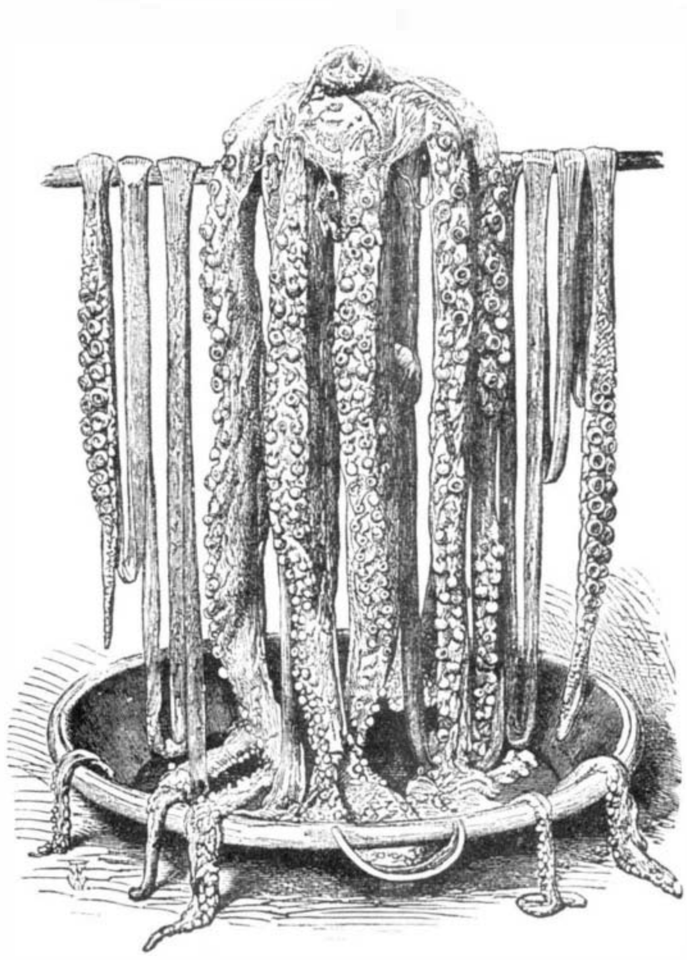
THE NEWFOUNDLAND DEVIL FISH.

Some weeks since we printed a letter from a correspondent in St. John's, Newfoundland, which was accompanied with a photograph, giving a description of a huge octopus or devil fish, found by some fishermen, entangled in their nets. We present herewith an engraving prepared from a photograph of this monster, which shows the head and arms with the beak in the center. The eyes are further back and do not appear. The nucleus is supported on a stand, and the eight short arms hang down with the suckers standing out prominently from the surface, the small ends resting in a round bath in which it had to be carried. A number of suckers are wanting in one arm, having been torn off in capturing the fish; the rest are perfect. At each side of the shorter arms the two long tentacles, 24 feet each, rest on a pole over which they have been doubled several times, their terminations, covered with large and small suckers, hanging down at the extreme right and left of the picture.

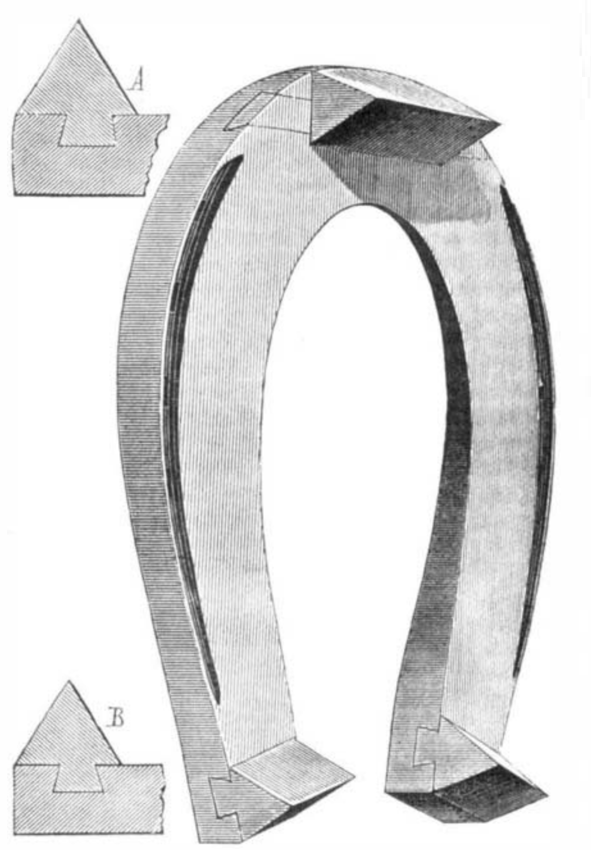
It is said that even this enormous creature is small beside some which infest the northern coasts of this continent, and of which trustworthy accounts are in existence. The terrible fate of any victim which may come within its clutches can well be imagined. Each of the short arms carries one hundred suckers; and the moment one of them touches the prey, the fish feels the contact and draws back a membranous piston. A vacuum is created and the edges of the disk are pressed against the surface of the victim with a force equal to the weight of the atmosphere added to that of the water above. The more the victim writhes, the more does it come in contact with other disks, each of which adheres; other arms soon encircle it, bringing it within reach of the powerful beak. "No fate could be more horrible," says a writer, in concluding a very graphic description of the monster, "than to be entwined in the embrace of those eight clammy, corpse-like arms, and to feel their folds creeping and gliding around you, and the eight hundred disks with their cold adhesive touch gluing themselves to you with a grasp which nothing could relax, and feeling like so many mouths devouring you at the same time. Slowly the horrible arms, supple as leather, strong as steel, cold as death, draw the prey under the fearful beak and press it against the glutinous mass which forms the body, and then, as the victim is paralyzed with terror, the powerful mandibles rend and devour." We doubt if the most depraved opium eater, in those terrible stages of delirium which succeed the delightful dreams induced by the drug, could imagine anything much more dreadful than such a death.



THE NEWFOUNDLAND DEVIL FISH.

BARNUM'S REMOVABLE HORSESHOE CALK.

Mr. John D. Barnum, of Amenia Union, Duchess county, N. Y., has invented a new removable calk for horseshoes, which, judging from the reports of its actual use, would seem to be a valuable and useful article. Its object is, while affording a sure footing to the animal on icy pavements, to economize in horseshoes and time; for instead of shifting shoes when the calks become worn out, it is only necessary to knock out the calks themselves, and very easily insert a new set. No especial shoe is needed, as all that is required to adapt the ordinary form to the device is the cutting of three grooves, one at either end and one near the toe, as shown in the annexed engraving. These grooves are made slightly tapering, and receive the dovetail tenon on the calks, as shown in the sections, A and B. The calk is attached by entering the small end of the tenon in the groove and then driving it tightly in. The projecting extremity of the tenon is then struck up or hammered smooth against the outer side of the shoe, forming a tight clinch.



When the calk has been worn and requires removal, it is only requisite to straighten out the clinched portion of the tenon and drive it out of the groove, when another calk may be inserted. Proposals regarding the investment of capital for manufacture, and inquiries for further information, should be addressed to the inventor as above.

Improvements in Concrete Construction.

A paper was recently read before the Institution of Civil Engineers, London, by Mr. Bindon Blood Stoney, C. E., "On the Construction of Harbor and Marine Works with Artificial Blocks of Large Size."

The author described a new method of submarine construction, with blocks of masonry or concrete far exceeding in bulk anything hitherto attempted. The blocks were built in the open air on a quay or wharf; and after from two to three months' consolidation, they were lifted by a powerful pair of shear legs, erected on an iron barge or pontoon. When afloat, the blocks were conveyed to their destination in the foundations of a quay wall, breakwater, or similar structure, where each block occupied several feet in length of the permanent work, and reached from the bottom to a little above low water level. The superstructure was afterwards built on the top of the blocks in the usual manner by tidal work. By this method the expenses of cofferdams, pumping, staging, and similar temporary works were avoided, and economy and rapidity of execution were gained, as well as massiveness of construction, so essential for works exposed to the violence of the sea. There was now being built in this manner an extension, nearly 43 feet in hight, of the North Wall Quay in the port of Dublin. Each of the blocks which composed the lower part of the wall was 27 feet high 21 feet 4 inches wide at the base, 12 feet long in the direction of the wall, and weighed 350 tuns. The foundation for the blocks was excavated and leveled by means of a diving bell, the chamber of which was 20 feet square and 6½ feet high. When the men were at work, the bell rested on the bottom. A tube or funnel of plate iron, 3 feet in diameter, rose from the center of the roof of the bell to several feet above high water level. An air lock in the top of this funnel afforded a passage up or down, without the bell having to be lifted out of the water. The material excavated was cast into two large trays, suspended by chains from the roof of the bell; when these were filled, the bell was lifted a few feet off the bottom, and the bell barge was drawn a short distance away from the line of the wall, where the stuff was discharged, by tilting the trays, and the bell returned to its work again. The hull of the floating shears was rectangular in cross section, 48 feet wide and 130 feet long. The aft end formed a tank, into which water was pumped to balance the weight of the block suspended from the shears at the bow of the vessel. The shear legs were rectangular tubular pillars of plate and angle iron, with a cross girder resting on the top; above this girder there were two sets of pulleys, through which were reeved the lifting (pitch) chains, formed of one and two flat links alternately. There were eight parts to each chain, or sixteen parts altogether, so that each part had to support, theoretically, one sixteenth of the suspended block. The inner ends of the chains passed down to the deck, where they were controlled by a pair of powerful crab winches driven by a 14 horse power steam engine, which also worked a centrifugal pump for filling or emptying the tank. The slack of the chains, after passing through the crab winches, was led under the deck, and was coiled up in the engine room over fixed pulleys by two donkey engines. When paying out chain, the donkey engines were thrown out of gear, and the crab winches on deck hauled up the slack according as it was wanted. Two cast iron girders were built into the bottom of each block, and at the end of each girder there was a rectangular hole. Four vertical tubes were built in the block over these holes in the girders, and the suspending bars were lowered from above and turned at right angles, so that their ends, which were T shaped, caught beneath the girders. The upper ends of the suspender bars were also T shaped, and were attached in a similar manner to the lower sets of pulleys, through which the lifting chains were reeved. When a block was set in place, the suspender bars were turned back 90°, and withdrawn for further use. Each block had vertical grooves left in the sides; and when two blocks were in place, these grooves formed a tube 3 feet square. A mass of concrete was subsequently thrown into the grooves, to act as a key or dowel between block and block; this completely plugged up the joints, which were only about ½ inch open on the face.

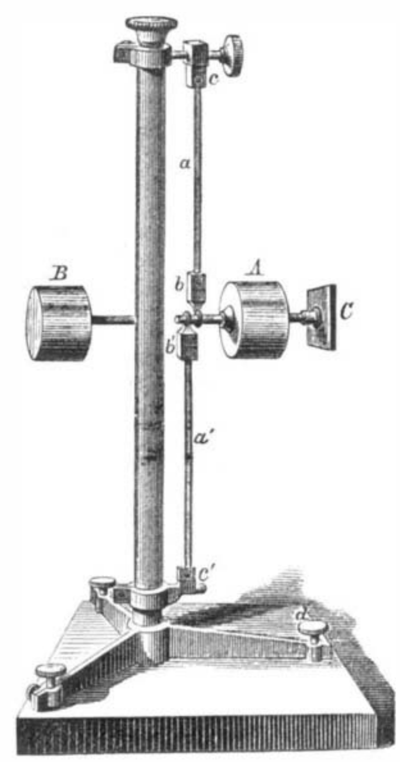
The paper also contained a description of an annular block of concrete 19 feet in diameter, weighing 80 tuns, which the author constructed for the base of a beacon tower, in the year 1863, and conveyed two miles down the Liffey, where it formed its own cofferdam, in water 5½ feet deep at low spring tides. The water was pumped out by hand pumps, and the ground inside excavated, concrete being placed on the top of the ring as it sank, like the brick wells in India or the shafts of the Thames Tunnel.

The method of making concrete and mortar, adopted by the author, differed in some respects from that in ordinary use. He preferred a rapid mixture of the ballast or sand with cement or lime to the slow triturating process of the mortar pan with edge runners. The concrete mixer, devised by him, driven by a 3 horse power engine, would turn out from 10 to 12 cubic yards per hour. The mixer was a fixed horizontal or inclined trough, open on the top, with a longitudinal axis, having stout iron blades at short intervals which, as they revolved simultaneously, pugged the materials and screwed them forward. The water was let on gradually through a rose, and the first few blades incorporated the materials in a dry state before they reached the water.

The author believed the application of the new system of gigantic blocks to the construction of breakwaters would, in many cases, be cheaper, more rapid, and more permanent than the ordinary methods of construction.

Zöllner's Horizontal Pendulum.

M. F. Zöllner communicates to the English *Philosophical Magazine* a paper on the origin of the earth's magnetism and the magnetic relations of the heavenly bodies, in which he describes a method by which he considers we are enabled to measure even those small forces which are, for instance, produced by the difference in distance between any point on the earth's surface from sun or moon and the distance of the earth's center of gravity, or by difference in the centrifugal force of two points at different distances from the earth's surface.



The apparatus is represented in the accompanying engraving; *a a'* are thin watch springs held in continual tension by the weight, *A*, with the mirror, *C*, in front. The stand is made of iron, and the feet of the tripod are as long as possible, in order to effect very small changes in position of the points of suspension with regard to the direction of gravitations by the slow movement of the screws. By means of the screw *d*, situated in a vertical plane passing through the two points of suspension, *c* and *c'*, the sensitiveness of the instrument may be governed, as by the relative position of the points, *c* and *c'*, the time of vibration of the horizontal pendulum is determined. A time of vibration of 30 seconds (half a period) is easily accomplished. *B* is a counterpoise of *A*. Before the oscillating mass, *A*, and the parts belonging to it were placed in the rings, which fit into small incisions cut into the cylindrical axis, it was set in vibration by the direct action of gravity round a knife edge occupying provisionally the place of the turning point. The time of oscillation amounted to nearly 0·25 of a second. By means of a known relation, the the ratios of moments of direction are thus easily obtained, which are exerted by gravity on the vibratory mass in the horizontal and vertical directions. The mirror attached to the end of the pendulum allows the reading off of the changes in the direction, according to the method of mirror reading, on a scale 10 feet 4½ inches distant from the mirror. With regard to the above mentioned time of vibration of 0·25 second, it was calculated that a 0·2539 inch division on the scale corresponds to a deviation of 0 0097063 second of an arc of an ordinary pendulum. The instrument is so extremely sensitive that deviations of only 0·001 second of an arc may be obtained even with a time of vibration of 14 44 seconds. A railway train at a distance of a mile has been found to set the instrument in operation.

Observations are best made in deep and quiet mines, where the variations of temperature and shakings of the earth are absent, and all those influences can, therefore, be determined quantitatively which are caused either directly by volcanic movements of the ground, or indirectly by magnetic induction, through changes in the velocity of the streaming masses on the inner part of the earth. Besides the generation of an inner tidal and pressure wave, the sun and moon exert a direct influence on the positions of the instrument, because they attract, with different intensity, the center of gravity of the earth and the center of gravity of the pendulum. We may thus expect to determine the magnitude on which these influences depend, by a much extended and statistically headed series of observations, that is to say, the masses and distances of sun and moon in units of the mass and radius of the earth.

Supposing the instrument set up in the meridian, the pendulum, if moving only under the influence of the sun, would pass, in twenty-four hours, four times through its position of equilibrium in the meridian—at sunrise, sunset, and at the upper and under passage of the sun through the meridian. As the movement of the pendulum is not an effect of summature, as that of the sea in the tides, but is generated directly by attractive action at a distance, it must take place simultaneously with the corresponding true position of the sun. But if gravity, as light, takes a time of about eight minutes in arriving from the sun to the earth, the above position of equilibrium would take place so much later. If, therefore, we only succeed in determining these positions to within one minute of accuracy, the question whether gravity needs time for its propagation could be decided even if this velocity were ten times that of light.

The discussion of observations made simultaneously in two vertical circles with the horizontal pendulum, and their comparison with the readings of magnetic instruments, will supply valuable material, tending to elucidate the causes of the close relation between the mechanical, electrical, and magnetic phenomena on our planet; the explanation of which will, perhaps, some day give us as clear a conception of the occurrences in the earth as the language of signs of the senses, chiefly by the help of light, has given us of the occurrences on its surface.—*Science Record for* 1873.

New Metallic Decorations.

At a recent meeting of the Royal Institute of British Architects, Mr. C. H. Cooke introduced to the profession a new style of decoration, recently perfected in Paris, and applicable to iron, brass, and zinc, which is expressed simply and plainly as "cut work."

The cutting of these metals was effected by a steam saw, the hardness and make of the saw being in reality the secret of the whole work; and this tool, as was shown by the various specimens which were exhibited, offered the greatest facilities for the conception and working out of the most intricate and delicate design obtained by any other means. The zinc work, it was believed, would stand in this country, as at Paris, the effect of the weather, without painting.

This method of cutting through hard metals has been brought to great completeness, and by it could be cut brass and copper three inches thick and wrought iron one inch thick. The face of the work could be chased or engraved as desired; and after the pattern required had been cut by the saw, it could be heated, and the twist to the ends or points, so frequent in wrought work, could be given, and certain portions of the ornamental work raised or depressed as desired; and this forms a combination in metal working hitherto unknown.

The cost was moderate, being more than a third less in cost than for the same kind of work in wrought iron as usually done. It was stated that this mode of working in metals offered a valuable opportunity for the operation of the architect. It would be idle to attempt to enumerate the various ways the work might be applied, for every architect and actual metal worker must be aware that it was almost unlimited in its applications.

TIN FOIL ORNAMENTATION.

Mr. Cooke also said that the printing on tinfoil, in imitation of wood or marble, was applicable to wall decoration, woodwork, and house furniture, and would be found on examination to possess many advantages. Some would, he knew, object to it as a sham, but they must have some sham; and for his part he looked upon this as very good, useful sham, especially when they could put this work upon damp walls, and decorate the surface at the same time; besides which, it offered great facilities for decoration in places where it was difficult to obtain skilled labor, and the case and skill with which it could be used would be specially valuable either on new buildings or temporary erections, and be a great boon to our colonists. For halls and staircases, it certainly would be much more effective and serviceable than paperhanging as now used. From the extreme thinness of the material, it was capable of enveloping the most delicate of moldings and the surface being varnished, and then placed in a hot chamber, and subjected to a heat of 120° Fah., it was considered permanent and durable. This work can be obtained in rolls two and three feet wide, and eighteen feet long.

The Mountains of the United States.

The following is the hight of the principal mountains in the United States, as compiled from Professor Hayden's Report, in the United States *Register*:

ROCKY MOUNTAINS, SIERRA NEVADA AND CASCADE RANGE.

	Feet.
Mount St. Elias, Alaska, (Est.)	15,860
Mount Fairweather, Alaska, (Est.)	14,783
Mount Whitney, California	15,000
Mount Shasta, California	14,442
Mount Rainer, Washington Territory	14,434
Mount Tyndall, California	14,386
Mount Harvard, Colorado Territory	14,270
Pike's Peak, Colorado Territory	14,216
Irwin's Peak, Colorado Territory	14,192
Gray's Peak, Colorado Territory	14,145
Mount Lincoln, Colorado Territory	14,124
Mount Yale, Colorado Territory	14,081
Long's Peak, Colorado Territory	14,050
Mount Brewer, California	13,886
Mount Hayden. Wyoming Territory	13,858
Horse Shoe Mountain, Colorado Territory	13,806
Silver Heel's Mountain, Colorado Territory	13,650
Fremont's Peak, Wyoming Territory	13,570
Mount of the Holy Cross, Colorado Territory	13,500
Mount Hodges, Uintah Mountains	13,500
Mount Tohkwano, Uintah Mountains	13,500
Velie's Peak, Colorado Territory	13,456
Mount Audubon, Colorado Territory	13,402
Gilbert's Peak, Uintah Mountains	13,250
Mount Dana, California	13,227
Mount Lyell, California	13,217
Mount Guyot, Colorado Territory	13,223
Parry's Peak, Colorado Territory	13,133
Three Teton's, Idaho Territory	13,000
Bald Mountain, Idaho	13,000
Mount Flora, Colorado Territory	12,878
San Francisco Mountains, Arizona Territory	12,052
Wahsatch Mountains, Utah	12,000
Spanish Peaks, Colorado Territory	12,000
Mount Englemann, Colorado Territory	12,000
Snow Line, 41° North Latitude.	
Mount Wright, Colorado Territory	11,800
Mount Silliman, California	11,623
Mount San Bernardino, California	11,600
Mount Hood, Oregon	11,225
Mount Pitt, Oregon	11,000
Lone Peak, Utah Territory	11,000
Black Hills, Wyoming Territory	11,000
Wind River Mountains, Wyoming Territory	11,000
Electric Peak, Yellowstone Park	10,992
Mount Baker, Oregon	10,719
Emigrant Peak, Montana Territory	10,629
Lassen's Butte, California	10,577
Mount Sheridan, Wyoming Territory	10,420
Mount Washburn, Yellowstone Park	10,388
Ward's Peak, Montana Territory	10,371
Mount Delano, Montana Territory	10,200
Mount Blackmore, Montana Territory	10,134
Mount Doane, Yellowstone Park	10,118
Mount San Antonio, California	9,931
Mount St. Helen's (Volcano), Washington Territory	9,760
Old Baldy, Montana Territory	9,711
Mount Garfield, Idaho Territory	9,704
Mount Adams, Washington Territory	9,570
Bridger's Peak, Montana Territory	9,000
Crater Lake, Cascade Range, Oregon	9,000
Mt. Olympus (Coast Range), Washington Territory	8,136
Yellowstone Lake, Wyoming Territory	7,788
Mount Mitchell, Allegheny Mountains, N. Carolina	6,732
Mount Washington, White Mountains, N. Hampshire	6,285

PASSES OVER THE ROCKY MOUNTAINS.

	Feet.
32d Parallel, near El Paso	5,714
35th Parallel, near Albuquerque	7,472
38th Parallel, (Coochecopa Pass)	10,000
41st Parallel, (Union Pacific Railroad)	8,241
42d Parallel, (South Pass)	7,085
47th and 48th Parallels, (Cadott's Pass)	6,044
47th and 48th Parallels, (Deer Lodge Pass)	6,200
47th and 48th Parallels, (Lewis & Clark's)	6,323
Flathead Pass, (Northern Montana)	5,459
Kutanie Pass, (British America)	6,000

PASSES OVER THE SIERRA NEVADAS.

	Feet.
Tejon Pass, 34° 45' North Latitude	5,250
Walker's Pass, 35° 30' North Latitude	5,300
New Pass, to Owen's River	3,164
Mono Pass, to Mono Lake	10,700
Silver Mountain Pass, to Carson City	
Donner Pass, (Central Pacific Railroad)	7,042
Beckwith's Pass, to Pyramid Lake	4,500
Truckee Pass	7,200
Lassen's Pass, (40° 35' North Latitude)	
Madelin Pass	5,667

P. suggests that a waterproof sizing or glazing be used in the manufacture of paper collars, so that they can be cleansed by wiping them with a moistened cloth.

Dyeing and Coloring Natural Flowers.

"Painting the lily" is generally considered about the acme of useless performances, but a correspondent of the *Garden* in the following lines tells us how to do it. The idea, of course, is not to improve on Nature's handiwork, but simply to prepare the flowers so that they will keep for an indefinite length of time, and, when arranged in bouquets, form handsome ornaments. The process, it will be seen, may also be applied to grasses and mosses with very good effect.

Dyeing is especially used for the red *xerranthemum annuum fl. pl.*, red asters, and all kinds of ornamental grasses. Mix ten parts of fresh water with one part of good nitric acid, plunge the flowers in, shake off the liquid, and hang them up to dry. In this way xerranthemums, which should be cut when entirely open, will acquire a beautiful bright red tint; while grasses only become a little pale red on the tops, but will keep afterwards for many years, and may, if needed, be colored otherwise at any time. Asters generally, when treated in this way, are not so fine as if dried in sand, or smoked with brimstone. To color flowers and grasses blue, violet, red, scarlet, and orange, use the different kinds of aniline; for yellow use picric acid, and for bright scarlet use borax. The aniline dye should be dissolved in alcohol before it is fit for use, in which condition it should be kept in well closed bottles until it is required. It may also be purchased in a dissolved condition of any respectable chemist. To color by means of aniline, take a porcelain or any other well glazed vessel, pour in some boiling water, and add as much dissolved aniline as will nicely color the water. According to the quantity of aniline used, the color of the flowers will become more or less bright. After the water has cooled a little, plunge in the flowers or grasses, and keep them in it till they are nicely colored; then rinse in cold water, shake off the liquid, and hang them up in the open air to dry. To obtain a fine blue, take aniline *bleu de lian*, boil the color with the water for five minutes, and then add a few drops of sulphuric acid before using. For violet, use one part aniline violet and one part of aniline *bleu de lian*; for red, aniline fuchsin; for scarlet, one part of aniline fuchsin and one of aniline violet; for orange, aniline *d'orange*; for lemon color, picric acid, which should be dissolved in boiling water and then thinned with a little warm water. Dip in the flowers, but do not drain off the liquid. All kinds of ornamental grasses can be thus colored, especially *stipa pennata* and *ammobium alatum*, white xerranthemums, and most other everlasting flowers. *Immortelles*, however, as well as the other kinds of helichrysums, must be treated differently; their natural yellow color must first be extracted by dipping them in boiling soap water, made with Italian soap, and afterwards dried in an airy, shady place. The flowers generally become closed when thus treated, and should be placed near an oven and subjected to the influence of a dry heat, when they will soon re open. This is very important if they are intended to be colored; if not, they will remain fine pure white immortelles. Most immortelles, however, are colored bright scarlet by means of borax, which gives a beautiful color; but it does not keep well, and becomes gradually paler. For this purpose, dissolve as much borax in boiling water as will color it nicely; when cool, dip the flowers, but do not allow them them to remain in after they have taken the color; if kept in too long, they will not again open their flowers. The chief point in every mode of coloring immortelles is to place them first in a dry, warm atmosphere, where they will open their flowers well; and, after coloring, they should again be exposed to heat, by which means they will nearly always reopen them. Very nice looking immortelles are also produced by coloring only the center of each flower scarlet, which is done very rapidly with borax, by means of a small pencil or a thin wooden splinter, which is dipped into the color and afterwards applied to the center. This is generally done by little children in those establishments in Germany and France which supply the trade with everlasting flowers. The following is a very cheap and very good recipe to color ornamental grass and moss a beautiful green: If a dark green is required, take two parts of boiling water, one ounce of alum, and half an ounce of dissolved indigo carmine; plunge the moss or grass into the mixture, shake off the liquid, and dry the grass or moss in an airy, shady place. In the winter, however, they should be dried by means of fire heat. If a light green is required, add to the above mixture more or less picric acid, according as a more or less light shade is required.

Copper Alloys and Ores.

Dr. Percy, in a recent lecture at the Royal School of Mines on the above subject, said:

You must have observed the iron railings of London. Where the iron is in immediate contact with the lead at the bottom, there corrosion takes place to the greatest extent. When two metals are brought together—say, zinc and copper—they rust on exposure to air and moisture, but one of them serves to protect the other from rusting. To prevent the corrosion of the copper on ship bottoms, Sir Humphrey Davy recommended that pieces of zinc should be placed in contact with the copper: by that means the corrosion of the copper was prevented, but the zinc corroded and wasted very rapidly. Since that time the Admiralty have had some more precise experiments made on this subject, and it has been found that, when in contact, lead promotes the corrosion of copper, and copper promotes the corrosion of iron.

What takes place when copper and lead are melted together (say) at temperature of melting point? Will they alloy—that is, remain permanently united when the metal has become cold, as in the case of common brass, a compound of spelter and copper? Suppose I take a quantity of copper and melt it, and add thereto an equal weight of lead and mix the whole together thoroughly; then if I take out the mixture and cool it rapidly, I get an ingot composed of copper and lead, almost wholly in mechanical mixture. Suppose, instead of cooling it rapidly I leave it to cool slowly; an almost complete separation of the two metals takes place; the lead, being the heaviest of the two, accumulates at the bottom of the mold. The separation in this latter case is not perfect, for the copper will retain about 2 per cent of lead, and the lead also about that percentage of copper. There is, therefore, no proper alloy of these metals in the strict sense of the term.

Next let us take copper and iron, and the iron we use will be that which is most like pure iron—wrought iron. Suppose we expose the mixture of copper and iron to a very high temperature; we shall not get anything but a mechanical mixture; when the proportion of the iron increases beyond a certain degree, we can distinguish under the microscope small grains of that metal, diffused through the mass. Iron is a white metal, and copper a red one. In every other case that I know, when two metals differing in color form a true alloy, the product differs in color from either of the metals, but in the case of this mixture of iron and copper, the product is a ruddy colored mixture like copper, the iron being diffused through it. That is to my mind a satisfactory proof that it is a mechanical mixture, and not a true alloy. To get this mixture in the best manner, take some oxide of iron and oxide of copper, as fine as possible, and mix them up intimately with some finely powdered charcoal, and then subject the mass to a high temperature; the charcoal, as we know, will then reduce both the oxides, and set free the metals in a condition most favorable for their combination.

Metallic copper or native copper is frequently found in connection with other copper ores; sometimes in vast masses, as near Lake Superior, where it was said there was one mass of copper in the metallic state weighing not less than 500 tons. In this condition it is, perhaps, one of the most expensive ores of copper, for the metal is excessively tough, and cannot be blasted, but must be prepared for the market by being cut up with tools. The next ore is the oxide of copper; there are really two oxides of copper, the red and the black, and they are among the richest ores of copper. Then we have the blue and green carbonate; the latter is commonly called "malachite" and is frequently applied to ornamental purpose. These latter ores are compounded of oxide of copper, carbonic acid, and water; and when heated up to a good red heat, they lose water and carbonic acid, and the residue consists of oxide of copper. In treating an ore of this kind, then, we may consider ourselves, therefore, as virtually treating an oxide of copper. There is another class of ores in which copper is combined with sulphur; one exactly similar in all respects to that compound I have before described—the gray sulphide of copper, an extremely valuable ore. Then there is another in which iron occurs as a constituent—common yellow ore or copper pyrites; it consists of copper and iron, and sulphur. Sometimes copper pyrites is mistaken by inexperienced persons for iron pyrites, a compound of iron and sulphur, which is far less valuable than the other, but here is a simple test by which you can infallibly distinguish between them. Apply the point of a penknife in the case of copper pyrites, you can scratch it easily; but in the case of iron pyrites, you can make no mark upon it.

CHEMICAL NOTES.

Action of Heat on Gases and Vapor Condensed by Charcoal.

When wood charcoal, saturated with dry chlorine, is placed in the longer branch of Faraday's siphon gas-condensing tube, and the heat of boiling water is applied to it, the shorter branch being placed in a freezing mixture, a portion of the gas is volatilized. Pressure being thus developed, liquefied chlorine soon appears in the tube. The experiment is well adapted for a lecture demonstration. The author has liquefied in this manner ammonia, sulphur dioxide, hydrosulphuric acid, hydrobromic acid, ethyl chloride and cyanogen.

Wood charcoal retains so firmly the vapors of the volatile liquids, bromine, hydrocyanic acid, carbon sulphide, ether and alcohol, that, upon repeating with them the experiment just described, no liquid is obtained.

Pouillet observed a slight evolution of heat when water, oils, ethyl acetate, and alcohol were absorbed by mineral powders, and still more marked effects with organic powders. The author finds that, with charcoal, still more heat than in the above case is given out when it absorbs liquids upon which it has, apparently, no chemical action. Thus with 5—10 grains of charcoal, and 40—80 grains of bromine, the temperature was raised 30° C. If the charcoal had been previously heated to expel gas, and then cooled *in vacuo*, the absorption of bromine being also conducted *in vacuo*, no doubt the rise of temperature would have been still greater. —*Melsens. Comptes Rendus—Journal of the Chemical Society.*

Sugar from Caoutchouc.

Caoutchouc from Madagascar yields a saccharine substance, which A. Girard has named "matezite," from the native word for caoutchouc. Matezite is white, very soluble in water, less soluble in alcohol, from which it crystallizes in tufts. It melts at 181° to a vitreous mass, which does not crystallize on cooling, and may be sublimed at 200°—210° without decomposition. It deposits in drops. Its formula is $C_{10}H_{20}O_9$; and on treatment with hydriodic acid, it undergoes a decomposition analogous to the others, forming a sugar called by the author *matezodambose*.

Glycyrrhizin, or Liquorice Juice.

P. Griessmayer says: "It has been suspected that sugar, extracted from liquorice root, has been used for the purpose of adulterating beer, and yet the opinion of chemists has been that such sugar is not fermentable. Glycyrrhizin is a glycoside, which, on boiling with acids, decomposes into glycyrretin and sugar. Even after boiling it with water, sugar may be detected by Fehling's test. The sugar obtained in this manner was treated with yeast, and after three days the fermentation was complete, and alcohol was found in large quantity by means of the well known reaction converting it into iodoform. During the latter stage of the fermentation a peculiarly disagreeable putrid odor was perceived, and the substance emitting it passed over into the distillate; the disagreeable taste of some German beers is doubtless owing to this body.—*Dingler's Polytechnisches Journal.*

Amylammonium Chloride.

Amylammonium chloride, introduced under the skin of the rabbit, guinea pig, and dog, causes, in small doses, a marked diminution of the pulse, and some fall in temperature. In larger doses convulsions are produced, which end in death. With man a dose of from 8 to 16 grains lowers the pulse 10 to 20 beats per minute, and occasions a fall in temperature. Dr. Dujardin-Beaumetz has administered this salt with advantage in some cases of typhoid fever. Amylamine has not the sedative action on the nervous system which trimethylamine possesses, but surpasses it greatly in its effect on the pulse, and in its toxic action.

Experiments on the Preservation of Eggs.

F. C. Calvert finds that eggs, either entire or pierced at the end by a fine needle, may be kept for three months without change in an atmosphere of nitrogen, hydrogen, or carbonic anhydride. In dry oxygen entire eggs undergo no change, but if the gas is moist the egg becomes covered with a white filamentous mold.

An egg pierced at the extremity soon becomes putrid either in dry or in moist oxygen, the amount of oxygen consumed, and of carbonic anhydride and nitrogen evolved, being much greater in the latter case than in the former.

New laid eggs immersed in weak chlorine water contained in a stoppered bottle underwent no change for nearly eight months, but on leaving the bottle open for a week, they became covered with *penicillium glaucum.*

Eggs kept in a weak solution of chlorinated lime soon began to show signs of change externally by the growth of penicillium. With lime water and with calcium sulphite, similar results were observed.

Eggs kept in solution of phenol exhibited no change for three months. They were then slightly coated with penicillium, but their contents were perfectly sweet.

Camphor for Seeds.

According to A. Vogel, camphor is found to have a marked effect in stimulating the germination of seeds, both by shortening the period of germination and causing more seeds to sprout. Turpentine has a similar action, but seems to exert a hurtful influence on the further development of the plant, which is not the case with camphor.

The Costly Mistakes of Civil Engineers.

President White, of Cornell University, makes the following strong assertion in a recent lecture:

"Another great department bearing on a multitude of industries, directly and indirectly, is civil engineering. Take one among the fields of its activity. We have in the United States about 70,000 miles of railway, and every year thousands of miles are added. I do not at all exaggerate when I say that millions of dollars are lost every year, by the employment of half educated engineers. Proofs of this meet you on every side. Lines in wrong positions, bad grades, and curves, tunnels cut and bridges built which might be avoided. All of us know the story. But this is not all. Hardly a community which has not some story to tell of great losses entailed by bad engineering in other directions. Here it is the traffic of a great city street interrupted for a year because no engineering can be found able to make the calculations for a 'skew arch' bridge, a thing which any graduate of a well equipped department of engineering can do; there it is a city subjected to enormous loss by the failure of its water supply system because the engineer employed made no calculation for the friction of water in the pipes; in another instance it is a whole district sickened by masma, because a half taught engineer was entrusted with its drainage. We must prepare men for better work; and for every dollar thus laid out, we shall create or save thousands. Nay, we shall save lives as well as money. Mr. Baldwin Latham, in his recent book on "Sanitary Engineering" and Dr. Beale, in his work on "Diseased Germs," show by statistics that a proper application of engineering to sewerage would save one hundred thousand lives yearly in Great Britain alone, and the same truth holds in this country."

One Hundred and Twelve Miles an Hour on the Ice.

The Poughkeepsie *Eagle* gives an interesting account of an example of such movement, which recently took place on the Hudson river at Poughkeepsie. "The wind blew very fresh from the south, and the owner of the new ice boat Cyclone determined to take advantage of the favorable opportunity for timing his yacht. The Hudson at this point is very wide, and at the course selected its breadth is one mile. Having made every preparation for the feat to be accomplished, the reef points were shaken out of the sails, and every stitch of canvas spread to the gale. With two men on the windward runner to keep the boat down to the ice, the helm was turned, the sails filled, and in a moment, with every inch of canvas drawing, she was under full headway. Like an arrow from a bow she darted away on the course, clouds of pulverized ice following in the track of her runners as they hummed over the surface of the river, and in what seemed but an instant the river had been crossed and the mile accomplished in the almost incredible time of thirty-one seconds, being at the rate of two miles in a minute and two seconds, or 112½ miles per hour. Persons on shore compared the speed of the flying racer to that of a meteor flashing through the sky, and watched her movements with eager interest. The owner afterward put the boat through some movements on the ice, and astonished the lookers-on by sailing all the way across the river on one runner, the force of the wind throwing her over on her beam ends and raising the windward runner from ten to twelve feet above the ice. Although but few were found willing to partake of the amusement, all seemed disposed to coincide in the opinion that ice yachting is the most exhilarating of sports, and the evolutions of which one of these yachts is capable, the most graceful of anything they had ever witnessed."

We have in various articles in the back volumes of the SCIENTIFIC AMERICAN illustrated and described the philosophy which governed the movement of ice boats, and have pointed out the reasons why they were frequently driven at a considerably higher velocity than the speed of the wind by which they were propelled. But we think the above statement of velocity needs further verification.

Allowing that the breeze which propelled the boat was a high wind, its velocity could not have exceeded thirty-five miles per hour, while the boat moved at the rate of one hundred and twelve and a half miles per hour, which is faster than a tornado. The wind of the latter reaches a velocity of one hundred miles an hour, pressing with a force of fifty pounds to the square foot upon whatever object it touches, sweeping away buildings and trees in its fearfully rapid progress.

Correspondence.

Harmonic Law of the Planetary Distances.

To the Editor of the Scientific American:

Permit me, through your valuable paper, to publish to the world a new harmonic law existing between planetary distances and motions. It is superior to Kepler's third law, which, although only an approximation, has been the basis of all theoretical astronomy for the last two hundred and fifty years. The following will be found mathematically exact:

The square root of the quotient arising from dividing the distance of any exterior planet by the distance of any interior planet, multiplied by the velocity of the exterior planet, shall equal the velocity of the interior planet. I give the last corrected figures of planetary distances and motion, so that any one, acquainted with the first rules of arithmetic, can work the problem, proving the existence of this beautiful and exact law, another signature of the Omniscient Almighty:

	Mean distances in miles.	Mean motion per hour.			
Mercury	35392638	105	(thousand +)	330	miles.
Venus	66191478	77	"	050	"
Earth	91430220	65	"	533	"
Mars	139312226	53	"	090	"
Jupiter	495693149	27	"	744	"
Saturn	872134583	21	"	221	"
Uranus	1753851052	14	"	963	"
Neptune	2746271232	11	"	958	"

Kingstown, Ind. ALFRED LUTHER.

REMARKS BY THE EDITOR.—Our correspondent should communicate his results to Professor Daniel Kirkwood, of Bloomington, Ind., who is called by Mr. Proctor the "Kepler of Modern Astronomy." Kepler's laws are as follows:

1. Each planet describes round the sun an orbit of elliptic form, and the center of the sun always occupies one of the foci. 2. The areas described by the radius vector of a planet, round the solar focus, are proportionate to the time taken in describing them. 3. The squares of the times of revolution of the planets round the sun are proportional to the cubes of their major axes. The search for this last law (which applies to the satellites also) cost Kepler 17 years' calculation. Harmonic relation appears throughout the universe. Overtones in music, the formation of crystals, *phyllotaxis* or the arrangement of leaves around the stem, all show most curious numerical relations. The lines of fluted spectra of the first order are supposed to be successive harmonics of a single motion in the molecules of luminous gas. Perhaps these harmonic laws may yet teach us, beside the distances of planets, the distance of atoms and the size of the molecule.

Charcoal for Wounds, etc.

To the Editor of the Scientific American:

The best simple remedy I have found for surface wounds, such as cuts, abrasions of the skin, etc., is charcoal. Take a live coal from the stove, pulverize it, apply it to the wound and cover the whole with a rag. The charcoal absorbs the fluids secreted by the wound, and lays the foundation of the scab; it also prevents the rag from irritating the flesh, and it is antiseptic.

If, however, you prefer a white scab to a black one, use quinine instead. This possesses all the virtues of the charcoal, and is, besides, astringent and tonic. P.

HACHISCH.—M. Naquet has lately been studying the physiological action of hachisch. The extract of hemp seed (*cannabis indica*) administered to various persons produces a great exuberance of ideation; it is not new ideas, but the exaggeration, amplification, and combination of ideas which pre-existed in the person's mind. Hachisch produces one curious effect (which is also observed in acute mania); this is a singular inclination to make puns and plays upon words.