CHAPTER VII.


We are aware that it is most difficult to estimate even approximately what would be the cost of an undertaking of such magnitude as the Panama Canal. Even works of a less problematic character cannot be valued with absolute accuracy. Unexpected emergencies arise which frustrate the most careful calculations of the engineer and the financier, and it is for this reason that all great enterprises should first be carefully studied in all their aspects. As there is great difficulty in closely estimating the ultimate cost of a gigantic undertaking, proper care should be taken at the start in collecting all the elements which will help in making an estimate. If you want to build a palace in a certain locality that you have never inspected, but over which somebody else has walked and has then written about it some perfunctory remarks, you first dispatch a competent man to report to you about the locality, so that you at least may start with a tolerable knowledge of the ground—if you have first to fill up or to dig the soil, or even to blow up some granite quarry. And if your surveyor finds some stream crossing the intended site of your palace—a stream which every year is known to swell to the proportions of a torrent—you first study how to control that stream. These and other elements are properly weighed in your mind, and even when they do not offer any great diffi-
iculty to your engineer or architect, you take into account what they cost, because their great cost may be an insuperable difficulty to you.

Now, what has been the case of the Panama Canal? MM. Wyse and Co. see that the Nicaragua people are trying to go on with their scheme; MM. Wyse and Co. snatch a concession from Colombia, and secure the name of a great promoter, to whom they sell their concession. The great promoter at once takes the business up. He is contented with the surveys made by incompetent men in a few days. He imagines that he must have his canal without tunnel. Through his influence some men of science meet in a Congress which is packed by himself with his retainers, so that his own scheme may be given the benefit of the endorsement of an apparently scientific and international council. He even causes the Congress to estimate the cost of the work, of the feasibility of which the Congress was not satisfied. The estimate is given with reservations enough to make him despair. He then goes over the ground, and in a little over a month his new instrument of "science" gives a new estimate almost doubling the quantity of soil and rock to be excavated. He then, without any new "studies," cuts down the cost estimated by his own men. Is it any wonder, then, that the great promoter to-day admits that the total excavation to be made is nearly three times as much as that which his first Congress had in view when it estimated the total cost of the canal at about double the amount which is now claimed by the great promoter to be the expected outlay? Can you believe what he says? Would you have undertaken a work in which in a few days you find that there are 75,000,000 of cubic metres to excavate instead of 46,000,000, and which in a few months more you find amount to 125,000,000? Would you have touched
that business at all? and, in your own selfishness and vanity as a renowned contractor, would you persistently and recklessly assure your capitalists that the work will only cost a trifle over one-half of the estimate made when you thought there were only 46,000,000 of metres? Well, that is what M. de Lesseps has been doing.

At the Paris Congress, M. Wyse estimated a Panama Canal with no tunnel at 427,000,000f., divided thus:—

Excavations, 46,150,000 cubic metres 361,600,000f.
Charges, lock at Panama, breakwater,
and other works 65,900,000f.

For a canal with tunnel he had presented an estimate making its total cost 380,000,000f.—no contingent expenses being added in either case.

But the sub-committee on estimates was far from satisfied with his calculations.

Adding 25 per cent. for unforeseen expenses to the Wyse project for a canal with tunnel, the cost would be 475,000,000f.; and the other one, with a through open-air cut, would come to something like 535,000,000f.

At the meeting of May 21, M. Cotard, giving some results arrived at by the sub-committee—composed of himself; M. Favre, the contractor of the St. Gotthard tunnel; M. Lavallée, contractor-general of the Suez Canal, and representing the Paris Society of Civil Engineers; M. Ruelle, general director of construction of the Paris-Lyon-Méditerranée Railway; M. Garay, a Mexican C.E.; and M. Couvreux—reported that the sub-committee estimated the cost of the Wyse canal, with a tunnel, at 747,884,812f., including 25 per cent. for contingencies, but not reckoning [we quote]—

"1. The expenses necessary not only to place the works of excavation beyond danger of the water, but also to arrest excavations under water.
"These expenses cannot be estimated even approximately, but they will be very great; most likely they will exceed $100,000,000.

2. The interest during time of construction, which should be put down as ten years.

3. The several liabilities of the company; among them the indemnity to the Panama Canal Company."

M. Lavallely, speaking immediately after the presentation of the report, called attention to the immense difficulties of the work in the valley of the torrential Chagres; to the obstacles, almost insuperable ("sur les embarras presque insurmontables"), to doing the work dry. He believed that it was of absolute necessity to deviate waters from the Chagres at one or more points. These are difficulties of the first order, which add to those already inherent in the work itself, and which will increase still more heavily the total cost of that canal. ("Toute la dépense importante augmentera encore très peniblement le coût total de ce canal.")

M. Cotard, addressing the meeting, once more (we are quoting from the Compte Rendu, pages 261, 262) "calls attention to the importance of the reserve made by M. Lavallely. . . . There is an unknown which we must confront seriously, remembering the risings of the torrent, and consequently its irruptions. That unknown would be still further increased if, as M. Wyse suggests, the tunnel be suppressed, and enormous cuttings be made" in the Culebra section.

That, we repeat, is the opinion of two gentlemen who are extremely friendly to M. de Lesseps. This estimate of the sub-committee, be it remembered, was for a sea-level canal with a tunnel, and M. Cotard said that "the unknown will be still further increased" if the tunnel were suppressed. Now, that is exactly, what, has been
done. We have to add to that total the difference between the solid rock excavation for a tunnel, estimated by the sub-committee at 297,220,000f., or £11,888,000, and the cost of deep cutting so as to make the canal an open-air one. Remember that in two kilometres of the Culebra section there are 25,000,000 cubic metres to be taken out; whereas by the Wyse tunnel project there were to be only for the whole tunnel 6,044,670 cubic metres ("Rapport de la Commission International," page 54), and you may only have but a faint idea of the increased expense. M. de Lépinay, a member of the second sub-committee, read before it a paper (Compte Rendu, pages 293-9), in which he said that the "sea-level scheme for a canal in Panama brings about an expense of more than 1,000,000,000f. . . . The reason of this exaggerated cost is that they want this canal to be made after the model of the Suez Canal—that is to say, with no locks—and yet its natural conditions are so very different. In Suez there is no water, the soil is soft, the country is almost on the level of the sea; in spite of the heat, the climate is perfectly healthy. In tropical America there is too much water, the rocks are exceedingly hard, the soil is very hilly, and the climate is deadly. Now, to thus act after the same fashion under such different circumstances is to try and do violence to nature instead of aiding it, which is the principal purpose of the art of engineering; and in the present case, when the cost is really doubled, we might very well go beyond the limits of what is possible."

But in spite of the reluctance with which Messrs. Wyse and Reclus modified their project with a tunnel, it was necessary to yield to the whims of M. de Lesseps who insisted that the canal should have no tunnel, and that a deep cutting should be made in the Culebra mountains, so as to render the canal an open-air one.
ESTIMATES OF COST OF THE CANAL.

They therefore presented on May 22 an entirely new scheme for a tide-level canal costing 427,000,000.

The report of the sub-committee under M. Cottard had established the prices for the units of work. Under such prices the scheme of the tide-level Panama Canal, such as is now being carried out, was estimated at 1,044,000,000, including:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damming the Chagres</td>
<td>25,000,000</td>
</tr>
<tr>
<td>Rectifying it</td>
<td>17,000,000</td>
</tr>
<tr>
<td>25% per cent. on 612,300,000.</td>
<td>153,075,000</td>
</tr>
<tr>
<td>Administration and banking, 5 per cent. on 765,375,000.</td>
<td>38,268,000</td>
</tr>
<tr>
<td>3 per cent. interest on capital for twelve years.</td>
<td>241,000,000</td>
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But the sub-committee in making out that estimate added that the "execution of such works, and principally that of such deep cuts, the stability of which is problematical, as well as the operations relating to the course of the River Chagres, constitute a complication of difficulties that it is impossible to estimate."

(Compte Rendu, page 31.)

M. Dauzats, whose opinion otherwise has no value whatever, attempted to impeach the figures given by the sub-committee of the Congress convened by M. de Lesseps. He remarked that in 1864 and 1865, when "those eminent engineers, Messrs. Lavalle and Couvreux undertook the work of the Suez Canal, there was only, out of 75,000,000 of cubic metres, which was the total to be done, about one-third that was ready; 56,000,000 of metres were done in three years, and 34,000,000 of them were excavated in the last nineteen months."
M. Lavallee himself was present, and he immediately replied as follows:

"M. Dauzats has endeavoured to establish a comparison between the time that was spent in the construction of the Suez Canal and the estimate made for the present project. Messrs. Lavallee and Couvreux excavated from 70,000,000 to 75,000,000 of cubic metres in five years and a half; but one should not forget that all the installation had been already made, the bed of the canal all cleared and partly open, and, besides, there was a considerable amount of material in hand. Then you cannot compare the soil of Suez to the 50,000,000 of cubic metres of the American hard rock. The estimate of twelve years is indeed a minimum." (Compte Rendu, pages 325 and 567.)

It should not be forgotten that M. Lavallee was taking M. Wyse's basis of 50,000,000 cubic metres. What would he not have said if he then knew that, as M. de Lesseps admits now, there are 125,000,000?

As M. Lavallee spoke the words that we have quoted, a member of the Congress rose and suggested that a calculation should be made of the cube of the whole excavation to be made. "I think," he continued, "that the twelve years will be found totally insufficient by the engineers who will study the question thoroughly. We have here persons of the greatest competence, like M. Favre, for instance, who worked wonders in the St. Gothard tunnel: he might enlighten us as to the means of execution. M. Favre calculates the price for excavating hard rock in Panama at 18f., while we paid only 2.50f. in Suez, which means that in Panama the work is about eight times as dear; and yet you want to do that work in twelve years!" (Compte Rendu, page 568.)

M. de Lesseps did not answer these remarks. Ho
contented himself with protesting that the six years calculated for Nicaragua were too little, to which M. Lavalle answered that to him "it seemed less difficult to do the work in Nicaragua in six years than that of Panama in twelve."

Later on, we find the same gentleman stating that "when the company is formed it must make its budget. I entreat it to depend upon it that in the three first years it will do nothing, and that when it does begin to work it will have been paying three years' interest for the capital." *(Compte Rendu, p. 570.)*

Of course, that is exactly what has come to pass; nor was it necessary to be a M. Lavalley, a practical man, the contractor-general of the Suez Canal, to perceive that. If M. de Lesseps had not already pledged his name to Panama, he would have said precisely the same thing.

But returning to the cost of the tide-level canal, we must say in justice to the sub-committee of the technical committee that it was forced to give an estimate on insufficient data. The matter was also ventilated at the plenary committee and then at the plenary Congress, and even there, where M. de Lesseps had a compact majority, the whole truth did not fail to appear.

The great cost of a tide-level plan, with its deep cuttings, was brought to the notice of the full committee by M. Ruelle after the passing of the resolution selecting the Panama route; and when the chairman proposed another resolution endorsing the sea-level plan, M. Ruelle submitted the following significant amendment:

"The technical committee recommend, as preferable, a sea-level canal, *if its execution be not found too difficult.*"

There followed a very lively discussion, which is not reported in full in the stenographic *Compte Rendu* of the meeting: But even M. Larousse (an intimate friend
of M. de Lesseps) remarked that if the cost were not heeded by the technical committee, how could this committee be justified in "recommending the canal that would cost dearer than any other?"

At the evening meeting on May 20 a desultory discussion was going on about little details of the construction, when M. Cotard, formerly an engineer of the Suez Canal, stated the gist of the whole difficulty in the following terms:—"The creation of the interoceanic canal should above all be a profitable undertaking. The expenses should be productive. The question is not to find out whether in theory it is better to have a canal which is sea-level, or one with locks or tunnels. There is only one way to think about this matter; a sea-level canal would be preferable, but the question is—how much would it cost, and how long would it take to build it? The cost and length of time in the construction are the two essential points which we should investigate here. We are dealing with hundreds of millions. We ought to know what we are going to undertake, and we should be able to come within 50,000,000f. of the money to be spent, and within two years of the time required; or else it would be better for us to adjourn our congress and then come back again." (Compte Rendu, p. 257.)

But, as we said, per fas et nefas, the Lesseps clique was bound to have a sea-level canal, and the Congress made an estimate for it of 1,044,000,000f., with the noted reservation that it could not be accurate because of the "unknown" of the Chagres.

Such figure, low as it is, was nevertheless a blow to M. de Lesseps. The programme was to select Panama, a tide-level canal, and 600,000,000f. or 700,000,000f. as the outside cost. M. de Lesseps failed in the latter. M. Wyse, without loss of time, began to correct his
own estimate once more, according, he said, to the same basis as the sub-committee, and by a stroke of the pen he put it down at $780,000,000, including 50 per cent. for contingent, banking, and administrative expenses.

M. de Lesseps now appealed to the public, but the public failed to bring him funds. The true impression prevailed, that the estimate of the cost of the work was a myth, as the ground had not been properly surveyed, and, moreover, that the United States Government was bound sooner or later to offer strenuous opposition to the building of the canal.

M. de Lesseps then took with him to Panama the "International Technical Commission," of which worthy organization we have already written. The commission was employed to say that the Chagres was "all right," and that the work was even easier than thought of at first. It was also to furnish a new estimate.

In the next chapter we will show the development of the transaction.