full of the like poisonous matter, but they are now things of the past. It is a misdemeanor to use metallic color in confectionery; it is just possible, however, that some of the old sweets may still remain unsold, so we bid parents beware of any sugar plums with vivid greens and reds, for they are sure to be poisonous.

Steam has helped us to undersell the French; now we export to that country much of the coarser kinds of sweets. In England we make for children, in France the "bonbon" is made for children of a larger growth. Nothing can exceed the taste with which the sweets are put before the public across the Channel. The boxes they are packed in are works of art in themselves. About Christmas time some of our leading West End shops are full of the artistic confectionery from the Parisian manufactories. It looks so pretty that we scarcely like to demolish it. It must be remembered that the presentation of caskets of sweets is a custom among the fashionables in France; our neighbors have, therefore, to meet the critical and fastidious taste of adults, and hence comfits, etc., rise in that country to works of art. We like sweets in this country, but we are too great cowards to own it; we do not doubt, however, that simpler tastes will prevail, and cause more artistic skill to be exhibited than is now thought necessary for our nurseries. If we expect a large export trade it should not be forgotten that other nations require even their sweets to be presented to them in a graceful form. In order to show the increase that has taken place in the trade, we may state that twelve years ago our entire make did not exceed eight thousand tuns, whereas in 1862 it had risen to twenty-five thousand tuns, and is now not very far short of thirty-five thousand tuns per annum. This amount does not include the rough sweets made in the hucksters' shops, nor the toffy made at home, which is not inconsiderable. If the whole nation should go back to the tastes of our childhood, like the French, the production would at once mount up to double the score at which it figures at present. That the English have a sweet tooth, witness our rich port wine, which is in itself a confection, such as no other nation but ourselves under the sun will drink. Such being the natural tendency of our palate, we do not doubt but that we shall take to sweets as naturally as the Italians do, albeit we have no carnival in which to use them as pleasant missiles.—*Every Saturday*.

ACROSS MT. CENIS—FELL'S MOUNTAIN RAILWAY.

"S. H. W." sends us the following supplementary account of his trip over Mt. Cenis:

"We left Turin on the 5 o'clock evening train for Susa, situated at the foot of the mountain, the trip occupying two hours. Upon reaching the station, we learned that the dilligences were not to leave until 2 o'clock in the morning; therefore, betaking ourselves to a small, dismal-looking inn, we obtained a comfortable dinner—anything eatable tasting good to a hungry man. We then bunked down for a quiet nap, but were aroused at 1 o'clock to prepare for a start.

"We found, at the station, a crowd of passengers, who had come up from Turin on the 11 o'clock train; and it was very evident that those who had not secured their places in advance, would have to take up 'with pot-luck.' Being fortunate, however, in this respect, we had only to amuse ourselves by waiting and watching the movement of things. Four immense dilligences were got ready, and, by the aid of a pair of stout horses on the wheel, and five pairs of mules attached to each vehicle, we began to ascend the mountain. The moon was shining full and clear, enabling us to obtain a good view of the scenery; and, after journeying for three hours, during which time we had made but nine miles, the passengers with their baggage were all unloaded, in order to take the dilligence sleighs, as we had reached the regions of snow.

"There were eight of these clumsy-looking vehicles, and to provide for their movement the teams were divided into sixes—one horse in the shafts, led by five mules following each other in line, and presenting a novel sight, as this long procession wound its way up the zig-zags of the mountain. We continued our slow journeyings in this manner for several hours, until we had gained the summit,—the night, owing to the brilliancy of the moon emerging almost imperceptibly into the cold gray of the morning.

"At this point, upon the summit, the mules were dispensed with, and two pairs of heavy horses were attached to each sleigh. The wind blew a sharp nor'wester, the snow came dancing down the mountains, and drifted itself in our way to such an extent that workmen were engaged in keeping the path open. The scene was bleak and cheerless in the extreme. We had been suddenly transferred from the genial sunshine of Italy, to a winter's day as cold and blustering as ever swept over the green hills of Vermont. Even the little mountain cataracts were glazed over by ribs of ice, with pendant icicles. Upon reaching the point where the road begins to descend, one horse only was needed on each sleigh; and right rapidly did he dash down the mountain, the old sleigh swinging around the sharp curves, as if hung upon a pivot. It was our first sleigh ride of the season; and though hungry and cold, we enjoyed it as rare sport, though I judge from home letters that it would have been no great rarity to you. By means of a break, to grip into the snow, which the driver managed with considerable engineering skill, the steep descents and sharp curves were made with comparative ease and safety.

"At the end of the snow region we were all again unloaded and repacked into dilligences, this time drawn by five horses, the leaders working three abreast. There were an army of conductors, drivers, and riders; but no noise, no unnecessary whipping, and no confusion, in making the many changes of vehicles and animals.

"In this way we journeyed to San Michel, the railway terminus on the French side, which point we reached at noon, having in the mean time once again changed horses. At San Michel we were met by the French custom-house officers, who extended to us a cordial reception. The passengers, by this time, were tolerably hungry, and did full justice to the provisions of the restaurant; 'so that the cats and dogs had reason to lament the polish of the bones.'

"An hour's time was just enough to go through the formalities of the occasion, and at one o'clock in the afternoon, we were off again, but this time in a comfortable railway carriage, expecting to stop for the night at a place called Culoz, at the junction of the roads to Lyons, Paris, and Geneva. Upon getting out of the train, however, we found out just in time that there was no hotel short of a carriage ride of three miles to the village, therefore we took the next train for Lyons, where we arrived at half-past ten in the evening. The trip from Turin to Lyons, altogether, combined more of novelty than anything we had before experienced.

"Fell's ever-mountain railway, which has already been described in the SCIENTIFIC AMERICAN, follows the windings of the dilligence road all the way from Susa to San Michel, and is a bold curious piece of engineering. The work upon it was suspended during the winter months, but the superintendent expected to have the cars running some time in May.

"Over the higher portions of the mountains, and for several miles along where the snows are most troublesome, the road is being covered in by heavy masonry supporting a corrugated iron roof. Somebody has had faith enough in the success of this enterprise, to spend a vast deal of money upon it; and with a good deal of care bestowed upon the track and machinery, I do not see any reason why it may not be a safe, and, certainly, a much more rapid and comfortable mode of crossing Mt. Cenis than by dilligence.

"Lyons, next to Paris, is the largest city in France. It is, moreover, an exceedingly fine place, built in an excellent situation. The inhabitants live by the manufacture of dress silks, ribbons, and velvets. There are no large factories, but the work is chiefly carried on at the homes of the weavers. Jacquard looms are to be seen through almost every window, as one passes through the quarter occupied by the weavers, and a fine monument to the great inventor has been erected in one of the public places. At the present time weaving is very dull, and the operators are suffering considerably.

"The distance from Lyons to Paris is 319 miles; the express train runs through in ten hours, including fourteen stoppages. The railway is a model of good management."

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Correspondence of the Sun with the Clocks.

MESSRS. EDITORS:—One of your correspondents asks, page 197 of this volume, "Why is the sun's center on the meridian ever back of the clock?" and you answer: "Because of the elliptical orbit of the earth, and the inclination of the earth's axis on the ecliptic." Allow me to remark that the sun's center is *not* always back of the clock, but half the time ahead of it, and that the inclination of the earth's axis has nothing to do with this phenomenon, which constitutes the difference between the mean time and solar time. The explanation is this:

On a well regulated clock, the days of twenty-four hours have of course exactly the same length; but the solar days, when measured by the time that the sun daily reaches the meridian, have not the same length; this is not caused by any irregularity in the daily rotation of the earth around its axis, as this rotation is perfectly regular, and proved by the most acute astronomical observations not to vary the least fraction of a second during several centuries (at least, at the present stage of the earth's existence); but it is caused by the fact that the earth, during its yearly revolution, does not remain at the same distance from the sun, its orbit being an ellipse, as you remarked in the answer above: the earth thus moving sideward in relation to the sun, and at the same time alternately approaching or receding, accelerating and retarding in its yearly orbit, causes an irregularity in the apparent place of the sun at the time of its crossing the meridian, or, in other words, the apparent daily motion of the sun is sometimes accelerated and sometimes retarded, and therefore the center of the sun passes the meridian sometimes before noon and sometimes after, when this time of noon is taken by a well regulated clock.

Tables have been calculated, founded on observation, how much these differences are for each day of different years, to within a fraction of a second, and such tables, with many others, are published several years in advance, by the Government at Washington, for the use of navigators, under the title of *American Ephemeris*. I extract from the *Ephemeris* for 1869 the following facts:

On Jan. 1, 1869, the sun will be behind the well regulated clocks nearly 4 minutes; March 1, nearly 12½ minutes; April 15, the sun will be nearly equal with the clock; May 15, the sun will be ahead nearly 4 minutes; June 15, the sun will be nearly equal with the clock; July 26, the sun will be behind nearly 6¼ minutes; Sept. 1, the sun will be nearly equal with the clock; Nov. 2, the sun will be ahead nearly 16¼ minutes; Dec. 24, the sun will be nearly equal with the clock.

It will be seen that the sun is four times a year equ with those well regulated clocks, which indicate the mean or average time, namely, April 15, June 15, Sept. 1, and Dec. 24; the sun is twice a year ahead of the clocks, namely, from middle of April to middle of June, and during the months of September, October, November and December; for the rest of the year the sun will be back of the clocks, and this change is taking place very gradually from day to day; the maximum days are given above.

Those dates and times shift slightly for other years, but to so small an extent as to be of importance only for navigators and astronomers, the same as the seconds and fractions of seconds given in the government tables, which I neglected in the above extract, for obvious reasons.

P. H. VANDER WEYDE, M. D.

Steam Temperature and Expansion.

MESSRS. EDITORS:—The expansion of saturated steam depends upon the temperature, and its pressure is about in proportion to its density. The expansion of a given pressure is easily found by formulæ patent to those who pretend to any theoretical knowledge upon the subject. Saturated steam does not exactly expand in accordance with the Mariotte-Gay-Lussac law, nor does any vapor, or even atmosphere, follow correctly the aforesaid law; in fact, the engineering world has to make the calculation by formulæ based upon practical results, obtained experimentally. The expansion of steam cannot be found correctly for any given pressure or temperature by the use of one formula. The existence of over forty-five different formulæ prove that we know as much about the expansion of steam as we know of the square of a circle; furthermore, steam (superheated steam) can exist at all temperatures, even below zero; if such was not the fact there would be no water in liquid form on the globe; it would have been long before this time, changed into solid ice at the polar regions.

It requires but a few words in order to show the error of Mr. Sisson's ideas regarding his own theory on expansion of steam. (See page 52, current volume.)

It is a well known fact to almost every apprentice in a machine shop, that steam engines cutting off steam, at usual pressure, at one fourth stroke, or below, still exhaust steam at a temperature above 212° of heat; if Mr. S.'s assertion be true, it would prove all steam engines cutting off steam at one half stroke, or below, a nuisance, they could not exhaust anything but water at a temperature far below the boiling point. Did this fact ever occur to Mr. S.?

Mr. S. also affirms that steam at seventy-five pound pressure cannot expand to twice its bulk without going below 212° of heat. I would advise Mr. S., in order to convince himself of the utter fallacy of his ideas upon steam expansion, to place his hand into the exhaust pipe of an engine that is working steam at seventy-five pounds pressure, at one fourth stroke, and I affirm that he will find nothing left of his theory but a burned hand.

Mr. S. speaks of expanding temperature to double its bulk, etc. Does Mr. S. measure heat by the bushel, or by weight?

Buffalo, N. Y. H. W. D.

House Fly Parasite.

MESSRS. EDITORS:—One afternoon, during the summer of 1866, a common house fly attracted my attention, from being thickly bespread with what seemed to be a red powder. After capture I detached some of the colored matter and placed it under the microscope, when it was immediately resolved into well developed insect life, apparently of the "tick" family, and of a cochineal color; repeated observation and experiment gave like result, then, and in the summer of 1867.

Having never seen an account of similar experience, nor met with any who have, perhaps your extended observation and acquaintance might throw some light on the matter, as to whether the occurrence is general, or confined to locality; or whether the fact has any bearing on the transmission of diseases among humanity. The latter idea may appear far-fetched, but it will be recollected that flies were at one time a plague to the Egyptians; probably from quantity, but possibly from some other cause. Judging roughly, it would seem a fair estimate to say, that did human parasites bear the same proportion to man, as those spoken of to the fly, we should have fleas and other "outside passengers" of about one fourth pound each in weight. ENTERPRISE.

Cincinnati, O.

Potassium and Sodium in Manures.

MESSRS. EDITORS:—On page 217, present volume of your paper, I notice an article stating that M. Eugene Peligot disapproved of the use of potassium and sodium as fertilizers, because by experiment he could find no traces of their presence in vegetables grown on soil where they had been used. Now, I used a quantity of compound sodium, that is, in the form of carbonate of natron, on my farm, and thereby made five spears of grass to grow where one grew before, and twice as stout. Yet, by analyzing the vegetable, I would not, perhaps, find a particle of sodium, while it was the very element of its growth. I pretend to say that potassium, or sodium, especially when combined with carbonic acid, is of the greatest benefit to vegetables. They undergo chemical combinations with the soil, thereby setting other substances free which nourish the plants. E. C. HASERICK.

Lake Village, N. H.

Self-adjusting Telegraph Magnets.

MESSRS. EDITORS:—Your correspondent, "S." (page 178), in asserting that a self-adjusting magnet is an impossibility, evidently refers only to the case of lines worked with two terminal main batteries and a "closed circuit," as is the usual custom in this country. If the transmitting station *only* uses a battery, it is evident that the key will break the *whole* of the electric current in all cases. This is known as the "open circuit" arrangement, and was formerly employed on the Bain lines in this country, and is at the present time much used in Europe.

The vital principle of Duxbury and Roberts' system referred to by your correspondent, D. C. S. (page 211) is that of working with reversed currents, the dots and dashes being transmitted with one poole of the battery and the spaces with the other by means of a reversing key. This method necessarily renders the receiving magnet self-regulating, because the same force is alternately used to move the lever in one direction and the other, opening or closing the local circuit as the case may be. This principle of working reversed currents is as old as the English needle instrument of Cooke and Wheatstone. The Morse system has also been worked with reversed currents for a number of years in Europe, with the best results, the relay being composed of a straight, soft iron bar movable within its helix, and which plays between the opposite poles of two fixed permanet magnets. This is obviously better than Duxbury and Roberts' plan of using neutralizing local batteries, whose electro-motive force is necessarily variable.

In his communication, "S." remarks that "a self-adjusting magnet must be one that will obey changes of current, no matter how slight, when made by the operator, but will refuse to act from accidental causes, however great," and as no magnet can do this, therefore, a self-adjuster "is an impossibility." If the accidental disturbing cause, produces a greater effect on the receiving instrument than the transmitting key at the remote station, it would clearly be equally impossible for an *operator* to adjust his instrument so as to receive the communication. What is needed in an instrument of this kind, is merely that it shall do its work *as well* as a practiced operator, and I see no reason to doubt the possibility of the invention of such an instrument adapated to the requirements of the Morse lines as now worked in this country.

ELECTRON.

New York city.

Rattlesnake Poison---Its Antidote.

MESSRS. EDITORS:—On page 198, current volue, of your journal I notice a statement that Dr. S. W. Mitchell, of this city, has been experimenting upon the venom of rattlesnakes, and thinks there is no antidote to the poison, the remedies usually applied being nearly or quite useless.

I was somewhat disappointed at this announcement, as I had hoped and believed that we had found a perfect antidote to all poisons of reptiles and insects, in iodine and iodide of potassium. Several years since, Dr. J. S., now of this city, informed me that he had practiced medicine for 18 years near the Blue Ridge, in this State; that during that time he had had a number of cases of rattlesnake bite, and never failed to cure with iodine, or iodide of potassium, externally applied.

Inclosed I send you an article, cut from a paper published some two years since. I am anxious to learn if Dr. Mitchell has tried this remedy and found it of no use:—

"After many experiments by the officers of the Smithsonian Institute, and other scientific gentlemen, a certain cure is said to have been found for snake bite. It is as follows: Ten grains iodide of potassium, and thirty grains iodine, to be dissolved in one ounce of water, to be kept in a bottle with a ground glass stopper, and to be applied externally—*never internally*. If possible, stop the circulation in the parts bitten by bandaging, and use a stick or anything to tighten the bandage, and apply the solution to the bite with a piece of cotton, sponge, or anything that will hold the fluid, and then bind it to the wound and keep wet until the cure is effected. It is said that five drops of undiluted poison from the fangs of a rattlesnake, mixed with five drops of the above solution, and inserted in a wound with a syringe, was as harmless as ten drops of water."

D. S.

Philadelphia, Pa.

MESSRS. EDITORS:—I see an article in No. 13, current vol., on the poison of rattlesnakes, in which Dr. Mitchell, of Philadelphia, asserts there is no antidote to the poison of rattlesnakes. I will state, for the information of the Doctor and others, that there is an antidote for the poison of the prairie rattlesnake, the large yellow rattlesnake, and copperhead snakes. I will give the remedy so that no one can mistake. Take a handful of garden rue; bruise it with a hammer; lay it in a dish, and add half a pint of the best cider vinegar, and then let it stand for five minutes. Then take a rag or sponge and apply or bathe the snake-bite wound with the liquid of the rue; then, after bathing a few minutes, take the rue out of the vinegar and apply it, as a poultice, to the wound, and renew the poultice as long as there is fever, and the cure is effected permanently. Alcoholic liquors are very good, but rue and vinegar will relieve all pain in five minutes after being applied. I have seen it tried on four persons, and also on horses and cattle, and never knew it to fail.

ISAAC B. HYMER.

North Manchester, Ind.

Vaccine Virus---Inoculation for Small Pox.

MESSRS. EDITORS:—In a recent article on the cholera, in the SCIENTIFIC AMERICAN, the casual remark is made that "the small pox is made harmless by passing the disease through one of our domestic animals."

Although this is the popular belief, it is not true, in fact. Vaccine matter was originally obtained from an irruptive disease peculiar to the cow, and, for aught I know, is still so obtained as occasion or opportunity may offer, and not by inoculating one of those animals with the virus of the small pox, as many suppose.

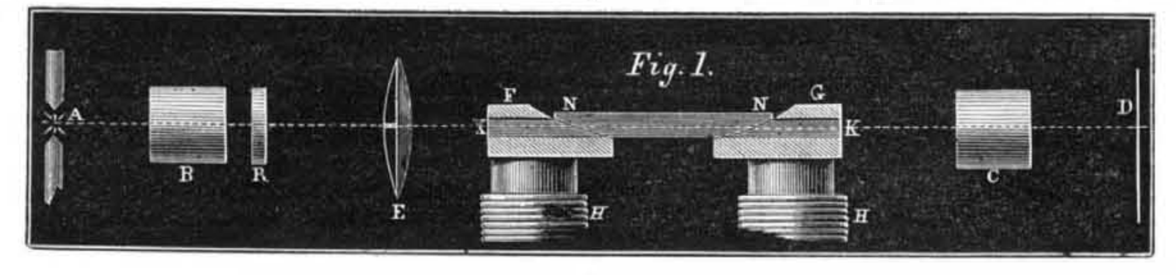
Many years since the small pox broke out in my native town; a young resident physician, acting on this idea, and desirous of procuring vaccine matter as pure as possible, inoculated a healthy young cow with matter from one of his pa tients, and with matter thus obtained inoculated a number of children. The result was the small pox, in its worst form.

Perth Amboy, N. J. G. O. READ.

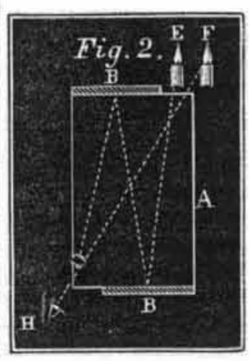
ROYAL INSTITUTION.

The London *Engineer* says: Prof. Tyndall has closed his series of lectures on "The Discoveries of Faraday," the last two afternoons of the series being devoted to the explanation of the phenomena of diamagnetism, and the action of the magnet upon rays of light. The experiments were, therefore, necessarily of a very curious and interesting description, the following being one of the best of them:

In the annexed engraving, Fig. 1, A is the electric light between the two carbon points; B and C are Nicol's prisms to polarize and analyze the ray of white light, A D. A double convex lens is placed at E, and F G are two movable poles of peculiar shape placed upon the top of the electro-magnet, H H. The square movable soft iron poles have holes through them, K K, to permit the passage of the ray of light. N N is a short square transparent rod of Faraday's heavy glass. R is a thin transparent circle of quartz, composed of two half circles, one being a piece of right-handed quartz, and the other a piece of left-handed quartz, placed opposite to each other, and so arranged that the two halves should give either complementary or the same colors in the polariscope. The lecture room was darkened, then a beam of light was sent through the whole arrangement described above, and the lens, E, so adjusted that a small circle of light was projected upon the screen, D. The quartz circle, R, was then turned till its two halves gave exactly the same color upon the screen. Upon sending a current of electricity round the electro-magnet, H H, the magnetism produced exerted some peculiar action upon the piece of glass, N N, which caused one half of the circle of light upon the screen to change to a red color, and the other half to a green. When the current was sent round the magnet in the opposite direction the colors upon the screen were reversed, the red and green changing sides with each other. Upon breaking the current the whole disk assumed its normal puce color, both halves of the circle being then alike. When the piece of heavy glass was removed from between the poles of the magnet none of the effects just described could be produced, thereby proving that the magnetism sets up some change in the molecules of the heavy glass.



In place of Faraday's heavy glass a solution of sugar without the aid of magnetism, will cause the plane of polarization to rotate. But this phenomenon is not exactly of the same kind as that discovered by Faraday. For instance, if the ray be sent through the solution of sugar it will cause the plane of polarization to rotate in one direction, and if it be reflected back again, through the solution, it will be rotated in the other direction, and these two actions will neutralize each other. When the ray, on the other hand, is reflected back again through the heavy glass the original effect is increased instead of neutralized. Faraday's method of reflecting the beam several times through the glass was a marvel of experimental ingenuity and simplicity, as shown in Fig. 2, where A is a square block of heavy glass. B B are the portions of the two ends of the glass which were silvered to produce the desired reflections. Now, let a candle be placed at F, a ray of light from it would traverse the glass in a straight line, and enter the eye at H, without being reflected. But let the candle be shifted to E, and the ray of light would have to be reflected twice, as shown by the dotted lines, ere it could enter the eye. On shifting the candle, E, still further to the left, the ray must undergo a still greater number of reflections ere it could enter the eye.

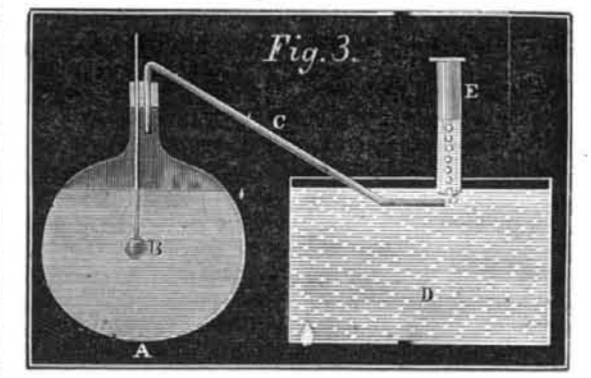


The lecturer stated that although Faraday was very bold he was very cautious, and he never ventured to express an opinion as to the exact change in the position of the molecules of the heavy glass set up by magnetism. As far as Professor Tyndall knew, Sir William Thomson is the only philosopher who has ventured an opinion upon the subject, and he thinks that in this experiment the magnetism makes the molecules of the heavy glass take up a motion of rotation. To show that in all probability magnetism brings a strain to bear upon the molecules of heavy glass, Professor Tyndall took a prism of this substance and bent it in the polariscope, and the strain enabled light to find its way through the prisms of Iceland spar, although the latter were so arranged that light could not get through till the prism of glass under strain was interposed. Biot's new experiment, wherein a long piece of glass vibrating longitudinally is placed crossways between the prisms of the polariscope, was also exhibited to show that glass under the influence either of a strain of tension or a strain of compression has an action upon polarized light.

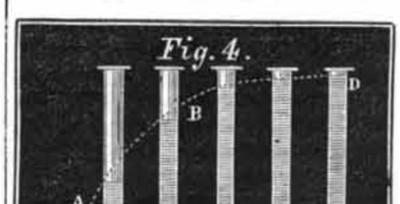
After the discovery of the effects of magnetism upon polarized light, Faraday hung a piece of heavy glass by a thread between the poles of his electro-magnet, and found that the bar placed itself at right angles to a line joining the poles. He then tried other substances, and tabulated the results, giving at the same time the name of diamagnetism to the new phenomena. The experiments in diamagnetism were difficult te present to a large audience, because of the smallness of the effects, but Prof. Tyndall overcame the difficulty by placing an electric lamp in front of the electro-magnet, and throwing a large shadow of the latter upon the screen. Hence any motions of little pieces of bismuth or other diamagnetic substances were seen upon the screen by everybody present. Pieces of carrots, apples, and such things were thus shown to be acted upon by magnetism. The lecturer specially pointed out the remarkable fact that although nitrogen is inert to the magnetic force, and oxygen is attracted by it, yet nitric acid is diamagnetic. Lastly, he exhibited the action of the magnet upon flame, by placing a lighted candle between the closely approximated poles of the electro-magnet. When the magnetism was induced by the electric current, the flame instantly bent down as if a stream of wind were blowing between the two poles.

Mr. Harcourt, Secretary to the Chemical Society, gave a Friday evening lecture at the Royal Institution on "The Times in which Chemical Actions take place." His experiments were in some cases so delicate as to be more fitted for the laboratory than the lecture room, but were of a very curious character, trenching upon a quite untrodden branch of molecular physics. He added some chloride of barium to sulphuric acid, the result being that a white milky precipitate was instantly produced. Next he added chloride of calcium to sulphuric acid, and the sulphate of calcium formed so slowly that the liquid took many minutes to turn milky. Some sulphurous acid was next added to a weak solution of bichromate of potash, a green color being immediately produced. But when oxalic acid was added to a solution of bichromate of potash, decomposition took place very slowly.

In the next experiment Mr. Harcourt heated solution of nitrate of ammonia very carefully, the result of heating this salt to a temperature short of 212° F. being to resolve it into nitrogen gas and water. As the salt in the solution diminishes in quantity the volume of gas given off becomes less and less. To make this experiment with scientific accuracy the lecturer nearly filled a flask, A, Fig. 3, with the solution, and a Centigrade thermometer, B, was fixed in the cork, so that the bulb should be beneath the surface of the solution.



A bent tube, C, conveyed the gas as it was formed into the pneumatic trough, D, where it was collected as fast as formed in long narrow gas jars similar to that at E. The mode of operating was this: A flame was applied beneath the flask, A, and the temperature of nitrate of ammonia gradually raised to 88° Cent.: when this degree of heat was reached the flame was turned down to keep the solution steadily at this temperature. The gas generated before this temperature was reached was allowed to escape. When the liquid kept steadily at 88° Cent., the gas given off was allowed to flow for one minute into gas jar No. 1, next for one minute into jar No. 2, and so on till five jars had been used, each containing the quantity of gas given off in one minute by the solution at a fixed temperature. The result proved that there was a relation between the quantity of nitrite in the solution and the quantity of gas given off. The jars, when arranged on the lecture table, gave the rough outline of the curve, A B D, Fig. 4.



In the next experiment four flasks were half filled with a solution of oxalic acid, a little sulphuric acid being also added, simply to quicken the action in the presence of the audience. A little measured permanganate of potash was then added to the first flask; half a minute then elapsed, and a little permanganate was added to the second flask, and so on throughout the series, half a minute being allowed between the measured additions to each flask. A yellow precipitate gradually formed in each flask after the addition of the permanganate. Next a solution of iodide of potassium was added to each flask, and this stopped the action going on by destroying all the undecomposed permanganate in the solution, iodide being liberated in its place. As it is possible to measure the exact quantity of iodine thus liberated, the quantity of per-