NEW YORK ACADEMY OF SCIENCES.

A meeting of the New York Academy of Sciences was held Monday, March 24th, at the Stevens Institute of Technology, Hoboken.

A NEW OZONE GENERATOR.

Prof. Albert R. Leeds exhibited his new form of ozone generator, by the aid of which he has been enabled to overcome the difficulty hitherto experienced by investigators of preparing ozone in sufficiently large quantities for experimental purposes. Formerly sticks of phosphorus were placed in contact with moist air in large glass balloons or carboys; and so great was the uncertainty of the process that sometimes after the lapse of several hours the operator had scarcely enough ozone to show its properties.

In the new ozonator the phosphorus used is first melted under water in a watch glass, and when cool it is placed with its convex surface upward on a perforated lead tray provided with slots, so that it may be easily introduced in a bell jar and brought to rest upon short glass rods attached to the jar a little above the rim. A bell glass thus furnished with five or six phosphorus cakes is then plunged into a glass jar containing a solution of 25 grammes bichromate of potash in 1250 c.c. water acidulated with 150 c.c. sulphuric acid, so that the convex surface of the phosphorus, kept clean by the energetic action of the solution, remains exposed and ozonizes the air in the jar. It is advantageous to use the phosphorus in this form, because of the rapid consumption of sticks and the consequent danger of inflammation.

A series of careful experiments has revealed the fact that the temperature is a potent factor in the generation of ozone. Below 6° C. no ozone is given off; as the temperature rises the evolution of gas increases up to 24°, and from that point on it again rapidly diminishes. In consequence of this, Prof. Leeds finds it advantageous to place the jar in a copper water bath, and to provide it with a thermometer, so that the apparatus may be maintained at the maximum temperature. When two jars are used in conjunction, the amount of ozone obtained is 25 per cent greater than from one alone, and with three the increase is but slight.

A great point of difficulty in the construction of ozone apparatus is in connecting the parts. Where rigid connections are allowable they may be made by the use of paraffine, and all corks through which glass tubes pass must be coated with it. Rubber is almost instantly destroyed. Fortunately Mr. Day, of New York, has succeeded in making a species of kerite, suitable for flexible connections. Tubes made of this material have now been in use for several weeks without showing the slightest signs of deterioration.

Mr. Peter Cooper, who was present at the meeting, suggested that the substance might perhaps prove useful as a substitute for rubber gas tubing, which is soon attacked by coal gas and becomes offensive.

A NEW MEASURE OF ACTINISM.

It has been maintained by Schoenbein and others that perfectly pure sulphuric and nitric acids containing no trace of nitrous acid would not produce any change in iodide of starch. Prof. Leeds stated that he had been unable either to obtain acids so pure or to make them himself, but that his iodide of starch solutions were invariably affected by them. Upon reasoning on the circumstance, it struck him that iodides might be decomposed by light in the presence of acids, a supposition which afterward proved true; and he based upon it a method for measuring the relative actinic effects of different kinds of light. Upon exposing such solutions for the same length of time to the sun's rays, to the electric light, and to a magnesium light, and then comparing the results in a color comparator, described in a previous communication, he was surprised to find that the electric light had produced over three times as much chemical effect as sunlight, while the action of the magnesium light was but a very small fraction of it.

THE ELONGATION OF METALLIC RODS BY HEAT.

The Academy then adjourned to the physical laboratory of the Institute, where Prof. Alfred M. Mayer exhibited his apparatus for measuring the variations of length in metal bars at different temperatures. This apparatus has been so well described in the SCIENTIFIC AMERICAN (Dec. 8th, 1877) that only a brief reference to it will be necessary in this place. Finding that previous experiments in this direction were vitiated by the fact that the heat or cold applied to the metal bars to be measured at the same time affected the measuring apparatus, Prof. Mayer conceived the idea of separating the two parts, so that his bar could be brought to the required temperature and could then be measured with extreme rapidity. Great accuracy of measurement is rendered possible by the use of Saxton's reflecting comparator, described at length in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 96, Nov. 3, 1877.

MEASURING THE EFFICIENCY OF ELECTRIC LIGHT MACHINES.

Prof. Henry Morton then exhibited the apparatus in use at the Stevens Institute for measuring the efficiency of machines designed for generating powerful currents for the production of the electric light. The hour for adjournment having arrived, no detailed description was given.

C. F. K.

AMERICAN IRON FOR CHINA.—A shipment of 200 tons of American iron was lately made by the Thomas Iron Co. to fill an order from China. This is said to be the first American iron ever sent to that market.

Correspondence.

Gary's Nail Experiment.

To the Editor of the Scientific American:

In an article on page 208 of the SCIENTIFIC AMERICAN, of April 5th, the writer claims that the explanation of the nail experiment given in my letter, published March 22d, is essentially the same as that contained on page 144, issue of March 8th, namely, that the nail falls to the ground by reason of the superior force of gravitation while leaving the sheet iron for the magnet. I am, however, unable to discover in what respect these explanations are similar.

In the article on page 144, March 8th, no mention is made of change of polarity or demagnetization of the nail upon approaching the magnet; but, instead thereof, the explanation implies clearly that the nail is simply drawn away from the sheet iron, but before reaching the magnet the stronger force of gravitation brings it to the ground.

The actual fact is that the nail does not leave the sheet iron, "because, by reason of its approach to the attracting pole, it tends to fly to it," but because it becomes demagnetized, or so nearly so as to allow gravitation to control it. Furthermore, at the point of demagnetization at which the nail drops (if properly arranged to show the experiment), there is no tendency to fly to the magnet, and the magnet has no attraction for it.

Figs. 1, 2, and 3 will serve to show the three positions of the nail to illustrate this theory.

In Fig. 1 we assume that the nail derives its polarity principally from the armature; its north pole being at the greatest distance from the north pole of the magnet, and its south pole inclining slightly toward the north pole of the magnet. Fig. 2 represents the armature nearer the magnet, and the nail just ready to drop on account of demagnetization by having had its north pole brought nearer to the north pole of the stronger magnet, and its south pole carried further away, the tendency being to a reversed polarity from the proximity of its upper end to the magnet.

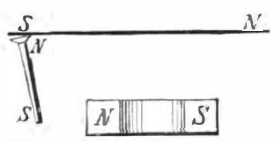


Fig. 1.

At this point the nail hangs free for an instant, with no inclination of its lower end either toward or from the magnet, and then drops directly to the ground.

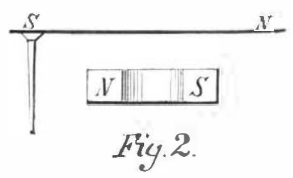


Fig. 2.

In Fig. 3 the armature is represented as still nearer the magnet. The upper end of the nail will now show a slight south polarity derived from the north pole of the magnet in excess of the north polarity influenced by the armature, which fact is proven by the inclination outward of its lower end, which has become the north pole.

This excess of magnetism derived from the magnet enables the nail to adhere (although very weakly) to the sheet iron armature, notwithstanding similarity of poles. Strictly speaking, the polarity of the armature is north to the nail at the point of contact, while it still remains south to the magnet, its relations with the magnet not having been changed, except as regards strength of magnetism acquired.

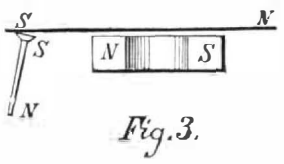


Fig. 3.

Mr. Gary, in his letter to the SCIENTIFIC AMERICAN, published April 5th, page 209, says in referring to my letter on page 177, of March 22d: "Does not the writer know that when a nail is in contact with an induced magnet, or any other magnet, it has the same polarity and is a part of the same?"

I will reply to this question by asking Mr. Gary if he does not know that a piece of soft iron cannot be attracted by a magnet without becoming itself a magnet, with a certain polarity, which polarity will remain the same whether in contact or not?

This fact also proves the non-existence of a "neutral line," for, if such did exist, there could be no attraction on that line, and the armature in approaching the magnet would lose its magnetism and drop back. This not being the case, there is no "neutral line."

G. F. MILLIKEN.

Boston, March 29th, 1879.

Gary's Neutral Line.

To the Editor of the Scientific American:

Referring to the latest "perpetual"—Gary's motor—I was much pleased with your editorials thereon. I noticed also in your last issue a correspondent's remarks regarding the nail which drops when approached to one of the magnets.

But there is one point in Gary's fallacy that you have not fully explained. I refer to his so-called "neutral line." I think the following explains this feature:

Referring to the sketch of the two permanent magnets—one stationary, the other rocking on centers—he claims that he arrests the attraction of the two magnets for each other by interposing the armature of soft iron between them on the "neutral line." He does cut off the attraction, and in this way:

His armature is of soft iron. He places it across the poles of the stationary magnet, and much nearer this than the rocking magnet. The armature is magnetized inductively by the stationary magnet, and, of course, its polarity is opposite that of the magnet that influences it. And as his two permanent magnets had their opposite poles exposed to each other, it now follows that the rocking magnet is exposed to the influence of the armature, whose polarity is like its own. Hence the action is repulsive instead of attractive.

Therefore, if he could get power enough to move his armature up and down, his machine would be a perpetual motion undoubtedly. But to do this he must cut the magnetic lines of force of his stationary magnet, and the power required to do this is exactly proportional to the strength of those lines of that magnet, and therefore he never can produce any result, except to impoverish himself and those capitalists who believe in him.

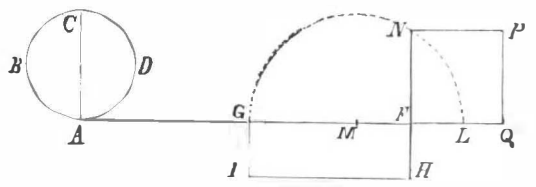
Had Gary shown less contempt for scientific men, some one of them might have told him that with a pocket compass he could have demonstrated the fallacy of his "neutral line" in three minutes, and saved himself and others a world of expense and trouble.

C. H. HASKINS.

The Circle Squared.

To the Editor of the Scientific American:

Given any circle, A B C D, to find a square that shall be in area equal to it. Let the horizontal line, A F, be tangent to the circle at A. Revolve the circle on its circumference until the point, A, touches the line again at F. Then will A F be exactly equal to the circumference of the circle. Bisect A F in G. Draw the perpendicular F H = the radius, or ½ the diameter, A C, and complete the rectangle G F H I, which will be exactly equal to the area of the circle = ½ the circumference × ½ the diameter.



Now produce G F to L, making F L = F H; bisect G L in M; with M as a center and radius M G, describe a semicircle, and produce H F to N. F N will be a mean proportional between G F and F L or F H. On F N describe the square F N P Q, which will be exactly equal in area to the given circle, A B C D.

Q. E. D.

Philadelphia, Pa., March 17, 1879.

A Warning to Western Farmers.

The *Colorado Farmer* counsels the agriculturists of his State to stick to their farms, and not be induced to leave their comfortable homes for the mining regions, where so much discomfort and uncertainty are in store for them.

We are told, says the editor, that farmers are quitting their farms or are letting their fields lie idle to rush to Leadville, or to haul freight from the railroad termini to the mining camps.

We have not a word of fault to find with them for striving to earn money, for all know how bravely they have struggled through two years of the locust plague, and two years of very low prices. But at this time to abandon their farms or fields to weeds and idleness, is suicidal.

There are pouring into Colorado 500 people every day, and this number will be increased twofold in less than a month, and will be kept up well into the summer. At least 50,000 will be added to the population of the State. These people must be fed, and the bread and meat to feed them should be supplied by our farmers. To do so will take much more breadstuffs and feed than all our farmers can, under the most favorable circumstances, supply. Raise as much as you may, it will all bring a fair price, even if Kansas and other Western States raise as large a crop as last year, which we do not expect them to do.

More money can be made this summer on Colorado farms than has been in any one year for the past six, and it is the height of folly to quit a certainty for the very, very uncertainty of mining.

Farmers of Colorado, stick to your farms; don't let the *ignis fatuus* of mining camps lead you from the solid ground of your farms to the bogs and quagmires that are in and through and all around the camps and cities that are created by the excited crowd in the rush and struggle for wealth that is got by accident or luck.

Coal at its Lowest.

The regular monthly coal sale of the Delaware, Lackawanna, and Western Company, in New York, for March, was largely attended, and the 100,000 tons offered were well distributed, in small lots, at an average reduction of 8 7-10 cents per ton from last month's prices, and an average reduction of 5 cents per ton from the prices obtained at the Delaware and Hudson Canal Company's sale on the 21st inst. The quantities sold and the prices realized were as follows: Five thousand tons of steamer at $2 17½, a decline from last month of 7½ cents per ton; 20,000 tons of grate at $2 20 to $2 17½, a decline of 7 cents per ton, 20,000 tons of egg at $2 20 to $2 17½, a decline of 9¾ cents per ton, 45,000 tons of stove at $2 55 to $2 50, a decline of 13¾ cents per ton; 10,000 tons of chestnut at $2 32½ to $2 35, a decline of 7¼ cents per ton. This is the lowest price ever reached for stove coal.