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BOOK REVIEWS.

The Panama Canal. By R. E. Bakenhus, S.B., H. S. Knapp, U.S.N., and E. R. Johnson, Ph.D., D.Sc. Published by John Wiley and Sons, New York City; Canadian selling agents, Renouf Publishing Co., Montreal. First edition, 1915. 257 pages; 20 illustrations; 6 maps; size, $6\frac{1}{2} \times 9\frac{1}{2}$ ins.; cloth. Price, \$2.50 net.

(Reviewed by E. L. Cousins, B.A.Sc.)

This work comprises the history and construction of the canal and its relation to the navy, international law and commerce. It is divided into six parts. Part 1 is entirely of an historical nature; Part 2 covers the route—the design and construction; Part 3 deals with sanitation, costs of work, elements of success, etc. These three portions are written by Mr. R. E. Bakenhus, S.B. Part 4 deals with the relationship of the United States Navy to the Panama Canal, and Part 5 with the Panama Canal in connection with international law. These parts have been written by Captain H. S. Knapp, U.S.N. Part 6 deals with the commercial importance of the Panama Canal, and is written by Mr. Emory R. Johnson, Ph.D., Sc.D.

Part I.—Historical. Some 23 pages of the text are devoted to the historical spirit in regard to the history of the canal idea, which covers the spirit and development of the canal idea from 1269 up until the Spooner Law became effective in June, 1902, and following this the treaty with the Panama Government proclaimed in February, 1904, the time at which the United States took possession of the site and property. While this section is purely historical, the information is set forth in such a way that it makes extremely educational and interesting reading, and is more in the nature of a descriptive article than a review of historical facts. In addition to the purely historical situation, it covers in a general way the various types of construction and routes considered in the early stages of

the projected canal idea and deals fully with the final recommendation in 1902 of the final route.

Part II.—Route, Design and Construction. The character and topography of the canal route and adjacent territory, as it was before any work was done, is clearly set forth, keeping in view all the time the route and canal as now built. It deals in a very interesting way with the discussions and differences as to choice of type of canal, that is, whether it would be a sea level or lock canal. Interesting information is also given as to the comparative data and estimates, together with actual costs of the work as carried out. That is, the original estimated costs of lock canal for 85-foot summit, estimated cost of sea level canal and the actual cost of the canal as built with the 85-foot summit. Also extracts from the comment of Secretary of War Taft on report of consulting engineers dealing with the majority and minority reports; also the essential portion of the decision of President Roosevelt in 1906 in favor of the lock canal.

A well deserved description, not heretofore published insofar as the reviewer knows, at least not in such detail, is given in connection with the Gatun Lake and its influence and relation to the American project. Gatun dam, which made Gatun Lake possible, and which is the key to the American canal scheme, is described in elaborate detail, also reasons governing the type of construction that was adopted for this dam. The Gatun spillway is also fully described, giving in detail all reasons for the site chosen and the type of construction adopted.

The most important part of the canal construction, that is, the Culebra Cut, is given in full detail as to how the work was handled and the detailed cost in connection with various portions of the work, class of material encountered, together with the amount and classification of explosives used.

Under the heading of "Geology and Slides" are given in considerable detail the class of material and formation that had to be handled and also deals in detail with the various slides and amount of same, and sets before one very clearly the great probability that the sea level canal might have been extremely impracticable, although probably not impossible to construct, on account of the fact that it would have necessitated going 85 feet deeper than has been done in connection with the construction of the canal, in which event no one can say how great the magnitude of the slides might have been with this type of construction. It covers the Miraflores Lake construction, the location of locks and the reason for changing the lower lock location from close to Balbora to the location as now adopted. The main cause for changing the location is a strategical and military viewpoint, together with foundation considerations.

The details in connection with the construction of the canal locks are clearly set forth and the manner in which the vessels are to be handled through the locks by lock operators instead of under their own steam, together with details of protection against accidents, also costs in connection with the construction. There is also set forth