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THE PASSAGE OF THE NICARAGUA CANAL BILL BY THE HOUSE.

The question of the construction of a canal across the Isthmus may be considered from many standpoints—international, political, strategic, commercial and technical. Once the construction of a canal has been decided upon in a general way, there are reasons why, the very first point from which the subject should be approached is the last of those named above—the technical, or to be more particular, the engineering point of view. Included in the term Isthmus is a stretch of country several hundred miles in length, whose topography is such that it necessarily presents many different routes which might be chosen for the cutting of the desired canal; and, evidently, unless canal building, for some inscrutable reason, is to be exempted from those common-sense principles which govern men in the ordinary business affairs of life, the very first thing to be done, before turning a spadeful of earth or voting a dollar for construction, is to make a thorough investigation of the ground and determine which route, all things considered, is the best.

Failure to take this obvious preliminary step is primarily responsible for all the ignorance, confusion, folly, and financial disaster which have marked the history of the Isthmian canal project, whether at Panama or Nicaragua, in the old world or in the new; and it is a fact that, even at this late day, there is not a man on the face of the earth who can say with the certainty of absolute knowledge whether this route, that, or some other, is the best that can be selected in respect of construction, cost, maintenance, operation and profit.

After many weary days of profitless discussion Congress, at the close of its last session, seemed suddenly to awake to this very fact, and with commendable promptitude it acted upon the question by voting one million of dollars and authorizing the President to appoint a commission and expend this sum of money, none too adequate, in making such a survey as would enable it to approach the stupendous problem with an intelligent estimate of the situation.

We have heard a great deal during the recent discussion in the House about the desirability of building an "American" canal. We venture to say that the decision of Congress last year to appoint this commission was by far the most distinctively "American" step that has yet been taken in the matter—"American" because essentially practical and common-sense.

A strong commission, composed of eminent engineers and political economists, was appointed, and has been faithfully investigating. Its labors are about two-thirds completed, and by the time the next Congress meets there will be submitted the only comprehensive and adequate report upon the situation that has ever appeared in the history of this canal agitation. Until that report is made public any definite action looking to the immediate construction of a particular canal is not merely presumptuous, not merely a gratuitous insult to the President whose name the commission bears, but it betrays a spirit of fretful impatience that more befits the nursery or kindergarten than the legislative halls of the nation.

There are some crises in which it specially behooves us as a people, to "make haste slowly;" and surely this is one. The delay of a few months which is necessary to allow the President's commission to report is of no consequence whatever in the prosecution of a national work which may require a decade and a half for its completion; particularly if such delay will serve to cool the heated passions, and clear the clouds of ignorance, which were so abundantly manifest during the debate that preceded the passage of the Hepburn Bill.

We earnestly commend the above considerations to the Senate with the hope that it will judge the question with that breadth of outlook which was so conspicuously wanting in the recent debate in the house.

AMERICAN LOCOMOTIVES IN GERMANY.

It seems that early in the present year a letter was sent by the Bavarian State Railway administration to the two leading makers of locomotives in that kingdom, in which it was explained that the principal purpose of the Bavarian government in ordering American loco-

motives for service on the State railways was to give Bavarian engineers and engine builders an opportunity to ascertain what were the superior features in the American machines, and imitate and incorporate them in their own locomotives. Attention is drawn to the fact that the *Bürger Zeitung*, of Berlin, states, in a recent issue, that the Prussian State Railway administration also intends to make an early trial of American locomotives, being convinced that these machines have shown, by reason of their great boilerspace and heating surface, that they are more efficient and economical. The Minister of Public Works of Berlin, referring to the Bavarian State Railways trials, says that "with faultless performance" they have "cost considerably less than locomotives of similar class belonging to the Prussian railway system." The journal referred to above concludes by saying that it need hardly be explained that if these engines demonstrate their superiority, and are adopted, they will not be built in any foreign country. Our Consul-General at Berlin, Mr. Frank H. Mason, pertinently remarks that this is a sincere and flattering compliment, and though not directly and largely profitable to American builders, it has its value as an illustration of the importance of protecting, as far as possible, by German patents, every American invention or improvement which is sold for use in that country.

Everyone of our readers who is familiar with German methods of developing home industries, is well aware that imitation and adoption of American methods is not confined to American locomotives, but applies broadly to American tools, machinery and a thousand and one articles of American design and manufacture, which, unfortunately, are not patented in that country. If the incident carries its full significance it will stimulate inventors in this country to protect themselves not merely by patents, but also in the broad field of trade marks and designs.

THE CANTILEVER SYSTEM OF BRIDGE CONSTRUCTION.

We are informed that the contract has been let for the construction of a steel bridge which will exceed in the length of its main span, not merely the two great suspension bridges across the East River at New York, but the celebrated cantilevers which stretch across the Firth of Forth at Queensferry. The Brooklyn Bridge measures a few feet under 1,600 feet between the towers; the new East River Bridge between the same points of measurement will be exactly 1,600 feet; the two main spans of the Forth Bridge are 1,710 feet in the clear, while the great bridge now to be erected across the St. Lawrence at Quebec is to have a central span of 1,800 feet. The securing of the contract by the Phoenix Iron and Steel Company, of Phoenixville, Pa., is another distinct tribute to bridge builders of this country; for it is certain that the award of a \$4,500,000 contract for the erection of a bridge on British territory would not have come to this country if the British bridge builders had been able to offer superior inducements in the way of design and economy.

It is significant that in spite of the oft-repeated statement that all subsequent bridges of this magnitude would be constructed on the suspension principle, the new Quebec Bridge is to be of the cantilever type. The old objection of lack of stability which formerly held against suspension bridges has disappeared. The principles of the suspension type are better understood, or, shall we say, better applied, than they were, and with the improved materials that are now available, it is possible to give suspension bridges of the largest size all the rigidity which can reasonably be asked for. As regards the question of economy, the cantilever is by far the more costly type, the difference in cost increasing at a multiplying ratio of the increase in length. In view of this fact it is probable that the adoption of the cantilever type at Quebec was due to the local conditions.

SCIENCE FOR THE LOVE OF IT.

Our forefathers were wont to draw the line rather sharply between the professions and the trades. The professional man; it was thought, labored chiefly for the pure love of his calling; the tradesman, for what it brought him. To-day there is a gradual breaking down of the wall that once separated the man with the trained intellect from the man with the trained hand, and the ethical distinction between the professions and the crafts is now so finely drawn that it can be no longer honestly maintained that their representatives are not equally alive to the pecuniary rewards of their daily labors.

Something of that altruistic devotion to his calling which was thought to be the distinguishing mark of the professional man, still lives and thrives in the modern scientist. It was one of the foremost of our American physicists, Joseph Henry, who said:

"My ambition is to add to the sum of human knowledge by the discovery of new truths, which may be of some use to the world. The practical application of these I leave to others."

So completely have the material achievements of science overshadowed what may be called its theoretic-

cal development, that we are inclined to underestimate the work which has been done in pure science for the mere love of it.

In our admiration of the skill which has given us our long-span bridges, our towering city buildings, our colossal locomotives and steamships, we are apt to forget the rarer skill and deeper processes of thought which have lately brought to light hitherto unknown elements in the atmosphere, and added something to our knowledge of the solar system.

It is because the work of the pure scientist is so self-sacrificing and unselfish that he commands our special regard. With but little prospect of material advancement, he is content to labor long years for the sheer joy of adding something to the sum total of human knowledge. Not to mention that most conspicuous example of disinterested scientific research, Faraday, what adequate pecuniary reward has Tyndall derived from the arduous research that culminated in his brilliant theory that heat is a mode of motion? What personal advantage has accrued to Crookes and Lockyer in their endeavor to prove that the seventy odd elements known to chemists are but the modifications of one matter, even as our various forms of energy are but the manifestations of a single force? What commensurate reward have Darwin and Spencer received for their investigations in the theories of natural selection and evolution, or Röntgen for the discovery of the rays that should rightly bear his name?

But although the achievements of the pure scientist are financially unprofitable, they yield rich fruit to be garnered by other hands. Without the discoveries of Henry in electromagnetism, the invention of the telegraph would have been long delayed. The infinitesimal calculus devised by Leibnitz and Newton was not merely a valuable addition to the science of mathematics, but also one of the foundation-stones of modern mechanics. For, a knowledge of the theorems regarding the ultimate values or limits of the ratios of variable quantities is almost as necessary to the civil engineer as the iron with which he builds his bridges. And yet, it is possible that neither Leibnitz nor Newton ever suspected how their system of higher mathematics would aid subsequent investigators in formulating and expressing those laws of mechanics which underlie the superstructure of modern engineering. These are facts, the significance of which we are apt to forget in an age so purely utilitarian as our own.

THE CAPE NOME GOLD FIELDS.

The interest in the new gold fields is so great at the present time that a really authoritative account of the conditions which exist there, such as is furnished by Consul Smith of Victoria, will be welcomed. He wrote under date of December 21, 1899, and stated that there was every indication that there would be a great rush to Cape Nome the present spring. The distance from Victoria to Cape Nome is 2,500 miles and is performed entirely by water. Transportation companies have booked large numbers of passengers, and it has been computed that 65,000 persons desire to go to Cape Nome as soon as possible. A number of returning miners called at the Consulate at Victoria and exhibited specimens of gold saying they were dug on the beach near the water's edge. Men with only hand shovels, and the simplest and rudest of pans, cleared from \$50 to \$100 and even \$300 per day, and sometimes a "clean up" of from \$1,000 to \$1,500 has been reported.

Nuggets worth \$300 to \$400 were found near Anvil Creek, and it is believed that between \$300,000 to \$400,000 was taken out of Snow Gulch last summer. One man, it is said, took \$190,000, while another claims still more than that. According to their statements the gold does not extend to a great depth, 5 or 6 feet being as low as any have yet found "paying dirt." By the decision of Commissioner Hermann no land below ordinary high tide can be disposed of to individuals or corporations, but is open to the public to operate on; the right to dig in these lands is as free as the right to fish in the adjacent waters, so anybody may wash gold out of the sand between high and low water. Anxiety is expressed regarding the establishment of a port of entry at Cape Nome. Captains all agree that there is practically no anchorage or harbor at the cape itself, but at Port Clarence, distant only a few miles, there is a safe and commodious harbor. The market quotations for provision are very high, beef selling from 75 cents to \$1 per pound; flour, \$10 a hundredweight; butter, \$1 a pound; coal, \$57 a ton, and lumber, \$250 per thousand feet. The ruling prices of the restaurants are extremely high, a steak with coffee, bread, cheese and pie would be about \$5. An ordinary two-story dwelling of eight rooms rents for \$200 a month; for the delivery of heavy freight, by horse team and wagon, \$10 per hour is charged; the price of a shave is \$1, and it costs the same amount to have a white shirt laundered. Longshoremen have been paid \$2 an hour for their labor, and carpenters receive \$1.50 an hour. From these figures it will be seen that while it may be comparatively easy to obtain considerable quantities of gold, that the mere cost of staying at Cape Nome is enormous. Probably with an increased number of steamers the prices may be decreased.