m.; but two hours afterwards upon our return, found the tide had widened the stream to a River, and within an hour more the land on the left will be covered and the stream will be a Lake. This bridge has spanned the incoming and outgoing tide for over 240 years.

Drawing water from a Public Hydrant to throw on Passers-by.