CHAPTER XI.

OPINIONS OF VISITORS ON THE WORK.—NO. 1.

Views of a professional correspondent of the New York Herald.—
He thinks the total cube will reach 150,000,000, instead of 46,000,000, 75,000,000, 110,000,000, and 125,000,000 metres, as it has been stated.—The Chagres problem: the basin of the river has not been properly surveyed.—Doubts as to the ultimate success.—Horrible climate.—Inefficient labour.—Extravagant management.—The canal will cost more than $350,000,000, or £70,000,000 if it could be finished in 1889; but it can only be finished many years later.—Another correspondent says that M. de Lesseps' engineers are discouraged and propose to abandon the sea-level plan.—The canal only finished in fifty years.—The Chicago Engineer thinks that even in twenty-four years the canal will not be ready.—The mud taken will revert to the canal.—The company to be bankrupt in 1886.

We have shown what the company has been accomplishing on the isthmus according to its own official records, and, limiting our comments on the wide difference between that which has been done and that which has been promised, it will now be found of interest to see how the prosecution of the work and the general prospects of the undertaking have impressed some American visitors to the isthmus. In this article we will give an account of what three able correspondents have written to the New York Herald and the American Engineer of Chicago; and in the next chapter we shall deal with the reports of four officers of the United States Navy who lately visited the isthmus.
A most intelligent correspondent of the New York Herald, who, to judge from the letter he wrote to that paper from Aspinwall, under date of Feb. 8, 1885, must be a professional engineer, and one of very sound judgment, makes a thorough review of the plan of the canal, the engineering difficulties, and the probability of its being finished at the time specified by M. de Lesseps (1888). Before regular surveys could be undertaken, he says, it was necessary to clear the line to the extent of 100 metres in width of a tremendous amount of tropical vegetation and forest. Even now, it is necessary every year to destroy the vegetation which springs up during the wet season and attains a height of from 8 to 10 feet.

The preparations for the work were most elaborate and complete. Immense quantities of material, dredges, excavators, tugs, scows, &c., were ordered. Houses, hospitals, in fact little villages were constructed upon each of the twelve sections of the line. A small army of engineers, draughtsmen, &c., were brought over from France. The annual expense with them is £400,000. The salary of the Director-General, M. Dingler, is £20,000 a year, besides house, horses, and carriages.

This correspondent thinks that the total amount to be excavated amounts to 150,000,000 cubic metres (196,040,000 cubic yards), and not 125,000,000 as stated by the canal people. (In making up the estimate of cost, Chapter VIII., we have taken the smaller figure.) The two sections, Emperador and Culebra, contain 50,000,000 cubic metres mostly solid rock, and constitute the great obstacles to the completion of the canal, as far as the simple work of excavation is concerned.

The powerful dredges of the American Dredging Company, which are the best on the isthmus, and are at work near the Aspinwall terminus, have the maximum
OF MONSES OF VISITORS ON THE WORK.

capacity of 8,000 cubic metres per day when working in soft earth.

The great difficulties in the construction of the canal are presented by the surface drainage, and particularly by the much-remarked diversion of the Chagres River. During the dry season this river is 2 feet deep. In the rainy season it rises in a few hours to the height of 40 feet, and flooding the country rushes with great violence towards the sea, carrying with it not only an immense mass of detritus washed from the soft earth of the forest, but an immense amount of débris. Now the river has its source 40 or 50 miles east of the line of the canal, which it first crosses at Gamboa, where the bed of the river is about 50 feet above the bottom of the canal. From Gamboa to the ocean the Chagres intercepts the canal no less than twenty-nine times. When the river rises its surface will be at nearly 100 feet above the bottom of the canal. Such a flood falling into the canal from such a height would either totally destroy it or at least blockade it for many months, and would require an immense outlay of money to dredge it.

The smaller rivers, Rio Grande and Rio Obispo, cross the canal eleven and seventeen times respectively, and if allowed to flow into the canal they would, of course, cause much damage. It has, therefore, been decided to cut new channels for all these rivers, utilizing the original channels wherever possible. New channels will thus be required to the extent of more than 30 miles. The great problem, however, and the only one that presents very great engineering difficulties, is the controlling of the tremendous floods from the Upper Chagres, the large area drained by which forms a basin surrounded by hills. The outlet of this basin, near Gamboa, lies between two hills a mile apart, between which it is proposed to con-
struct a dam or embankment of earth much resembling an immense railway embankment, but sloping more gradually. Its length will be about one mile, and its height over 200 feet. Beneath the dam a large culvert or tunnel 50 feet wide will be constructed of solid masonry, and large enough to admit the ordinary flow of the river. The inner end of the tunnel will be fitted with strong iron doors by which the flow from the Upper Chagres can be entirely stopped. At the upper edge of the dam an overflow channel will be cut by which the water will be carried to join the channel cut for the diversion of the Lower Chagres, on the eastern side of the canal. This sluice or channel will be large enough to carry off a much larger volume of water than the ordinary flow of the river.

This most observing correspondent says of the area or basin of the Upper Chagres:—"There are still some doubts as to whether the estimated capacity is not too large, for its basin has not been accurately surveyed. There is at present a party of engineers engaged on this survey, but although the area is not large, the difficulties encountered are enormous. In order to arrive with any degree of accuracy at its capacity it will be necessary to run a line of levels at the height of the dam completely around the basin, following all the intricacies of the innumerable ridges and hills; then a sufficient number of cross sections to give the contour of the bottom. It is also necessary to know the area drained by the Upper Chagres, which multiplied by the greatest observed rainfall gives the volume of water the dam will be required to contain. All the lines for this survey must be cut slowly and laboriously through a perfect wilderness of forest and jungle, so thick that it is impossible to see 10 feet in any direction, and so gloomy, mushy, and
stifling that it is difficult to breathe. Until these surveys are made there must remain a doubt as to the ultimate success of the canal, not to mention the difficulty of completing such an enormous work across a river subject to such freshets. In order to safely drain such an immense volume of water through the artificial channels considerable time will be required. The question naturally arises—What will become of the structure in the not improbable event of a second heavy fall of rain while the dam is only partially drained of the first flood? There cannot be much doubt that, being an earth embankment, it would be entirely swept away. The terrible effect of this volume of water suddenly hurled into the valley of the Lower Chagres can scarcely be conceived. Everything would be swept before it, and the Atlantic end of the canal would be completely destroyed."

The writer then goes on to speak of the climate: "One of the most serious difficulties encountered is the unhealthiness of the climate and the consequent inefficiency of labour." Even during the healthy season there is considerable dysentery, yellow and malarial fevers. In Panama yellow fever is almost epidemic. Nor is it confined to the lower classes, for M. Dingler, the director-general, lost his son, daughter, and wife in rapid succession. Panama, as well as Aspinwall, are disgracefully filthy, and these wretched cities exercise a most baneful influence on the health of the labouring population of the isthmus.

The efficiency of the Jamaica negroes working on the isthmus is about one-fourth or one-third that of American labourers in America. They receive 4s. to 6s. per diem, which is like paying 12 to 16 in America.

The country offers absolutely nothing but bananas
and oranges; all breadstuffs are brought from Europe and the United States, and beef from the Spanish main.

The Aspinwall wharves are inadequate to the great quantity of freight landed there, and consequently a great deal of money is expended in demurrage fees. At Panama vessels must be discharged by means of lighters—a ruinously expensive method. "It costs more to land lumber from a vessel at Panama than the first cost, added to its transportation from Oregon. The cost of coal is increased two-thirds;" it is worth £3 per ton in the harbour and £5 when landed.

The writer then dwells on the extravagance with which money has been expended. For instance, twenty-eight locomotive engines ordered from the United States were found to be useless for the work intended for them; they were ordered without proper care and proved to be almost a total loss.

Treating of the prospects of the company, this correspondent remarks that the amount of earth excavated up to January 31, 1885, according to the company's Bulletin, is 11,000,000 cubic metres. The amount of money subscribed by the shareholders is 600,000,000f. If to this be added the proceeds of the sale of bonds of 50f., we have 729,000,000f. But as on January last the balance on hand was 362,000,000f., the money already expended at that date was 367,000,000f. Subtracting 55,000,000f. for excavating the 11,000,000 cubic metres, we have 312,000,000f. as the sum expended for preliminary purposes, and for material and machinery, and installation in general.

Now, he continues, "it is apparent that the canal cannot be completed with the amount of money now on hand, there being 139,000,000 cubic metres to excavate
at about $1 (4s.) per metre, and only $72,000,000 on hand. But the most important consideration is the time at which it will be finished, and this is a particularly hard proposition for solution. From a knowledge of the amount excavated during the last year, or the rate of progress in the excavation at present being made, it would seem impossible to complete the enterprise in less than twenty years, or in 1905. It is only fair to state, however, that on none of the sections has the full force of men and machinery been brought to bear which it is expected will be working in the near future. Assuming that all the machinery and men promised are at work at the contemplated time, and that the excavation of the enormous amount of earth that they claim to be able to dispose of each year is successful, the canal may be completed in 1889, with the exception of the great Culebra and Emperador cuts, which it does not seem possible can be finished in that time. The progress of the work on the Gamboa dam will depend on these cuts, as it is to be built of the earth excavated from them. Another difficulty which may be reasonably anticipated is that toward the bottom of the deep cuts, streams of water of such volume as to seriously impede the work may be encountered. They may, at all events, render the excavation of rock very expensive by requiring continual pumping. It seems fair to conclude, first, that if the diversion of the Chagres by means of the Gamboa dam is successful, and if no insurmountable obstacles are encountered in the great cuts at Culebra and Emperador, the canal can be finished in time with sufficient money; second, that supposing the canal is completed in 1889, and allowing $1 per cubic metre for the remaining excavations, and 100,000,000f. (M. de Lesseps' estimate) for the Gamboa
the whole cost, interest included, must be something more than $350,000,000" (or £70,000,000), "even if it is finished in 1889; third, that at the rate at which the work is advancing, or is likely to advance, it will be many years later than 1889 before it can be completed."

Another correspondent of the New York Herald, writing from the city of Mexico as late as April 24 last, gives an account of an interview he had with Mr. Nathan Appleton in that city, and gives his opinion upon the Panama Canal question, which he has followed up very closely, and, we may add, very intelligently. After saying that the Lesseps Commission of 1880 estimated the cost of the canal at £32,000,000, which figure M. de Lesseps cut down to £24,000,000 (as we have already stated in detail in previous chapters), the correspondent, who knew Colonel Totten, says that he "had expressed his conviction, through the press, that the cost for the proposed tide-level way could not be less than $400,000,000"—i.e., 2,000,000,000f., or £80,000,000. Colonel Totten told the same thing to the writer of these lines, and added that a tide-level canal for Panama was an absurdity.

The correspondent remarks that out of the £24,000,000 M. de Lesseps, by his own showing, has already spent £16,000,000, and he adds that he has been informed by "an officer of undoubted influence and high position under M. Dingler" that the inner circle of canal authorities do not believe that it will be possible to build a sea-level canal, and to control the Chagres. "The informant," he concludes, "said that the directors do not believe that they can finish their task under fifty years."

In October 1884, the American Engineer of Chicago
published a remarkable article, written by a gentleman who had spent several months on the isthmus and devoted his entire time to examining the work in progress. He had been given exceptional facilities to study the matter, and he had left the isthmus in April 1884. The writer of the article is astonished that so little truth has been told about M. de Lesseps' scheme: the principal reason is, he says, that the whole French press is subsidized.

The writer is of opinion not only that the canal cannot be ready in four years' time, as promised by M. de Lesseps, but cannot be finished even in twenty-four years. On May 1, 1884, after two years' work, only 4,000,000 cubic metres had been taken away, out of a sum total which is fully, he thinks, 130,000,000 (we have placed it at 125,000,000). Of this, 30,000,000 are of exceedingly hard rock near Culebra, the more difficult to blast because it fractures irregularly. There are 30,000,000 more in Emperador, Obispo, Paraiso, and Gorgona, as well as very tough clay. The surface has merely been scratched, although the "installation" is thorough and complete.

Speaking of the part of the canal near Aspinwall that has been dredged, he says that "every particle of mud dredged thus far will have to be handled a second time, as it is thrown out as soon as dredged upon the western side of the canal, where it has to be widened, so that it must all be redredged, rehandled, loaded upon scows and carried out to sea, as should have been done from the beginning." The French engineers have, it is said, ignored the fact that for a sea-level canal there can be no other proper dumping ground than the bed of the sea. The turning of the Chagres waters at Gamboa presents to this writer insurmountable difficulties. The stone dam,
170 feet high at its central point, is estimated at £4,000,000, but if one may judge by the constant and enormous variance from the estimates made by the canal engineers and the actual cost of the work it will cost £12,000,000 at least.

The writer then deals with the finances of the company up to April 1884. According to the company's own statements $94,200,000, or £18,840,000 have already been raised, and yet only 5-130ths of the excavations were ready, and that of the easiest work. The difficult work has not been touched, to say nothing of getting rid of the floods of the Chagres. In addition to that the engineers of the company estimate £4,000,000 as the lowest sum which will have to be expended for the great lock and basin back of Mount Ancon and the Panama terminus. With the best possible methods the canal cannot be completed except at a fabulous sum. It may be completed, he adds, "but not by the existing company, or under the existing management." Its completion before the year 1890 is scarcely possible, and, unless radical changes are made in management and mode of working, absolutely impossible. "It is probable that the present company will go into bankruptcy or liquidation in three years from 1884, and the enterprise be taken up or completed by a new company or a Government."

The special correspondent of the New York Herald in Washington, Mr. Charles Nordhoff, a gentleman of long experience of public affairs, giving an account of the article in the Engineer, above referred to, says that "here in Washington, where the importance of an interoceanic canal is fully understood, and careful reports of all the surveys are to be found, the opinion prevails that the present company will go into bankruptcy." (New York Herald, November 2, 1884.)