An Early Inventor in Electric Lighting.

The Rev. G. H. Staite, vicar of Sutton Cheney, Hinckley, writes to the *Pall Mall Gazette* as follows:

"Knowing your love of fair play and readiness to ventilate hidden grievances, I venture to ask the insertion of this letter, in the belief that if the facts were known, some among your many readers would be inclined to entertain the claims of the family of a man who spent his life and fortune on a recognized public work of the greatest importance. My father was the originator of electric lighting, his exhibitions extending from 1847 to shortly before his death in 1854. During that interval he expended a considerable fortune, and left his family penniless. There are at the present time his widow, aged eighty, two daughters, and myself. That our claims to recognition are not unfounded will be seen from the following testimony: Prof. Tyndall, 'Fragments of Science,' Vol. II., p. 424: 'To keep the carbons at the proper distance asunder regulators were devised, the earliest, I believe, by Staite.' Haydn's 'Dictionary of Dates,' later editions, 'Electric Light': 'Apparatus for regulating the electric light were devised in 1846 and shown by Staite and Petrie in 1848.' Urquhart, 'Electric Light,' edited by Webb, 1880, p. 161: 'Staite and Edwards patented an electric regulator based upon the heating and expansion of metals by the current to be regulated. This idea, beautiful in itself, is really the original of the regulators used to-day, and the self-same principle is employed by Mr. Edison.' And 'Dr. Siemens,' page 173: 'Staite as early as 1847 patented a lamp in which the lower carbon is controlled by a movable soft iron core acted on by a hollow electro-magnet.'

"Fontaine and Du Moncel gave similar testimony. The priority of the principle of automatic regulation, the *sine qua non* of electric lighting, was decided in my father's favor by the French Academy of Sciences, as recorded in *Le Courrier Francais*, February 4, 1849. Of his many patents and improvements no use could be made by his family; practically, as far as they were concerned, they died with my father, although they were and are still available for subsequent workers in the same field. His family feel that they have entirely lost their fortune through his public enterprise. All their money, consisting of thousands of pounds, was sunk, and by the premature death of the inventor in his forty-second year his and their hopes of any pecuniary return were irretrievably lost. It is this combination of facts which induces me to write this appeal, every point of which I shall be most glad to substantiate should any one be kindly induced to notice it."

What Flowers will Grow in the Shade?

The question, "What flowers will grow in the shade?" is put to me every spring, says the editor of the *Horticultural Times*, by scores of city people whose little garden, which they wish to devote to flowers, is so walled up by neighboring houses that the direct rays of the sun never touch it. But few plants will develop their flowers there, and none will do it so well as if it were lighted up by sunshine a part of the day. Fuchsias, pansies, forget-me-nots, violets, lobelias, lily of the valley, hollyhocks, phloxes, and other herbaceous plants whose native habitat is a shady wood, will do best, but even these languish if denied all direct sunlight. The best effect in such situations is produced by ornamental leaved plants, the beauty of which is not dependent upon their flowers. Among these may be ranked the gold and silver variegated leaved geraniums, achyranthes, alternantheras, begonias, caladiums, centaureas, coleuses, etc., which, if planted so as to bring the various shades in contrast, produce a pleasing effect, which continues during the entire summer months, and is not surpassed by any display of flowers. The cultivators of flowers in rooms should understand the necessity of sunlight to plants that are to flower, and endeavor to get these as close as possible to a window having an eastern or southern aspect. The higher the temperature, the more plants suffer from want of light. Many plants might remain semi-dormant in a temperature of forty degrees—in a cellar, for example—away from direct light, for months, without material injury; while if the cellar contained a furnace keeping a temperature of seventy degrees, they would all die; such would particularly be the case with plants of a half hardy nature, such as monthly roses, carnations, fuchsias, geraniums, etc. In our greenhouse culture of flowers, direct sunlight is an all important consideration, and a spell of sunless weather in midwinter is often a loss to us of hundreds of pounds, by preventing the development of flowers. Hence we use every means at command to dispose the plants to secure the greatest amount of light. The debilitating effects of want of direct light on plants are well illustrated by taking a vigorous plant in full foliage and flower, that has been growing in the direct light of our greenhouse benches, and placing it under the bench. If the temperature is high—say seventy degrees—in forty-eight hours the sickly signs showing want of light will be apparent to an experienced eye, in a week its condition would be such as to indicate sickness to the most common observer, and in a month it would, most likely, be dead.

EXPERIMENTS IN STATIC ELECTRICITY WITH THE INCANDESCENT LAMP.

BY ELMER E. E. EMMONS.

The incandescent lamp is generally classed among the applications of dynamic electricity, and, practically speaking, it properly belongs there, but many who are interested in science may be interested to know that the incandescent lamp may also be classed with the apparatus for studying the phenomena connected with static electricity.

With an Edison lamp, two or three suspended pith balls, some fragments of light material, and a silk handkerchief, the two fundamental laws of static electricity may be demonstrated.

The lamp should be held by the small end and the glass bulb rubbed with the handkerchief and then presented to the substance experimented upon. The bulb should be heated slightly to dry it.

Now, if a lath is balanced on a point on the bottom of a round-bottomed bottle, it can be made to revolve by holding the rubbed bulb near one end. (Fig. 1.)


Fig. 1.

In fact, any experiment that can be made with a glass rod or stick of sealing wax can be made with the lamp.

If, in the dark, the lamp is held by one hand and the bulb rubbed with a piece of cloth, the interior becomes filled with a bluish white light. (Fig. 2.)

I find that the hand is as good as anything for the above experiment, for if the hand be moved rapidly up and down, striking the bulb a glancing blow as it passes, the glow may be made to fill the entire globe, and, after stopping, if the hand is placed against the glass, the interior will be immediately lighted up, and it may be repeated several times without more rubbing.

When a barrel of lamps is opened and the lamps gently stirred, the same glow spreads through the whole mass of lamps disturbed.

In the above experiments the carbon filament may be entirely destroyed, and for the experiments in attraction and repulsion the lamp would be somewhat improved thereby.

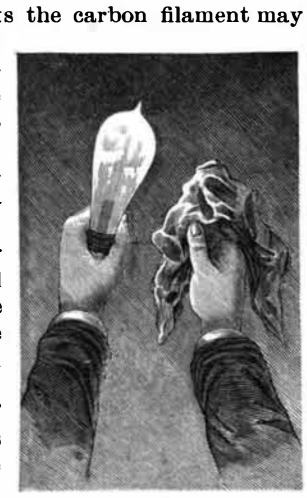
Fig. 2.

It is, however, as a condenser that the lamp excels.

If the lamp is held by the bulb, and the metal piece connecting with the carbon presented to the prime conductor of an electrical machine, it will become charged, that is, if the person holding it is standing so as to be "grounded."

The lamp can also be charged by an electrophorus, or from a running belt if the latter is charged.

If, when the lamp is charged, the holder touches the metal with his free hand, he will receive a smart shock. If another person touches the metal on the lamp, they both will receive a shock, the circuit being completed through the ground.

If the lamp is held long enough, the time depending on the quantity of electricity to be derived from the charging device, the lamp will finally discharge itself, the spark jumping from the metallic portion of the lamp to the hand of the holder, and the holder is made aware of the fact by the loud snapping sound and a pretty heavy shock. (Fig. 3.)

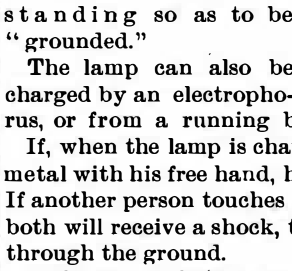
Fig. 3.

By watching, the spark may be seen as it jumps the interval.

By taking hold of the lamp well down toward the end of the bulb, the spark can be made to jump the whole distance between the ferrule and the hand, a distance of three inches or more.

It is really astonishing what a heavy shock one can get from a 16 candle lamp; and if the original inventors of the Leyden jar had been holding a healthy incandescent lamp in their hands instead of the historic phial of water at the time they received their first shock, it is probable that they would never have ventured near enough to have taken another, judging from the fright the phial caused.

To make a first-rate Leyden jar the lamp should have tin foil pasted over it to within 1½ inches or 1¾ inches of the ferrule. It may then be held in any convenient way suitable for experiment.

With a lamp so arranged, all the experiments usually made with Leyden jars can be performed.

The foil is, of course, to be connected with the earth. Running a wire to the floor is usually sufficient.

I have taken with the foil on it, suspended it near a running belt, connected the foil to "ground" by running a wire from it to the floor and then run a wire from the metal connection to within a few inches of the belt. So arranged, the lamp will become charged very rapidly and discharge, the spark leaping through the air between the ferrule and tin foil and close to the glass. (Fig. 4.)


Fig. 4.

During the time of charging, the space inclosed by the carbon filament is filled with a pale blue light, and at discharge the whole globe is illuminated, the light being due to discharge in vacua, and not to the carbon being heated.

If the carbon is broken in two, it works just as well, so that burned-out lamps may be obtained and used. Any one who has ever tried to make a Leyden jar knows the difficulty in getting good glass, but the lamp is perfect in that respect.

Artesian Wells in New York City.

In a paper on the geology of Manhattan Island, read by Mr. James F. Kemp, before the New York Academy of Sciences, we find the following: Efforts have been made since the beginning of the century to obtain water from wells, both surface and artesian. Dr. Elwyn Waller informs me that over a thousand exist at present. Within the last ten or fifteen years, very many artesian wells have been sunk by the oil well methods and the diamond drill. Many of the large breweries, malt houses, and manufactories demand an abundant supply of water, and have found it advantageous to sink wells in preference to paying the city water rate. Sometimes they are successful in striking a wet spot and a good supply is obtained, but, as there is no certainty from the nature of the formation, they quite as often yield very little. Still, the straitened capacity of reservoirs and the small head allowed consumers have greatly quickened the well industry. They are drilled by the methods perfected in the petroleum districts, and, indeed, one can hardly journey very far around the city without seeing the tall derrick and hearing the creak of the bull wheel and the thud of the drill. The wells are sunk by contract at from $6 to $12 per foot, the contractor fixing his price on his estimate of the hardness of the rock. Much difficulty is experienced on account of this varying hardness, as the drill tends to glance and make a crooked hole. Ordinarily the progress is 20 feet in 24 hours. The drillers say they are obliged to go down from 400 to 1,000 feet to strike water. The following facts have been obtained by inquiring of the drillers, and may not be very exact:

	Feet.	Daily.
Schaefer's Brewery	640	5,000 bbls.
63d Street Malt House	414	2,700 "
Third Ave. and 67th Street	1250	10,000 gals.
Sixth Ave. and 59th Street	730	10,000 "
Field's Building, 1 Broadway	400	57,000 "
Foot 58th Street, Hudson River	700	Unsuccessful.
Munic. Gas Co., 11th and 45th, 2 wells	500 each	30–45,000 gals.
Tenth Ave. and 39th Street	468	40,000 "
W. 41st Street, No. 529	585	20,000 "
Foot W. 39th Street	550	90,000 "
Sterns, Third Ave. and 42d Street	600	8,000 "
11th Ave. and 48th Street	600	30,000 "

99th Street and Second Avenue, 7 wells, 38 feet each in drift, total of 216,000 gallons per day.

The Last Herd of Buffalo.

Mr. Clinton A. Snowden, of the Chicago *Times*, is the originator of a scheme to save bisons that still remain on the plains. It has been ascertained that of the millions which once roamed on the prairies of the West only seventy-five or a hundred remain, and these are located in the extreme southwestern portion of Texas. An expedition is soon to start for Texas to round up therefor buffalo. The leading purpose is to perpetuate a species of animal which is thoroughly typical of American animal life; one of the controlling ideas of the trip being to kill none of the animals while corralling them or after their capture. News of the work of the expedition is to be sent to the *Times* by carrier pigeons.

It is to be hoped this laudable expedition will succeed. It would seem as if Congress might do something to promote and encourage the preservation of this wonderful breed of animals.

Cement Floors.*

Such floors, when properly made, are very valuable for barns and outbuildings. In the first place, they are impervious to liquids, and will retain all the manurial matter that is placed on them. In the second place, rats and other vermin cannot burrow through them, and, so far as my experience goes, will not burrow under them to any great extent. Floors made with American cement will not generally be tough enough to withstand the treading of animals, and should be protected by a covering of boards. A covering of English Portland cement about two inches in thickness, made by mixing three parts of sharp sand to one part of cement, with water just sufficient to damp it, and thoroughly rammed in place, will stand treading of animals, but will, I think, in most places be more expensive than a board covering.

METHOD OF CONSTRUCTION.

A foundation for such floor should first be made. This is done by laying a course of small stones from two to four inches in diameter. Ram these in place with a ram made of a block of wood about 10 inches in diameter at the lower end, and two or three feet long. After this course of stones is in place, make a mortar by using one part, by measure, of quicklime, one part of American cement, ten parts of sand and sufficient water to make it very thin. Pour this water as soon as mixed on the course of stones, and with a common hoe work the mortar into all the cracks. Sufficient mortar will be used when the cracks are full. After the first course is completed, a second one should be put on. This will make a total thickness of about six or eight inches. If a floor is to be laid for a stable, joists of two by four scantling should be bedded in the upper course and allowed to project about one-half inch above the course. Before the floor is laid, a mortar made of one part quicklime, one part American cement, and six parts sharp sand is spread over the surface and leveled off from joist to joist. The boards or planks for the floor should be laid at once while the mortar is soft. This last course of mortar may, with advantage, be replaced by a mortar made of hot coal tar and sand, mixed and applied while hot.

If the floor is not to be trodden on by animals, it will do to finish it with a coat of cement mortar, about one inch thick. The mortar for this finishing coat should be one part sand to one part cement and no lime. If a cement floor is needed for a stable, a covering of Portland cement mortar as described should be placed upon the stones.

I have seen very good floors made by mixing hot coal tar with sand and stones, instead of lime or cement, as described. This floor will give off its characteristic odor for a long time, however, and cannot be recommended when such odor is objectionable. The floors under the cattle stable and also the piggery at the Michigan Agricultural College were constructed substantially as described. All the surfaces of woodwork in contact with the mortar were first coated with hot coal tar. This work was done in 1871. In 1886 it became necessary to remove the piggery to a new site. The floor was well preserved, but the joists bedded in the mortar were badly rotted. The cattle stable floor is apparently in as good condition as when first put down.

I wish to say just a word regarding the use of cement and lime. Cement should be used as soon as mixed with water, as it very soon hardens or sets. This operation should not be disturbed, and if it takes place even in a small degree before the mortar is deposited in its permanent place, it will never become as hard as though it had not been disturbed. Lime mortar is rather improved than injured by allowing it to remain a long time after being mixed. In this article I recommend the use of equal quantities of lime and cement, solely on the ground of economy. If the foundation is, however, in the water, the lime should be replaced by cement, but for all ordinary circumstances a mixture of half lime and cement gives better satisfaction than pure cement—such a compound forms a water lime, that, although it will not set under water, still, when once it is set, will not be affected by water. For ordinary floors, I think it becomes in time harder than pure cement.

* Professor R. C. Carpenter, Michigan Agricultural College, in *Rural New-Yorker*.

The Mosquito.

Mr. H. Sullivan Thomas, who has been lecturing on the mosquito before the literary society of Madras, India, is ungallant enough to say that it is only the female mosquito that does the biting. He considers the mosquito a most useful pest, seven-eighths of its existence being devoted to the service of man and only one-eighth to his annoyance. It exists in the larval state twenty-one days, and during that period engages in sanitary work with ardor and thoroughness. Wherever there is dirty water, wherever there is a filthy drain, there the mosquito larvæ are to be found, voraciously devouring the contaminating matter. Mr. Thomas admits that he is an anomalous animal, who wears his heart where others wear their throat, and sows his wild oats at a time of life when the human kind try to make their fellows and heaven believe they have never been sinners; but his days of sin are only a tenth of his total existence, which is more than could be said of most animals, man included. And in clarifying the water of India, which needs the process so badly, the mosquito is performing a public benefaction, and atoning to some extent for the bloodthirsty appetite he develops during the three days he exists in the more familiar form. Mr. Thomas tells us he never yet found a case where a bite was inflicted by any other than a female mosquito; and though he suggested as a possible explanation that the male had quicker ears and might be more on his guard against being caught, this was obviously rather a concession to the feeling of the feminine portion of his audience than the expression of scientific conviction.

Bullets for Small Bore Rifles.

A series of experiments have lately been carried out in Austria on the projectiles for small bore rifles. Three varieties of bullets, says *Engineering*, were used, namely, balls of hardened lead, of lead with a steel jacket, and of lead with a nickel jacket. In the experiments on penetration, copper-coated bullets were also employed. The rifles used were the Kropatschek and the Nagant. The first is of 0·315 in caliber and is rifled with four grooves, making one turn in 35 calibers. Its barrel is about 2 ft. 8¼ in. long, the weapon weighing slightly over 10¼ lb. The Nagant is of the same caliber, but is rifled with six grooves, with a pitch of 31 calibers. The barrel is of the same length as the Kropatschek, but the weapon weighs rather less, or about 8·84 lb. The bullets were tested with regard to accuracy of fire, penetration, and on the effect of prolonged fire, and in all these respects the jacketed bullets took the first place. In particular, by the rapid fouling which occurred with the hardened lead ball, the accuracy of the weapon was rapidly spoilt, which did not occur with the other projectiles. As regards penetration, the best results were given by the steel-coated ball, though the difference between it and the one with the nickel jacket was never very great, both bullets giving results greatly superior to those obtained with the hardened lead balls. The rifles were in no cases injured by prolonged firing of any of the projectiles.

A Novel Storm Anchor.

A so-called storm anchor, invented by Capt. Waters, and designed for the use of vessels in urgent distress at sea, has recently been successfully tried. The anchor is an ingenious yet simple and inexpensive contrivance. It is made of canvas in the shape of a bag. Two were used in the recent experiments, one being attached to a circular framework, the hoop of which is from two to three inches in width, the other fastened to a square framework of wood bolted together at the ends. The width across the openings of these bags is about four feet, the depth being about five feet. These anchors or bags are thrown into the sea, and made fast to the bow of the vessel by a stout rope. The immediate object of these anchors is to bring a vessel up head to sea when all other means have failed, and the vessel is in danger of foundering. Capt. Waters made use of a temporarily constructed arrangement of this kind in a terrific gale in the Bay of Biscay some years ago, when his vessel was in danger of foundering, and the craft, although only a small one, was brought head to the sea by this means, and successfully rode out the gale for fifteen hours, when it abated. The bags are eyeleted at the bottom to prevent the pressure of the water bursting them, and are attached at a short distance to a beam of wood, which suspends them a few feet below the surface.

The Wiesbaden Congress on Alcoholism.

On the 9th ult., the seventh Congress of German Physicians, re-enforced by investigators and special practitioners from all parts of the empire, met at Wiesbaden, under the presidency of Prof. Leube of Wurzburg. The feature of the Congress, however, was the paper by Dr. Binz of Bonn, and the debate that ensued, on "Alcohol as a Remedial Agent." Having shown the alternating affirmative and negative views held in recent years on the efficacy of this agent, Dr. Binz maintained that the preponderance of English authority was in favor of the former, and that this view was being re-enforced by German original investigators, who, like Zunz, had with much cogency advocated the non-heating and distinctly efficacious virtues of alcohol. Dr. Binz set himself to prove—(1) that alcohol has a value, not represented by any other agent, in heart failure and lung disease; (2) that it is a *Sparmittel* (economic factor) in the organism, because it is consumed therein; and (3) that it operates as a controller of pyrexia and fever. On the sick bed its virtues are invaluable; but in the healthy subject it is difficult to define where its abuse is not felt; for the man in good health needs no stimulation, no artificial economizer of energy or replacer of albumen, no depressant of temperature. All that can be proved in favor of alcohol in such a case is its power of renewing cerebral energy when lowered by mental work. Even here moderation in well-watered alcohol is imperative. Dr. Binz further contended that alcohol consumption between meals, especially in the form of beer, is a great and, in Germany, a national evil, practiced as it is in the stuffy atmosphere of cellars and that, too, for hours. Not only do the secondary products of beer exhaust the system and induce an adipose habit, but the habitual beer-drinker is as much an alcoholist as the drinker of drams, with this difference, that he has not the excuse of the latter in that moral wretchedness for which spirits are an immediate, though in the long run a fatal, remedy. Remembering all this, Dr. Binz concluded that there was a large, not to say an increasing, group of maladies—maladies in which idiosyncrasy was an important factor—where alcohol was imperative, and where no substitute for it could be found. In the discussion which followed, Dr. Binz was supported by Professor Jaksch of Graz, while Dr. Nothnagel of Vienna put in a special *caveat* against the exhibition of alcohol to children. The whole treatment of the question as officially reported will have much practical force, not only for the physician, but for the public hygienist and the legislator.—*Lancet.*

Photochronoscopic Method of M. Hermite.

To obtain a distinct photograph of an object moving with great velocity, as, for instance, a rifle bullet traveling at the rate of 400 meters (1,304 ft.) per second, is *prima facie*, and from the popular point of view, a somewhat difficult problem. It has been very neatly solved, however, by M. Gustave Hermite, under the condition that the object must be in darkness. He simply illuminates it by the spark from an induction coil. The sparks from this instrument occur at perfectly regular intervals of time, so that the only practical difficulty in carrying the suggested means into effect is to accurately measure the duration of the interval. This M. Hermite has accomplished by the use of a diapason, of which the number of vibrations per second is accurately known, and which is simply a thin strip of steel fixed in a metallic holder. It is set in vibration by bending it with the finger. If now it be illuminated by sparks from a Ruhmkorff coil, and the number of vibrations of the strip happens to be equal to that of the sparks, the strip will be seen in a position of inclination. If the number of sparks be double that of the vibrations, the strip will be seen in the form of a V. If there be discord between the numbers, the branches of the V will appear to close and then to open again. It will be seen that these phenomena afford a means of regulating the coil so that it may give a determinate number of vibrations and sparks per second; and the means in question are found to be very practical and very accurate.

Cost of the Production of Electric Energy.

M. W. Penkert, in the *Centralblatt fur Elektrotechnische*, gives some practical figures of the cost of electric energy variously produced. Although his figures are susceptible of modification for this country, yet the ratios they determine are highly interesting. The cost of developing 1,000 watts is:

2·66 fr.	when produced	by	Daniell's battery.
3·77 fr.	" "	"	Bunsen's battery.
40·07 fr.	" "	"	Clamond's thermo-electric battery heated by gas.
1·05 fr.	" "	"	Clamond's thermo-electric battery heated by coal.
0·26 fr.	" "	"	dynamo and steam engine.
0·62 fr.	" "	"	dynamo and gas engine.

In these calculations, 1·8 kilogrammes (4 lb.) of coal per horse power hour for a steam engine, and 1 cubic meter (35$\frac{8}{10}$ cubic feet) of gas for a gas engine for the same work was allowed for.

Tinning by Simple Immersion.

Argentine is a name given to tin precipitated by galvanic action from its solution. This material is usually obtained by immersing plates of zinc in a solution of tin containing 6 grammes (about 90 grains) of the metal to the liter (0·88 quart). In this way tin scrap can be utilized. To apply the argentine according to M. P. Marino's process, a bath is prepared from argentine and acid tartrate of potash rendered soluble by boric acid. Pyrophosphate of soda, chloride of ammonium, or caustic soda, may be substituted for the acid tartrate. The bath being prepared, the objects to be coated are plunged therein, first having been suitably pickled and scoured, and they may be subjected to the action of an electric current. But a simple immersion is enough. The bath for this must be brought to ebullition, and objects of copper or brass or coated therewith may be immersed in it.—*L'Echo des Mines et Metallurgie.*

Electroplating with Aluminum.

H. Reinbold claims to have obtained good results with the following solution: Alum 30 parts, water 300 parts, aluminum chloride 10 parts. This solution is heated to 200° Fah., and after cooling, 39 parts of potassium chloride are added.