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## A BRIEF HISTORY OF THE PANAMA CANAL

BY

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Professor Johnson\* has well named his admirable history, "Four Centuries of the Panama Canal," for that stupendous Isthmian project, though but now well under way, was, nevertheless, conceived by brilliant minds several centuries ago.

In 1245, Pope Innocent the Fourth sent one Friar John, as a missionary to the Great Khan. Later, in 1253, King Louis of France sent William of Rubriquis for a similar purpose. Both of these men upon their return reported the presence of a great sea to the east of Cathay. With such a sea to the east of this empire and another on the west of Europe, what could be more natural than a dream of a new glorious highway to Cathay?

In fact, it was such a highway—and no new continent—that Columbus sought when he embarked in 1492. He landed in the Bahamas and firmly believed that he was among the islands of the Indian Ocean, showing such belief by his letters and by his naming the inhabitants of San Salvador, Indians. He was strengthened in his error by his second, third, and fourth voyages. On these voyages he believed himself to be among the numerous islands off Cipango described by Marco Polo, and that Cuba was Cathay; consequently, he sought to return to Europe by way of the Indian Ocean. He never reached the Isthmus, however, and that honor fell to the lot of Rodrigo de Bastidas, of Spain, in the year 1500.

In 1505, La Cosa and Amerigo Vespucci explored the Gulf of Darien. In 1506, Juan Diaz de Solis and Vincente Ganez Pinzon touched at Jamaica, and from there voyaged to Yucatan. In 1508, Alfonso de Ojeda, Spanish governor of the Caribbean coast of Colombia, penetrated far inland and died while in search of the passage. Next, Balboa, governor of Castilla del Oro, driven to the pursuit of such a goal by the necessity of holding his position through some grand discovery, crossed the Isthmus, and on September 25, 1513, discovered the Pacific Ocean.

\*Professor Willis Fletcher Johnson, whose valuable book on the Panama Canal has been the chief source of the information contained in this article, has kindly approved the publication of this paper.

In no way daunted by these failures, many others from Europe sought the strait, and among these was Giovanni da Verrozzano and Jacques Cartier, to whom France owed her Canadian colony; Magellan, who sailed around the great cape; and Hernando Cortez, whose explorations in Mexico made him famous.

The failure of such men to find "the hidden strait" created a doubt as to its existence, and in 1529 the idea of an artificial passage was conceived by Alvaro de Saavedra Ceron. He had been a companion of Balboa and was, for the times, well conversant with the Isthmus. It was he who drew up crude plans for a canal at Panama and discussed the four great probable routes, Darien, Panama, Nicaragua, and Tehuantepec. This man, who died while in the midst of his work, by such advanced thoughts and by such appreciation of the advantages of a canal route over the long passage around the Horn, certainly stands out in bold relief from his age. Though dead, the pregnancy of his idea remained, and both Charles the Fifth and Philip the Second dreamed of such a project until turned to other channels by the pressure of state affairs. About this time, too, the British Freebooters became active on the Spanish Main and the canal project was laid aside and practically forgotten until the nineteenth century.

In the nineteenth century, however, lawlessness along the Isthmus had subsided. Internal dissensions no longer entirely engaged the attention of the nations, and so the canal was once more agitated. Attention was invited to it by the writings of such men as Humboldt and Goethe, and certain interested States on the Isthmus also urged it. As a result, about 1825, concessions were granted by both Panama and Nicaragua, and companies were formed. Through various causes these companies failed; Americans had been interested in them, however, and such fact kept the idea alive in this country. Consequently, other projects relating to the subject were constantly proposed and gradually the Government became interested and began to seriously consider the subject. Thus it was that the British aggressions upon the Isthmus at such a time naturally stirred the United States.

The British since the seventeenth century had gradually been unlawfully increasing their domain in Central America, but the United States having no apparent interests there and being busy in other affairs had paid no attention. Its resentment now was aroused, not by the unlawful expansion of British control, but by the fact that such expansion threatened its trade routes to the Pacific coast. As a result, in order to guard these routes, a treaty was made in 1846 with the Republic of New Granada, which was to have a most decisive effect on all interoceanic projects. By this treaty "the United States secured the exclusive rights of transit across the Isthmus

of Panama, including all routes in the country between the Chiriqui Lagoon and the Atrato River, and in return undertook to maintain the neutrality of such routes and of any line of traffic which might be established on that Isthmus, and also the sovereignty of the Isthmian territory against any attack by alien powers."

In Nicaragua the effect of British extension was immediately felt, and American commercial interests were greatly hampered. The interests of the United States and Great Britain so conflicted there that an acute crisis developed, which after much diplomatic intercourse, in which the United States made a poor showing, was tided over by the famous Clayton-Bulwer treaty. This treaty "provided that neither the United States nor Great Britain should exclusively control the Nicaragua canal or build any fortifications along it; that neither should ever take possession of, fortify, colonise, or exercise dominion or protection over any part of Central America; that they should mutually guard the safety and neutrality of the proposed canal, and should invite all other nations to do the same; that both should give aid and support to any satisfactory company which would construct the canal; and that thus a general principle should be established for application to all Isthmian canals or railroads at Panama or Tehuantepec as well as at Nicaragua."

This treaty, though regarded as extremely satisfactory by the American nation at the time it was signed, was in reality a most stupid political blunder. It was not applicable to the British claims in the Bay Islands and on the Mosquito coast, thus confirming Britain in all her disputed claims and violating the Monroe Doctrine; it was in direct opposition to the treaty of 1846 made with the Republic of New Granada; and it hampered greatly the policy put forth later of "an American canal under American control."

The disputes, which soon arose because of this treaty, did not, however, at the time interfere with canal projects, and many preliminary surveys were made both by the French and the Americans. France, however, was the most active, and in 1879 held an International Engineering Congress, presided over by De Lesseps, the famous builder of the Suez Canal. This congress considered the different routes and reported in favor of that which traversed Panama. This route was the one advocated by De Lesseps, though opposed by the other engineers of the convention, of whom there were few, the congress being more speculative than engineering in character. Accordingly a company was formed, a concession secured, and the construction entrusted to De Lesseps. The project called for a 28-foot tide-level canal, to cost \$132,000,000 and to be under European control.

Such a plan naturally aroused strong criticism in the United States, as it was a threatened infringement upon both the Monroe Doctrine and the Clayton-Bulwer treaty. De Lesseps naturally tried to smooth matters over, but was unsuccessful, and President Hayes further intensified matters by sending a most emphatic message to the Senate, in which he stated that it was the natural "right and duty of the United States to assert and maintain supervision over any intervening canal across the Isthmus."

Public opinion of such character, and that strong barrier, the treaty of 1846, effectually killed the idea of European control of the canal. De Lesseps, in turn, in an attempt to protect his own canal, tried, by a lavish expenditure of money and other means, to kill the United States-Nicaraguan canal, which was being promoted at that time, and also to have the treaty of 1846 abrogated. He failed in his purpose, however, though the idea of such a United States canal later came to naught, due to the blundering diplomacy of Secretary Blaine in his attempt to have the Clayton-Bulwer treaty abrogated. Thus it was that in 1881, when the French company actually began work, both the Clayton-Bulwer and the treaty of 1846 were still in effect.

In this year the company made a very showy opening, and for the seven years following the world, unknowingly, was a witness to a piece of gigantic graft and thievery. Such a system naturally resulted in bankruptcy, and the amount spent, \$400,000,000, compared to the work done, was appalling. Nevertheless, the French, though astounded by such knavery, attempted to reorganize and again struggle towards the goal. A receiver was appointed, affairs put in businesslike shape, and a new company finally formed in 1893.

In the meantime, Nicaragua had loomed forth as a dangerous rival. While the French company was in the throes of reorganization, concessions had been granted by that Government to an American company, and, in 1890, work had actually been started by this company at Greytown. Though it did little work, it nevertheless had an important influence upon the present interoceanic project, for when the company fell into difficulties, strong influence was brought to bear upon Congress to help it out. Congress became interested, and from that time on an enthusiastic minority constantly championed the canal. In 1895, a Commission was appointed to report upon the scheme. This Commission decided that the plans of the company were practicable. Such a report renewed the enthusiasm, and in 1897 another Commission with greater power and funds was assembled. However, due to the fact that the Spanish-American War broke out in 1898, this report, though favorable, for the time seemed likely to come to naught.

The Spanish-American War was short, however, and, unexpectedly, an event in it aroused widespread enthusiasm for a quick passage between the oceans. This event was the record-breaking run of the "Oregon" from San Francisco to Cuba. Such a trip awoke all to the value of a canal, and the people began to clamor for it, and also for the abrogation of the Clayton-Bulwer treaty. As a result, a third Commission was appointed to investigate the Panama and Nicaragua routes, and negotiations, relative to the treaty, were commenced by Secretary Hay.

The results of both these operations were successful. A new treaty, called the Hay-Pauncefote treaty, was signed in 1901, which gave the United States complete power "to construct, operate, and control without cooperation" an Isthmian canal. A little later the Commission reported. It had examined the two routes and readily decided that the Panama one was the better. The reasons for such superiority, as stated by General Abbot, are as follows:

The Panama route at that time had two good harbors already existing. A good railroad was in position along the entire route. Construction of the canal was well under way and the remaining obstacles were definitely known. No new work was necessary which was not justified by former engineering experience. Except the works at Bohio, no difficult construction work was to be accomplished where the annual rainfall exceeded 93 inches. The route lay entirely within the bounds of Colombia. The distance to be lighted and supervised was but 46 miles. There were no active volcanoes within a radius of 200 miles and earthquakes were, therefore, less to be expected. The cost already estimated on the prepared plans was but \$100,000,000. The ports were known to be of easy approach. The length of the route was but 46 miles and the time of transit fourteen hours. The summit elevation was, at the most, 103 feet, and maybe considerably less. The locks were to be double from the opening of the canal, the chambers 738 by 59 and 738 by 82 feet, respectively, with intermediate gates. The curvature was gentle and the smallest radius 8,200 feet. Of the 46 miles of length,  $26\frac{3}{4}$  were straight and 15 had radii exceeding 9,800 feet. There were no troublesome winds or river currents, even in time of flood.

The Nicaragua route, on the other hand, had to have two harbors created, one of which, at Greytown, presented great natural difficulties. There was no railroad, and its construction would be laborious. No construction had yet been undertaken and many details of the project were not yet settled upon. Several dams would have to be built of a character never before attempted. The embankments necessary along the canal would always be a source of danger. All the difficult work would have to be done in a

region of 256-inch annual rainfall. The route lay along the border of Nicaragua and Costa Rica, thus furnishing a cause of conflicting interests. The distance to be lighted and supervised was about 176 miles. There were active volcanoes near the route, and in 1898 an earthquake had created considerable havoc. The cost, estimated on doubtful data, was over \$133,000,000. The access to ports was not secure, especially on the Atlantic coast. The length of route was 176 miles and time of transit forty-four hours. The summit elevation was 110 feet. The locks were to be single and only 650 by 80 feet. The curvature was too sharp, the smallest radius being 4,000 feet. There were heavy winds and strong river currents to be encountered.

Nevertheless, in spite of such obvious advantages of the Panama route, the Commission stated that, though the Panama was cheaper, the concession was unobtainable from the French company, and it, therefore, recommended the Nicaragua canal.

A report of this character was an extremely shrewd move, for it quickly brought the French company to terms. The company, seeing the impossibility of competing against the United States Government, at once opened negotiations with Colombia for permission to sell—was successful—and agreed to dispose of its rights for the proffered \$40,000,000. The Commission accordingly reversed its recommendation, and in 1902 a bill was passed by Congress authorizing the building of the Panama Canal.

At this point the Colombian Government stepped in and attempted to hold up the United States. It craftily saw that a two years' delay meant the lapsing of the French charter, with the loss of the \$40,000,000 to that company, and its own consequent gain of that amount. Accordingly it desired to delay negotiations, and the attempt was almost the ruination of the Panama project. The people of Panama, however, made desperate by the thought of such a loss to their country, in 1903 revolted, obtained their independence, and set up a republican form of government.

Much comment has been made and many sarcastic political articles have been written upon the part the United States played in this revolution. From the known facts, not enough credit has been given to the work of the patriotic few who desired the welfare of their country, and too much suspicion cast upon the United States. However, be that as it may, one thing is certain: the revolution was a success, and that same year the Hay-Bunau-Varilla treaty was negotiated.

This treaty gave the United States all rights upon the Isthmus of Panama necessary for the construction, control, and operation of an interoceanic canal. Thus it was that in the year 1903 the choice of a route was at last settled, the Monroe Doctrine firmly established as a national policy in all

American minds, and an "American canal under American control" assured.

By an act approved in 1902 the President had been charged, through a Board, with the construction of a canal, providing terminal harbors, and the necessary provisions for protection. Accordingly on February 9, 1904, the President appointed a Commission. Its duties were wide and various, including the making of the necessary surveys and preparing the needful plans and specifications; the supervision of the engineering, hydraulic, and sanitary works; the enactment of proper legislation for the Zone; and the administration of military, civil, and judicial affairs.

Accordingly, the committee went to work organizing the necessary departments and assuming control of the Zone and the French company's property. Mr. Wallace was selected as chief engineer in 1904, and repaired to the Isthmus immediately to take charge of the engineering work. His position there afforded him an opportunity to examine local conditions, and he early showed strong prejudice in favor of De Lessep's old sea-level project, which, after the tremendous failure in 1889, had been condemned by all subsequent French and American commissions. Upon the strength of his recommendations the engineering committee of the Commission, in 1905, recommended such a type, but this recommendation was pigeon-holed by the Board and no action taken upon it.

In this same year the Commission was reorganized by an order in which the President stated that "the practical results of the operations of the Isthmian Canal Commission, appointed and acting under previous executive orders, has not been satisfactory, and requires a change in the personnel of the committee and in the instructions for its guidance." The new Board had definite duties and definite orders as to their scope.

It was during this reorganization that Chief Engineer Wallace resigned, and, after a stormy interview with Secretary Taft, was also requested to retire from the Board, and, later, was severely arraigned by the latter for his defection as chief engineer. Mr. J. F. Stevens was immediately appointed to fill the vacancy of the chief engineer, and shortly after this a Board of Consulting Engineers was appointed "for the purpose of considering the various plans to and by the Isthmian Canal Commission for the construction of a canal across the Isthmus of Panama between Cristobal and La Boca.

The Board convened by this order accordingly met and considered the subject for several months. The members finally reached their conclusions, but were hopelessly divided. The majority, made up principally of all the foreign members, advocated a sea-level canal similar to that recommended in 1905, but with important modifications. The minority, all Americans, a lock canal with an 85-foot summit level. The two re-



ports were submitted to the Commission and the majority endorsed the minority report of the Board of Engineers, as did Chief Engineer Stevens and, later, Secretary Taft and President Roosevelt.

The influencing features in each case can, perhaps, be best shown by the President's instructions to the Board of Engineers as to the essential features to be considered in determining the type of canal, and by extracts from the reports later submitted in favor of each type. President Roosevelt outlined the purpose as follows :

"There are two or three considerations which I trust you will steadily keep before your minds in coming to a conclusion as to the proper type of canal. I hope that ultimately it will prove possible to build a sea-level canal. Such a canal would undoubtedly be the best in the end, if feasible; and I feel that one of the chief advantages of the Panama route is that ultimately a sea-level canal will be a possibility. But, while paying due heed to the ideal perfectibility of the scheme from an engineer's standpoint, remember the need of having a plan which shall provide for the immediate building of a canal on the safest terms and in the shortest possible time. If to build a sea-level canal will but slightly increase the risk, then, of course, it is preferable. But, if to adopt the plan of a sea-level canal means to incur a hazard, and to insure indefinite delay, then it is not preferable. If the advantages and the disadvantages are closely balanced, I expect you to say so. I desire also to know whether, if you recommend a high-level multi-lock canal, it will be possible, after it is completed, to turn it into or substitute for it, in time, a sea-level canal, without interrupting the traffic upon it. Two of the prime considerations to be kept steadily in mind are :

"First: The utmost practicable speed of construction.

"Second: Practical certainty that the plans proposed will be feasible; that it can be carried out with the minimum risk.

"The quantity of work and amount of work should be minimized so far as possible.

"There may be good reason why the delay incident to the adoption of a plan for an ideal canal should be incurred; but, if there is not, then I hope to see the canal constructed on a system which will bring to the nearest possible date in the future the time when it is practicable to take the first ship across the Isthmus; that is, which will in the shortest time possible secure a Panama waterway between the oceans of such a character as to guarantee permanent and ample communication for the greatest ships of our navy and for the larger steamers on either the Atlantic or the Pacific. The delay in transit of the vessels, owing to additional locks, would be of small consequence when compared with shortening the time for the construction of the canal or diminishing the risks in its construction.

"In short, I desire your best judgment on all the various questions to be considered in choosing among the various plans for a comparatively high-level multi-lock canal, for a lower level with fewer locks, and for a sea-level canal. Finally, I urge upon you the necessity of as great expedition in coming to a decision as is compatible with thoroughness in considering the conditions."

The majority of the Board concluded as follows: "It is the belief of the Board that the essential and indispensable features of a convenient and safe ship canal at the American Isthmus are now known; that such a canal can be constructed in twelve or thirteen years' time; that the cost will be less than \$250,000,000; that it will endure for all time.

"The Board does not believe that a provisional treatment of this great question would yield results which would be satisfactory to the American nation or advantageous to American commerce, or that such treatment would be in consonance with the increase of population, of trade, and of wealth which will surely take place during the next half century in the Western Hemisphere."

The report of the minority of the Board differed decisively as to cost and time, and stated: "In view of the unquestioned fact that the lock canal herein advocated will cost about \$100,000,000 less than the proposed sea-level canal; believing that it can be built in much less time; that it will afford a better navigation; that it will be adequate for all its uses for a longer time, and can be enlarged, if need should arise, with greater facility and less cost, we recommend the lock canal at elevation 85 for adoption by the United States."

Mr. Stevens said: "The sum of my conclusions is that, all things considered, the lock or high-level canal is preferable to the sea-level type, so called, for the following reasons:

"It will provide as safe and a quicker passage for ships and, therefore, will be of greater capacity.

"It will provide, beyond question, the best solution of the vital problem of how safely to care for the flood waters of the Chagres and other streams.

"Provision is made for enlarging its capacity to almost any extent at very much less expense of time and money than can be provided for by any sea-level plan.

"Its cost of operation, maintenance, and fixed charges will be very much less than any sea-level canal.

"The time and cost of its construction will be not one-half that of a canal of the sea-level type.

"The element of time might become, in case of war, actual or threatened, one of such importance, that measured, not by years, by months, or even days, the entire cost of the canal would seem trivial in comparison.

"Finally, even at the same cost in time and money for each type, I would favor the adoption of the high-level lock-canal plan in preference to that of the proposed sea-level canal."

The majority of the Commission reported as follows: "It appears that the canal proposed by the minority of the Board of Consulting Engineers can be built in half the time and a little more than half the cost of the canal proposed by the majority of the Board, and that when completed it will be a better canal for the following reasons:

"It provides greater safety for ships and less danger of interruption to traffic by reason of its wider and deeper channels.

"It is in much less danger of damage to itself or of delays to ships from the flood waters of the Chagres and other streams.

"It provides quicker passage across the Isthmus for large ships or large traffic.

"Its cost of operation and maintenance, including fixed charges, will be less by some \$2,000,000 per annum.

"It can be enlarged much more easily and cheaply than can a sea-level canal.

"Its military defence can be effected with as little or, perhaps, less difficulty than the sea-level canal.

"It is our opinion that the plan proposed by the minority of the Board of Consulting Engineers is a most satisfactory solution of the problem of an Isthmian canal, and, therefore, we recommend that the plan of the minority be adopted."

The minority report of the Commission stated: "The undersigned does not concur in the preference for a lock canal, as expressed by the Commission, but regards a sea-level canal, as proposed by the majority of the Board of Consulting Engineers, a better canal for commercial and military purposes.

"Because, while for exceptionally large vessels, such as built for Atlantic liners, the time of transit might be as long as, or longer than, in the lock canal, the average time of transit of the class of vessels which will use the canal for a long term of years will be less than in the lock canal.

"Because the risks of interruption to traffic from accident are deemed greater in a high-level canal with six locks than in a sea-level canal with a tidal lock, notwithstanding the greater distance in the latter canal which might be obstructed by a sunken vessel.

"Because the cost of maintenance and operation of the sea-level canal will be less.

"Because in the enlargements to accommodate increase in traffic the relative advantages of the sea-level canal will increase.

"Because it is a better, safer, and more capacious canal from a military standpoint."

Secretary Taft in his letter of recommendation to the President said: "In the high-level canal a vessel of the dimensions noted (i. e., the largest vessel afloat) would have, with the exception of the 4.7 miles where the width is only 200 feet, ample leeway for safe navigation and good speed, without objectionable currents and without difficulties at the points where changes in course are necessary.

"With the proposed sea-level canal conditions are different. The depth is but 2 feet greater than the draught of the ship, not sufficient to permit her to proceed under her own steam, except at great risk; 21 miles of the canal is not sufficiently wide for two such vessels to pass; currents caused by the regulation of the Chagres and by the flow of other streams into the canal, and its many curves, combine to increase the difficulties and dangers of navigation. In short, the sea-level canal recommended is 'not of sufficient capacity and depth' to afford convenient passage for vessels of the largest tonnage and greatest depth, and can be made so only by materially increasing the depth and width, and at a considerable increase of time and money. If the suggested width of 150 to 200 feet is the greatest width economically permissible for a sea-level canal, the cost of the enlargement required must be prohibitive.

"It, therefore, follows that the high-level canal more fully meets the requirements of Congress."

These, then, were briefly the principal arguments of the various reports submitted to Congress by the President, and it was based upon their different strengths and weaknesses that Congress finally decided in June, 1906, upon the lock canal at an 85-foot elevation.

Thus it was that the question of route and plan were settled, and but one thing remained undecided in the long and laborious stage of preparation. It was the question whether the work should be performed by contract or day labor. At first the idea of contract in terms of a percentage upon the estimated cost of construction was favorably considered and bids were actually called for and made upon such a plan. No award was immediately made upon these bids, however, and the matter was still under consideration when the President visited the Isthmus.

This visit was made in November, 1906, and the President personally inspected the entire route. The result of his observations was a complete change in the executive management. Seven departments were created, and it was definitely decided that the work should be done by day labor under the charge of the United States Corps of Engineers. Accordingly the resignation of Chief Engineer Stevens was accepted, and Maj. G. W. Goethals was put in charge of the construction. This step, taken in February, 1907, marked the close of the preliminary stage.

At the present time, the second stage—that of execution—of the great project is well under way. The management has been excellent, the work rapid, and the end seems not far distant.

Success will be far-reaching. Our seaports will be benefited, our naval strength increased, the world's commercial routes greatly shortened—all accomplished by the opening of this great artificial highway, of which De Ceron and other great men dreamed.

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## Balloon Guns

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Every step in advance in offensive warfare stimulates the inventive genius of man to devise a means of neutralizing the new danger. How often we read that some recent invention has revolutionized war and that soon it will be impossible to place an army in the field or to maintain it against the new powers of annihilation! And yet defensive warfare continues to develop parallel with the advances made in means of attack. So a very natural consequence of the rapid strides achieved in the solution of the problem of aerial flight, which threatened to afford a line of attack beyond the reach of existing field guns, is the production of special guns.

The accompanying cut of a Krupp gun, intended for special use against balloons and other air ships, is reproduced from the *Revue Militaire Suisse*