Correspondence.

Lightning in City and Country.

To the Editor of the Scientific American:

Can you or any of your readers inform me if thunder storms are less severe in our large cities than in the open country? By that I mean fewer earthstrokes, and of less volume.

I was led to this observation from reading in the SUPPLEMENT of February 4, 1888, of the protection afforded the summit of Ventoux, which has not been struck since the installation of the Melsens apparatus.

What that accomplishes on a small scale, it seems to me the miles of gas and water mains underground, railroad tracks on the surface, and telegraph and telephone wires overhead, to say nothing of the continuous tin roofs and lightning rods, should accomplish on a large one, in a city, but I have never seen a comparison.

There is a story going the rounds of the lay press that a building with a slate roof has never been struck by lightning. If it has happened, some one of your readers will surely know. T. H. S.

Germantown, Pa.

[While it is hard to obtain such comparative statistics, it is not impossible that some of our readers may possess them. The extensive grounding and many gas lamps and fixtures in a city should be an element of safety. —ED.]

Discovery of Comet Brooks of 1888.

To the Editor of the Scientific American:

I have the honor to announce my discovery of a new comet early last evening—August 7—in the northwestern heavens.

Its approximate position at discovery was right ascension 10 hours 5 minutes, declination north 44 degrees 30 minutes, which brings it quite near to the star Lambda Ursæ Majoris. The comet is moving in an easterly direction, at the rate of one degree daily. It has quite a large head and a broad, short tail, which, rather singularly, appears to be pointing toward the sun.

I thought at one time I should have a repetition of my experience with the comet of December 26, 1885 (which many of your readers will recall), in which, to complete my observations, I had to remove the telescope from its stand, carry it around the house, and rest it over the front fence. This last comet was quite near the horizon when discovered, and soon settled down behind the top of a pear tree, but, fortunately, the telescope revealed it among the interstices of the leaves and branches. In this way I was able to finish my observations, telegraphically announce my discovery, and it was cabled to Europe the same night. Otherwise that pear tree would certainly have had to come down—and it was loaded with fine fruit, too.

WILLIAM R. BROOKS.

Smith Observatory, Geneva, N. Y., August 8, 1888.

Carbolic Acid in Small Pox.

The experience of Dr. A. Montefuso in a recent epidemic of small pox in Naples indicates that carbolic acid is capable of yielding excellent results in the treatment of this disease. Its use as an ointment did not prove especially beneficial, but, according to the *Bulletin gen. de Therapeutique*, April 15, 1888, doses of from fifteen to thirty grains (daily ?) in about eight fluid ounces of water, for adults, led to a decided and usually permanent fall in temperature, with diminution in the frequency of the pulse and improvement in its force.

Montefuso came to the conclusion, from his experience, that carbolic acid is the only remedy which has a real influence upon the eruption in variola. He found it to limit the extent and the duration of the eruption, although he does not claim for it an abortive action. When used at the beginning of an attack, the pocks are often seen to become wrinkled and to dry up in a few days, without involvement of the subcutaneous connective tissue. When suppuration has already begun, the effect on the eruption is not so obvious, but the effect on the constitutional condition is manifest.

Montefuso did not observe any disturbance of the gastro-intestinal canal, or—except in one case—of the genito-urinary apparatus, from the doses he used and recommends. The only contra-indication to the administration of carbolic acid in small pox which he mentions is marked nervous manifestations.

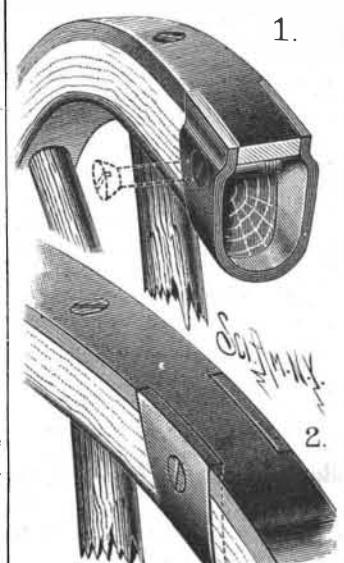
If the observations just cited have been carefully made, they certainly justify testing the value of this remedy further. It is not the first time it has been proposed, but Montefuso's experience is one of the most encouraging with which we are acquainted. It will not be forgotten that the treatment of small pox nowadays is largely symptomatic, and that the fatality of the disease under any treatment is much less than it was formerly, but any remedy which has a decided influence upon the fever and the development of the eruption would be a valuable addition to the physician's armamentarium.—*Med. and Surg. Reporter.*

An Electric Indicator for Lightning Rods.

A new instrument for recording when a lightning conductor has acted is now being brought out by Messrs. Hoyer & Glahn, of Schonebeck. Briefly described, this instrument consists of a galvanometer with a long magnetized needle pivoted on a horizontal axis, and kept horizontal by a small weight. Below the needle is a soft iron core surrounded by a solenoid, which is coupled as a shunt between two points of the lightning conductor; and if this core becomes excited, one or the other end of the magnet is attracted, and remains attached by virtue of its own permanent magnetism. The inventors thus hope that the instruments will indicate not only through which conductor a lightning discharge has passed, but also the direction of the discharge, whether up or down. Instruments would be fixed on the various lightning conductors, and by mere inspection of them after each thunder storm it would be easy to see which of the conductors are most likely to be chosen by the lightning, and should therefore receive the most attention to keep in good order. Four of these instruments have now been fixed in Munich, in order to test whether the theory advanced by the inventors is borne out by practical experience.

AN IMPROVED FELLY-CLIP.

A simple and inexpensive clip for holding the tires to the fellies of vehicle wheels is illustrated herewith, and has been patented by Messrs. James Higgins and John Sullivan, of Grand Rapids, Mich. The clip is preferably stamped or formed of steel about one-eighth of an inch thick, made narrower at the central part, where it clasps the inner rounded edge of the felly, and gradually widened toward both ends, which are let into notches or recesses formed in opposite edges of the wheel tire, so as to be about flush with the outer face of the tire. The clip plate may either be fitted to the outer faces of the felly, and be bent inward rather sharply at both ends to enter the opposite side edges of the tire, as shown in Fig. 1, or it may be let flush into the felly, as shown in Fig. 2, the extremities of the clip entering the edge notches of the tire, the dovetailed or overlapping fit of the flaring ends of the clip plates on the end parts of the recesses of the wheel tire locking the tire closely to the outer edges of the felly sections, and increasing the strength and durability of the wheel.



HIGGINS AND SULLIVAN'S FELLY-CLIP.

Transatlantic Electrical Litigation.

Two important cases have recently been decided in the English law courts, which may perhaps come to have an important influence upon the future of electrical lighting in that country, and which may possibly be not without some ultimate effect upon similar interests upon this side of the Atlantic. The first of these, in respect to priority of the date of judgment, related to the patent of Gaulard & Gibbs for the distribution of electricity by alternating generators and converters. The circumstances attending the institution of this action, which was on a petition for the repeal of the patent, appear to have been somewhat peculiar. It seems that a corporation known as Sir Coutts Lindsay & Co., working an installation having its central station at the Grosvenor Gallery, in London, originally equipped their system with the Gaulard & Gibbs appliances, having the converters arranged in series on the line. This was done under a contract, whereby the patentees were to be paid a stipulated royalty for every electrical horse power installed. After the plant had been some time in operation, it was placed by the company in charge of an electrician named Ferranti, who subsequently reorganized the plant, placing the converters in parallel and substituting, in part at least, new converters of his own design. A dispute, which in time arose concerning the matter of royalties, led to a cancellation of the contract and a refusal on the part of the licensees to pay further royalties. As a result of this, an action for infringement was commenced by the patentees, while at about the same time Ferranti obtained leave to bring a cross action for the repeal of the patent. This proceeding appears to have given rise to considerable comment, inasmuch as the real plaintiffs in the case were Sir Coutts Lindsay & Co.; but since the payment of licenses under the patent estopped them from denying its validity, the action was ostensibly brought by an employe. The patent act expressly enumerates, among those who are disqualified to bring such an action, the patentee of a subsequent and subordinate patent. This disqualification was, however, got over by obtaining a special leave from the attorney-general to bring the action; a circumstance which has caused much comment, and indeed reminds us, in more ways than one, of the initiatory proceedings which occurred in connection with the late Pan-Electric scandal in our own country. However, the case was tried in court and judgment given annulling the patent. An analysis of the reasons upon which the decision of the court is founded shows that the invention was admitted to be a most useful and meritorious one, and that its novelty was not necessarily impeached by any or all the numerous printed publications and paper patents put in by the defense for the purpose of showing it to have been old. The real difficulty was found in the vagueness and insufficiency of the patentees' specification, which failed to distinguish with sufficient clearness between what the patentees had done and that which was public property. We understand that the case is to be appealed, and it would seem as if there were at least an even chance of a decision favorable to the patentees. Whatever may be the ultimate fate of the British patent, it can have no legal bearing upon the status of the American patent for the Gaulard-Gibbs invention.

The opinion of Justice Kay in the Edison lamp case cannot but be regarded as an exceedingly able one, both by reason of the extent and accuracy of the knowledge of the state of the art displayed in it and of the unerring instinct by which the real issues of the case have been grasped and dealt with. The Edison-Swan Company went into court with a very strong presumption in their favor, arising, of course, from the circumstance that both the patents sued on, Edison's for the incandescent lamp and Sawyer & Man's method of treating filaments by heat in the presence of a hydrocarbon (known in England as the Chesebrough patent), had been twice sustained in an action brought against Woodhouse & Rawson. But the suit just terminated appears to have been defended with far more boldness, vigor, and ability than the others, the efforts of the defendants being mainly directed to establish the inaccuracy and insufficiency of the specification and to the inadmissibility of the broad claim in view of the prior knowledge of the art, as evidenced by the work of Swan, Lane-Fox, and other early laborers in the field. Beginning with a masterly analysis of the state of the art and of the voluminous testimony presented on both sides—and it must be confessed, in the main, exceedingly well presented—the justice reaches the conclusion that the Edison patent is invalid, first, because he aims at an exclusive monopoly of all incandescent lamps with carbon filaments, a claim which the justice says "is far too wide, considering how little Edison had actually invented;" second, because the lamp described in the specification never became or could become a commercially successful one; and third, because the carbon described could not be made without much previous experimentation. There are other objections stated, but we have enumerated the leading ones. The justice also remarked that if the same materials had been before the judges in the earlier case, he believed they would have reached his conclusion.

A careful examination of these cases has but served to confirm our first impression, that the adverse result in both was due to precisely the same cause, viz., the utter failure of the solicitors who prepared the specifications to comprehend wherein the real invention consisted, and so to differentiate it properly from the prior work of others. Each ignorantly sought to claim the whole art, instead of the particular step in advance which had really been made, and in thus grasping at a shadow the substance has been lost.

In the same judgment, the Sawyer-Man or Chesebrough patent, which is controlled in Great Britain by the Edison-Swan Company, and in the United States by the Consolidated Company, was fortunate enough to have its novelty and validity emphatically reaffirmed. We imagine it will be found somewhat difficult to compete successfully in the production of incandescent lamps without the employment of the hydrocarbon treatment, and hence the position of the Edison-Swan Company would seem to be a sufficiently secure one, notwithstanding the adverse result with the Edison patent. The British law does not permit the sale within the realm of goods made by a patented process, even though the process be worked outside the jurisdiction, and hence the holders of the Chesebrough patent are secured against foreign as well as home competition. It has been asserted, apparently by authority, that whatever result attended litigation in England respecting a patent, "*ergo*, a like result must follow in this country." It is hardly necessary to point out to the intelligent reader that this is a little doubtful, to say the least.—*The Electrical Engineer.*

LATENT HEAT OF EVAPORATION OF WATER.—Regnault's experiments were made at temperatures above 0°, and he obtained a formula which led to the value 607 units of heat, the latent heat of evaporation at 0°. Dr. Dieterici by the use of an ice calorimeter has made a direct determination of this constant, and has obtained the value 596·4 thermal units at 0°.—*Nature.*

Project for Supplying Paris from the Waters of Lake Neuchatel.

M. Ritter brought before the company of Ingenieurs Civils, at a meeting which took place on June 1, his proposed scheme for supplying Paris with water. An account of this is given by the *Annales Industrielles* as follows:

M. Ritter makes a rapid survey of the divers points concerning the execution of the works relating to his project. First, he proposes that two submerged tubes should be employed, in order that all repairs may be effected without hindering the supply of water. These tubes are to be immersed by means of four large boats, each tube being fixed at the extremity to the masonry of the aqueduct by a strong shaft, round which it can turn. This system gives every security and facility for placing them. The mechanical perforation of the large tunnel through the Jura mountains, by means of perforators mounted on carriages and driven by compressed air, will be greatly facilitated by the favorable nature of the rocks which have to be pierced. The limestone is a semi-hard rock very easy to perforate; the length of the tunnel through this mass would be only about 500 meters. The rock of the Upper Jura is somewhat harder, but also very favorable for working; the drills can easily perforate spaces of 1·50 m. every two hours, or 0·75 m. per hour, which, counting the time for clearing away the materials, bringing back the carriages, etc., which takes as long as the boring itself, represents a progress of seven meters every twenty-four hours, the work being continued night and day by relays of men every eight hours. The length of perforation through the Upper Jura will be 7½ kilometers. Then comes the Oxfordian or Middle Jura, mostly of a marly nature, which would require the lining of the aqueduct tunnel, as well as the various marls of the lower beds crossed by the tunnel. The boring of the Oxford strata would be somewhat easier than that of the limestone rocks of the Upper Jura. In this region, therefore, it may be reckoned that the progress made would be from 7 to 8 meters. Next come the oolite strata, a part of which, known under the name of pearly flagstone, would present greater difficulty, and through which the rate of rapidity of perforation by the drills would be diminished by 20 per cent, and would even descend for certain crystallized layers to one meter for every two hours' work, or 0·50 m. per hour.

However, the advancement made through these beds of the oolite group would be on an average at least 6 meters per day on account of the softer soil of which they are in a great measure composed. The length of perforation through this mass would be 10 to 11 kilos., and it would not be necessary here to face the tunnel except at the crossing of the Bathonian beds. Following these is the Liasic rock, the middle part of which is of schistose limestone, not very hard, and the lower part of limestone known as gryphee limestone. About a third of this portion would require the walls of the tunnel to be faced with brickwork; its length would be about 6 kilos., and about 8 meters per day would probably be the rate of excavation. Then comes the trias formed of sandstone, chalk, etc.; through this, if the calculations are realized, the perforation would be equally easy; facing would, however, be necessary for more than half of the length. These rocks, on the lower strata of which it is more difficult to pronounce, present no difficulty as to hardness, as the cuttings made through them in Switzerland have shown. There would then be no primitive strata with hard and crystalline rocks to traverse. The probability is, therefore, that the tunnel could be bored at an average speed of 7 meters per day.

The perforation of the longest portion of 18 kilos. would take about 1,300 days, or less than four years. But to arrive at this result it would be necessary to work with two headings, one at the base and the other at the head, and to proceed immediately to scatter the *debris* over as large an extent as is compatible with the quantity of material. There being a considerable quantity of labor available for the execution of the work, it might be accelerated, especially the clearing. M. Ritter quotes the figures he has taken as a basis for his calculations, and estimates the expense at 1,500 f. per meter for piercing the large tunnel, and 800 f. only for the smaller ones, their section being taken as 26 to 28 current meters. The works would be lighted by the electric light, produced by dynamos worked by the engines for general use. The expense of a complete installment with two carriages of eight perforators, each with their relays, the compressors of 6 kilogs. pressure furnishing the air necessary for the engines, is estimated at 300,000 f., not comprising the engines employed for the water supply. The engines for the works are included in the estimate. M. Ritter points out that these statements are founded on the estimates of first-rate constructors, who have executed the greater part of the principal tunnels recently made, particularly those of the Alps.

Referring to the siphons, their diameters of 2·50 and 2·00, and the calculations as to discharge, have been drawn from the old formulas of Darcy, but M. Ritter reckons upon profiting by the excess of speed which results from the remarkable work of M. Vallot, facilitating the more exact calculation of the discharges, and giving for the cases in question an increased speed of nearly 18 per cent for one of the diameters and 10 per cent for the second. The siphons of plate iron are estimated at 500 f. the ton; in certain similar works the price has not been more than 450 f. Every 200 meters at least an expansion joint enables the pipes to be lengthened or shortened. The aqueduct bridges will be constructed of cement concrete, which should cost 35 f. the cube meter. A great number of works executed by M. Ritter have proved to him the possibility of executing the numerous aqueduct bridges at the prices he indicates. However, he is at present calculating the net price of the works for crossing the highest ravines with piles and aqueducts of iron, the latter formed of two cases filled with concrete, covered over with a roof to prevent the water from being heated by the sun. Concerning the repairing of the masonry, M. Ritter explains that during its execution the water could easily be made to pass through a provisional canal of plate iron suspended to the girders which support the aqueduct. The question of how to cut the trenches for the aqueduct as rapidly as possible has been a subject of much consideration, and M. Ritter thinks that this kind of work can be done economically without removing the upper earth. M. Ritter explains his system of staging, making rigid arches supporting a kind of roof, which enables the rubbish to be carried off, by sustaining the earth of the vault and resisting its lateral thrust. By means of levers, the navvy advances each outer lagging of the length excavated to the frame, placing by degrees and uniting the pieces of a fresh frame, and so on. The masons follow the navvies. This system would render the slight variations in the depth of the soil of little consequence, and would considerably economize the length of the aqueduct.

The expense of the earthwork could be almost fixed, whatever the depth from the surface to the center of the work might be. M. Ritter concluded by reading a letter from M. Comtette, Counselor of State, and Director of the Department of the Canton of Neuchatel, assuring him that he may rely not only on the sympathy but the support of the authorities in carrying out his project. Not only, adds M. Ritter, would this scheme be favorable to France, an important part of the population of which would be abundantly supplied with excellent water, but it would be to the advantage of the Canton of Neuchatel. In the first place, by the indirect realization of a number of projects in connection with the making of the great tunnel; and secondly, because it would participate in some degree in the profits of the enterprise, which promises to be remunerative. It would be a real association of interest between the two parties; and on this basis the new aqueduct would assuredly be the most solid bond of union between the two nations.

Action of Bleaching Agents upon Writing Ink.

BY ROBERT IRVINE, F.R.S.E., F.C.S.

It is well known that ordinary writing is easily removed when it is acted upon by bleaching agents. Advantage is taken of this fact by unscrupulous persons desirous of altering documents, checks, and banknotes for improper purposes. Hence the number of fugitive inks and supposed untamperable papers in use to meet this difficulty.

A curious and interesting case of supposed fraud came under my notice in the form of a document which was written upon the flyleaf or second page of a sheet of legal paper, the margin of the first page containing the stamp, date, and watermark of a will purporting to have been written about twenty years ago. The document or will was thus written upon paper bearing both on stamp and in watermark a date which gave it the semblance of age. The appearance of the document gave rise to suspicion, and I was asked if it was possible to tell the age of the writing, and if the writing had been executed at one and the same time, and if so at what time.

This was, of course, impossible, as I was not allowed to treat the document itself. I had, therefore, to make experiments upon writings the dates of which I knew.

I selected writing one day, six months, twelve months, two years, six years, fourteen years, and twenty-two years old, and exposed these writings to the action of a very dilute solution of ordinary bleaching powder in water. The specific gravity was about 1001. In six minutes the newly written matter had disappeared; in from nine to twelve minutes the writing of six months ago had disappeared; in twenty minutes the writing of two years had partly disappeared; in a like time the writing of six years ago was not greatly affected; fourteen years ago very slightly; and twenty-two years hardly affected at all (indeed, old writing seems hardly affected by such a weak solution, even after hours' exposure).

Peroxide of hydrogen acts more slowly, but gives more definite results. Other reagents give effects which help (although sometimes in a contrary manner to that I have indicated) to establish the fact that ordinary writing ink, which is a compound of gallic and tannic acids with proto-salts of iron, becomes more stable (presumably by oxidation), and consequently is less or more affected by chemicals which act upon the organic coloring matter of the ink. There are great varieties of writing inks, chromium and vanadium salts being sometimes substituted for the iron salts. There are also black and colored inks prepared from coal tar dyes; but thinking it highly improbable that any documents intended for preservation would be executed in such evanescent inks, I did not investigate their behavior under such treatment. When ink is thus bleached or apparently removed, most of the iron contained in the compound remains mordanted with the fibers of the paper; consequently, writing so tampered with or dealt with can be restored by the application of gallic or tannic acid. The writing is thus reproduced almost in its original depth of color. It is delicate work (especially in the civil legal aspect of the case to which I have referred) to determine in a reliable manner the age of any particular writing, and it is necessary that the following precautions be carefully observed:

1. The inks must be those known as ordinary writing inks, prepared from iron and chromium salts and galls.

2. Writing dried by means of blotting paper is naturally more easily removed than writing which is allowed to dry on the surface of the paper; and light writing is somewhat more easily removed than coarse and heavy writing.

3. The bleaching solution must be exceedingly dilute, otherwise the action is so rapid and powerful that both old and new writings are removed almost simultaneously.

4. The action must be carefully watched so as not to be too long continued. Lastly, very old writing which has become brown by age, although it resists the action of weak solutions of bleaching powder and peroxide of hydrogen, will show signs of giving way almost instantly when acted upon by dilute nitric, hydrochloric, and oxalic acids.

Although I have only made use of a well known process and materials to obtain the results I have indicated, still I think such a simple means of detection may act as a check to frauds which are becoming only too common. There was a most interesting paper read before the Literary and Philosophical Society of Manchester, in the session of 1879 and 1880, by Mr. W. Thomson, F.R.S.E., which I commend to the study of any one wishful to carry this investigation further than I have been able to do. In it the author gives many curious and interesting facts in connection with the behavior of writing inks under the influences of various chemical compounds.—*Journal Society Chemical Industry.*

Noah's Ark Wood.

Within a radius of sixty miles of Nashville, Tenn., there is said to be found a tree that is said to be the shittim wood of ark fame. Celebrated botanists from all over the country have examined the trees and agree that they grow nowhere else on the globe. They have decided that it is the shittim wood of which Noah's ark was constructed, mention of which is made several times in the Bible. The tree is medium sized, with very dark, smooth bark, and the wood is of a bright gold color. In early spring the trees are laden with long, white blossoms, closely resembling great ostrich plumes. There seems to be no doubt about the identity of the trees, and it is remarkable that they are found only in this small area and so few at that.

Cider.

When cider is cooled to —18 deg. to —20 deg., a portion of the liquid soon solidifies, and the temperature rises to —3 deg. to —4 deg. The portion still liquid has a higher specific gravity than the original cider. The solidified portion melts to an almost colorless liquid, having a specific gravity of 1·0, and containing only 0·3 per cent of alcohol. Cider containing 4 to 5 per cent of alcohol yields on freezing a concentrated cider containing 7 to 8 per cent of alcohol and 60 to 80 gr. dry extract per liter. This composition corresponds to that of the richest Normandy cider. Both the taste and aroma of the cider are obtained in a concentrated form by freezing it. The fermentation is slowed, but not stopped, even after 212 hours.

Brazilian Anacondas.

Two large anacondas were discovered in the hold of the barkentine Emma R. Smith, which is now discharging a cargo of phosphate rock at South Camden, N. J. Each of the reptiles measures over thirteen feet long. The captain of the vessel is unable to account for the snakes being aboard of the ship, and thinks that they might have reached the rigging from dense overhanging tropical foliage while the vessel was lying in the harbor of Para, Brazil, which is conceded to be the home of the anaconda and the boa constrictor. The reptiles have thus far shown no inclination to interfere with the crew or the 'longshoremen working on the vessel. The captain will probably dispose of the snakes to some museum snake charmer.