Scientific American.

ESTABLISHED 1845

MUNN & CO., - - - EDITORS AND PROPRIETORS.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, - - NEW YORK.

TERMS TO SUBSCRIBERS

One copy, one year, for the United States, Canada, or Mexico $3.00
One copy, one year, to any foreign country, postage prepaid. £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845) ..... $3.00 a year.
Scientific American Supplement (Established 1876) ..... 5.00 "
Scientific American Building Edition (Established 1885). ..... 2.50 "
Scientific American Export Edition (Established 1878) ..... 3.00 "

The combined subscription rates and rates to foreign countries will be furnished upon application.
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MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, NOVEMBER 11, 1899.

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-

sion of the country is taking place in every part of the world. This is a species of invasion, upon the ethical and economical aspects of which we are all pretty well agreed; and on the receipt of each bulletin announcing the success of the foreign representatives of our great industrial concerns in winning orders against strong local competition, we may well feel a touch of patriotic pride.

The latest and most significant instance of our invasion of foreign territory is furnished by the contracts which several American firms have secured for furnishing the plant and equipment for the Glasgow municipal tramways. The National Cable and Conduit Company is to supply and build the cables and conduits; the E. P. Allis Company the engines; the General Electric Company the electric fittings, and the first one thousand cars are also to be supplied by an American firm. The total value of these contracts is said to be in the neighborhood of $15,000,000.

COMMISSIONER DUELL ON TRADE MARKS.*

The subject under discussion to-day is an important one, not only so far as it relates to domestic trade and commerce, but it is of even more importance in its bearing upon foreign commerce, which is the subject we are all most interested in at the present time. The manufacturers and merchants of this country must find an output for their products in the markets of the world, and that they are beginning to realize this is clearly shown by the statistics in reference to the export of manufactures. Nine months of the present calendar year show that such exports amounted to very nearly $280,000,000 against nearly $230,000,000 in the nine months of 1898. These exports form over 31 per cent of our total exports, as against less than 27 per cent for the corresponding months of 1898. Anything, therefore, which adds to our power to hold and increase this remarkable showing is of the utmost importance.

In the first place, to secure a large foreign trade we must manufacture the goods that foreign nations demand. They must be unexcelled in the materials of which they are made, and in the manner of making and packing them. When the trade is once established, it can be only retained by continuing to send a grade of goods equally as good as those first sent. How important is it then that the exporter, in sending forward his goods, should have them so marked and distinguished that when the mark becomes known, no one can palm off an inferior grade of goods as the product of the one who has established the business. It becomes essential, therefore, that exporters should adopt and use trade marks.

From the earliest days of recorded history it has been the custom of men to indicate their proprietary rights in all kinds of movable property by the use of individual brands, marks and other insignia of ownership. As trade and commerce extended and ceased to be local, it became more important for the manufacturer and merchant to distinguish their goods from those of others. At first, signs and symbols, such as representations of animals, stars, shields, crescents, and the like, were employed. As man ascended in the scale and education became more diffused, coined words were employed, but, whatever the mark selected, it should be one which is a lawful trade mark, the right to which can be maintained against any and everybody.

The exclusive right to property in trade marks has been recognized by all civilized countries for many years; and as the importance and necessity for preserving proof of the adoption and use of marks became more important, statutory provisions for the registry of such marks have been enacted by most of the countries of the world. The first national trade mark law in the United States was adopted in 1870. That act was declared unconstitutional by the Supreme Court. Up to that time some 8,000 trade marks had been registered in the United States Patent Office. In 1881 a new trade-mark law was enacted under which nearly 25,000 marks have already been registered. That the present law needs amendment is universally admitted, but I will leave for others the discussion of the question as to how the law should be amended.

Notwithstanding the large number of marks that have been registered in the Patent Office, thousands of alleged trade marks presented for registration have been refused because they did not disclose matter that was susceptible of exclusive appropriation, and this leads me to the point to which I desire most earnestly to call your attention. The advice will consist largely of "don'ts," although it will not be as sweepingly used as Punch's advice to the young man about to marry.

Do adopt and use trade marks, not only for your domestic but for your foreign trade. When you select a mark, be very careful that it is a lawful trade mark, and one to which your right is undeniable.

Don't adopt your own name as a sole mark for your manufactures. Every man undeniably has a right to use his own name upon his own goods to indicate their origin and ownership and as a guarantee of their quality and character. This right is common to all men, and, therefore, if there are twenty men by the name of John Adams, each one of the twenty has as good a right as any of the others. True, he cannot use his name in an unlawful manner, and from such use he will be enjoined, but a mark which consists merely of the name of the party using it is a very weak reed upon which to rely.

Don't adopt a geographical term. The Supreme Court of the United States has repeatedly held that no one can exclusively appropriate to his own benefit a geographical term so as to prevent others inhabiting the same or similar territory from dealing in similar articles. It is true that the decisions of the courts have not been uniform on this subject, but in every case, with possibly one or two exceptions, where the exclusive right to use a geographical term has been sustained, some peculiar facts have led to the decision. If you wish to keep out of litigation, don't select a geographical term for your trade mark.

Don't adopt a descriptive word or name. It has been held by the courts times without number that words or names simply indicating the quality or ingredients of the articles cannot be appropriated so as to prevent others from employing the same words upon the same articles.

Don't adopt a word expressing quality, grade or peculiar excellence. No man has the exclusive right to use any word or symbol which merely indicates the excellence of his article. No more has he the right to exclusively appropriate for his products marks, letters, numbers, or words which actually indicate the grade of the article. While I cannot say don't adopt a suggestive word (for such a word will generally be sustained by the courts), the greatest care should be used or you will enrich some member of my profession.

It is so easy to select a device or symbol or to coin a word that there is no reason why a manufacturer or merchant should select as his mark anything which is not a lawful trade mark or which is on the border line, and will in all probability ultimately land him in the courts. So many alleged trade marks are presented at the Patent Office for registry, and those not being lawful trade marks have to be rejected, that I have felt impelled to make use of this opportunity to utter this note of warning.

Through our labor-saving inventions we are able to produce manufactured articles as cheaply as they are produced in many other countries where wages are much lower. If then our manufacturers send out only such of our manufactured products as suit the tastes and requirements of the people to whom they sell, we cannot fail to greatly extend our export trade in manufactured articles; and, when once established, if we have adopted and used lawful trade marks to indicate our ownership and title, there will be no reason why the trade, once gained, cannot be kept indefinitely.

* Address delivered at the International Commercial Congress, at Philadelphia.

SEARCHLIGHTS FOR THE NEW YORK FIRE DEPARTMENT.

The New York Fire Department is about to add a complete portable electric searchlight plant to its apparatus. The searchlight wagon will go to fires with the engines, etc., and it is believed it will add greatly to the efficiency of the force, both in saving life and property. It resembles a fire engine in general appearance, but instead of a pump it has an engine and dynamo. There are two searchlights each with an 18-inch lens. These will be carried on a platform behind the driver's seat. They can be used either from the platform or removed and carried to any desirable point of vantage, all communication with the generator being kept up by means of flexible cables which are insulated with rubber. The lights are provided with devices for quick regulation so that the light may be spread out over a wide area or confined and directed to any particular point. The purpose of the apparatus will be to light up dark parts of the street and aid the firemen in laying the hose, setting ladders, etc., also to light up the front of buildings where people may be in danger and to project light into the buildings themselves.

THE NEW GOVERNMENT PRINTING OFFICE.

The new government printing office will cost about $2,000,000, and it is said that even after its completion it will not be large enough to meet the demands upon it. The new building will be eight stories in height, and its floor space will be about nine acres. The floors will sustain a load of 85,000,000 pounds. The building will be constructed in such a substantial manner that nearly the entire space can be filled with paper and books without injuring its stability in any degree. Access to the various floors will be obtained by twelve electric elevators. The building will be lighted with 7,000 incandescent lights. A refrigerating plant will furnish cold filtered water on every floor for drinking purposes. A large crematory will destroy all the refuse material, and this will aid in heating water, etc. It is hoped in time that Congress will appropriate the money for modern typesetting machines, but it is probable that when the census is complete and the reports published, the equipment of the census printing office will revert to the government printing office.

OUR CALIFORNIA NATIONAL PARKS.

The report just made to the Secretary of the Treasury by Second Lieutenant Henry B. Clark, the acting superintendent of the Sequoia and General Grant National Parks, in California, deals in an interesting manner with the problems under his control. During the past fiscal year much devastation of timber by forest fires and of game by unlawful hunting has been unpreventable by the force under his command, because of the necessary removal of the regular military patrol for war service and the entirely inadequate force of civilian custodians appointed in their place. It is estimated that over 200,000 sheep have been roaming at will over these reserves, private property fed at public expense; and by these many of the nests of game birds have been trampled out and much of the herbiage needed by the elk and mountain sheep has been consumed. The latter two species have practically all been killed off, and other smaller game, now in greatly decreased quantities, will be preserved with difficulty unless immediate and energetic steps are taken. Mountain lions, panthers, coyotes, several varieties of fox, black, brown, and cinnamon bear, deer, mountain and valley quail, and many species of fish are still quite abundant; and probably the carnivores in this list are holding their own. Speaking of the mighty forest monarchs of the General Grant Park, Lieutenant Clark says:

"The tree General Grant was named in honor of the general while he was still in command of the armies in 1867. The stump and log of the immense tree exhibited at the Philadelphia Centennial are well-preserved objects of interest. Another log has been so burned that a cavalryman can ride through its whole length, 125 feet. The stump of the World's Fair tree is to be found north of the Grant Park. The largest tree in the Giant Forest is the General Sherman, 34½ feet in diameter at its base. This is conceded to be the largest and finest tree in the world, rivaling the eucalypti of Australia in height, and far surpassing everything else in bulk. Another clean and healthy sequoia, which has stood sentinel over the Sierras and the Pacific for more than a thousand years, is called the Admiral Dewey. Visitors are generally content to stand uncovered and almost mute from respect to these dignified monarchs of our forests."

NEW METHOD OF DETECTING GOLD.

A new method of detecting the presence of a small quantity of gold has been recently discovered by Dr. Ohler. By this method the presence of quantities as low as 77 centigrammes per ton may be established. The operation is as follows: A quantity of finely powdered ore, say 120 grammes, is introduced into a flask. To this an equal volume of tincture of iodine is added, and the mixture well agitated. It is then left for an hour, agitating from time to time, and is finally allowed to stand. When the solution has separated, a band of filter paper is saturated with this, and the paper allowed to dry. This operation is repeated five or six times in succession, in order to completely saturate the paper. It is afterward calcined, and it will be observed that the ash, when gold is present, offers a purple color. This color should disappear quickly if the ash is moistened with bromine water. The test may be modified in the following manner. A quantity of the powder, 120 grammes, is covered with bromine water, and after agitating during the course of an hour, the solution is filtered. Upon adding protochloride of tin to the solution, it takes a purple color, in the presence of gold, giving the reaction known as "Purple of Cassius." In the case of sulphides the ore should be previously roasted, and when the mineral contains a considerable proportion of carbonate of lime, it should be calcined in the presence of ammonium carbonate.

USES FOR CORN STALKS.

Half a dozen years ago the farmer considered the value of his corn crop to be practically terminated with the husking of the corn. What was left was worth a very small sum an acre as fodder. Many experimenters, however, working along different lines have established the value of the by-products of the corn crop, and there is now a home market where a farmer can get from $3 to $5 a ton for corn stalks, so that their value is now from $6 to $12 an acre.

The American Agriculturist recently gave the following list of what can be made from corn stalks; first, cellulose for packing coffer-dams on our ships; second, pyroxyline varnish; third, cellulose for nitrating purposes for making smokeless powder and other explosives; fourth, as a packing material; fifth, for paper pulp and the various forms of paper made therefrom, both alone and mixed with other grades of paper stock; sixth, as a stock food made from the fine outer shells or shives of the corn stalks and also from the nodes, or joints. The leaves or tassels also furnish a shredded or bale fodder; seventh, mixed feeds for stock containing fine ground shell or shives as a base and in addition thereto various nitrogenous materials and concentrated food substances, or blood, molasses, distillery and glucose refuse, sugar beet pulp, apple pomace and other by-products; and eighth, poultry foods.