

ELECTRIC ILLUMINATION.

BY JOHN TROWBRIDGE.

In the subject of electric illumination America is far behind Europe at present, unless there may be some great invention about to issue, with the seal of the Patent Office, which shall give her the lead. This inferiority is not alone in the number and variety of the lamps before the public, but also in the forms of dynamo-electric machines. On the continent of Europe we find several forms of the Siemens-Halske machines; the Gramme machine and its different species, of which Schuckert's is a notable type; the new Gramme alternating machine, which is almost indispensable in the regular consumption of carbons used in electric lighting, and the Lontin machine. The horse power seems to be

less per light with the use of the foreign machines than with the American, if we can judge from the measurements made public; and less velocity is required to run the machines, which is a great desideratum. America has not given to the world a regulator which is as efficient as the Serrin lamp. The foreign carbons are better than those of American make, and the process of electroplating them with copper or other metals, in order to prevent their heating so far below the point of burning, has long been known in France. The Brush lamp and the Wallace lamp are the prominent lamps before the American public, and answer very well for purposes of general illumination. There are not more than a dozen establishments in America which are lighted by electricity, while there are hundreds on the continent. Lighting by incandescence

has not hitherto been successful either by the use of carbons in receivers exhausted with air or filled with nitrogen, or with platinum or iridium wire, or platinized asbestos. The carbons disintegrate or crack after a time, and the metals fuse. Both of the above methods—that by carbons and that by incandescent wire—have been tried in Europe and have been proved to be more expensive than the use of gas.

The great attention that is being paid to the so-called divisibility of the electric light is evidenced by the number of new lamps that appear from time to time. Messrs. Siemens and Halske, the owners of the Siemens dynamo-electric machine, have patented eight forms of lamps; among the most noteworthy are the following:

Fig. 1 represents a form in which the carbons, C C, are separated by the rod, R, which is moved by means of the lower arm, A, which is set in action by the electro-magnet, E. When the current passes through the electro-magnet, E, and the carbons, C C, the rod, R, which is made of a refractory substance, thrusts the carbons apart. If the current should decrease in strength, the carbons fall together again, and the current is not broken by any similar lamp on the circuit failing to perform its function.

In Fig. 2 one carbon is set in oscillation or vibration by means of the lever arm, which is terminated by an iron cylinder which forms the movable core of the electro-magnet, E. This carbon has to vibrate merely 32 times a second to cause the appearance of a steady light at the point, P. This lamp also admits of many lights in the same circuit.

Fig. 3 represents another form of the same idea. The upper carbon falls gradually upon the lower one, which is set into vibration by means of the lever arm, A, which is set in action by the electro-magnet, E. The lower carbon moves so quickly that the upper carbon, which is forced down merely by its own weight, cannot sympathize with it, and a small voltaic arc is therefore produced at P. The fluctuations of this arc are so rapid that they are said to produce no apparent alternation in the light. This lamp has also been invented in this country by Professor Thurston, of Philadelphia.

With the lamps above described a continuous circuit can be maintained even if one lamp should, from any cause, be extinguished, which is not the case when the Jablochkoff candle is used; for the poorly conducting medium employed in the latter prevents the re-establishment of the current when the light is extinguished. It does not appear, however, that these vibratory lamps have been put to practical tests.

A Substitute for Pens and Ink.

A German named Schwannhäuser has invented a sort of pencil which he calls a "Universal Tintenstift," which possesses all the advantages of both ink and pencils, but is quite unlike the aniline marking pencils once introduced into New York. It is deep black without containing any graphite, can be copied by a press just as copying ink can, yet does

not fade in sunlight as aniline inks do. The method of preparing the mass is as follows:

Ten pounds of the best logwood is boiled repeatedly with 100 pounds of water, and the decoction evaporated down to 100 pounds. This liquid is heated to boiling in a porcelain dish, and nitrate of chromium added in small quantities until the bronze precipitate that forms at first dissolves again with a deep blue-black color. It is then evaporated on a water bath to the consistency of an extract, and finely elutriated fat clay mixed in, so that there is 1 part of clay to 3 or 3½ parts of extract. A little gum tragacanth may be added according to the hardness desired.

It is very necessary to observe the right proportion of chromium salt to logwood extract, for an excess makes it write badly, while too little changes the solubility of the black compound. No other salt of chromium is suited to the preparation of this mass, as they are all crystalline, and on drying the crystals make it brittle.

The nitrate of chromium is prepared as follows: Dissolve 20 pounds chrome alum in 20 pounds of boiling water, and add slowly to this solution enough carbonate of soda, also in solution, to precipitate all the chromium as hydrated sesquioxide. After this bluish-green precipitate has settled the liquid is poured off and the precipitate washed until it is free from sulphates of soda and potash, as found by testing the wash water with acidified chloride of barium solution. The precipitate is brought upon a filter, and pure hot nitric acid, diluted with an equal part of water, put on slowly, so that upon boiling a long time a small excess of the oxide still remains undissolved. In this way a perfectly saturated solution of nitrate of chromium is obtained free from excess of acid, which would be very injurious to the logwood extract, producing a dirty red color.

Another advantage of using the nitrate is that no basic salts are formed when excess of acid is present, as in the case of most other chromium salts. These basic salts would precipitate a greater part of the coloring matter from the logwood extract.

It is claimed that it dries quickly, so that blotting paper or sand are unnecessary.

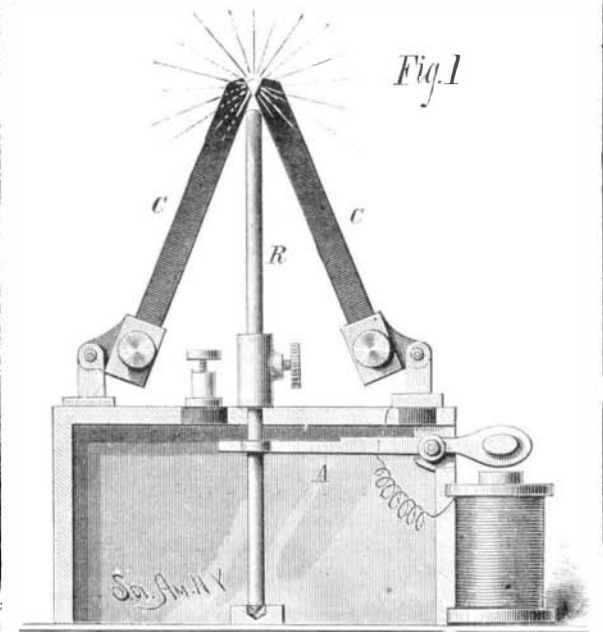
The written ink is indifferent toward caustic alkalis; dilute nitric acid colors it reddish without diminishing its intensity. It is not affected by oxalic acid, which destroys ordinary iron inks. The pieces cut off in sharpening the pencil can be thrown into water and used as ink with a common pen.

New Inventions.

An improvement in Water Gauges for Steam Boilers has been patented by Mr. Erastus B. Kunkle, of Fort Wayne, Ind. This invention consists in scrapers or cleaners formed upon the valve stem of the water cock, to free the cock from scale. The valve has a vacuum chamber at the outer end of the water cock, to prevent the escape of hot water around the valve stem.

Mr. John D. William, of Rising Sun, Ind., has patented a Burglar Alarm, which is an improvement upon that form of burglar and fire alarm in which a clock mechanism is set going and made to ring a bell from the movement of a tripping device, which is released when one of a number of cords running to the various parts of a house is burned by fire or disengaged by the entrance of a burglar.

Mr. Robert W. Tavenor, of West Bay City, Mich., has patented an improved Lubricator or Oil Cup, designed to be attached to the steam chest of a locomotive, and depending



for its automatic feed or operation upon the intermittent injection of steam into it. The cup is provided with valves for admitting steam and permitting the exit of the oil, and also for facilitating the discharge of sediment.

Mr. Wilson E. Facer, of Cleveland, Ohio, has devised an improved Electric Gas Lighting Apparatus, which, by the simple opening and closing of an electric current, turns on and lights the gas or shuts it off. It is designed principally for lighting street lamps, but is capable of application to other purposes.

A Curious Surgical Operation.

The success of the experimental researches of Odier, Paterson, and others, in regard to the transplanting of various organic tissues, lately led to a remarkable experiment in practical surgery. The case is reported at length in a recent number of the *Lancet*. A marine engineer had broken both bones of the left forearm, a little above the wrist. The arm was kept in splints for some weeks, but the bones refused to unite. Eight months elapsed before the man reached land, and then he entered the Glasgow infirmary for treatment. Three separate operations of setting the bones were performed, and all failed to secure a union. A year and a half after the accident the man returned to hospital to have an amputation performed, the hand and lower part of the arm being useless. Although amputation was unanimously recommended by the surgeons, Dr. Patterson was granted permission to try any plan he chose to save the limb, and accordingly planned the following operation:

"The patient was, on the 14th of September placed under the influence of chloroform, while at the same time a retriever dog was being anesthetized. Cutting down upon the ends of the fractured bone, and removing the fibrous band which alone formed the bond of union, the rounded points were removed by the saw, and a hole drilled obliquely through each squared end. This process was repeated on both sides of the arm, when it was found that an interspace of about ¼ of an inch existed between the two fragments. In the meantime, one of the senior students, and a very clever manipulator, had exposed the humerus of the quadruped completely denuded of every tissue except the periosteum. The length of the bone was accurately measured (¾ of an inch), while from half an inch beyond the end of the necessary length the periosteal covering was rapidly but carefully dissected, the bone sawn through, a hole drilled in either end obliquely, as in the bone in the arm, where it was at once placed and fitted accurately. Wires having been passed through the holes, the bones were firmly tied together. The wound was stitched with silver wire, the bone sutures coming out at each end of the incision. The entire operation was conducted under the carbolic acid spray. The arm was put up in gauze, and held in two rectangular splints.

"After the operation there was a slight tendency to sickness, which was relieved by ice. On the 15th the wound was dressed, and one or two of the stitches removed, as there were signs of tension and a slight blush around the sutures. Tincture of opium (25 minims) was given to induce sleep. "By the 3d of November a union had taken place, and the wires were removed on the 28th of the same month. The fracture then had all the appearance of being firmly united, and the patient was dismissed, with orders to return weekly for dressing and examination. On leaving the hospital boracic lint was used as dressing. One small wound remained open for twelve months, when the dog's bone, reduced to about half its size, came away, after which the wound healed completely. Shortly after this the patient resumed his former occupation, at which he is still engaged. He remains in perfect health, and retains a very useful arm."

Dr. Patterson says that he had some hope that the strange bone might have found a new home in the man's arm; failing that, he was sure it would secure perfect alignment of and steadiness in the ulnar fragments. Should a similar case occur he would adopt the same process, still hoping that the two bones might become one.

Effects of Food upon the Bones.

Experiments made by Lehmann upon young animals showed that food containing an insufficient amount of phosphates not only affects the formation of the skeleton, but has an essential influence upon its separate parts. A young pig was fed 126 days upon potatoes alone, and it had, as a result of this insufficient food, *rachitis* (rickets, or softening of the bone). Other pigs, from the same litter, fed upon potatoes, leached-out meat, meal, and additional phosphates, for the same length of time, had a normal skeleton. Yet even in these animals there was a difference according to the kind of phosphate added. Two that were fed on phosphate of potash had porous bones, specifically lighter than the others, which were fed upon phosphate and carbonate of lime.

GOOD SAUSAGES.—The following is a time-honored recipe of excellence which, at this season of the year, may be found useful: For 30 lbs., of meat, chopped, add ½ lb. fine salt, 2½ ozs. of pepper, and 2 teacups of powdered sage, sifted.

