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, APRIL 20, 1901.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE ERIE CANAL MUDDLE.

The Erie Canal problem has been further complicated by the action of the Canal Association of Greater New York, which has emphatically and unanimously repudiated the $26,000,000 canal improvement bill now before the State Legislature, and has declared itself as being strongly in favor of the 12-foot 1,000-ton barge waterway costing $62,000,000, which was recommended by the expert commission of Governor Roosevelt's administration as the only solution of the problem. As the Canal Association comprises all the leading commercial organizations of this city, its resolution may be taken as indicating that the city of New York is opposed to any appropriations for the 9-foot $26,000,000 canal, or any improvement of less scope than the 12-foot waterway.

The resolution of the Canal Association produced something like consternation among the supporters of the present bill, for it looks as though this expression of opinion would prevent the passage of the bill and, therefore, prevent appropriations of any kind for canal work at this session. So far as we have been able to discern, very little, if anything, has been said of one aspect of the question—an aspect which is surely of the highest importance, seeing that it dominates the whole canal problem, irrespective of the particular merits of a 9-foot or a 12-foot reconstruction. We refer to the superior advantages, due to geographical location, offered by the powerful competitive route which exists in the system of canals and channel improvements known as the St. Lawrence River Canal system. Since the object of the Erie Canal improvement is to provide a cheap route from the Lakes to deep water, it is evident that the question of the quantity of tonnage which will seek this outlet will be determined by the question of its relative convenience compared with the northern route. As matters now stand, the least depth over the sills of the Canadian locks is 14 feet, which is 2 feet more than the least depth of the proposed 1,000-ton barge canal. Moreover, the aggregate length of the St. Lawrence canals is relatively insignificant compared to the total length of the Erie system, the canals in the former case being merely connecting links between the natural channels of the St. Lawrence River, which have been put in wherever the navigation is obstructed by rapids or waterfalls. We notice that in the report of the Green Commission to Governor Roosevelt, the approaching completion of the Canadian system was urged as one of the urgent reasons for improving the Erie canal, and in this connection it becomes a question for serious consideration as to how far the shorter length and greater capacity of the Canadian system will cause the east-bound grain to seek that outlet in preference to a canal of inferior accommodation through New York State. Probably the St. Lawrence Canal has now been in use long enough to determine what its effect will be upon the various rail and canal routes from the Great Lakes to New York. That it will divert a portion of the tonnage which has hitherto come to this city is to be expected, and upon the probability or improbability of a 1,000-ton barge canal being able to compete successfully with one that will allow of shipments direct from lake ports to Europe in deep-sea steamers, should depend very largely the question of the expediency or inexpediency of any canal improvements whatever, short of a full-sized ship canal.

The question of a ship canal is an attractive one until it is weighed in the balance of cold figures; for it must be confessed that the report of the United States engineers indicates that the total cost would be so great as to overbalance the prospective advantages to the State at large or to the city as a terminal point. At the same time, we think that a careful investigation of the results already obtained by the St. Lawrence Canal system, and a determination of its advantages of location, would render it possible to determine very closely what improvements would be necessary to place the Erie Canal at least on equal terms with its powerful northern competitor.

APPLICATION OF THE COHERER TO DETECTION OF STORMS.

M. Tommasina has recently discovered a new application of the coherer, that of detecting atmospheric electrical discharges or storms, even when these occur at great distances, and has devised an instrument for the purpose, which he calls the electro-radiophone. A description of this apparatus has been given in a paper presented to the Academie des Sciences. It is, however, to the Italian scientist, Prof. Boggio Lera, that the credit of constructing the first instrument of the kind belongs; by using a coherer in combination with a series of relays of different sensitiveness, the effect of the distant electrical discharges was recorded upon a registering apparatus. The relays acted in greater or less number according to the conductibility acquired by the coherer under the action of the discharges, and the apparatus traced a series of lines, long or short, according to the intensity of the phenomenon. M. Tommasina utilizes in his new instrument the principle of the "auto-decoherer" discovered by him, in connection with a telephone receiver. This form of coherer consists of a glass tube containing two cylindrical carbons, nearly touching in the center; between the carbons is a small quantity of carbon granules, and this combination, under the action of electric waves, forms a coherer which has the unique property of returning to its original state after the waves have ceased, without any external action. This coherer, placed in circuit with a battery and telephone receiver, is thus a very good detecter for electrical waves; and M. Tommasina has applied it with success in detecting far-off electrical disturbances of the atmosphere or distant storms.

The coherer used in this case is formed of two small arc-light carbons, of 0.16 inch diameter, fitting easily into a glass tube, and between which are placed small grains obtained by crushing a portion of the same carbon, these being well freed from dust. To the ends of the carbons are fixed platinum wires to form the outer terminals; the carbons and granules are dried by heating to redness in a flame. The space between the carbons is regulated for maximum sensitiveness, this being 0.04 inch for grains of 0.008 inch diameter; the tube is then sealed at the ends to prevent moisture from entering, as this causes variations in the sensitiveness of the coherer. The tube is placed parallel to the axis of the telephone receiver and put in series with its coil and a few cells of battery. When the receiver is held to the ear the coherer is horizontal and in the position for best action. In carrying out the experiments, this arrangement was used at the same time as the electric registering apparatus of Prof. Lera, and the experimenter states that during the time that the discharges of the distant storm were registered, he heard a corresponding series of sounds in the telephone, and the hearer has the illusion of being transported to the actual place of the storm and of listening directly to all its phases; he was thus enabled to hear and study the phenomena of storms when they were at such a distance that no trace was observed on the horizon. In one case he observed a storm twelve hours before it passed over Intra, in Italy, where he had installed his apparatus. Owing to its great simplicity and absence of regulation, there is no doubt that the "electro-radiophone" will render great service in detecting the approach of storms, especially on shipboard.

IMPROVED PROCESS OF DUPLICATING PHONOGRAPH RECORDS.

The commercial demand for phonograph records for amusement purposes amounts to several thousand records a day. It would not be practicable to supply such a demand if each record had to be made separately by singing or playing before a phonograph. For several years the practice has been to record each performance on from four to a dozen machines at once, the machines being arranged on racks or shelves with the horns converging toward the band or singer. The records thus made are called masters, and are copied in duplicating machines, which work somewhat on the principle of a pattern lathe. Two mandrels rotate side by side, one bearing the master record and the other a blank on which it is to be copied. A reproducer stylus rubbing over the master guides a recording stylus which cuts the duplicate record in the blank. By this method a number of duplicates are made from each master, but after a while the master shows signs of wear, and the duplicates produced are not of good quality. Ordinarily about twenty good duplicates can be made from one master before the latter is condemned.

As many of these masters require a whole band of music to make them, they are expensive, and it is very desirable to have a method of producing a larger number of duplicates from a single master. Two successful solutions of this problem have recently been perfected.

By the first method an electrotype mold is made by first depositing over the master an exceedingly thin coating of metal by Edison's process of vacuous deposit, electroplating, and backing up the copper plate with a stout backing of metal. Records are cast by introducing melted wax into the mold about a core. The mold is used cold, so as to chill the surface of the wax.

To remove the record from the mold advantage is taken of the facts that wax has a high coefficient of expansion, and that the record groove is very shallow, so that when the record is cooled it contracts more than the mold and is readily slipped out endways. The molds may be preserved indefinitely, and any number of duplicate records produced from them.

The other process referred to is quite different from this, and is very ingenious. The master is dipped into a solution of gelatine and bichromate of potash, which when dried and exposed for a time to the light remains as a thin, tough skin adhering closely to the record. This is coated with shellac, and afterward with a substantial backing of wax, which is turned true and pushed into a brass tube. When the master record is broken out, there remains on the interior of the composite cylinder thus produced a very faithful gelatine mold of the record. A one per cent solution of celluloid is flowed over the interior of this mold and permitted to dry, leaving a very thin skin of celluloid which is then coated with chromatized gelatine. Several alternate layers of celluloid and gelatine may be laid on in this mold until a skin of sufficient thickness is obtained, which is then strengthened by a suitable backing having in its center a hole properly tapered to fit the mandrel of the duplicating machine. The brass tube and the wax part of the mold are then removed and the gelatine matrix stripped from the celluloid, leaving a very perfect copy of the original record with a surface of celluloid.

This record is used as a master in the duplicating machine, and it shows no signs of wear even after many hundreds of wax duplicates have been made from it.

NEW PRODUCTS IN THE GLASS INDUSTRY.

M. Léon Appert has lately read an interesting paper before the Société des Ingénieurs Civils, relating to the progress of the glass industry as shown at the Paris Exposition. After describing the different processes of manufacture, he mentions several new products which have been lately brought out. One of these is called glass stone by its inventor, M. Garchey. It has been found that when certain kinds of glass are cooled, then slowly reheated, that a kind of precipitation takes place in the mass. The inventor uses a glass rich in lime, such as bottle-glass, for this purpose. The glass, cooled to a point somewhat below fusion, is submitted to a temperature of 1,200 deg. C., and the plastic mass then undergoes a strong pressure by means of powerful hydraulic presses. The piece after it comes out of the press is annealed in the usual way. This product possesses remarkable qualities of hardness, inalterability and resistance to wear. It is more elastic than ordinary glass, and is thus much less fragile. Its properties render it well adapted for paving blocks or tiling, and it may be used to advantage on the outside of buildings. The author mentions also the "strengthened glass" which has come into use, this being a flat glass plate containing a metallic network in the center which renders it far superior to ordinary glass as regards solidity and resistance. In case of fire it will stand the highest temperature without bending. This glass may be obtained in two different ways. The French process, due to M. Appert, differs from the American, in which the rigid metal network is forced into the glass sheet; in the French process, two separate sheets of glass are rolled, and the network is introduced between them, the whole being pressed together in the rolls. Another glass which may be considered as new, although known for some years past, is that known as "opaline." This glass, of a milk-white or greenish hue, has come into use of late for tile-work, and it may in a great many cases replace ordinary tiles at a less cost. The underground stations of the Paris Metropolitan are entirely lined with these "opaline" tiles, which produce an agreeable effect. The St. Gobain glass works had an important exhibit of opaline glass at the Exposition. The author mentions also the perforated glass, which facilitates the ventilation of dwellings, and thus renders great service from a hygienic point of view. Plates of glass for buildings, roofs, etc., are now being made of very large size, up to 15 and 18 feet in length, and glass tubes are made as large as 20 inches in diameter.

NEW CHEMICAL COMPOUNDS.

Two new compounds have been recently formed in M. Moissan's laboratory by M. Tarible, who combines the bromide of boron with the two chlorides of phosphorus and obtains two well-defined crystalline bodies. The experiments are described in a paper read before