A LOCK CHAMBER ON THE PANAMA CANAL AT PEDRO MIGUEL.

Imagine if you can a great tub, one thousand feet long, more than one hundred feet broad, and eighty-five feet deep. Imagine that this huge tub has at its ends immense gates as high as a seven-story building and half a city block wide. Then you can form some idea of one of the most impressive features of the Panama Canal—the locks. The parts of the locks that most strongly kindle the imagination are the great steel-gates. There are ninety-two of these gates, or forty-six pairs, half of them at Gatun, the other half at Pedro Miguel and Miraflores. The construction and operation of them all are identically the same.* These gates were made in the United States and were shipped to the canal in sections and parts of sections. The greater task of erection was left to the workmen sent by the contractors to the Isthmus for this purpose.

The average time required to fill or empty a lock, thus raising or lowering the boat, as the case may be, is fifteen minutes.

The time required to pass a vessel through all the locks, is estimated at three hours, one hour and a half at Gatun, and about the same length of time in the three locks on the Pacific side, the one at Pedro Miguel and the two at Miraflores.

The time of passage of a vessel through the entire Canal, is estimated at from 10 to 12 hours, according to the size of the ship and the rate of speed she can travel.

*There is some variation in the height of the gates. The highest gate is located at Miraflores lock, where a variation in the Pacific tide of 20 feet has to be taken care of.
THE GREAT GATES TO PEDRO MIGUEL LOCKS, NOW VIRTUALLY COMPLETED.

Like the other gates at Gatun and Miraflores, those of the Pedro Miguel locks are each 65 feet wide and 7 feet thick. A comprehensive idea of the construction is gained here, for only one side of the gate has the steel plates in place, the "honey-comb" construction of the gate being plainly visible.

Some idea of the immensity of the gates can be gained by comparing their heights to that of the man standing upon the top of the gate in foreground. This gate is only two-thirds as high as the gates shown in the picture just beyond. A dozen men could easily be placed in one of the "honeycomb" openings in the gate.

A ship is lifted but once in passing through Pedro Miguel lock, but despite the fact that it is the smallest of the locks, the others being double and triple lifts, it is most impressive, for its shortness in length emphasizes its extreme width and depth.
THE GREAT CONCRETE WALLS OF THE LOCKS.

It is impossible to conceive the immensity of the great concrete walls of the locks, for the entire canal is constructed upon such a huge scale. Inside of these walls are huge passages as large as the Pennsylvania tube under the Hudson River.

The side walls, as well as the centre wall of all the locks, are the same. The side walls are from 45 to 50 feet wide at the bottom, and narrow from a point 24 1-3 feet above the floor of the lock to a width of 8 feet at the top.

The centre wall is 60 feet thick at the bottom, and rises to a height of about 81 feet, and is the same thickness along its entire height.

At a point of 42 1-3 feet above the surface of the lock bottom, and 15 feet above, the culvert, which runs through the centre wall, will be a U-shaped space, which will be 19 feet wide at the bottom and 44 feet wide at the top.

This tunnel or U-shaped space will be divided into three stories or galleries. The lowest will be for drainage, the next above will be used for the wires which carry the current to operate the water valve and machinery for opening and closing the gates. The top tunnel will be a passage for the man operating the locks.
THE SPILLWAY.

The Spillway is a great crescent-shaped concrete dam 1,200 feet long. It holds back the water of the Gatun Lake during the dry season and regulates the overflow during the rainy season. The crest of the dam is 16 feet below the normal level of the lake. On top of the dam are 13 concrete piers, between which are mounted fourteen 44-ton regulating gates electrically operated. By raising or closing them the overflow from the lake is controlled. When fully raised a discharge of 140,000 cu. ft. per second can be handled. In this picture the water is shown coming out of the sluiceways at the bottom of the dam.

The smallest run-off of water over the basin, which is now Gatun Lake, during the past twenty years, was 146 billion (146,000,000,000) cubic feet, which is sufficient to operate the locks through the entire year, for it is only during the three dry months that the lake will have to be called upon, for during the rest of the year the constant tropical showers supply more water than is necessary, and it is discharged through the spillway. During the three months of dry season, there will be sufficient water in the lake, allowing for evaporation, leakage, etc., to make on the average of 41 lockages per day, which is considered more than is practical to make during the 24 hours.

It is here at the spillway that the government has built the great hydro-electric plant, which generates the power for all the lock machinery and furnishes the light for the entire canal, including the many lighthouses which guide the vessel in its course through the canal.
THE ATLANTIC ENTRANCE TO THE CANAL.

From the Atlantic entrance to the Gatun Locks the canal appears as a natural waterway. The work here is practically completed. An old French dredge, working wonderfully well, is clearing the channel near the entrance to the Gatun locks.

The first five miles in the journey from the Atlantic coast through the canal is along this sea-level channel. While it is only five miles from the coast line of the Atlantic Ocean to the Gatun locks, it is in reality ten miles of canal channel, for an immense amount of dredging was necessary to secure a channel of sufficient depth from the shore to deep water. In addition to this, a great stone breakwater had to be built from Toro Point, near the town of Cristóbal, out to sea for a distance of two miles. This breakwater is fifteen feet wide at the top, and extends above the water at high tide a distance of ten feet. It required about 2,540,000 cubic yards of rock to construct this breakwater. At the Gatun Locks, the vessel is lifted 85 feet, when it enters Gatun Lake. Passing through Gatun Lake, the vessel enters Bás Obispo Cut, after which come Culebra Cut, and then the Pedro Miguel Lock. Passing through Pedro Miguel, the vessel travels one and a half miles to Miraflores, where it is lowered to sea level and passes through a sea-level channel four miles in length to the Pacific Ocean.
THE CHAGRES RIVER IN THE DRY SEASON.

The Chagres River, the main source of water supply for Gatun Lake, is most unimpressive in size during the dry season, seemingly a very small stream, but during the rainy season it is a huge flood of water. It has often been known to rise 30 feet in twenty-four hours. As the Isthmus is not able to boast of a single decent or even usable road outside of the Canal Zone, the natives make use of the river for a thoroughfare. There is no more beautiful river to be found anywhere than the Chagres.

With both banks heavily timbered with various tropical trees which are reflected in the crystal-like clearness of the waters, it often appears with charms peculiarly its own.

Almost daily can be seen the long, narrow "dugouts" of the natives loaded with bananas, silently going along the river on their way to the markets at Empire and Culebra.

The Chagres River flows into the canal near the Atlantic end of Culebra Cut, or more clearly spoken, about halfway between the Gatun Locks and Miraflorés.
GATUN LAKE.

Gatun Lake will impound the waters of a basin comprising 1,320 square miles. When the surface of the lake is 85 feet above sea level, it will have an area of 164 square miles, and will contain about 206,000,000,000 cubic feet of water. During the rainy season, which covers a period of eight or nine months out of the year, the lake will be kept full by the constant tropical showers, and a surplus will be stored for the dry season. As navigation through the lake can be carried on with about 41 feet of water, there will be stored for the dry season an ample amount to operate the Canal.

A ship in traveling through the canal, proceeds under her own power through the lake, Culebra Cut, and both the Atlantic and Pacific approaches to the locks. The only towing is while the ship is being put through the locks.

Through the first 16 miles from Gatun, the channel in the lake is 1,000 feet. Then for four miles the channel is 800 feet, and the remaining four miles have a channel of 500 feet.

The depth of the lake will vary from 45 to 85 feet. The water line in Culebra Cut will be the same as the minimum lake depth, 45 feet.

Three hundred feet is the minimum channel width of the canal.
"THE OLD SEA WALL" WITH NEW PANAMA IN THE DISTANCE.

The Old Sea Wall at Panama still remains just as it was in the days of romance, when the Spanish Buccaneers stood upon it, gazing seaward towards the treasures of Peru and Ecuador.

Beneath the old wall is the Prison where the Spanish years ago held captive their slaves, and to-day the Panamanian Government uses the Prison for confining those who break the country's laws.

One of the peculiarities of the Isthmus is the difference of tides between the Atlantic and Pacific Oceans.

At low tide the Pacific recedes several hundred feet away from the old sea wall, while at high tide it washes high up upon it, the difference between high and low tide being 21 feet in the Pacific, whereas it is only 14-10 in the Atlantic.

The old city was destroyed by Morgan in 1671. The new city was founded in 1673. With the clear blue water of the Pacific washing against it, and the coloring in the Spanish architecture beyond, the Old Sea Wall with its environment remains a relic of the days of romance.

Rising above the red tiled roofs of the town are seen the twin towers of the Cathedral, embellished with a myriad flashing pearl shells dredged from the famous pearl fisheries of Panama Bay.