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THE PANAMA CANAL.

The present condition of the work of excavating the interoceanic canal, which comprises the removal of about three billion cubic feet of rock of varying consistency, may be summed up as follows: 2,450,000,000 cubic feet, 350,000,000 of which had already been excavated on the 31st of last December, are to be removed by the different firms, according to terms of contract which fix the finishing of their work at successive dates in 1885, 1886, and 1887. The 1,000,000,000 cubic feet making up the entire volume of the cutting will be removed either by the same parties (which appears to be most rational), at the close of their present contracts, or by new parties, who, like their predecessors, shall accept fixed epochs for the delivery of their work in a finished state.

Two billion four hundred and fifty million cubic feet of the canal, then, are now given up to the dredges and excavators of the twenty-one principal contracting firms. Six hundred and thirty million cubic feet, about, must be finished by the first of August of the present year; about fifty million in June, and about one billion two hundred million on the first of October, 1886. The balance comprises the two extremities of the canal, that is to say, the low and easy portions. The twenty-one contractors represent an expenditure of about forty-eight million dollars, of which 13 go to French contractors, 11 to American, 20 to Italian, Swiss, Swedish, and native, and 90 to an Anglo-Dutch company. The money to be paid the French is in part for work on the Emperador cutting, which we represent in Fig. 3, and the location of which will be seen on the map (Fig. 1). This work takes its name from quite a large village situated upon the Atlantic side of the Culebra. Emperador is the center of a section of the great cutting, between the Obispo section, which marks the foot of this side, and the Culebra section, upon the crest of the Cordilleras. Upon examining the topographic plan in Fig. 1, we find that in this extent of three and a half miles the Emperador section embraces a broken central portion where rise Mounts Lapita, Cerrito, and Campement. These highlands are in places quite rocky, and it is in one of such localities that the excavators are seen working in our engraving. Beneath Mount Campement, toward the Culebra, the Emperador section traverses the valley of the Obispo and the plain of Livio. Like all the sections of the Isthmus, the Emperador works are connected with the railway from Colon to Panama. They are likewise connected with the works at the great dam, over which the trains of cars, hauled by locomotives, go to deposit the excavated material that is to form the retaining wall of the Chagres waters. The Emperador cutting has, at certain points, a width of 650 feet. Immediately after the Emperador come the colossal Culebra works. It is between Mts. Culebra and Livio that the canal will be widest, as shown in Fig. 2. Four hundred and fifty million cubic feet of this section are being removed by the Anglo-Dutch firm, Messrs. Cutbill, Watson, and Van Huttum. This firm has contracted to remove all the rock above the level 50 (see map). As the great cutting has a maximum depth of 370 feet, the contractors will have to remove the solid rock to a depth of 230 feet.

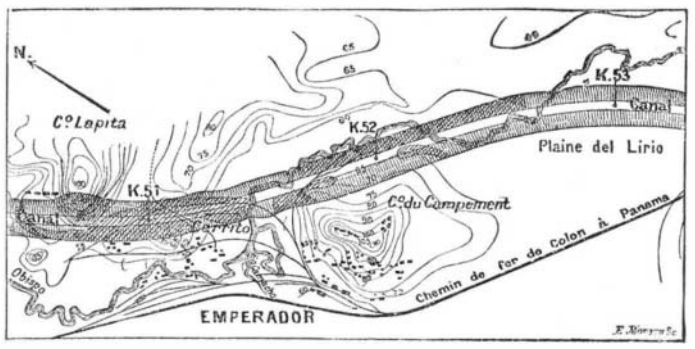


Fig. 1.—FIELD OF OPERATIONS AT EMPERADOR.

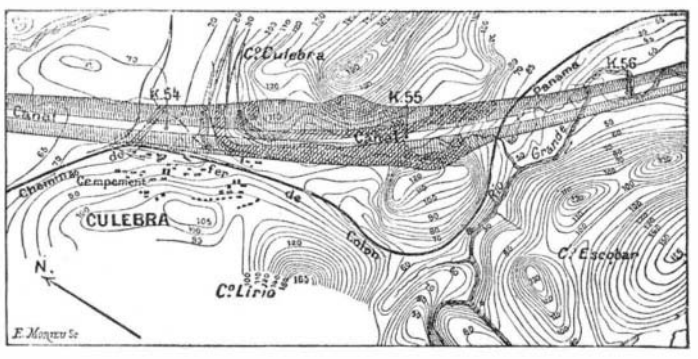
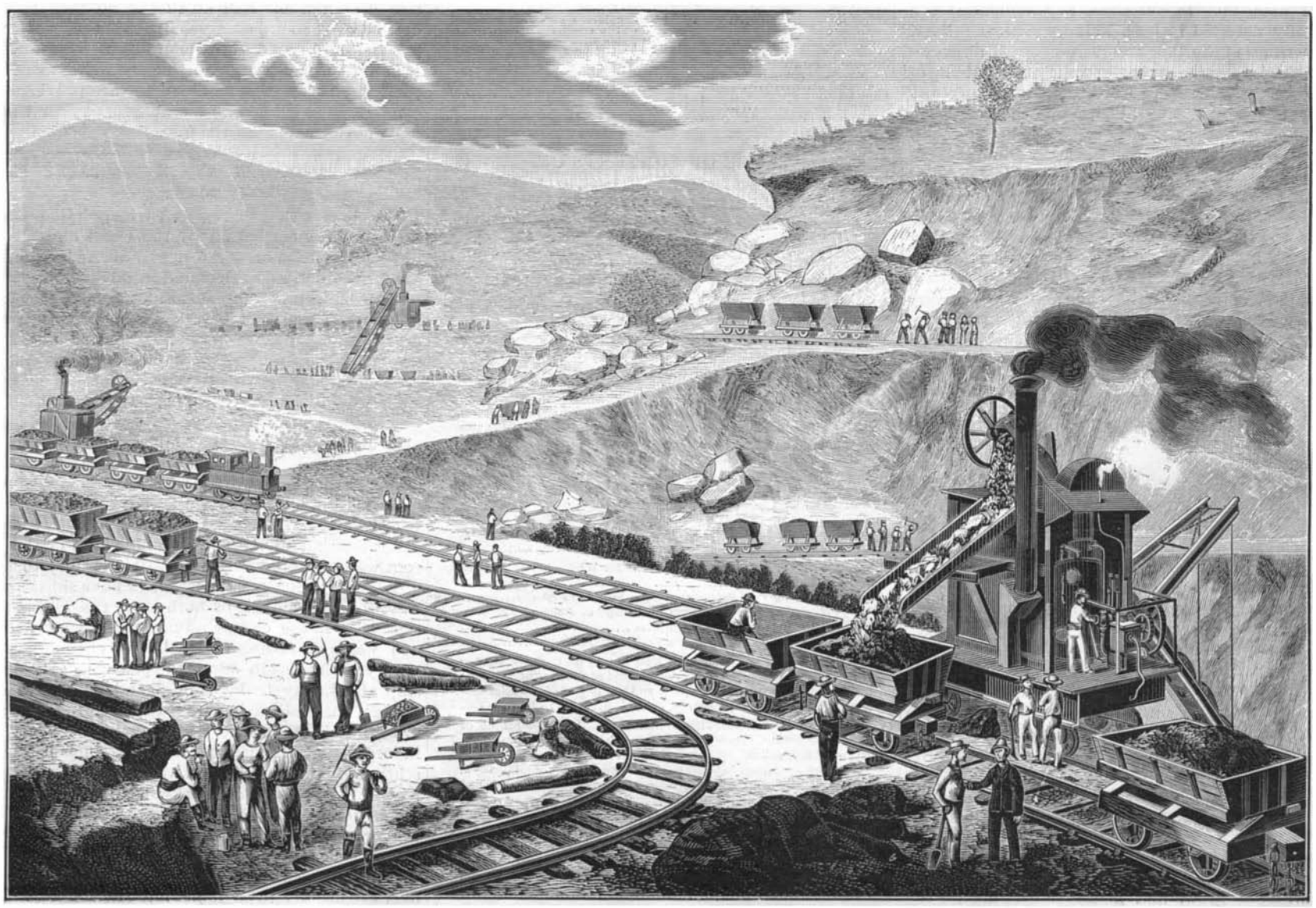


Fig. 2.—FIELD OF OPERATIONS NEAR THE CULEBRA.

It seems to be indicated that, after the completion of the work that they have accepted, the same contractors will finish the cutting. The Culebra and Emperador works have for direct corollary the establishment of the Gamboa dam.

While the excavation of the canal, the dredging of the low portions, the construction of the Chagres dam, and the excavating of the side drains are going on, the ports of entrance on the Atlantic and Pacific will be established. Extensive dredging operations have already been begun at Colon. A platform of earth, provided with a mole at its eastern extremity, has been constructed with the material taken from the Kenny's Bluff quarries near the roadstead of Colon. Upon this platform spreads out a new city, Christopher Columbus, containing workshops, stores, dwellings of the employes, etc. All these structures are connected with



THE PANAMA CANAL.—Fig. 3.—SCENE OF OPERATIONS NEAR EMPERADOR.

each other and the Isthmus railway by branches. Ships of the greatest draught can unload, free from the reach of the wind, alongside of wooden wharfs that project into the sea. On the Pacific side the establishment of a terminus port at Boca presents no technical difficulty. A maritime channel three hundred yards in width will form a true outer port, in which ships will be able to station themselves for their preliminary operations, and the left bank of which will be provided with tracks that connect with the railway.

Last March six large dredges were being mounted at Boca, and are certainly now in active operation.

This colossal installation, and all these fields of operations, over which are maneuvered hundreds of machines, thousands of cars, and a formidable *materiel*, required a special organization for the service of the transports, the starting, and the repairs necessitated by continuous work. For this reason the Isthmus has been divided into three sections—from Colon to San Pablo, from San Pablo to the Culebra, and from the Culebra to the Pacific—with the central seat of the shops at Matachin, at the foot of the dam and the great cutting. The entire stock of tools, apparatus, etc.—that which is to be sent to the different fields of operation, and that which comes from the latter for repair—is concentrated at Matachin. The Isthmus railway, which is now the property of the Interoceanic Canal Company, wonderfully facilitates that moving about of the implements, etc., upon which depends the regular operation of the different sections.

In short, more than two-thirds of the canal are now underway, with a formal engagement on the part of the contractors to have their sections finished at an epoch that shall not exceed the end of 1887. The execution of the canal, then, is a problem that is now solved. The parties who have contracted to perform their work cannot break their agreement. The company, moreover, holds in reserve sufficient tools to allow the engineers at a given moment either to replace or aid any contractor who is getting behind. All the contracts contain a special clause that gives the director-general of the works the right to step in with his own machines and his own men in any case of this kind.—*La Nature.*

Ova of Bilharzia in the Lungs.

From a communication to the *Unione Medica Egiziana* of June 15, by Dr. Belleli, it appears that genuine ova of bilharzia hæmatobia have been discovered in the lungs. The patient was an adult man, who died in the Hopital des Diaconesses at Alexandria. He had been admitted a few days before his death with purulent cystitis, consecutive to the bilharzia disease. Rigors and intermittent fever were the chief symptoms, and pyæmia was diagnosed. An autopsy was made, and the bladder. liver, kidneys, and lungs removed for examination. The walls of the bladder were infiltrated with the ova of bilharzia. One of the kidneys was studded with minute abscesses, and numerous ova were easily detected in both kidneys and the liver. On the surface of the lungs numerous small abscesses of variable size were seen; in the walls and contents of these abscesses, the eggs of the bilharzia were found. The eggs in the lungs were like those in the bladder in every respect, but they were much less numerous. Nearly all the eggs were found in the interlobular connective tissue; a few were detected in the intralobular and peribronchial structures. The situation of the ova corresponded to the distribution of the finer ramifications of the pulmonary artery, along which they had traveled. The connective tissue in the neighborhood of the blocked vessels had undergone a process of proliferation of recent date. The other pulmonary tissues were in various stages of inflammation and suppuration. This occasion is said to be the first on which the eggs have been discovered in the lungs. The adult worm lives in the portal vein, and the eggs are distributed thence. It is supposed that in the present case the ova passed from the vesical veins into the hypogastric veins, and so into the vena cava inferior, whence they would traverse the right heart, and so get lodged in suitable branches of the pulmonary artery. Another route might be through the communication between the portal and systemic systems, by way of the hæmorrhoidal plexus. A third mode of transit is suggested in the vessels of a certain caliber, which are said to provide direct communication between the portal trunks and the sub-hepatic veins or vena cava inferior. —*Lancet.*

SPEAKING of the rotting of timber, the *Builder* says: "The *Merulius lacrymans* is the common wood fungus that destroys nine-tenths of the wood with which we are acquainted. The reason of it being common to new buildings and not to old is that moisture, one of the constituents of its existence, is more present in new, green buildings than in old, dry, seasoned ones. The two prime conditions of its existence are moisture and heat; if moisture is present without heat, it will not grow, and hence its depredations, in the winter time are unknown. If heat is present without moisture, it will not grow, and hence ventilation for the passage of a current or dry air will prove fatal to its existence.

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MANUFACTURING PROSPECTS.

A number of interviews, held recently with the proprietors and managers of representative manufacturing establishments in a New England State, afford some interesting if not positive information relative to the prospects of manufacturers.

Out of the number visited, fourteen establishments may be taken as representative. These comprise the makers of machine tools, steam engines, hand tools, cutlery, sewing machines, guns and pistols, machine screws, bench hardware, builders' hardware, drop forgings, patterns. A number of these branches are duplicated in the visitations.

Taken as a whole the reports are favorable, not only for present work, but for prospective business. In one establishment the hours of work have been doubled during the month of August; the factory had been running on half time for several months. This increase of time is not due to a "spurt" of a single order, but to a gradually increasing pressure of small orders. Two machine tool establishments have lately increased their force of hands, and are busy filling recent orders; they both say that they have few finished tools in stock. The steam engine builders complain of a lack of orders; there does not appear to be many new manufactories starting, and few which are increasing their power. The call for bench tools for iron and wood has lately received an impetus from fresh orders; but possibly this may come from dealers whose stock has run low. Cutlery, guns, pistols, and sewing machines are more in demand than they were three months ago—April and May—and the manufacturers are confident that "the good times" are about to come again. Machine screws are affected largely by the manufacture of machine tools and manufacturing machinery; but this industry, which has lagged slightly, is coming up to a healthy if not a driving condition. Bench hardware has suffered considerably; the dealers have a considerable supply on hand. In some localities builders' hardware has been in brisk demand all through the spring and summer, and there is an increase in orders. Drop forgings are special as well as regular, and the former seem to have increased in orders, while the latter have not materially fallen off.

So these facts as to the actual state of work may be properly supplemented by the combined opinion of the managers of the manufactories. On the whole, the impression gained is that our manufacturing business is beginning to increase; the deadlock is to be removed, and the dullness of years is to be gradually changed to an activity that shall give competent labor remunerative employment, and invested capital profitable returns.

As to the cause of the present relative inactivity, opinions differ. Probably there are combined causes, which do not resolve themselves into a comprehensive explanation. But all those who have been addressed on the subject agree upon one cause—that of production beyond the requirements of the people. It is a remarkable state of society where more of all comforts, necessaries, and luxuries are provided than can be sold to those who are able to pay for them; it may, nevertheless, be the fact.

THE TRIANGULATION AND HYDROGRAPHY OF THE COAST.

The charges that the work of triangulation and hydrography, as carried on by the Coast and Geodetic Survey, has been arranged so as never to be completed are misleading, and calculated to do much injustice to a really important and meritorious service. It matters not what action shall be taken regarding the present organization, the work of triangulation and hydrography must of a necessity be continued by the government, for otherwise the coast charts of many districts would only serve to mislead the mariner and cause disaster.

If all harbors and the approaches thereto were formed of rock, having channel ways that never varied, a single hydrographic survey made with care and precision would suffice for all time; and the scheme of triangulation when once developed and used for the determination of the hydrographic lines of the adjacent waters, would never thereafter require to be redeveloped. But most waterways have shifting channels; sands or shingle or both are in constant activity, especially in the case of estuaries, and what ten years ago was a six fathom channel, large enough under ordinary conditions to admit the passage of the deepest ship afloat, may to-day be high and dry at low water, the real channel having been deflected to the one side or to the other. Hence a resurvey is necessary, and in order that it may be accurately made, the old scheme of triangulation on the shore must be resurrected. Under favorable circumstances this can be quickly done. In the case of large cities, for instance, the prominent points near the water line, such as church steeples, the flagstaffs on the forts, the cupolas of residences standing on elevated ground, and the like, are usually to be found laid down on the charts, and so no laborious work with the transit instrument is required. But in sparsely populated districts, as