long by fifteen feet diameter, and will have a draught of nine feet of water when afloat. All being riveted water-tight, it will be rolled into the sea and across the sandy bed of the water until it floats. It will then be turned over and the manholes at the top opened, and about thirty tons of ballast will be put in to keep the ends vertical, so as to act like stem and stern. It will then have two keels, a rudder, spar deck, mast and lug sails attached, and be provided with an anchor and good chain cables, and, if necessary, a pump in case of leakage. The cylinder ship will then be fit to go to any port of the world with its freight, and in any weather.

The cost of this operation will amount to about $15,000. The obelisk in its case will be towed over during the summer months and laid aside the Thames Embankment on a platform properly prepared for the purpose and lifted high enough to clear the parapet, and the bilge keels and other additions being stripped off, the cylinder will be rolled to the proposed site and then stripped off the obelisk, which will lie ready to be elevated to its pedestal, an operation which will be simply effected by means of a few balks of timber and two small hydraulic rams. The whole cost is not to exceed $50,000, and that of the obelisk at Paris is said to have been $400,000.

ASTRONOMICAL NOTES.

Observatory of Vassar College.

The computations and some of the observations in the following notes are from students in the astronomical department. The times of risings and settings of planets are approximate, but sufficiently accurate to enable an ordinary observer to find the object mentioned. M. M.

Positions of Planets for April, 1877.

Mercury.

Mercury cannot be seen early in the month. On April 1, it rises at 5h. 42m. A. M., and sets at 5h. 52m. P. M. On the 5th, it is at its superior conjunction, that is, it ranges with the sun and on the side remote from the earth. On the 30th, Mercury rises at 5h. 49m. A. M., and sets at 8h. 47m. P. M. At this time it should be looked for in the twilight, some degrees north of the point of sunset.

Venus.

Venus cannot be seen. It is approaching superior conjunction, is apparently small, and ranges nearly with the sun.

On the 1st, Venus rises at 5h. 32m. A. M., and sets at 5h. 32m. P. M. On the 30th, Venus rises at 5h. 1m. A. M., and sets at 6h. 40m. P. M.

Mars.

Mars can be seen only in the morning. On April 1, it rises at 2h. 14m. A. M., and sets at 11h. 20m. A. M. On the 30th, Mars rises at 1h. 24m. A. M., and sets at 10h. 56m. A. M.

Mars can be recognized on April 30 by its position relatively to the double star a^2 *Capricorni*. It is south and east of this well known star.

Jupiter.

Jupiter is coming into better position. On April 1, Jupiter rises at 1h. 2m. A. M., and sets at 10h. 4m. A. M. On the 30th, Jupiter rises at 11h. 6m. P. M., and sets at 8h. 8m. the next morning. Jupiter is very low in the south, but can easily be known by its size. It is among the stars of *Sagittarius*, moving very little through the month, stationary on the 19th, and after that date is retrograde in its motion.

Saturn.

Saturn is visible for very few hours. It rises on April 1 at 4h. 53m. A. M., and sets at 3h. 57m. P. M. On the 30th, Saturn rises at 3h. 6m. A. M., and sets at 2h. 18m. P. M.

Uranus.

Uranus is the only planet in a good position for observations. On the 1st, Uranus rises at 1h. 56m. P. M., and sets at 3h. 48m. the next morning. On the 30th, Uranus rises at noon and sets at 1h. 53m. A. M. of the next day.

Uranus is occulted by the moon on the 21st a little after midnight. The moon passes directly between the earth and the planet, and hides the latter from our view. According to the *Nautical Almanac*, the planet disappears behind the moon at 12h. 31m. A. M. (Washington time), and reappears at 1h. 24m. A. M. of the 22d.

Uranus will be low in the northwest at this time, but it will not set until some twenty-five minutes after two; and as the moon will be just past its first quarter, the observation of the phenomena can be easily made, and cannot fail to be interesting. An ordinary opera glass will render Uranus visible as the moon approaches it, and the difference of color between moon and planet will be very noticeable.

Sun Spots.

The report is from February 19 to March 16 inclusive. The pictures of February 19 and February 21 show the sun's disk free from spots. From February 21 to March 1, photographing was prevented by clouds. The pictures of March 1 and March 3 show, near the center of the disk, a large group, consisting of a large spot surrounded by a chain of small ones, and above this a very small spot. On March 5 the small spot could not be found, and a change was observed in the number and arrangement of the spots in the group. On March 6 the small spots in the group were no longer seen, and only the large one remained, while near the center a pair of large spots was observed which had not been visible on March 5. The observation of March 8 showed the group still visible, but the single spot had passed off. On March 9 the disk was free from spots. On March 10 a very small spot in the midst of faculæ was seen on the western limb. From March 10 to March 16, whenever observations have been made, the disk has been uniformly free from these phenomena.

[For the Scientific American.]

THE SEPARATION OF COBALT FROM NICKEL BY COLORIMETRIC TEST.

BY LEONIDAS SCHUCH, PH.D., NEW YORK.

The handbooks of chemistry give methods for the separation of cobalt from nickel which could only be practically used when operated on a large scale, and with a considerable expenditure of time and money. Induced some time ago to seek a practicable method, I herewith give the results of my experiments to the public. The ore used was iron pyrites carrying cobalt and nickel free from arsenic, dispersed in green or black hornblende. This ore is found at Stony Point, Rockland county, N. Y., where a vein of it appears almost on the surface. The mat produced by cupola furnaces consists especially of sulphuret of iron, about 1 per cent of cobalt and nickel, and 3 per cent of copper. The mat is nearly all dissolved by diluted sulphuric acid, copiously evolving sulphureted hydrogen. Iron vitriol stays in solution, and this is crystallized and brought to market, and the remainder is a muddy, black deposit in the form of carbureted iron, bisulphureted iron, and the sulphurets of cobalt, nickel, and copper, slowly and only partially soluble in concentrated acids. The black residuum is separated from the mother liquor by strong pressure, and mixed to a pulp with English sulphuric acid in ample stone jars, and soda saltpeter added (with occasional stirring) as long as red vapors rise. Very remarkable heating of the mixture takes place, and nitrous acid is evolved. The end of the operation is at hand when the pulp begins to solidify, and the whole mass appears of a rather brown color. The mass is then emptied into vats, and cold water under agitation added. The undissolved part, consisting mostly of sandy particles, is deposited there.

The clear supernatant liquid which holds in solution (besides the salts of iron) the salts of cobalt, nickel, and copper, is mixed with a thin pulp of hypochloride of lime, until ferrocyanide of potassa fails to produce a blue color. Finally the iron salts are thrown down with chalk. The liquid separated from the iron salt contains now cobalt, nickel, and copper. After passing sulphureted hydrogen gas through the solution (by which operation the copper is taken out), the liquid, holding considerable quantities of lime salts, is treated with sulphuret of soda (which latter is prepared by boiling together soda, slaked lime, and sulphur). The deposit of the sulphureted metals is washed as much as possible, pressed, and, by additions of concentrated sulphuric acid and soda saltpeter, dissolved. The liquid, brought to the boiling point, is neutralized with soda until metallic carbonates begin to separate, and then treated with a solution of hypochloride of soda (made of hypochloride of lime and soda); and after each addition, a small portion of the precipitated hyperoxyd of cobalt is separated by filtration to observe the change of color.

By the first precipitation, there is a pink-colored solution produced, which gradually, by continued additions of the precipitating medium, turns to a grayish green. When the filtrated liquid stays at a pure green, the point is at hand where all the cobalt is separated. A solution of a pure nickel salt, kept in a test tube of the same diameter as that used for filtration, can serve as a guide.

To ascertain when the separation of the two salts is perfect, it is necessary to make a quick test. A small portion, neutralized with an excess of ammonia until a light blue nickel salt solution is obtained, is filtered through a small paper filter. Change of the color (by the formation of oxycobalt salt) of the filtrate is a proof that the separation is not entirely effected; in which case an additional quantity of the hypochloride of soda is carefully added till no change of color takes place after filtration; the separation is then completed. The liquid now is left undisturbed until the clear supernatant part can be drawn off, the hyperoxyd of cobalt filtered, and the adherent liquid finally separated from the deposit by pressure. The solution of the nickel is now brought to the boiling point and the metal precipitated by a solution of hypochloride of soda, as hyperoxyd of nickel.

Finally, I have to state that, by the presence of cobalt in nickel salts, or *vice versa*, the color of either one of the salts is rendered grayish green or reddish green, the phenomenon of which explains itself by the complementary action of red and green.

How to Use a Galvanic Battery in Medicine.

Dr. Herbert Tibbits recently delivered an important lecture on the above subject before the Hunterian Society of Edinburgh, Scotland. After discussing the various modes of applying electricity, he explained that, the dry skin being a non-conductor of electricity, dry metallic conductors from an electrical instrument in moderate action when applied to it produced only sparks and crackling, but no physiological phenomena, the electricity not penetrating the skin; but that, if these metallic conductors were replaced with well moistened sponges, very variable phenomena of contractility or sensibility were produced, according as the electricity acted upon a nerve, a muscle, or an osseous surface. That the voltaic current was applied as an interrupted and as a constant current; in the former case, the current being interrupted by gliding over the skin one or both of the conductors, or keeping one stationary and lifting and re-applying the second at intervals; in the latter, by maintaining both conductors immovable, or by the feet or hands of the patient being immersed in tepid water with which the conducting wires of the battery were in contact. Radcliffe's "positive charge" was then explained, and it was shown that by connecting the negative pole of the battery with the earth, and carefully insulating the patient, the negative electricity passed away, and that the patient remained charged with positive electricity only. Direct muscular electrization, by placing the conductors upon points of the skin corresponding to the muscle, was then contrasted with indirect muscular electrization, consisting in causing muscular contraction by acting upon the special nerve-trunk and branches, instead of placing the conductors upon the muscle itself, and the methods of electrizing the brain, spinal cord, internal organs, and organs of the senses were shown.

The general principles of electro-therapeutics were then considered: that the influence of faradaism in those cases in which it does not produce muscular contraction is chiefly stimulant; that where it does produce contraction it acts in addition as an artificial gymnast, imitating natural muscular action in a way quite impossible to any agency but electricity; that the interrupted voltaic current is similar in its action upon muscle to faradaism; but that this is complicated by chemical effects upon the animal tissues, and by special influences upon the central nervous system. That the constant voltaic current differs altogether from either of the above; that it consists not only of a current which is continuous, and which does not vary in power during the application, but of this current so applied to the patient by the operator that its flow through that part of the patient's body to which it is directed shall be as continuous as the stream of the current from the battery to the conductors; and it was strongly insisted upon that unless thus applied it is not a constant current at all, and that its therapeutic application will be unsatisfactory; that the effects of the current thus applied are chiefly sedative, restorative, or refreshing and absorbent; that it possesses great power, power sometimes unapproached by any other remedy, in relieving pain; that in its application for the relief of neuralgia the sponges should be so applied as to include the affected nerve in the circuit; that the strength of current should not be sufficiently great to produce pain; and that not only should the conductors be maintained quite immovable, but that care should be taken that the strength of the current should be so gradually increased that no shock is felt, and at the end of the application it must be as gradually decreased. Length of application from five to ten minutes, and frequently, usually, once or twice daily.

Dr. Tibbits believes that in severe and obstinate cases the full sedative effect of the current is only to be obtained by applying it as frequently as the paroxysms of pain recur. The use of electricity in muscular rheumatism and rheumatic gout was next considered, and cases quoted. In cerebral paralysis no support was given to cerebral galvanization, and it was advised that peripheral faradization should not be used until three or four months after the attack, and then only of a strength just sufficient to bring the muscles into full contraction, but that in cases in which the paralyzed muscles were cold, blue, flaccid, and ill-nourished, they should be well sponged with the voltaic current alternately with faradization. Applications to be made daily, or every other day, for from five minutes to fifteen minutes. In spinal paralysis the evidence in favor of direct electrization of the cord was said to be much greater than could be adduced in support of similar treatment of the brain, and when powerless to cure, it not unfrequently relieved some of the most distressing symptoms. Peripheral faradization should not be employed during the early periods of active mischief in the cord, but in the persisting localized paralysis following upon myelitis it is often of the greatest service, especially in relieving symptoms of paralysis of the bladder and rectum: the dribbling of urine, which is so troublesome in some paraplegic cases, being frequently relieved. In locomotor-ataxy the constant current was recommended as often relieving many of the symptoms. Reference was made to Dr. Poore's successful treatment of writer's cramp by localizing the voltaic current in the nerves of the affected muscles, and exercising these muscles during the passage of the current by various gymnastic movements; and two successful cases were quoted in which faradization of the antagonists of the suffering muscles, united with the localization in the muscles themselves of Radcliffe's "positive charge" for fifteen minutes daily, had resulted in a cure. The subject of essential infantile paralysis was then discussed, the lecturer saying that the more his experience of this disease extended the more strongly did he feel how lamentable it is that the physiological treatment of the affected muscles in this affection has not yet become the routine treatment invariably directed by the practitioner in attendance, and that within a short time of the onset of the disease. Were it so, he added, an incalculable amount of helplessness and subsequent unhappiness would be spared to children; and if proper treatment is adopted in time, the greater number of cases admit of cure, and where perfect recovery cannot be obtained we have the great authority of Mr. William Adams for the statement that deformity ought never to result.

A case was then detailed which was first seen by Dr. Tibbits in 1869. The child was then suffering from a typical attack of infantile paralysis affecting the muscles of the left thigh and leg. Electrical treatment was recommended, but circumstances only allowed of its administration upon three or four occasions, and the child went to India, returning in June, 1875, with a useless leg measuring some inches less in circumference than the healthy limb. There being complete abolition of reaction to both currents in all the affected muscles, no hope of benefit was entertained; but at the earnest request of the mother, she was taught how to apply electricity, and recommended to do so daily, in addition to shampooing. The treatment has been carried out almost daily for sixteen months with a result that is surprising. There is now little difference in the appearance of the two limbs; there is reaction in all the muscles but the anterior tibial muscles, and a large amount of voluntary power has returned.

NEW YORK ACADEMY OF SCIENCES.

The regular monthly meeting of the Academy wa. held at 64 Madison Avenue on March 5, 1877. After some routine business and the election of several new members, Mr. T. O'Conor Sloane, E.M., read an interesting paper on a new and accurate method of

DETERMINING SULPHUR IN ILLUMINATING GAS.

After describing and illustrating the methods usually employed, Mr. Sloane proceeded to exhibit his apparatus, which, he claimed, possessed the following advantages: First, the air which supports the flame is purified to remove any sulphur contained in it, an important precaution when performing an analysis in or near the place where the gas is made; second, no aspirator is required. The burner employed is made by unscrewing and removing the base of the ordinary Bunsen burner, closing all the openings but one, and inserting it in a brass tube 1 inch in diameter. A tapering or funnel-like tube is screwed to the lower end of the latter, thus reducing its diameter to half an inch, so that it can be inserted into the perforated cork of a large bottle. Another tube about 2 inches in diameter and 2 inches long is screwed on the upper end of the latter, and filled with water to form a water joint about the chimney of the burner. A large bent tube of glass leads all the products of combustion into a large tubulated bottle, placed horizontally and containing a solution of permanganate of potash and hydrochloric acid. From the tubulus of this bottle another tube leads into a second bottle containing the same mixture. About 5 cubic feet of gas are burned in a small thin flame. The air which supplies the burner passes through a bottle filled with broken glass and marbles, which are moistened with a solution of permanganate of potash. The sulphur compounds in the gas are burned, forming sulphurous and sulphuric oxides; by contact with the chlorine and permanganate of potash they form sulphate of potash. At the close of the operation the liquid should still have a violet color. The excess of permanganic acid is destroyed by boiling, or by adding alcohol. The sulphuric acid is then precipitated by means of a barium salt, and weighed as sulphate of barium.

The chemical section met at the same place on Monday evening, March 12, 1877, Professor Martin in the chair.

Mr. Amend exhibited a fine specimen of scapolite.

Dr. Bolton then read a paper by Professor Lupton,

ON THE FISHLIKE ODOR OF POTABLE WATERS.

Professor Lupton ascribes the fishlike odor of some of the waters of Nashville, Tenn., to the presence of *algæ* and other low plant forms in the water, since he found that the residue left on filtering the water, and consisting for the most part of *algæ*, developed a strong odor of fish when treated with warm water. During the discussion, which arose after the reading of this paper, Mr. Cox was of the opinion that no proof had been adduced to show that the odor arose from *algæ*. Professor Leeds re arked that the researches of a French chemist had shown that, as the amount of oxygen dissolved in the water decreased, the amount of lower vegetable life increased. Professor Seely thought it would have been well to have ascertained if the odor did not really arise from the presence of putrefying fish in the water.

Dr. P. Townsend Austen then read a paper by Drs. Cech and Schwebel, of Berlin, on

A NEW FORMATION OF ISOBENZONITRILE.

In the course of some introductory remarks, Dr. Austen said that the organic cyanides are particularly useful, since they form the stepping stone from the organic halides to the acids. Thus we are able to pass from marsh gas into acetic acid by a series of typical reactions:

$$CH_4 + Cl_2 = \underset{\text{methyl-chloride.}}{CH_3.\ Cl} + HCl$$

$$CH_3.\ Cl + KCN = \underset{\text{methyl-cyanide.}}{CH_3.\ CN} + KCl$$

$$CH_3.\ CN + 2H_2O = \underset{\text{acetic acid.}}{CH_3.\ COOH} + NH_3$$

These same cyanides or nitriles, as they are also termed, may be derived by dehydration of the ammonium salt of the acid:

$$\begin{array}{ll} CH_3.\ COONH_4 & \text{ammonium acetate.} \\ \quad O\ \ H_2 & \\ \hline CH_3.\ CONH_2 & \text{acetamide.} \\ \quad O\ \ H_2 & \\ \hline CH_3.\ CN & \text{aceto-nitrile.} \end{array}$$

If we examine the constitution of the lowest member of the nitrile series, the nitrile of formic acid, hydrocyanic acid—

$$\underset{\text{ammonium formiate.}}{H.\ COONH_4} - {}_2H_2O = HCN,$$

we shall see that it contains a tetravalent carbon united with a trivalent nitrogen and a monovalent hydrogen, $H - C = N$. Knowing, however, that nitrogen often appears in the *rôle* of a pentivalent element, we can suppose the possible existence of a compound isomeric with hydrocyanic acid, and having the formula $H - N = C$. Although this acid is not known, several of its derivatives are. The first member of this series was discovered by Hofmann, who obtained it by treating aniline with chloroform and an alkali. The reaction is $C_6H_5.\ NH_2 + CHCl_3 = C_6H_5.\ NC + 3\ HCl$. This compound is called isobenzonitrile and is isomeric with the benzonitrile derived from benzoic acid:

Benzonitrile........................$C_6H_5.\ CN$.

Isobenzonitrile....................$C_6H_5.\ NC$.

Lately the class of isonitriles has received the generic name of "carbylamines." The isonitriles of the fat series have in many cases been obtained by treating an organic halide with silver cyanide. The silver cyanide seems to consist of a mixture of Ag CN and Ag NC. Finally, small amounts of isoacetonitrile are obtained in the preparation of the real nitrile by treating potassium ethylsulphate with potassium cyanide. The reactions of the nitriles and isonitriles are different and characteristic. On boiling the acetonitrile, for instance, with an alkali, ammonia is evolved and acetic acid is obtained. On subjecting aceto-isonitrile to the same treatment, methylamine and formic acid are formed.

The paper of Drs. Cech and Schwebel was then read. The authors described the production of dichloracetic ethyl ether by the treatment of potassium cyanide with chloral hydrate. The dichloracetic acid was obtained from this ether by treatment with hot concentrated hydrochloric acid under pressure. On boiling aniline dichloracetate with a dilute solution of caustic soda, the odor of isobenzonitrile was detected. The authors found the products of this decomposition of aniline dichloracetate were isobenzonitrile, hydrochloric acid, and formic acid.

Cast Steel Without Flaws.

We find in the report of a recent session of the Society of Mineral Industry, of St. Etienne, France, a very interesting communication from M. Pourcel on the fabrication of cast steel without flaws. M. Pourcel stated that, from the day when the different phases of the Bessemer process were explained *à priori*, the means of casting steel without flaws were discovered. It being known that silicon hinders the formation of carbonic oxide, it remained to determine the extent of the applications of the principle; and these are the analytic methods which, at Terre Noire, have led to the production of flawless cast steel. The following are the facts observed:

In the Martin furnace, on softening a gray silicious pig iron by means of successive additions of malleable iron or steel, it is found, by examining samples of the metal after each addition, that at a certain moment the metal is full of flaws. And further, if there be submitted to analysis a sample abstracted immediately before ebullition, silicon is found in combination with the metal exempt from flaws, while the metal may contain interposed scoriæ, but not free silicon. Such is the analytic result, the effects of which may be reproduced synthetically, thus: If silicon in the form of silicate of iron be added to a bath of steel entirely formed, the flaws are caused completely to disappear. It is true that this steel is generally red short, a condition attributed to the presence of silicon, not only by steel makers but by many eminent chemists. M. Pourcel, however, doubts the conclusion, and believes that silicon, in the proportions in which it is usually found, does not abstract from the steel any valuable qualities, and does not render it brittle, either when hot or when cold. The flaws which exist in cast steel—as Bessemer pointed out and demonstrated several years ago—are due to the carbonic oxide which is generated in the liquid metal by an intermolecular reaction between the carbon of the metal and the oxide of iron formed during the melting. When the metal remains liquid for a long period of time, the gases escape; but generally, the temperature of steel when run off being but little superior to that of its solidification, the carbonic oxide remains imprisoned, and causes flaws or silvery alveolæ disposed symmetrically and perpendicularly to the major axis of the ingot.

Silicon hinders the formation of these flaws, because it is more oxidizable than carbon through intermolecular combustion, the oxidizing body being either peroxide of iron or carbonic acid; but then, in place of the product of oxidation being a gas, it is a solid body which is produced in the mass of the metal, and is found uniformly disseminated among its molecules. It is a silicate of iron, a scoria interposed between the molecules, which renders the metal fragile when hot. The means of removing this scoria is to add a base, which causes it to liquefy; and for this purpose M. Pourcel uses manganese.

Manganese serves in the Bessemer process to remove from the molten metal the peroxide of iron which it holds in solution. It reduces it to its minimum of oxidation by taking one equivalent of its oxygen; and the combination of the oxide of manganese with the silicate of iron which is produced yields a very fluid scoria which liquates.

In lieu of silicide of iron, M. Pourcel has used a double silicide of iron and manganese. The two reducing agents, silicon and manganese, act simultaneously in the mass in fusion to reduce the peroxide of iron, and to prevent the formation of carbonic oxide; and the result of their oxidation is a silicate of protoxide of iron and of protoxide of manganese, very fluid at the temperature of solidification of steel, and which liquates easily. With regard to the silicide in excess, M. Pourcel thinks its effects are not deleterious.

While the process we have described is apparently quite simple in practice, its application is found to be both delicate and complex. Still the difficulties attendant upon it have been in great part resolved, and there is now produced at the Terre Noire founderies cast steel having nearly all the gradations of forged steel, from the hardest to the softest. The perfect homogeneity of these cast steels, a result of their chemical composition and the equilibrium of their molecules (which is produced by a reheating or hardening or varied nature), may, in M. Pourcel's opinion, lead to other results, such as have never been obtained with forged steels.

Transplanting Evergreens.

A correspondent says:

"I am aware that the general opinion and advice are that the time to transplant evergreens, whether trees, shrubs, or vines, is in the spring. I fell in at one time with this idea, and stated that in spring, just as the new growth was forming—just as soon as the buds began to swell—was the time to make a sure thing in the transplanting of an evergreen, no matter what the variety. In a long life of practice in the laying out of gentlemen's places, public grounds, etc., in my way as a landscape gardener, it has come to me that error existed in the aforesaid advice to plant only in the spring. I reason in this way: 1. It is not possible for a large number of those who plant evergreens to have them in the spring just when they should. 2. There is always more hurry of work in the spring than in autumn, and consequently the work of planting is not as thoroughly done as it should be. 3. In the month of September and early October the nurserymen are comparatively at leisure, and can give more and better attention to the digging and shielding the roots from the sun and cold dry winds, before they pack. 4. In the autumn, say from the 1st of September for three months, the evergreen is as near in its dormant state as ever; the ground is warm, and from fall rains is usually moist, without being really wet, as in the spring, and, being warmer than the atmosphere, Nature does what our best gardeners do when they propagate by bottom heat: she furnishes a bottom heat and moisture in sufficiency to cause new roots or rootlets (fibers, if you will) to grow from the wounds made in the work of digging, by which many of the supports of life, to the tree or plant, are lost. This renewal of new roots made in autumn not only aids the tree or plant to support itself during winter, but it goes to work in spring, and supplies food for growth; when the roots of trees planted in spring are struggling to make new fibers in a cold soil with the atmosphere twenty degrees above, and calling through the leaves for food.

"I write not from theory, but based on practical theoretical knowledge, and from practice in removal of thousands of evergreen trees and shrubs in the autumn months. Here let me say, that I prefer from the 10th of September to the 20th of October to do the work; but with due care never to leave the roots half an hour exposed to the sun or dry coid winds. There is no fear of want of success—provided the planter has the ground prepared for planting as it should be, and at the same time knows how to do the work."

A Colossal Organ.

We recently explained M. Montenat's new pyrophone, which consists of tubes of copper in which incandescent pieces of charcoal inclosed in wire gauze are introduced, to create an upward current of air and so to cause the pipes to sound. It is now proposed to construct an instrument on this principle on an enormous scale for the French Exposition of 1878, the tubes being large enough to receive small charcoal furnaces. The inventor points out that his device may be used as a fog signal, as it produces a loud noise and requires scarcely any machinery to operate it.

A New Use for Asbestos.

Some experiments have recently been successfully made in Italy on a new way of burning petroleum under steam boilers. The method consists simply in pouring the oil over a thin layer of asbestos. The petroleum burns with an intense heat; while the asbestos, being incombustible, is not affected, and thus not only serves as a means of retaining the oil, but, being so good a non-conducting substance, the prevention of fire from the volatile oil is obvious. In the experiments, sheets of paper placed beneath the furnace were not injured, despite the fierce incandescence of the oil above.

NEW BOOKS AND PUBLICATIONS.

ELECTRICITY AND THE ELECTRIC TELEGRAPH. By George B. Prescott. Illustrated. New York city: D. Appleton & Co.

We have already published in the columns of both SCIENTIFIC AMERICAN and SUPPLEMENT copious extracts from the advance sheets of the above work, from which our readers have doubtless ere this arrived at an idea of the thorough and complete manner with which it deals with some of the branches of the great science to which it relates. Familiar as we are with the progress which has been made in electrical knowledge of late years, we cannot but feel genuine astonishment at the immense advancement evidenced by the volume before us over what was known hardly ten years ago. Here is a book of nearly one thousand pages replete with engravings of devices of marvellous ingenuity, and yet this large volume does not exhaust a subject of which three times ten years ago the world understood scarcely more than a few empirical facts; and even regarding those, few who had studied them agreed. If the 19th century becomes memorable for nothing else, it certainly will be known as the age during which the science of electricity was developed. We have nothing but praise for Mr. Prescott's book. It is the best on its subject not merely in virtue of its being the latest modern work there on, but because it is written by a thorough electrical expert. Mr. Prescott writes whereof he knows, and knows well. He gauges inventions by the rigid rule of practicability and susceptibility to useful ends, and is chary of commendation when he fails clearly to see utility. He is therefore a safe and cautious guide, and the student who follows him will never be landed in doubtful theory or left in perplexity over questionable matters of practice.

A BEAUTIFUL CATALOGUE.—We have received from Messrs. B. K. Bliss & Sons their "Illustrated Gardener's Almanac, and Abridged Catalogue of Garden, Field. and Flower Seeds," for 1877. This is one of the most complete catalogues issued in this country, and valuable both to the practical farmer and florist, as well as to the gentlemen farmers and florists who seek merely to beautify their homes and raise vegetables and flowers for their households. Any one desiring a dollar's worth for 35 cents should remit the last named sum to 34 Barclay street, New York, and obtain a copy free by mail.