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, DECEMBER 15, 1900.

REPORT OF THE ISTHMIAN CANAL COMMISSION.

The preliminary report of the Isthmian Canal Commission, recently transmitted to Congress by the President, would seem, on the face of it, to be somewhat self-contradictory, for the reason that although its facts and figures show that from an engineering point of view the Panama Canal is more advantageous and cheaper to construct, it is recommended that the more costly Nicaragua Canal be built. The estimates of the cost of the two canals are about fifty per cent greater than the estimates of the International Commission which recently examined the Panama Canal and the estimate put in last year by the Walker Commission for the Nicaragua scheme. This increase, however, is not due to any underestimate by either of these commissions, but results from a great enlargement of the scope of the plans for both enterprises, such enlargement being necessary to render them available for the larger vessels and greatly increased traffic of the year 1910, which, in the case of both schemes, is the time estimated for their completion.

To secure a true comparative estimate of the cost, the same depths and widths of the canal and dimensions of the locks were adopted in each case, namely, a depth of 35 feet at mean low water and a bottom width of 150 feet for the canals, with duplicate locks, each 740 feet long, 84 feet wide, and 35 feet in depth. In the case of Nicaragua, the canal would be 186 miles long from ocean to ocean, and as a preliminary to construction 98 miles of double-track railroad, costing $7,350,000, would have to be built. The Panama Canal, which is about two-fifths completed, would be 43 miles in length. The total cost of the Nicaragua Canal would be $200,540,000, and of the Panama Canal $143,342,579. The time necessary to complete each canal would be about ten years.

The considerations which led to the choice of the Nicaragua Canal are as follows: Although the estimated cost of the Nicaragua Canal is some $58,000,000 more than that of the Panama Canal, to the estimated cost of the latter scheme must be added the purchase price of the rights and properties of the present Panama Canal Company, which, it is conjectured, would be enough to bring the total cost up to that of the Nicaragua scheme. Judged from the standpoint of advantages of operation, the Panama Canal would be the shorter, it would contain fewer locks, the summit elevation would be less, and—a most important consideration for navigation—there would be less curvature. The average time of the passage from ocean to ocean would be about twelve hours as compared with thirty-three hours for the transit of Nicaragua. As offsetting this advantage, it is pointed out that as far as the interests of commerce are concerned, the sailing distances from port to port via Panama would be greater. The voyage from San Francisco to New York would be 377 miles longer by Panama than by Nicaragua; from San Francisco to New Orleans the distance would be 579 miles greater, and to Liverpool 386 miles greater. These longer sailing distances would more than offset the shorter time of passage through the Panama Canal, at least so far as United States commerce is concerned, and the report states that this difference would be sufficient to offset the greater cost of maintaining the longer canal.

The question of the construction of the Panama Canal by the United States government is greatly complicated by the fact that the concession by Colombia to the present Panama Company is exclusive, and that it will be in force for many years to come. The commission is of the opinion that any concession of rights by the government of Colombia to the United States by agreement with the new Panama Canal Company is, for various reasons, impracticable. Although no formal reply has been given by the Panama Company to the request of the commission for a statement of the terms on which it would dispose of its property to the United States, the report states that the company does not appear to be willing to sell its franchise, but is rather disposed to allow the United States to become an owner of part of the stock, a situation which will scarcely commend itself to our government. As against these difficulties and objections, it is to be noted that the governments of Nicaragua and Costa Rica are not hampered by any existing concessions.

Until the full text of the report is available, it will be premature to enter into any extended review. As it is, enough of the report has been made public to show that it would have been better to have awaited its publication before taking any such definite legislative action for the immediate construction of the canal as is contemplated by the Hepburn bill. The SCIENTIFIC AMERICAN has always strongly advocated a conservative course on the part of Congress with regard to this most important scheme; and its contention that the Panama route would be found to be, from an engineering standpoint, the most feasible and least costly, seems to be borne out by the report. As far as can be judged, the failure to recommend the Panama route is due largely to the short-sighted policy of the new Panama Canal Company. Had they come forward with a reasonable proposition, one that was consistent with the dignity of the United States government, it is quite possible that the shorter route, with its many obvious advantages, would have been adopted; but as the matter now stands, we certainly think that the attitude of the French owners has been such as to render the recommendation of the Nicaragua route the only logical course open to the commission.

THE RELATIVE COST OF STEAMSHIP CONSTRUCTION IN EUROPE AND AMERICA.

Among the papers presented at the recent general meeting of the Society of Naval Architects and Marine Engineers in this city was one by Mr. George Dickie, of the Union Iron Works, San Francisco, on the question "Can the American Shipbuider under Present Conditions Compete with the British and German Shipbuilders in the Production of the Largest Class of Ocean Passenger and Freight Steamships?"

The author of the paper recently made an extensive tour among the shipbuilding yards of Europe, one of the objects being to note what advantages foreign shipbuilders have over ourselves in skill, labor and materials. The paper was written on board the "Saxonia," a sister ship to the "Ivernia," which, in an article published in the SCIENTIFIC AMERICAN of November 10, was taken as the latest representative of the large cargo and passenger steamers which are becoming increasingly popular among the shipowners of the present day.

Mr. Dickie's comparison between British and German and American methods is made under three heads: skill in design, cost of labor, and cost of material. As regards the question of skill the British designers labor under the severe restrictions of Lloyd's Register, and Mr. Dickie gives them full credit for a thorough understanding of their profession and great skill in turning out economical designs that conform to the rigid requirements and restrictions of the Register. Given an American register of shipping that would lend itself more readily to the tendencies of American design, Mr. Dickie believes that the American architect will show himself to be quite abreast of his British cousin. As regards the cost of labor, it is shown that under our present methods labor cost in the United States is 25 per cent greater on the hull and 50 per cent greater on the machinery of an average ocean-going freight or passenger steamer.

It is just here, in discussing the cost of marine machinery, that the author brings out a fact which will be certainly very astounding to those of us who have believed that in economy of shop management we are far in the lead of Great Britain. As an explanation of the cheapness of British marine engine construction, he tells us that every part of the engine in a first-class establishment is made to gage, and when finished by the tools is sent to an expert examiner at a large surface table, who determines if every operation performed by the tools has been accurately done. If the work is not perfectly accurate, it is returned for correction or, if not worth correction, it is entirely rejected. "The pieces thus produced that go to make an engine when brought together, are not erected by fitting each piece to its place by file or chisel, but they are placed in stock ready to be assembled in a few hours on receipt of an order for an engine of the size they represent." The author is of the opinion that the introduction of a system to insure correct tooling on every piece entering into the construction of our marine engines would reduce the cost of erection by one-half. The full text of this valuable paper will be found in the current issue of the SUPPLEMENT.

REPORT OF THE COMMISSION ON PATENTS AND TRADE MARKS.

In our last issue we referred editorially to the fact that the Commission appointed by the President under act of Congress to revise the laws of the United States concerning patents and trade marks, had been holding a final session in the city of New York, preliminary to presenting to Congress bills for modifying and harmonizing the present patent practice and trade-mark laws with existing conditions. Through the courtesy of one of the members of the Commission, it has been our privilege to examine the report of the Commission and the bills, which have been most carefully drawn. It will only be possible to summarize briefly the general scope of the bills, rather than to pass any criticism upon them at the present time.

It will be remembered that the treaty of agreement which has been generally known as the "International Convention for the Protection of Industrial Property" was concluded at Paris in March, 1883, in which nearly all the important countries of Europe, together with the United States, were parties, the only important exceptions being Germany and Russia. The general object of the movement was to secure greater harmony between the patent systems of the world. The results derived from the Convention directly and indirectly have been far-reaching. Many leading European countries have since 1883 practically rewritten their laws in the direction of far greater liberality toward inventors.

No less than seventy-one countries have patent laws, and the general features of these laws, with particular reference to the differences existing between them and the United States, are clearly presented in the report. For instance, in many foreign countries patents are granted without investigating the question of novelty. Many countries require inventions to be unknown to the public up to the day on which application for patent is filed; many inventions, such as foods and medicines, which are patentable here are excluded from protection in most foreign countries; patents in many foreign countries date from the day of application instead of from the date of issue, as here; in nearly all foreign countries annual taxes are required to keep patents in force throughout the terms for which they are granted; patented inventions are required in foreign countries to be manufactured on a commercial scale within a short time after the grant of the patents on pain of forfeiture, and owners of patent rights may be compelled to license others to make and use the patented inventions.

None of these features should, in the opinion of the Commissioners, be incorporated into the United States patent system. There is no doubt, they say, as regards its essential features that the United States patent system is the best which has been devised up to the present time. But in some matters not affecting the essential principles of the system the Commissioners find certain features of the foreign laws desirable. These are, first, that foreigners who take out patents here should have in this country a representative on whom papers may be served in any suit affecting their interests; second, to render a foreign patent, as a bar to the grant of patent here, the same weight as any other disclosure—that is, if printed, the patent should be given the effect of a printed publication, and if not printed (and in many foreign countries patents are not printed and may even be kept secret), it should have no other effect than that of knowledge or use of the invention in the country in which it was granted; third, to provide that a mere application for a foreign patent shall not be a bar to the grant of a patent here; and fourth, that in case of an interference, if it is shown that the later applicant is the real inventor, the patent shall be granted only for the unexpired term of the first patent.

Furthermore, under the present laws, caveats can be procured only by citizens of the United States. The Commission considered that if caveats are still permitted to be filed, foreigners as well as citizens should be permitted to file them, but they recommend, in view of the fact that caveats are generally regarded as of no practical value, that the law which provides for them be repealed. They also recommend that the executors or administrators of a deceased inventor, even though appointed abroad, be permitted to apply for a patent for the invention. As the law is now construed in such a case, auxiliary letters of administration are required to be taken out in this country. This amendment seems to be broad-spirited, and will do away with many of the formalities which now render it difficult and expensive for a foreign administrator to file or prosecute an application in this country.

The report may properly be divided into two parts, namely, that which refers to modifying our present patent laws to conform with the Convention, and secondly, and by far the more important part, that which relates to reforming our present trade-mark practice. Our present practice is causing widespread discontent; and now that our merchants and manufacturers are engaged so extensively in foreign commerce, the importance of having a simple system of trade-mark registration is imperative, and it is to be hoped that this all-important question will receive the intelligent consideration of Congress and that the much-sought-after relief which is looked for by the industrial community may be found.

THE TRADE MARK BILL.

The Commissioners have made a careful study of the trade-mark laws of the principal foreign countries. Trade-mark laws are found to fall into two general

classes. First, those known as "declaratory," in which the right to the mark is acquired by actual use of the mark or brand in trade; and secondly, those known as "attributive," which make the ownership in the mark depend upon the act of registration, the first who presents the mark for registration becoming, by that act, the owner of the mark, irrespective of the fact of his having previously used the mark or not. Many foreign laws, like that of Germany, are of this character. In foreign countries generally registration is recognized as of great importance to the public, as notice of what trade marks are claimed as the subject of exclusive right, and every effort is made to induce owners of trade marks to register them. The registration fees are made very much smaller than in this country, being in a number of countries less than $5, while $25 is required here. The procedure of registering is generally much simpler than here.

The report contains a lengthy review of the constitutional power of Congress to provide for the registration and protection of trade marks used in interstate commerce. The conclusion is that Congress has this power, under the commerce clause of the Constitution.

It is to be regretted that the Commission have not agreed upon a single bill embodying their views. Judge Grosscup and Mr. Forbes, of the Commission, have submitted a proposed bill, and Ex-Assistant Commissioner Arthur P. Greeley, agreeing to the principal features of the bill of his colleagues, has drawn up a bill of his own which has been separately presented. These bills have been introduced into the Senate by Senator Pritchard.

The bill recommended by Judge Grosscup and Mr. Forbes was introduced on December 5, S. 5027. Mr. Greeley's bill is S. 5026. In the former bill it is proposed to regulate and protect trade marks, to enforce the treaties regarding the same when used in interstate commerce or foreign trade by registering them, for making the willful infringement of a registered trade mark punishable by a fine of not more than $500. The bill also provides for the seizure of goods bearing a false mark, and provides very fully for the regulation of commerce, both interstate and foreign. The fee for registration is reduced to $10, and the procedure necessary to secure registration is made as simple as possible. Practically all marks which could be considered good trade marks at common law are made registrable.

The bill of Mr. Greeley is in harmony with the features of the majority bill in respect to permitting the registration of marks used in interstate commerce, in reducing the registration fee to $10, in simplifying the procedure necessary to registration and providing additional remedies for the registration beyond those now secured under the common law, but does not include the one very important particular of making the title of ownership *depend* upon the act of registration.

The preparation of this report has taken an immense amount of labor on the part of the Commission, covering a period of more than two years. An unusual feature of the work is the fact that the Commissioners serve without compensation, the total appropriation for the expenses of the Commission being but $250.

It has been possible only at the present time to make a statement as to the provisions of the bills. It is not possible at the present writing to take up for consideration the merits of the proposed legislation.

SHOOTING AT THE CLOUDS.

The practice of "shooting at the clouds" with cannon or other specially constructed contrivances for the purpose of dispelling threatened hail storms is rapidly changing from the odd to the commonplace throughout Europe. In Continental newspapers one reads at present of the systematic use of artificial storm destroyers in almost every country where agriculture forms the chief mainstay of prosperity. In many parts of France, Italy, Germany and Austria, the custom has grown so extensively that it often forms an official department of the municipality. In such cases, with the assistance of the neighboring landowners and farmers, thorough systems have been devised, until the elements have become so firmly harnessed that it is almost impossible for them to inflict injury or destruction to crops.

Indeed, so widespread is the public interest in this valuable aid to agriculture at present that the leading agricultural societies have taken up the subject, with a view to contributing to the means already employed the results of their minute investigations. In Vienna recently a congress of the members of the Meteorological Institute was called, at which the various methods of cloud shooting were exhaustively discussed and many new experiments were inspired, which cannot fail to be of great benefit to the farmers in the districts peculiarly susceptible to the ravages of hail storms.

From the report of the proceedings of this congress, it seems that the idea of averting storms by means of cannon shots is not a new one in Austria. It was first introduced during the reign of Empress Maria Theresa, who issued a decree prohibiting the use of cannon by the peasantry shortly after the adoption of the practice. In time, however, this decree was overruled, and in the year 1896, the burgomaster of Windish-Feistritz, in Styria, again introduced the method in Austria, substituting in place of the ordinary cannon a new weapon. This consisted of a funnel-shaped barrel of sheet iron, 6½ feet long, and 79 centimeters (26 8 inches) in diameter at the muzzle and 20 centimeters (7·8 inches) at the base. The idea of the broad muzzle was to distribute the discharge over greater space and thus to increase the effect. So successful were the results attained by the burgomaster's experiments that in 1897 the municipality of Windish-Feistritz counted no less than thirty shooting stations; since when there have been no hail storms whatever in that locality.

Nowhere, however, has cloud shooting found such general usage as in the vicinity of Venice, Lombardy and Piedmont, districts that formerly suffered fearfully from the destructiveness of hail storms. During the summer of last year there were at least 2,000 stations, built on the plan of those constructed in Styria. At a congress held a short time ago in Casale Monferrato it was found that in numerous localities where shooting stations had not been introduced, hail storms were still of frequent occurrence, causing immense damage to crops and property, whereas the districts protected by artificial means were entirely free from loss from such causes.

In a speech delivered before the Vienna Meteorological Institute in Vienna a few weeks ago, Burgomaster Stiger, the originator of the present method, gave some interesting facts regarding his first experiments with the cloud-shooting cannon. He began his experiments with the fundamental principle of disturbing the intense stillness preceding a hail storm. In view of the established fact that there is no physical reason why sound waves should exercise an effect on the formation of hail, Stiger determined that it would be necessary to confine his operations to creating a form of whirlwind. An official trial in 1897, conducted by an expert, demonstrated that after the firing of a shot a small whirlwind arises, easily perceptible in the reflected sunshine. This whirlwind ascends with a piercing whistle, the sound lasting for 13 seconds in day time and 20 seconds at night.

During this experiment it was noticed that a swallow which flew within the radius of one of these whirlwinds instantly dropped dead. On examination the bird had the appearance of being shot.

The mechanical energy created by the wind thus produced, upon which Stiger laid great stress, found few supporters in Europe until at the congress in Casale, Italy, a Prof. Roberts reported that at a distance of 240 feet the wind had destroyed a strong diaphragm. Thereafter several experiments held at St. Catherine demonstrated that the whirlwind was the main if not the sole agent in diverting hail.

Some careful experiments were carried on in Austria during the early spring, mention of which may also be of interest at this point. The experts who attended the exhibition could plainly see the wind rise from the mouths of the funnels with lightning rapidity, possessing all the aspects of a shot. When large cannon were used, whistling could be heard for 20 to 28 seconds. The most marked effects, however, were produced by horizontal shots. For the experiments, shields built of thick paper and linen were placed at intervals of 40, 60, 80 and 100 yards from the mouth of the cannon. When the circle of wind enfolded these shields, the heavy linen and paper were torn from the frames, the solid posts and framework snapped in two and cast from 18 to 22 yards, while a large mastiff standing near was lifted into the air and after turning several rapid somersaults hurled against the ground with such force that his interest in cloud shooting demonstrations was effectually dispelled.

It is calculated that these artificial whirlwinds carry their energy to a height of 1,600 to 2,000 yards, thus accounting for their effect on the clouds. As regards the creation of the wind, the explanation is that the air circulating in the mouth of the funnel is set in motion by the explosion of the powder and hurled forth in a ball that expands upon leaving the funnel until its full force is reached some distance overhead. In actual operation rapid firing is avoided, its effect being to diminish the force of the wind. The shooting must be done during the quiet preceding the storm. Only quick matches or fuses should be used, percussion caps and similar inventions being barred.

ALCOHOL AS A FUEL FOR MOTOR CARRIAGES.

A novel experiment has just been carried out by the Moto Club of France—the new automobile institution recently organized in Paris in competition with the older society—for the purpose of proving the efficacy of alcohol as a fuel in place of petrol. The mineral oil has to be imported into the country, and costs at the present time 14 cents per quart, while occasionally, owing to the development of the motor car industry, it has increased to as much as 16 and 20 cents per quart. Since alcohol is a product of the country, being extracted from beetroot, it is naturally a much cheaper article, costing only 10 cents per quart. The pure spirit, however, owing to the prohibitive excise duties, cannot be employed for fuel, but it can be utilized as methylated spirits, or even mixed with benzine. The test with this fuel was carried out over a route 88 miles in length, extending from Porte Maillot to Rouen, the course abounding with rough roads, ill-paved streets, and many stiff gradients. The object of the experiment was to ascertain the efficiency of the spirit, and was not a speed test trial. Nevertheless, some of the fifty-one competitors raced throughout the journey, one vehicle covering the total distance in two hours and a quarter. Every car that participated in the contest reached the destination without the slightest mishap, a fact which in itself conclusively established the efficiency of alcohol as a fuel for automobiles. The exact merits and demerits of the spirit, however, for this purpose will not be made known for some time, since exhaustive investigations are to be made regarding the consumption of alcohol by each vehicle during the journey and the relative power developed by the engines.

THE DIRECT COMBINATION OF ALUMINA AND OXIDE OF CALCIUM IN THE ELECTRIC FURNACE.

Messrs. Moissan and Dufan have recently undertaken a series of experiments upon the direct combination of alumina and oxide of calcium in the electric furnace, and in this way have succeeded in forming the monocalcic aluminate (Al_2O_4Ca) in crystalline needles. This body has been only imperfectly studied; several experimenters claim to have obtained it, but their results have lacked certainty. The experimenters pursue the following method, which is the subject of a paper read before the Académie des Sciences. By heating in the electric furnace an intimate mixture of 100 parts of well calcined alumina and 60 parts of anhydrous lime, with an arc of 1,000 amperes and 45 volts, after three minutes' action a gray mass, entirely melted, is found in the crucible, which upon breaking is found to be composed of an assemblage of fine brilliant needles. In the cavities of the mass some of the free needles attain one-eighth of an inch in length, and may be taken out and examined under the microscope. The product is freed from excess of lime by a series of washings with alcohol and ether, and dried in vacuo. In this way a crystalline powder is obtained which by analysis gives very nearly the theoretical quantity for the formula Al_2O_4Ca, and it is thus found to be the monocalcic aluminate. The needles are colorless and transparent, appearing to be oblique prisms with rectangular base. This body does not scratch glass; its density is found to be 3·671. The aluminate of calcium is quite stable in dry air, but water attacks it easily, with dissociation and precipitation of alumina. It is quickly attacked by hydrochloric acid, but nitric, sulphuric and hydrofluoric acids act more slowly. Fluorine, which is without action in the cold, attacks it when heated, with incandescence and formation of white fumes. The halogen elements and sulphur are without marked action at a moderately high temperature. Carbon only acts upon it at the temperature of the electric arc, with formation of carbides.

ELECTRIC TRAMWAYS IN LONDON.

The construction of the first electric tramway in London is rapidly approaching completion. The London United Tramways Company have dispensed with animal traction throughout the whole of their system, and hope to begin their service with the new plant within the course of the next few weeks. The enterprise originally met with powerful opposition, but convincing proof will soon be displayed regarding the many superior advantages of electricity over any other system for the propulsion of street tram-cars. This company has forty miles of track through the southwestern suburbs, and powers are being sought by the company to extend the service another sixty miles, so that in all they will serve one hundred miles of streets. If this scheme is successfully carried out, this company will be the largest and most powerful tramway concern in the whole country. The overhead trolley system has been adopted. Great objection was first raised to this system on æsthetic grounds, but after careful consideration, it was decided that this principle possessed numerous advantages over the conduit system, which would occasion great inconvenience to the traffic in the streets while the conduits were being installed, and also whenever repairs were necessary. The company have endeavored to disfigure the streets as little as possible by erecting slight, ornamental tapering poles. The cars are constructed after the most modern designs to insure the maximum of comfort. They each have accommodation for seventy passengers, as compared with forty-four passengers upon the animal traction cars—forty outside and thirty inside. The cars are well upholstered and illuminated with the electric light, while numerous electric bell pushes are provided, so that the attention of the conductor may be attracted when a passenger desires to alight. Now that the idea of electric traction has been adopted upon one tramway in London, there is no doubt that the County Council will convert their systems to electricity in the near future.