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THE ELECTRIC POWER PROBLEM OF NIAGARA.

With the article which appears on another page of this issue we close the series, on Niagara Falls as an industrial center, which has appeared at intervals during the present year, and it will now be opportune to sum up the results which have been accomplished, and see how far they agree with the expectations which were formed when the "harnessing" of the Falls on the present extensive scale was seriously undertaken.

In the first place it must be understood that the generation of fifty thousand electrical horse power was not attempted primarily with the expectation of transmitting it to far distant centers, there to be redistributed for local use. It is true that this was popularly supposed to be the object aimed at in the Niagara Falls Power Plant, and in the early days of its construction, writers were accustomed fairly to revel in picturesque descriptions of the silent flow of Niagara's energy to cities as far distant as Chicago and New York, where it was to displace every existing form of power by virtue of its extraordinary cheapness and convenience.

As a matter of fact, however, the eminent specialists and financiers who had the courage to build such a vast electrical plant did not undertake to generate this unprecedented amount of electrical energy with the idea of transmitting it *in toto* to far distant centers. Not only was the art of long distance transmission at that period in its comparative infancy, but it was foreseen that better economic results would be achieved in bringing the industries to the source of power rather than in carrying the power to the industries. As between the two alternatives, there were on the one hand the great cost and losses of transmission, and, on the other, the question of cheap railway and steamship transportation both for the raw materials and the finished product. The original promoters considered that, in respect of transportation facilities, the proximity of the Great Lakes and the convergence of several important railroads at Niagara rendered this an ideal manufacturing center, and, acting upon the conviction, they purchased large blocks of land contiguous to the power station, with the intention of renting the same for the erection of industrial establishments, which in the course of time were certain to be attracted by such an abundant electrical supply. At the same time, the company wisely determined to design the electric installation with a view to meeting the varied needs of its customers, and arrangements were made to supply, within reasonable limits, any kind of electric current that might be required.

That the expectations of the company were well founded is seen from a study of the facts presented in the series of articles in the SCIENTIFIC AMERICAN above referred to. In the few years that have intervened since the water was first turned into the wheelpit of the Niagara Falls Power Plant, a large number of entirely new industries have sprung up around, or within easy touch of, the station; while establishments that were already existing have become extensive users of the power. That the tendency is for the industries to gravitate to the power rather than the power to be transmitted to the industries is shown by the fact that out of a total of 35,000 horse power delivered from the station, over three-fourths are consumed in its vicinity, as against less than one-fourth that is transmitted to a distance—the principal long distance transmission being that of 8,000 horse power to Buffalo, for the use of the Cataract Power and Conduit Company.

Although the natural trend of events, controlled by well understood economic laws, has brought about a centralization of industries at the falls, it is not to be inferred that long distance transmission will not enter largely into the ultimate utilization of the energy of Niagara. In the few years since construction was first started a great stride has been made in art of generating and manipulating electrical currents for transmission, and the remarkable installation recently opened in Southern California, where a transmission of 83 miles has been successfully accomplished, suggests that a large part of the 7½ millions of hydraulic horse power available at the falls may yet be transformed and transmitted to the large cities of the East. The present indications are, however, that for some time to come transmissions are not likely to be attempted for distances of over 100 miles. The difficulties are not now so much of a physical nature (thanks to the alternating current of high potential), but are largely economical—the great cost of the line rapidly offsetting the cheap cost of production at the power station. The power from the falls could to-day be transmitted to a distance of 100 miles with a loss of 20 per cent; and in spite of this loss and the great cost of the line, it could compete successfully with steam power at a cost of $60 per horse power per annum.

COMMISSIONER DUELL ON TRADE MARKS.

By the courtesy of Commissioner Duell we are enabled to present on the adjoining page an address which he recently delivered at the International Commercial Congress at Philadelphia on the subject of trade marks. From the wide range of subjects connected with his work as Patent Commissioner, Mr. Duell chose for his address one which is particularly applicable to the remarkable expansion of our foreign trade which is now taking place. He makes out a strong case in favor of the use and registration of trade marks, both as an incentive to our manufacturers to maintain the high quality of their exported goods, and as a protection against foreign competitors who may attempt to pass off a poor imitation as the genuine article. The statistics of our exports, as quoted in the address, show that the introduction of American manufactured products into foreign countries is advancing by leaps and bounds, our exports for the first nine months of the present year being $280,000,000, as against $230,000,000 for the same period in the year preceding, an increase at the rate of about $67,000,000 for the whole year. It should certainly be the first duty of our manufacturers to see that these goods, representing over a quarter of a billion dollars in value, are sent abroad under the fullest trade-mark protection that the law can give. As an indorsement of the Commissioner's recommendation that manufacturers who ship abroad should adopt a trade mark, we may mention that to the writer's knowledge a private inquiry which was lately conducted developed the fact that an astonishing proportion of the goods exported bore no distinct trade mark. The evil of this omission is seen when we bear in mind the fact that foreigners unacquainted with the English language are unable to distinguish the mere manufacturer's name from other English words on the goods; whereas they would readily acquaint themselves with a distinctive name or trade mark. As an addition to the Commissioner's suggestion, we urge that trade marks be not only adopted, but that they be registered in foreign countries. Non-registered marks in foreign countries are unprotected, and as a matter of fact a competitor may register another's well-known mark and deprive the original owner of his rights.

It is a curious fact, the explanation of which we will not enter upon just now, that there are many firms which have adopted and have been using for many years trade marks that they have failed to register. It has sometimes happened (a case of the kind having recently come under our notice) that a firm has adopted a trade mark which was already registered and in extensive use for the very same article—a condition which could never have existed had the firm in question gone to the trouble of registration, one of the chief benefits of which is that in the process of applying for registration at the Patent Office, a thorough search is instituted to make sure that the particular mark has not already been registered. The case referred to above is that of a milling firm, which, after using for over twenty years a certain mark for its flour, applied for registration and found to its dismay that the identical mark had been in registered use by another reputable firm for over a quarter of a century. As it happened, the matter was arranged agreeably to the interests of both parties, but it can easily be seen how the valuable reputation acquired in twenty years' use of this particular mark and the many thousands of dollars which had been spent in advertising might have been completely lost to the firm.

The moral of this particular case, which could doubtless be duplicated many times over, is that a manufacturer should not only register at once the trade marks that he may have had long in use, but also any new mark which he has just adopted.

The selection of a trade mark is not by any means the simple matter that many people suppose it to be, and we strongly recommend that in making such a choice, the manufacturer carefully read over the series of "don'ts" which are enumerated in the latter part of Commissioner Duell's address.

BUREAU OF ORDNANCE ON THE ARMOR QUESTION.

When a congressional committee deliberately ignores the recommendations of the technical bureaus and undertakes to speak *ex cathedra* on a purely technical question and say that this can and that cannot be done, the interests of the country are sure to suffer. As a result of the limitation of the price that may be paid for armor for our battleships and cruisers, which was brought about by the action of a few committeemen in the last Congress, the good work of building up our navy is to-day in danger of being brought to a positive standstill. This serious state of affairs is brought out in the annual report of Rear Admiral O'Neil, chief of the naval bureau of ordnance, who says: "It is quite evident that the building of armored ships of war must soon be discontinued by this government until the vexed questions of the source of supply and cost of armor are disposed of."

The present condition of the matter of armor supply is as follows: The contracts for the "Kearsarge" and "Kentucky" have been completed, and the Harveyized armor for the battleships "Alabama," "Illinois," and "Wisconsin" is now being manufactured. Of the total amount required, 2,481 tons yet remains to be delivered, but it is likely that the contracts will be completed by the close of the year. In the case of the three battleships of the "Maine" class, authorized over a year and a half ago, and of the three battleships and three armored cruisers authorized last winter, no provision whatever for armor has been made, a clause having been inserted in the bill authorizing the six battleships and cruisers forbidding the closing of any contracts for the construction of the ships unless their armor could be secured for $300 per ton.

The determination of Congress to say what price shall be paid for armor is responsible for the whole delay, and its attitude on this question has been marked by a disposition to have its own way, regardless of the actual facts of the question, which does more credit to the obstinacy than to the judgment of the two or three committeemen who have been responsible for a positive deadlock in the construction of the navy. The policy of obstruction was commenced in connection with the ships of the "Alabama" class, when Congress placed the absurdly low limit of $300 per ton upon the price to be paid for the required Harveyized armor. Of course no bid was forthcoming, and it was only when Congress had raised the limit to the reasonable figure of $400 per ton that contracts could be closed. This arbitrary interference in a question on which it should have been guided by the advice of its technical bureaus resulted in a delay of one year and nine months.

Congress is now confronted with the question of providing armor for the six battleships of the "Maine" and "New Jersey" classes and the three new cruisers. There would be no difficulty in closing contracts for the supply of Harveyized armor at once at the price of $400 per ton; but the Harvey product, excellent as it was in its time, is not the best armor that can be made to-day. It is greatly inferior in its ballistic qualities to the Krupp armor, which is manufactured by a process that is an improvement upon the methods of face-hardening adopted by Harvey. Manufacturers of nickel-steel Harveyized plates will only guarantee them to stand ballistic tests up to a certain point, the uncertainties in the process being such as to prevent the guarantee being extended any further. The Krupp process is more certain in its results, and not only can the face-hardening be carried further into the plate, but the body of the plate is tougher throughout its whole depth and possesses remarkable ability to resist cracking and hold together under repeated impacts. At the same time these superior qualities are secured at a greater difficulty of manufacture, and a smaller quantity can be turned out in a given time than by the Harvey process.

The armor question will be one of the very first to engage the attention of Congress at its next session, when it will be confronted with the alternative of raising the limit of cost to something like $500 a ton, or clothing the latest and finest ships of our navy with armor which is greatly inferior to that employed by the other navies of the world. The limiting clause which prohibits the construction of the new ships until armor shall have been secured at a price of $300 a ton is so supremely ridiculous in the eyes of all practical men that the merest promptings of self-respect should lead Congress to rescind the objectionable clause and pass a more rational measure.

The price asked for Krupp armor is not, in view of the first cost of the plant, the risks of manufacture, and the smallness of the output, excessive. It is being paid willingly by the European governments, and costly as it may seem, the magnificent protective qualities of the plates render them, ton for ton, as cheap if not cheaper than those manufactured under the old process.

AMERICAN EQUIPMENT FOR THE CITY OF GLASGOW.

In the midst of much heated discussion of the political expansion of the United States, it is refreshing to see with what rapid strides the commercial expan-