High Waves on Lakes.

The recent storm wave on Lake Erie has called out the following account of earlier waves of like character, first printed in the Cleveland *Leader:*

"On Lake Superior, in 1789, opposite Isle Royal, there was a sudden fall of four feet in the waters. When they returned they did so with a rush, the vibration continuing for several hours. In 1834 the waters above the Sault Rapids suddenly receded, and in half an hour returned with great velocity. In August, 1845, Dr. Foster states that while in an open boat between Copper Harbor and Eagle River, an enormous surge twenty feet in height and crested with foam rolled toward the shore, succeeded by two or three swells. Dr. Foster observed repeated flows and reflux of the waters in 1847, 1848, and 1849, which preceded or followed storms on the lake. In 1851 D. D. Brockway reported, in a perfect calm, a sudden rise of one foot and three inches, and in another two and one-half feet. The *Lake Superior News*, of July 17, 1855, reports extreme fluctuations between the hours of nine in the morning and four in the evening. Father Andre, in 1670, while on Green Bay, reported a three foot rise, but this was accompanied by a northwester. On April 14, 1858, the Milwaukee *Sentinel* reported a change of level in Lake Michigan of six feet. May 10, 1823, according to DeWitt. Clinton, at Otter Creek, on the Canada shore, a wave came in nine feet high, and the same occurrence took place at Kettle Creek, twenty miles distant. Another in 1830 reports three waves at Madison Dock, Lake Co., O., the first rising fifteen or twenty feet. In 1844 or 1845 a wave came into Euclid Creek fifteen feet in height, carrying everything before it. On November 15, 1845, the water at Cleveland suddenly fell two and eight-tenths feet during a high wind from the southwest. The Toledo *Blade* records a change of ten feet on December 5, 1856. On June 15, 1872, at Charlotte, which is at the mouth of the Genesee River, the water rose twenty-two inches. In May, 1855, the waters of Seneca Lake exhibited a like phenomenon of continued rise and fall of sixteen and a half inches to two feet through two days. Similar agitations of the waters have been observed in Lake Geneva, in Switzerland."

Electric Storage.

At a recent meeting of the London Physical Society, Mr. Bosanquet described his application of the Faure accumulator charged by a dynamo-electric generator to the working of laboratory apparatus instead of the usual Grove or other battery. The net result of his experiments is that the accumulators charged for two hours have sufficient energy to keep the apparatus employed running for a week, and hence it is unnecessary for him as heretofore to put up thirty Grove cells each day.

Prof. Perry observed that a well made Faure cell, having the minium laid on in a uniform coat, does not lose its charge nor develop local action as is done by those accumulators in which the minium is put into holes in the plates.

Prof. Clifton described some ingenious devices adopted by him in lecture experiments on electrostatics. These consisted of insulating glass stems with glass cups, to hold sulphuric acid formed on the stems; also a form of key which, by rapidly succeeding contacts, brings the spot of light on the electrometer scale to rest without tedious swinging. He also described a form of lecture galvanometer, sine, or tangent, which could be readily shown in all its working to a large class, and exhibited a simple and inexpensive apparatus for measuring the focal length of a lens in six different ways, according to what is known about the lens. The results showed that the apparatus was very accurate in its indications.

Important Patent Decision.

In the case of the Detroit Lubricator Company against the American Lubricator Company, February last, in the U. S. Circuit Court, Eastern District of Michigan, before the Hon. Judge Brown, a verdict was rendered in favor of the American Lubricator Company, confirming and re-establishing their rights.

Judge B. F. James.

Judge James was, early in 1861, appointed by President Lincoln an examiner in the United States Patent Office, faithfully serving as such for more than eight years, when he became a member of the Board of Appeals, retiring from this position to take up the practice of patent law. For years past he had been suffering from a fatal attack of heart disease, to which he succumbed, June 26, at Washington, D. C.

Ingenuity Misapplied.

For two years the officers of the National State Bank, of Elizabeth, New Jersey, have been puzzled by the disappearance of cash from the drawer of the paying teller during business hours. A change of tellers did not stop the thefts. The detectives could make nothing of the mystery further than to establish an overwhelming probability that the robbery was effected by some one in the employ of the bank.

Recently, while attending to a customer of the bank, the teller thought he heard a mouse in the cash drawer. Opening the drawer quickly a thin line snapped, and he saw lying on a pile of $20 bills a small flat piece of lead, about an ounce in weight. On examination, it was found that one face of the lead was coated with gutta percha daubed with soft shoemaker's wax. The officers of the bank were summoned, with two detectives, and the cash was counted, discovering that thirteen $20 bills had been abstracted that morning. Further examination of the drawer discovered a thin fish line running through two screw rings, one in the under surface of the counter over the middle of the drawer, and another behind the rear of the drawer. There was a space between the top of the money drawer and the counter, concealed, of course, in front. In the floor there was an old gaspipe hole, left there after some alterations in the arrangement of the office furniture. This was in such a position relative to the cash drawer, that lines reeved through both the screw rings could be so worked as to drop in the lead upon the bills by one movement, and carry it out again by a reverse one, a bill being attached, of course, during the latter movement. It was plain that the work was done from underneath the office, and to this place nobody had access but the janitor, who was arrested and confessed his guilt. He had stolen in this way about $2,000. The device showed ingenuity, which, if turned to honest ends, might have made the thief a useful and successful inventor.

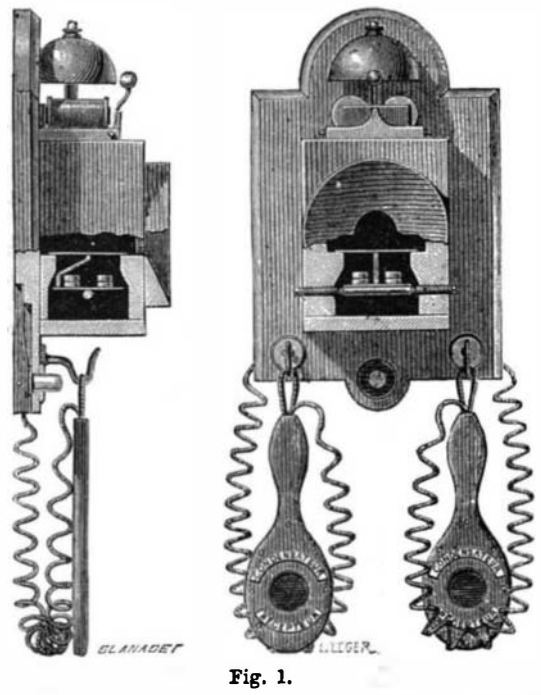

Fig. 1.

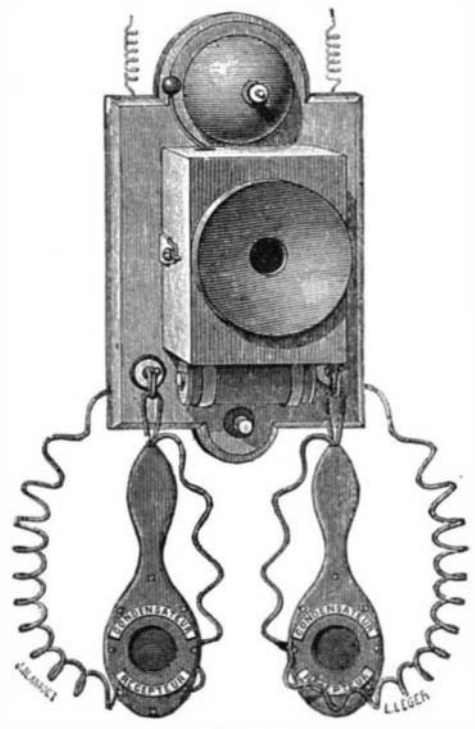

Fig. 2.

HERZ'S LONG DISTANCE TELEPHONE.

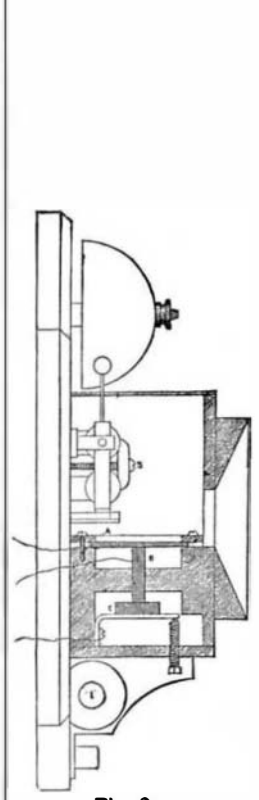

Fig. 3.

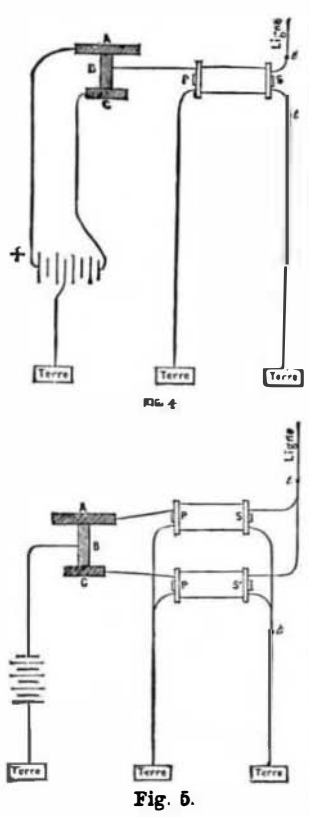

Fig. 5.

HERZ'S TELEPHONE SYSTEM.

THE TELEPHONIC SYSTEMS OF DR. HERZ.

M. du Moncel has thoroughly studied the different telephonic systems of Dr. Cornelius Herz, and the object of the present article is to describe some new experiments, and especially the efforts which have been made to simplify the apparatus and give it a practical and convenient form.

The apparatus represented in Fig. 1 is specially designed for lines most affected by induction, which renders communication impossible with ordinary telephones.

This plan utilizes two principles discovered by Dr. Herz: the alternation of the current in the line, and employing condensers as receivers. The instrument constitutes a station, completely inclosing, under a compact and appropriate form, all the parts necessary for the call and for communication.

The diaphragm is horizontal, but a funnel placed in front of the box collects the sound and concentrates it upon the diaphragm, and the instrument will transmit words spoken fifty centimeters from it.

Four pairs of microphonic contacts are placed upon an oscillating platform, under the diaphragm and connected with it by a rigid rod, communicating to it all the vibrations of the diaphragm. These contacts are of a special composition, and communicate with the battery and with the line.

In this apparatus it is not necessary to use the induction coil, but it is necessary that the number of elements of the battery in the line be proportioned to the distance of the two stations; for example, between Paris and Orleans it was necessary to use thirty elements of Daniell at each station, in order to obtain the maximum intensity. Besides, the condensers have to be charged, in order to reproduce speech, so that it is necessary to employ another battery which is interposed in the line. It would seem at first sight that the number of elements employed would perhaps be an obstacle to the use of this apparatus, but it must not be forgotten, on the one hand, that the battery designed to charge the condenser, working always in an open circuit, costs very little, and on the other hand, the instrument is designed to work over lines where the employment of magneto receivers would be impossible.

Figures 2 and 3 represent an apparatus where the alternation of the current is accomplished in a different manner, and in which the induction coil is used in order to diminish the number of elements necessary in a long line.

Originally this instrument was formed of a vibrating plate, having at each side a contact point touching the diaphragm lightly, and the vibrations increased or diminished the pressure alternately upon each one of these contacts, but this form being inconvenient, M. Herz preferred that which is represented in Figs. 2 and 3, which gives the same results.

The vibrating plate, A, is of conducting material. Below, and touching it lightly, is a cylinder, B, which rests upon a disk, C, the two being made of the same material as the plate. The disk, C, rests, in its turn, upon a thin metal spring, which is made adjustable by means of a screw, so as to vary the contact between the three pieces, A, B, C.

The plate, A, and the disk, C, are connected with one of the poles of a battery of four elements, which is grounded at the center. Finally, the cylinder, B, is connected with one of the extremities of the primary wire of the induction coil, the other end being grounded. The secondary wire of the coil passes out from one side to the line, and from the other side to the ground.

It may be seen by referring to Fig. 4 what occurs when the instrument is spoken to. The vibrations determine alternately the increase and diminution of pressure upon the cylinder, B. During the first vibration the power of conducting electricity increases suddenly at A (Fig. 4), while the inertia of the cylinder, B, prevents increase at C, the current follows the route, A, B, P, to the ground. On the contrary, in the second vibration the power of conducting electricity diminishes at A, but increases at B, and the current follows the route, C, B, P, to the ground. It may be seen that during these two phases there are alternating currents passing through the primary circuit of the induction coil, and that in the secondary circuit there will be produced four impulses, two in one direction and two in the opposite direction, passing over the line. By this arrangement the telephones are placed in a derived circuit between the line and the ground. This instrument has always given very good results upon a long line, of which the static charges are often considerable.

Another arrangement has been given to the same instrument which does not work with alternating currents, but as an ordinary microphone having great power. This arrangement is represented in Fig. 5. The current enters through the cylinder, B, and issues through the contacts, A and C, and is delivered to the primary circuit of the two induction coils, then to the ground.

The secondaries are independent, as the sketch indicates, or arranged upon the same circuit; in either case they are

connected with the line on one side and with the ground on the other. The engraving of this apparatus will show how the distribution of the current is made, and in order that the instruments may give good results it is indispensable that there should exist a certain relation in the resistance of the coils, between themselves, and the coils with the line.

Another principle has been utilized by M. Herz, to augment the power of his telephones: it is that of derivation from the ground. Fig. 6 represents an apparatus which is based upon the principle of derivation. Under the vibrating plate are four pairs of contacts arranged as in Fig. 1, but with different electrical connections. The four lower contacts are connected together, and the four upper ones also, in such a way that all the pairs work together without producing an alternating current. Fig. 8 shows how the instruments are arranged in two corresponding stations.

When the two receivers t, t', are hung up, each one of the stations may call the other by pushing on the button, C. When the station called has responded, the telephones are taken down; this changes the switches, and conversation may be carried on by the two instruments. Suppose, at first, that the station at the right speaks, the current from the battery, P, passing by the contact, t', re-established by the raising of the telephone, is divided, the one part passing to the line, and the other to the microphone, M, then to the ground. The variations of conductivity produced by the microphone in the derived circuit, M, T, will be varied in the same manner as the current of the line of which the resistance is constant.

At the receiver of the other station, the current from the line passes in at C, then into the telephone, and finally to the ground, the lever, t', having established the lower contact.

The apparatus described is placed horizontally, and may be spoken to directly over the diaphragm, but it may also have a vertical form as shown in Fig. 7; this arrangement, however, is only on the outside, and does not change the interior arrangement of the horizontal plate and the contacts.

The instruments which are the subject of this article put in practice three principles adapted to facilitate communication in various circumstances. These principles are the employment of condensers as receivers, the alternation of the current in the line, and the system of derived circuits. This does not form, altogether, a new method of telephonic communication, but either of them may be employed in cases where their application is specially indicated, and they constitute an important modification of the telephone.—*A. Noaillon, in La Lumière Electrique.*

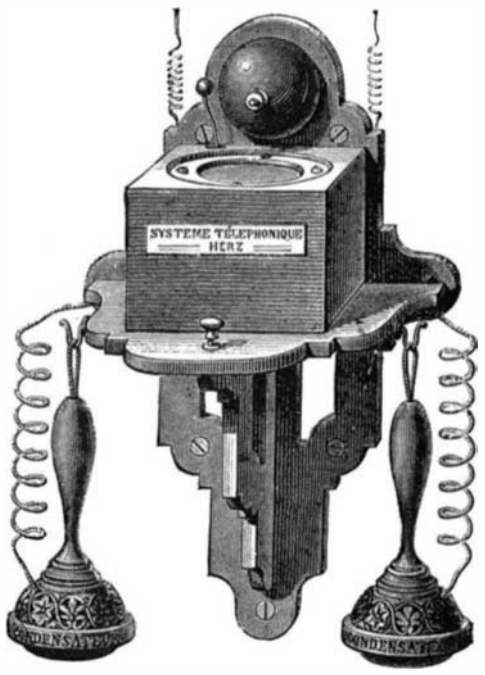

Fig. 6.

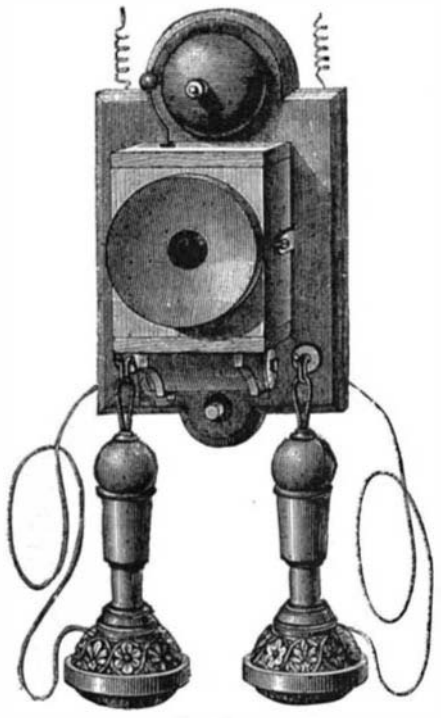

Fig. 7.

HERZ LONG DISTANCE TELEPHONE.

Researches on Lung Disease.

Fresh proof has lately been obtained by M. Giboux, of the danger in air expired by consumptives. He experimented with four young rabbits of the same litter, and born of healthy parents. Two of them were kept 105 days in a large wooden case, with side gratings, into which was introduced daily a quantity (about 20,000 cubic centimeters) of air expired by animals in a consumptive state. This operation was performed at midday and in the evening, and each time the gratings were kept closed for two hours. In another quite similar case, the two other rabbits were similarly treated, except that the impure air was made to traverse in its way to the case some wadding impregnated with carbolic acid. The rabbits in the first case, before long, showed loss of appetite, intense thirst, listlessness, diarrhea, and loss of flesh. On being killed, both were found to have tubercles in the lungs, the liver, and the kidneys, those in the lungs being the most advanced, and the upper lobes being chiefly affected. The other couple of rabbits presented nothing abnormal while alive, and no organic alteration was observed in their organs after death. They were eaten without repugnance by the author and his family. Again, observations have been recently made by MM. Grébaut and Quinquand, both on man and the lower animals, regarding the influence of injuries of the lungs (or of the bronchiæ or the pleural envelope) on the exhalation of carbonic acid. They prove that the amount of this gas exhaled is less where such disorder exists, even where there is fever. Two explanations are conceivable: the pulmonary change might bar the elimination of carbonic acid, which, in that case, would accumulate in the blood, or the injury might have the effect of diminishing the production of carbonic acid by affecting the general nutrition. Experiment favored the latter hypothesis.

THE *London Lancet* says that muscarine, the active poison of mushrooms, is directly antagonized by atropia.

A New and Cheap Method for Enameling Water Pipes.

Two inventors in Bohemia have patented a direct process for enameling cast iron pipes, which can be applied to other hollow castings that are made with cores. It consists in simply covering the sand core with the enamel and then pouring in the iron as usual. The heat of the melted iron fuses the enamel, and it attaches itself firmly to the iron, and detaches itself so completely from the sand that the enamel is said to be all that can be desired for water-pipes and other industrial purposes. In casting sinks, basins, urinals, etc., the enamel can be applied to the sand on that side of the mould which is to form the inside of the basin.

The composition of the new enamel is kept a secret, but is said to differ from the old form in the simplicity of its preparation and the extraordinary cheapness of the materials used. It is so cheap that it has found very extensive use in many branches of industry.

In color this new enamel is gray. It will be useful for gas pipes as well as water pipes, because it will make the pipes absolutely tight by this glassy lining. It will be no less useful for soil pipes, which are always liable to corrosion from the gas they contain, but for conveying acid liquors, like mine-water, and in chemical works, for sinks and waste-pipes in chemical laboratories, it should displace lead, glass, or terra-cotta.

The Fluid Density of Metals.

A paper on this subject was lately read before the London Physical Society, by Mr. T. Wrightson and Professor W. Chandler Roberts, F.R.S. The results were obtained by the process described in a former paper to the society on the fluid density of bismuth. The mean results were: For copper, 8·217; lead, 10·37; tin, 7·025; zinc, 6·48; silver, 9·51; iron (No. 4 Foundry Cleveland), 6·88. These results are slightly less than those given by Mallet's process, but they are sufficiently close. For bismuth the fluid density found by the authors is 10·055, which is slightly more than that given by Mallet's method (9·82). The authors consider their method satisfactory. It consists in suspending a ball of the solid metal from a spiral spring, and allowing it to dip into a crucible of the same metal in a molten state. The movements of the spring as the ball melts are recorded by a pencil on a band of traveling paper.

THE fastest regular time known to be made by the passenger trains from Jersey City to Philadelphia, 90 miles, was 1 hour 50 minutes.

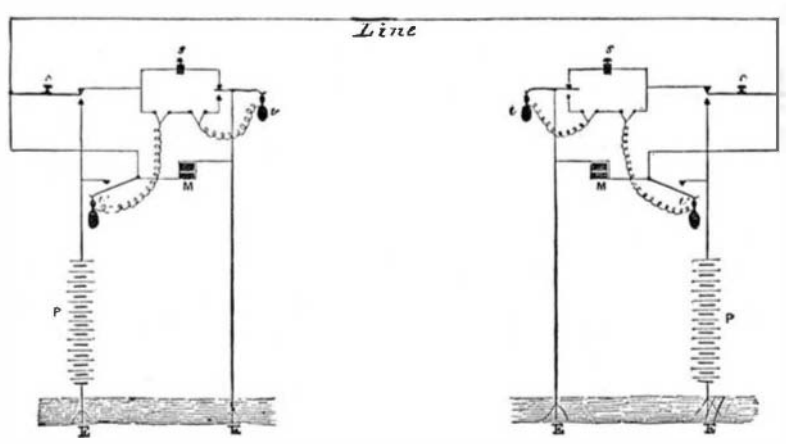

Fig. 8.

HERZ TELEPHONE SYSTEM.

Northern Chili.

The country which looks so narrow upon the map has nevertheless a breadth of 150 to 170 geographical miles, and rises with alternating hill and valley to the Cordilleras. This situation, between the Cordilleras upon one side and the quiet Pacific on the other, produces a climate which is very moderate for that latitude. The greatest heat in summer is 78° to 80° Fahr.; in winter nights it freezes, but as soon as the sun rises the cold is reduced to a very pleasant temperature. Certain kinds of palms grow very well in this climate. A remarkable uniformity prevails in the atmosphere, gentle land breezes by night, and sea breezes by day, are repeated day after day with a shining sun and clear only slightly clouded sky. A few times in winter the sky is thinly clouded over, and a strong, cold, moist north wind prevails, which brings with it a few hours of rain, but it does not penetrate more than an inch into the earth. Perhaps once in twenty years a spell of rainy weather sets in, which produces snow in the higher regions, while in the valleys there are heavy rain torrents, producing frequent brooks and rivers, with deeply excavated beds, which are left dry again in a few days, and usually remain thus dry for the next twenty years. After such a rain the hills and valleys become covered with flowers and plants, which continue to grow for several years with no other nourishment but the strong night and morning mists peculiar to the deeper regions. Otherwise the land from far south of Copiapo northward to Peru is a perfect desert. Even moss is rarely found on the mountains. The mountain chains, with their gaudy colors, stand forth totally barren of vegetation. Granitic and syenitic mountains, with frequent sand-filled cliffs, valleys covered with bowlders, clay, and sand, are seen. The valley of Copiapo, irrigated by a river of the same name, which receives its waters from the snowy regions of the Cordilleras, makes a very pleasant impression. By artificial means the water is spread over a broad stretch of country which then yields a rich harvest of fruits, vegetables and barley; wheat, rye, and oats are not cultivated here. The soil is so fertile that any addition of fertilizers is totally unknown, and yet barley produces a yield which would be thought impossible in Europe. Outside of this valley, and a very few similar ones, there is, of course, no agriculture in this desert. But on the other hand this region is very rich in mines, which frequently occasion the building of a small mining town, but just as frequently they exist without any animal or plant life. The population consists of a mixture of the long since extinct original Indian stock with the later immigrating Spaniards.

The Cordilleras, as is well known, extend north and south, and parallel to these and to the coast are the different geological formations which occur here. A vertical section from the coast to the peak of the Cordilleras would cut through all the strata, whereby a glance at the formation of the mountain would be possible. Next to the coast are the oldest stratified rocks, consisting of clay and quartz shale, without any fossils, and in which as yet there are no mines, but not destitute of metalliferous veins. The Chilians call this the gold formation! On the coast this is broken through by light colored granites; on the east it is bounded by a later diorite, which is 10, 16, or 20 miles from the coast, and parallel to it. This is the matrix in this part of Chili for the numerous kinds of copper ores, which makes Chili one of the largest copper-producing countries of the earth. The gangue is chiefly quartz. Deep down below the surface the ore is always copper pyrites, but above this, and near the surface, are all possible products of oxidation. Descending from above the ores appear in the following order: first, silicate, carbonates, and chlorides, then red oxide, next the black oxide (frequently in large masses), then kupferglanz (calcocite), and finally copper pyrites, with iron pyrites. Native copper is also found mixed with the ores, sometimes in pieces as large as the hand. These veins never contain galena, blende, arsenic, or silver, but, on the contrary, some gold. Beside the regular veins, pockets of wonderful richness are also found, as, for instance, the mine at Corrizabilo, north of the Chaneral. This lies on the boundaries of the porphyry, and produces monthly 15 to 20,000 cwt. of copper pyrites, containing 20 to 25 per cent of copper. The supply of metal is sufficient for a six years' run; a production of 216,000 cwt. in six years. The diorite is penetrated by numerous veins of greenstone, both older and younger than the veins of copper ores.

Eastly from the diorite we strike upon an eruptive formation, which consists at first of impure limestone, with ammonites; above is a stratum of porphyry conglomerate; between these appears a sandstone formation with argillaceous shale, in which is found the anthracite. Above the conglomerate again is a light marl and clay shale, with numerous ammo-

nites, belemnites, etc. This whole formation is penetrated with porphyry, with and without quartz, with and without mica, with and without hornblende, and is frequently broken through by hornblendic granite in mighty veins, which also very frequently form the highest peaks of the isolated mountains formed by erosion, while farther down they consist of shales that contain ammonites. Farther in the Cordilleras these secondary strata are also broken through by the diorite. In the above mentioned impure limestone, in a line from 30 to 60 miles from the coast, occur a greater part of the silver mines of Chili, including the celebrated Chanereillos mine, which has produced, since its discovery in 1834, over $100,000,000, but is now almost entirely exhausted. Some of these mines are 500 meters deep, and no ore has been found for the last 100 meters. The adjoining rock at this depth is totally different from that near the surface. In the porphyritic conglomerate, too, there are single mines of silver. The previously mentioned occurrence of anthracite has as yet been but little investigated. In the upper marl and shale strata are poor veins of lead ore, which are only seldom worked. In the porphyry, too, there are silver veins, for example, the mine Buena Esperanza, at Tres Puntos, which has yielded $16,000,000 since it was discovered in 1848. The most common ores of silver are horn silver, native silver, and ruby silver ore. Both in the stratified secondary formation, as well as in the irruptive porphyry, copper veins are met with, which differ from those in the diorite in this, that the gangue rock consists of calcspar instead of quartz, and that they contain in addition to the chief ore of pyrites, also fahlerz and argentiferous galena. Copper veins also occur in the diorite which penetrates the secondary strata further into the Cordilleras, but these are analogous to those that are found in the diorite on the coast.

These eruptive and shale formations form the principal mass of the western slope of the Cordilleras up to a height of 16,000 feet, but at a greater height they are unknown.

The ore veins may be classified as follows:

1. Quartz veins in diorite, with copper pyrites (and copper oxides), sometimes auriferous, but never argentiferous.

2. Calcspar veins in porphyry and stratified secondary rocks with argentiferous copper ores.

3. Limestone and barytes veins, likewise in porphyry and stratified secondary formation, with free-milling silver ores, some of them also auriferous.

4. Galena, with a little silver in the upper secondary marl and clay shale, not much worked.

5. Quartz veins in granite, with gold and some copper, but no silver. Its occurrence is not more nearly known; probably they will also appear in the later granite, which breaks through the oldest shale and has given to this formation the name of "gold formation."

Up to a height of 11,000 feet are found large alluvial and diluvial formations, consisting of stone, sand, and marl strata of considerable thickness, with single subordinate strata of trachytic tufa, and frequently covered over with trachytic porphyry with sardine crystals and pitchstone porphyry.

At a height of 8, 10, or 12,000 feet above the sea is found a series of half dried up salt lakes, without outlet, and from 40 to 50 or more miles in length. These lakes have abundant feeders, but the air is so dry and the evaporation so great at this height that an equilibrium is always maintained between the influx and evaporation. In the neighborhood of one of these lakes, very recently, a company found an immense mass of a borate of lime and soda, in layers alternately with common salt (soda chloride); still more recently a similar strata has been found at another salt lake, which lies near the projected railway over the Cordilleras, and it is very probable that still more will be found.

The eruptive nature of the trachyte surrounding these lakes, and the formation of borax now seen at the hot springs of Tuscany, permit us to conjecture that a similar formation is to be expected here. The present relations of the strata are explained by the evaporation of a former much larger salt lake, to which is ascribed the presence of some large salt deposits in the secondary formation, while others suppose that they are the remains of the large sea which in a comparatively recent time covered the Cordilleras to a height of 11,000 feet.

The trachyte which covers the alluvial strata is purely crystalline, and was formed after the eruption. Mr. Sandt, who observed these upon the spot, explains their occurrence as follows: Up to the time of the tertiary the Cordilleras stood under water to a depth of 11,000 feet, and then arose simultaneously with the eruption of the trachyte.

The alluvial formations are not a local formation, nor as such peculiar to the salt lakes mentioned, but they have here an extraordinary extension and contribute essentially to impart to the Atacama deserts the character of a mountain slope, from which the peaks emerge like islands. The borax mineral consists of borate of lime, borate of soda and water, is amorphous, snow white, has the luster of silver, and contains 30, 40, or 50 per cent of boracic acid, as it seems to consist of several varieties, with varying quantities of water and lime.

That an actual, real, epidemic fever should prevail in a country so rich in ores and mineral treasure, might be expected. Under the influence of this fever the search for ores and attempts at opening mines have been made, and our knowledge is derived rather from reports than from careful mineralogical and geological study. Although many of these stories are false, yet there is truth enough to cause large caravans to be fitted out, which endure cold, hunger, and other dangers to find these treasures. But many of the most celebrated mines in North Chili owe their present existence to the fever and its consequences, else they had long since been exhausted. So too the above-mentioned borax deposits, which are wonderfully rich. Yet in spite of all difficulties of a long transport to the sea coast, borax can be obtained thence more cheaply than from any other place. It has been suggested that this may produce a revolution in some of our metallurgical processes, when, in a few years, perhaps better means of transportation shall be introduced there. Over $100,000 has already been expended in making new roads and in preparing the impure mineral for shipment, such as expelling the water of crystallization, although the specific gravity of the mineral is so small that the cost of transportation is not very great.

Two Live Brant.

Mr. Frederick Mather, Assistant United States Fish Commissioner, has two live brant which he will try to have mate and breed at his trout farm on Long Island. They were wing-tipped last winter on the Virginia broad-water by a New York sportsman who was shooting there, and after a hard chase they were captured in shoal water and confined in a pen. Although, from time to time, brant have been domesticated both here and in Europe, they have never been known to follow the example of the other varieties of geese by breeding in confinement. As yet their nesting resorts have never been discovered by ornithologists or arctic explorers. Indeed, the surmises that there are open seas at the Pole has been principally based on the observations made of the habits of this mysterious fowl. As far north as the explorers have reached the brant have still been seen winging their way northward. Their food is known to consist mainly of marine grasses, which grow only on the shoals. This, perhaps, points more to open seas at the extreme north than any other evidence yet brought to light. On the day after the geese were secured they became very tame, and almost instantly recognized the person who fed them. They would run to the side of their inclosure and take sea grass and cabbage leaves from his hand. They arrived here recently from the South in fine condition, and when given their liberty they at once proceeded to eat a good breakfast of corn and make their toilets. Of all the five varieties of geese this fowl is the most beautiful. At this time brant are migrating northward, where they will meet the ice on the coast of Labrador. It is presumed that they descend from their aerial route and feed at the springs above Hudson Bay and in Greenland.

New York State Firemen's Convention and Exhibition.

A prominent feature of the coming Convention of the New York State Firemen's Association, in Rochester, will be an exhibition of fire engines and apparatus. The central committee have secured a capacious and centrally located exhibition building, having 100,000 square feet of area, the five floors being connected by elevators and well lighted and ventilated.

On the first floor are the offices of the Central Committee, Western Union Telegraph and Rapid Telegraph Messenger Service; also a display of steam fire engines, hand engines, and hook and ladder trucks The second floor will contain the hose carriages, fire escapes, extension ladders, chemical extinguishers, florists' display, and firemen's periodicals. The third floor will be devoted to hose, nozzles, valves, hose attachments, firemen's uniforms, badges, rubber coats and hats, and every description of small merchandise used by firemen. The fourth floor will be used as a convention hall, with special accommodations for delegates and reporters. On the fifth floor will be found the reception parlors and banquet hall for the special use of visiting delegates.

The building will be open for the reception of articles August 12, and all exhibits must be in position and ready for exhibition on the opening day. Machinery and manufactured articles must be entered in the name of the manufacturer. Entries will be permitted by manufacturers' agents and through their accredited representatives. All articles on exhibition must remain until the convention closes.

No charge will be made to exhibitors for entries or space for exhibits. The expense of the exposition building will be wholly assumed by the Central Committee. The committee will take charge of all articles upon which the freight has been prepaid, and remove them to the exhibition building at the expense of the exhibitor.

The Secretary of the Central Committee is H. W. Mathews, Rochester.

Another Application of Electricity.

The call for an electrical sheep-shearer, made by a New Zealand correspondent in these columns some months ago, has apparently brought forth fruit in an unexpected quarter.

The head of the Hudson Bay Fur Company of England is Sir Curtis Lampson, by birth a Vermonter. It is now announced that he has applied electricity to the trimming of seal skins. The skin is "fed" over a knife-edge bar, above which is stretched a fine platinum wire, which, raised to a white heat by an electric current, meets the longer hairs which rise above the under fur, and mows them down.

A PETROLEUM pipe line, constructed from the Couban oil territory over the Caucasus Mountains to Novoroszisk Harbor on the Black Sea coast, was opened on May 27. This line of pipe, which is 105 miles long, can deliver every day not less than 1,000,000 pounds of petroleum.

A Perpetual Motion Clock.

In September last, a new perpetual clock was put up at the Gare du Nord, Brussels, in such a position as to be fully exposed to the influence of wind and weather; and although it has not since been touched, it has continued to keep good time ever since. The weight is kept constantly wound up by a fan, placed in a chimney. As soon as it approaches the extreme height of its course, it actuates a brake, which stops the fan; and the greater the tendency of the fan to revolve, so much the more strongly does the brake act to prevent it. A simple pawl arrangement prevents a down draught from exerting any effect. There is no necessity for a fire, as the natural draught of a chimney or pipe is sufficient; and if the clock is placed out of doors, all that is required is to place above it a pipe, 16 or 20 feet high. The clock is usually made to work for twenty-four hours after being wound up, so as to provide for any temporary stoppage; but by the addition of a wheel or two, it may be made to go for eight days after cessation of winding. The inventor, M. Auguste Dardenne, a native of Belgium, showed his original model at the Paris Exhibition of 1878; but has since considerably improved upon it.

Carbons for the Electric Light.

At a meeting of the Paris Academy of Science, M. Jacquelain pointed out that carbon for the electric light should be purer than that obtained by calcining wood; and, if not free from hydrogen, should, at any rate, contain no mineral impurities. There are three methods for accomplishing this result: (1) By the action of a jet of dry chlorine gas directed on the carbon, raised to a light red heat; (2) by the action of potash and caustic soda in fusion; and (3) by the action of hydrofluoric acid on the finished carbons. M. Jacquelain has prepared carbons by all three methods, and has summed up in a table the photometric results of his experiments. He comes to the conclusion that the luminous power and the regularity of the voltaic arc increase in direct ratio to the density, hardness, and purity of the carbons. He remarked, incidentally, that the natural graphitoïd of Siberia possesses the singular and unexpected property of acquiring by purification a luminous capacity double that which it has in the natural state, and which exceeds by one-sixth that of pure artificial carbons.

Fall of Meteors.

The master of a ship which arrived at Dundee in June, reported that when his vessel was in latitude 51° S. and longitude 80° W., an immense meteor of amazing brilliancy fell into the sea within a few cables' length of the ship. As it plunged into the water it made a roaring, hissing noise, just as a great mass of red-hot iron would when extinguished. The second officer, Mr. John Veitch, took particular notice of this remarkable appearance, and of the noontide effulgence which the fiery body cast upon a broad space of the sky, and supplemented the entry of the occurrence in the log-book by saying, "that possibly some ships that had gone amissing may have been struck and sent to the bottom by such meteors."

Since then a similar case has been reported nearer home. On the last night of June a great and brilliant meteor was seen to fall into Muskegon Lake, the harbor of Muskegon, Michigan, near the shore of the lake of the same name. The aerolite struck three or four hundred feet out from the shore, causing a great commotion in the water. The shock was heard throughout the city, arousing those who had not been startled by the glare.

A Rope from Sheep's Entrails.

A strong and durable article of belting is made at Oakland, California, out of the entrails of sheep.

The entrails, which will average about 55 feet in length, are first thoroughly cleaned and then placed in vats of brine, where they remain some days. When thus prepared they are not much thicker than a piece of common cotton twine, and will sustain a weight of about ten pounds. The next stage in process of manufacture is to wind the prepared material on bobbins, after which the process is the same as in making common rope. This method is used to produce a round belt; but where a wide flat belt is to be made a loom is employed, and the fine strands are woven together, as in ribbon manufacture. The flat belts are made of any size, and the round of sizes varies from one-sixteenth up to one and a half inch in diameter. The round belts are made either in the form of a smooth cord, or as ropes with from three to five large strands. The three-quarter inch rope is said to stand a strain of seven tons, and is guaranteed to last ten years.

Embalming in Italy.

The *Lancet* describes the chief processes employed by the principal Italian embalmers; the special processes are kept secret. First, cold water is injected through the whole circulatory system, until it issues quite clear. This may take as long as five hours. Alcohol is then injected for the purpose of abstracting all the water from the body. This is followed up by the injection of ether, to dissolve out the fatty matter. After this a strong solution of tannin is slowly injected, and full time is allowed for its soaking into all the tissues; this takes from two to five hours. Lastly, the body is exposed for from two to five hours to a current of warm air, which is previously dried by passing it over heated chloride of calcium. The body can then be preserved for any length of time and is as hard as stone.