Notes and Queries

T. A. H., of Ill.—The singing sound of telegraph wires is produced by the wind, not by the passage of electricity.

Sol, of Mich.—We published some time since elaborate directions for making a sun dial. You can buy one ready made for fifty cents.

J. H. H., of Wis.—The specimen is oxide of iron. Its value will depend on its locality.

K. C., of Mass.—The best thing to remove salt from iron is water—wash the iron well in a running stream. We cannot judge of the practicability of your plan for making small castings of steel.

J. S., of D. C.—A cheap substitute for aniline dyes, if equally good, would be of immeasurable value. Coal gas tar is a mixture of a large number of chemical compounds, each having its peculiar odor with its other peculiar properties. The odor can be removed only by destroying the substance, and as most of the substances are odoriferous, if the odor of all was removed the mixture would cease to be coal tar.

J. R. G., of Ky.—By mixing coal tar thoroughly with potash, soda, or other alkali, you will neutralize any acid that it may contain.

D. L., of Pa.—You can make the very best black ink by boiling 12 pounds of nutgalls in 12 gallons of water three hours, then straining and adding 5 pounds of green sulphate of iron, and 5 pounds of gum senegal, both dissolved in water. Boil slowly and add water to supply that lost by evaporation.

H. B., of Wis.—A body set in motion will continue to move forever in the same direction and with the same velocity unless it encounters some resistance or force to change its motion; this applies to rotary motion. The only forces required to sustain the earth in its orbit are the *vis viva* of the earth and the attraction of the sun.

A. F., of Min.—There is difference of opinion among millers in regard to the best size of burr stones.

J. S. R., of Pa.—For work on optics and optical instruments, write to Henry Carey Baird, of Philadelphia.

H. A. D., of N. Y.—Manganese is now used extensively in the manufacture of steel; and the binoxide in the manufacture of chloride of lime. Its use is rapidly extending and mines of it favorably located must be valuable.

H. B., of Wis.—Precisely what people mean by the term "perpetual motion" we have never been able to ascertain. They certainly do not mean a machine which will run perpetually, as that a simple water wheel will do. Machines may also be driven constantly by heat and by electricity. They cannot mean a machine that will start and run without the application of any force. As nearly as we can get at it, there is a confused notion in the minds of some persons that by means of mechanism they can perform an amount of work more than equivalent to the work expended in performing it, and that is what they mean by the term "perpetual motion." We do not see that the absurdity, or even impossibility, of this idea follows from any principle of nature except the universal conservation of force.

C. W., of Me.—The pressure of water downward per square inch in a tube filled to the depth of ten feet, is the same whether the tube be one inch or ten feet in diameter.

H. W. B., of Mass.—Smith's Linear Perspective and Walren's Manual, both published by John Wiley, of this city, are highly recommended. Some of our artists also speak highly of Minifie's treatise.

G. H., of Mass.—You will find it most economical in the long run to use the best material that you can get for a jacket for your steam pipe. Whether you use pulverized charcoal, felt, or ashes, the main thing is to keep them perfectly dry.

H. C. A., of Ohio.—Steam in a boiler presses upon the upper surface of the water, and the water thus pressed presses on the water below it; the pressure is transmitted through the water, but the steam does not pass through.

S. B., of Iowa.—Sand is used by builders in this part of the country, not only in laying foundations, but also in building the whole wall—it is the general practice to mix it with the proper proportions of lime and water to make a good mortar.

A. M., of Oregon.—A dam five feet high, placed at the foot of rapids falling 100 feet in half a mile, would affect the depth of the water to a short distance only above the dam—not nearly to the top of the rapids.

A. B., of Mass.—Experiments are being made to test the value of soluble glass for protecting building stone subject to decay, but the results are not yet reached.

D. B., of Ill.—We are obliged to you for your second letter on screw cutting, but we have had so many rules and letters on the subject lately that we must decline publishing it.

B. S. Foreman, Chicago.—Our letters to you came back through the dead-letter office. It is no fault of ours if you do not hear from us.

M. P., of Ohio.—You are one of the few men we sometimes meet with, who understand how to differ in opinion from another and still be courteous. We shall be pleased to hear from you at all times on such subjects as are of general interest.

G. W. B., N. Y.—You will find Bourne's Catechism of the Steam Engine a satisfactory work for the information you require.

S. M., of Mo.—If you have satisfactorily determined the cause of all boiler explosions, you can make a great deal of money by preventing them in future. The magnanimity you display toward Mr. William Fairbairn for his errors will no doubt be appreciated by him when he hears of it.

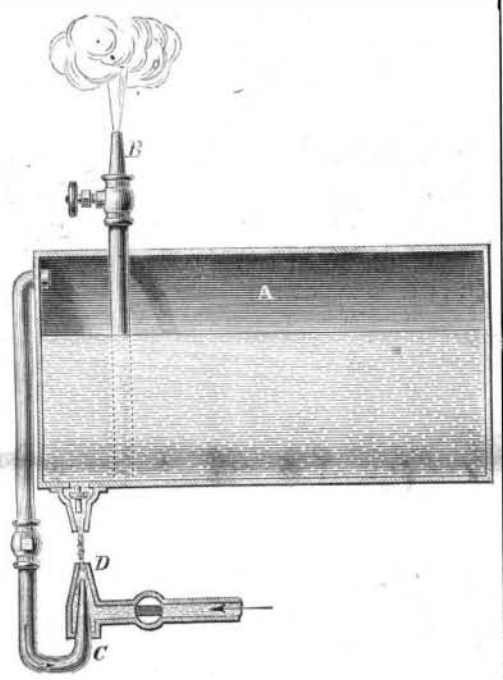
Engineer, N. Y.—We know of no book that treats of Western steamboats. You will find details of their engines in King's Notes on the Steam Engine

Correspondence

The Giffard Injector.

MESSRS. EDITORS:—The accompanying attempted explanation of a seeming paradox may interest a portion of your numerous readers. A converse of the injector may be seen daily in form somewhat as follows :—

Let A represent a steam boiler, having a pressure of say 100 lbs. to the square inch. Let B represent a pipe communicating with the water space and having a ventage of one inch area. On opening B a jet of water will appear which, at the point of emission, will exert a pressure, in excess of the atmosphere, of about 85 lbs., but which, on escaping into the comparatively thin medium outside the boiler, will quickly expand into steam, increasing fully 1,700 fold in bulk, and more than 40 fold in area with a corresponding decrease of inch pressure, to be in a few seconds lost by diffusion in the surrounding air.



THE INJECTOR.—Let C represent a steam nozzle, surrounded by a water nozzle, D. The steam, in escaping, becomes condensed by contact with its watery envelope so as to present a result diametrically opposite of the familiar phenomenon alluded to. The force of the escaping jet being concentrated upon a small fraction of its former area, acquires a momentum sufficient to drag forward, by mere friction, a volume of water from the surrounding nozzle and force the united steam into the same boiler from which the steam had issued, or even into another one of much greater pressure.

Seeing that every drop which leaves the boiler returns to it with only such loss of sensible heat as is taken up by the feed water and carried back into the boiler, the object may seem to have been accomplished without expenditure of the motive power, but the seeming paradox disappears when it is considered that, in resolving the steam back into water, there has been paid back, so to speak, the "latent heat" that had been expended in converting water into steam, said heat having been made to take the form of motion in the feed water.

G. H. KNIGHT.

Cincinnati, Feb. 20, 1866.

Seeing Air.

MESSRS. EDITORS:—On page 164, current volume, a correspondent, C. J. S, asks the question, "Why heated air is visible, and cold air invisible?" etc. In your answer, you explain it on the principle of refraction of light from denser to rarer media. Your principles though unquestionably sound, will not explain the phenomena. As for example, if I take a large heated surface, as the roof a house uniformly heated by the sun, and from which heated air of uniform heat and density is rising, and where would be no refraction from differing density; now place a sharply defined object, near the surface, and within its area, and let the eye be placed some distance off, but also within the area, so that between the eye and object the air is of uniform density, yet still the vibratory motion is perceptible. Refraction therefore will not explain it.

But my object is not with your explanation, but to correct an error of your correspondents. You can see cold air as distinctly as heated if you only take the right means. I made the discovery accidentally many years ago, and have tried the experiment a thousand times since, with hardly a failure.

The means I adopted are as follows, and if C. J. S. will try them he will see as I have often done, the air in its cold state:—Take a polished metallic surface of two feet or more with a straight edge. (I used a large hand saw.) Take a windy day, whether hot or cold, clear or cloudy, only let it not rain or the air be murky—in other words let the air be dry and clear; it is better if the wind be steady, but this is not essential. Hold your metallic surface at right angles to the direction of the wind; *E G.* if the wind is north, hold your surface directed east and west, but instead of holding the surface vertical, incline it about 45° to the horizon, so that the wind striking, glances and flows over the edge (keeping it straight) as water over a dam. Now sight carefully over the straight edge at some minute and sharply defined object, and you will see the air flow over as water flows over a dam. Make your observations carefully and you will hardly ever fail to see the air, no matter how cold; the result is even better when the sun is obscured. W. J. W.

Baltimore, March 12, 1866.

Sulphuric Acid in Spring Water.

MESSRS. EDITORS:—I would like to present a few questions for your decision, and to make the matter plain, will give you the facts as they exist. In working a coal mine in this vicinity, the coal is found to contain sulphuret or sulphate of iron; the water from the mines is used for boilers and tweers at a blast furnace, and the result is the boilers last but a few months, and the tweers sometimes are eaten through in two or three days, while at furnaces where good water is used they would last several months. The boilers or tweers do not seem to be destroyed by incrustation.

First, does water coming from coal mines in which there is quite an amount of sulphate of iron, contain sulphuric acid? If not, what is it that destroys the iron, and what effect would it have to mix this water with salt water? Would the water, after being mixed, answer a better purpose for boilers and tweers?

If you can give me the desired information on this subject, you will not only confer a favor on me, but would impart valuable information to many others interested in this subject. J. G. C.

Letonia, Ohio, March 30, 1866.

[The difficulty doubtless comes from sulphuric acid. There is sulphide of iron in the hill, and this, in coming in contact with the atmosphere, absorbs oxygen, and becomes sulphate of iron. The sesqui oxide of iron combines with sulphuric acid in two or three proportions, and in this case one of the higher sulphates is formed, which, in coming in contact with free iron, gives up one or two equivalents of its sulphuric acid to the iron, forming sulphate of iron on the surface of the tweers and boilers. As the sulphate of iron is very soluble in water, it is immediately washed away, thus corroding the iron. Lime would remove the sulphuric acid from the water, but it would form the sulphate of lime—the worst of all substances to produce incrustation. This might not, however, be objectionable for the tweers, though it would for the boilers. Baryta would combine with the sulphuric acid to form sulphate of baryta, an insoluble substance which would fall to the bottom; but baryta is too expensive. We can suggest no remedy but to use other water for the boiler.—EDS.

Pure Silex or Silica.

MESSRS. EDITORS:—We have an abundance of nearly pure silex or silica of the finest quality, for the manufacture of white flint glass or Bohemian. It is near the Tennessee river, which is navigable

all the year, is in one of the healthiest localities in the world, in the midst of fuel, and in every respect desirable for a glass factory. We also have kaolin, or white chalk, enough to supply the world with porcelain ware for a thousand years; *terra sigillatta* or red clay is abundant, some iron ore 55 per cent; plaster of paris and hydraulic cement material enough to support a very heavy demand, limestone, sandstone, millstone and grindstone, together with extraordinary water power, ever available in the midst of pine clad hills. The soil and climate are very favorable to the growth of grapes, strawberries and peaches. J. M. D. MILLER.

Iuka, Miss., March 6, 1866.

To Sawyers.

MESSRS. EDITORS:—In this section of the country there are a great many circular sawmills, and very few sawyers capable of doing good work in all kinds of hard timber; therefore, if any of your readers are practical sawyers, I would like very much to have them give some information on the following points:—

In regard to the position of the saw, ought its side to stand parallel with the carriage, or should the front be nearer? And if so, how much? What shape should the teeth have? To what angle should they be dressed? How deep from the point of the tooth should the throat be? Is it necessary for the mandrel to have "end play?" and if so, how much should it have? How should the saw stand when the guides are set? All the saws here have guides of some description, and are from forty-eight to sixty inches in diameter.

Some information on the above questions would be useful to many besides myself. F. M. E.

Warrensburg, Mo., Feb. 6, 1866.

Way to Granulate Zinc.

MESSRS. EDITORS:—In your journal of the 10th inst., a correspondent asks how to granulate zinc for brazing. Let him take a common corn broom, wet it thoroughly, and shake out the superfluous moisture. Then pour the molten zinc through it, at the same time shaking it sideways; the fine splints of the broom divide the drops of metal finely, and being moist it does not stick to them, being repelled by the film of steam made by its contact. The broom had better be held over a pan of water, to prevent the running together of particles not congealed in passing through. Brass may be done in the same way for brazing. W. P. C.

Lowell, Mass., March 12, 1866.

The Maximum Strength of Iron.

MESSRS. EDITORS:—I would like to know at what degree, Fah., iron attains its maximum density; for if it continued to contract by lowering the temperature, its cohesive attraction is augmented, and consequently its capacity to sustain a suspended weight, and the parting of supporting rods and tires, etc., at frosty times, must be attributed to the increased tension rather than diminution of strength.

J. F. L.

Logan Co., Ohio March 13, 1866.

[Iron doubtless continues to contract with the diminution of its temperature, but it does not follow that its strength increases with the contraction. —EDS.

To Make Smooth Iron Castings.

MESSRS. EDITORS:—Seeing in your paper of the 17th, an inquiry headed "Query for Molders," I will undertake to answer it. Facing is made by mixing coal and sand together in the following proportions: One of coal to eight or nine of sand. Facing alone does not make smooth castings, except for light ones—such as railing, brackets, etc. If S. V. E. wants to make machinery he had better use facing, and then dust on blacking and soapstone, in proportions of one of soapstone to two of blacking, and then return his pattern or slick it down with a tool, as circumstances may prove best, and leave his castings in the sand over night and they will turn out smooth.

Pittsburgh, Feb. 18, 1866.

Drawing Dust from Shops.

MESSRS. EDITORS.—Would some of your patrons inform me how to construct a vacuum over a machine that makes very much dust, and is injurious to the men working near it? I think a vacuum could be formed to draw all the dust up into the room above. I have been in receipt of your valuable paper for over a year, but have seen nothing touching on that point. INQUIRER.

Brooklyn, N. Y.

[It is the practice in cotton manufactories to draw the dust from out the picker room by means of a spiral fan placed on the outside of the mill, with a box pipe leading from under the picker to the fan. The fan is made with four blades, like a boy's windmill, and is run in a box like a cheese box, which has an annular opening in its outer face at the periphery. —EDS.

The Metrical System---Winding Watches.

MESSRS EDITORS:—In your article, a few weeks since, respecting a change to decimal weights and measures, I think you neglected the principal difficulty.

There are several measures in use, and some in store which the owners do not like to lose. Indeed, if the Government should assume one-half the cost of what would be lost in the change, it would make an appalling addition to "the debt," and for that reason the desirable change must fight its way.

I wish you would tell our watchmakers, to make the hole in the inner case, for winding, about 0·6 or 0·7 of an inch diameter, fitting nicely around or upon a rim, raised upon that part of the frame for that purpose; said rim to form a cup or cavity, in which the key, hinged to the winding post, shall be ready for use by simply raising it with the thumb nail.

E. J. A.

Coos, N. H., March 14, 1866.

[It seems to us that any trader, or even farmer, will save enough labor in calculating in a very short time to compensate him for changing his scales and measures.

The suggestion in regard to watches we submit to watchmakers, who will take it for what it is worth. Our correspondent may not be aware that some watches are now made to wind by simply turning the stem.—EDS.

To Dissolve Shellac.

MESSRS. EDITORS:—When I wrote to you in answer to a correspondent requesting a solvent for shellac, I did not suppose it would elicit so many responses from various parts of the country, and if the correspondent who wrote that he had failed to "secure such results" with borax, had taken the usual course in making all kinds of varnishes, viz., the application of heat, he would have met with success.

We have had up to the present time the following solvents besides alcohol, bicarb. soda, aqua ammonia, borax, and lastly, saleratus, all of which are alkalies. Undoubtedly any alkali will answer equally well. J. F. P.

Cincinnati, March 14, 1866.

Length of Geological Periods.

All the facts of geology tend to indicate an antiquity of which we are beginning to form but a dim idea. Take, for instance, one single formation—our well-known chalk. This consists entirely of shells and fragments of shells deposited at the bottom of an ancient sea far away from any continent. Such a process as this must be very slow; probably we should be much above the mark if we were to assume a rate of deposition of ten inches in a century. Now the chalk is more than 1,000 feet in thickness, and would have required, therefore, more than 120,000 years for its formation. The fossiliferous beds of Great Britain, as a whole, are more than 7,000 feet in thickness, and many which with us measures only a few inches, on the Continent expand into strata of immense depth; while others of great importance elsewhere are wholly wanting with us, for it is evident that during all the different periods in which Great Britain has been dry land, strata have been forming (as is, for example, the case now elsewhere) and not with us. Moreover, we must remember that many of the strata now existing have been formed at the expense of older ones; thus all the flint gravels in the south-east of England have been produced by the destruction of chalk. This again is a very slow process. It has been estimated that a cliff 500 feet high will be worn away at the rate of an inch in a century. This may seem a low rate, but we must bear in mind that along any line of coast there are comparatively few points which are suffering at one time, and that even on these, when a fall of cliff has taken place, the fragments serve as a protection to the coast until they have been gradually removed by the waves. The Wealden Valley is twenty-two miles in breadth, and on these data it has been calculated that the denudation of the Weald must have required more than 150,000,000 of years.—*Lubbock's Pre-Historic Times.*

FOREIGN SUMMARY.

REMARKABLE results have been obtained by M. Schloesing in the production of exceedingly high temperatures by the combustion of gas with air. By regulating the quantity of hydrogen and air brought together at the time of combustion a considerable range of temperature can be obtained, the highest named in a communication recently made to the Academie des Sciences of Paris, by Sainte-Claire Deville, being 2,736 deg. Cent.

ENGRAVING upon glass has hitherto been, not unfrequently, effected by the use of fluoric acid, which often produced dangerous wounds, when by accident it came in contact with the skin of the workmen. M. Henri Sainte-Claire Deville has recently exhibited to the Academy of Sciences of Paris some very fine examples of glass engraving executed by means of a solution of the fluoride of calcium in hydrochloric acid, with which there is no such danger. The results obtained by this method are said to be exceedingly satisfactory.

THERE are now twenty-three steam packet companies in England who own about 370 steamers, the tunnage of which is 560,000, the horse power 110,000, and the value between £30,000,000 and £40,000,000 sterling. 164 of these ships are connected with Liverpool, 94 with Southampton, 40 with Hull, 35 with London, 16 with Glasgow, and 15 with Hartlepool; 200 of these steamers trade with the Eastern, and 170 with the Western hemisphere. Upward of 80 of the largest of the latter trade exclusively with the United States.

FROM Greece intelligence has arrived that a new island began to rise above the level of the sea in the Bay of Thera (Santorin) on the 4th ult., and in five days it attained the height of from 130 feet, to 150 feet, with a length of upwards of 350 feet, and a breadth of 100 feet. It continues to increase, and consists of a rusty black metallic lava, very heavy, and resembling half-smelted scoria which has boiled up from a furnace. It contains many small whitish semi-transparent particles disseminated through the mass like quartz or felspar.

AMONG other wonders of the forthcoming French Exhibition there is to be a gigantic aquarium, the front of which is alone to measure 100 feeet. Every sort of fish is to be collected therein for the amusement of the public, and even sharks, cod, and porpoises are to exhibit their peculiar habits and customs in grottoes and caves, which are to be excavated in the floor of the building, and filled with sea water.

IT has been stated by Professor Faraday that the total quantity of oxygen daily required for the whole world is 8,000,000,000 lbs., or 7,142,857 tuns.

IT has been ascertained that wax under a pressure of 13,000 lbs. on the square inch requires thirty degrees additional heat to melt it; about one fifth of the whole temperature at which it melts under the pressure of the atmosphere.

THE authorities in Nottingham, Eng., have resolved to construct a subway for the reception of gas and water pipes in a street now forming in the center of the town. This is the third work of the kind now existing in Nottingham.

IMPROVED ROOFING MATERIALS.—We have inquiries from our readers in various parts of the country for these advertisements. Manufacturers are advised to keep permanent advertisements in the SCIENTIFIC AMERICAN, stating price per foot, advantages, etc.

THE eagles which surmount the colors of the French army, formerly made of copper gilt, by galvanism, are now made of aluminium, thus lightening the weight of the flag by nearly 2¾ lbs.