satisfied. Such a cut is mere *abrasion* of the glass, in the part over which the diamond has traveled.

The cutting point is found, in the ordinary glazier's diamond, somewhere between the perpendicular and the angle at which a pen is usually held while writing. This point must be sought for, and the diamond used only by one person. Here is applicable your frequently urged advice, "study the use of your tools," and have your own "kit."

The natural philosophy of the diamond cut in glass has not yet been satisfactorily explained, though studied over by some of the first minds in this country and in Europe. After the fracture of a piece of well cut glass, the track of the diamond is marked by a serried line (something like sawteeth) of a beautiful regularity, penetrating to the depth of about $\frac{1}{64}$th of an inch, varying slightly according to pressure. This appearance is quite plain to the naked eye, but under the microscope is the full beauty and much cause for astonishment. Thus seen it presents the idea of the line of holes in a sheet of postage stamps, with the exception that the holes are much closer, and appear as if made with an oval instead of a circular punch. A true cut is the result of much practice and study, and will become familiar by a clear, whistling, somewhat musical sound.

Again reiterating your excellent advice, "Study the use of your tools," and much real pleasure will result in their use. ENTERPRISE.

Cincinnati, Ohio.

Electro Magnetism as a Motive Power.

MESSRS. EDITORS:—I have been for years in receipt of numerous letters of inquiry on this subject, and as the writers are undoubtedly for the most part readers of your journal, permit me to refer them to your excellent report of my experiments at the Tabernacle in New York, found in your paper of November 15th, 1851, Vol. 7, No. 9.

It will be remembered that on that occasion I raised by the axial force of magnetism, with a huge helix, a bar of iron of 2000 lbs. weight, 5 inches from the floor. The bar weighed 800 lbs., the platform fastened to the top of it 300 lbs., and the six men on the platform over 1000 lbs. more. The huge mass I caused to vibrate for an inch by my finger. The bar and helix were the kind used in the engine exhibited. The battery used was 50 pairs Groves with platinum plates 12 inches square, 10 inches immersed. Such an enormous power has never been thus far repeated. Zimmermann, a late German author on electricity and magnetism, ridicules the idea, and says, "*It is an American story, and beats Munchausen.*" It will also be remembered that before this, I started with an electro magnetic locomotive to go from Washington to Baltimore. The car weighed 11 tuns, containing 14 passengers, two axial engines under the passenger seats, and a Groves battery of 100 pairs of the above size, swung on rubber springs underneath the car. On the way out the battery cells gave way, the acids mixed, and this happened twice before we reached Bladensburgh, a distance of six miles. It was for the most part an ascending grade. On a level track we made 19 miles an hour, although the machinery was rude and the friction of the engines and car couplings very great. We deemed it prudent to go no further, and had three more breaks on our way home. The engines were rated at four horse power each. All that can be inferred from the experiment is that the power can be increased on the axial plan to any extent, and that the larger the engines and battery the greater the portion of power obtained. The reverse of this is true in every form of engine which employs *electro magnetic attraction* as a source of power. The larger the magnets and engines the greater the loss of power. I have long since, however, come to the conclusion that a practical working engine cannot be made on any plan where the circuit is broken.

The combustion of metals with a three or four horse power is terribly rapid at all the breaks in the cut off. The magnetism must be unchanged and the current unbroken to get a working engine, if it can be obtained at all; and the battery must be constant and convenient. The cost per diem is not the real question. Produce a reliable working engine of even half a horse power, and it will be used in many places with great convenience, and in some with profit, even if it should cost twenty times the amount of steam in a Cornish engine. I need not dilate upon this part of the subject.

CHARLES G. PAGE.

Washington, D. C.

Casting Metal in Plaster Molds.

MESSRS. EDITORS:—When reading No. 13, current Vol., on page 201, I see one of your correspondents speaks of plaster of Paris for molds for castings of low fusible metals, and recommends that the mold be subjected to a heat of 400° F.

I must differ with the writer. I have had some experience in the use of plaster of Paris for molds, and I found the best plan was to dry the molds perfectly in open air. When about to use them, I warm them just enough so that they would not chill the metal when poured in. After warming I held them over a flame that produced a good deal of smoke, until the inside of the mold was completely blackened over. Then I could get about two hundred castings from each mold, after which the plaster became soft and small particles broke off. Upon examining I found the plaster was burnt and of no further use for molding purpose. A. C. SMALL.

Augusta, Ga.

Water Rams.

MESSRS. EDITORS:—As a more full reply to the correspondent, p. 167, about the water ram, we may say that a good water ram yields 60 per cent of the water expended, thus: that it yields 60 per cent useful effect of the mechanical power expended. This mechanical power and effect we obtain, of course, by multiplying the weight of the water by the height it falls or is raised. For instance, let 100 lbs. of water fall 3 feet, the power is represented by 300; this will raise 6 lbs. 30 feet, of which the mechanical effect is represented by 6×30, or 180; now 180 is 60 per cent of 300; and so the mechanical effect is 60 per cent of the power expended.

M. P. P., of E. W., Mass., states that he finds that his ram raises by a fall of 3 feet about one-sixth of the water expended, some 30 feet; this would for 100 lbs of water expressed be 16 lbs. raised. The mechanical power is here 3×100, or 300; the effect is expressed by 16×30, or 480; more than three times the effect of the best ram, and 60 per cent more than the power employed, which evidently is an absurdity. If this was so, he could obtain from the water thus raised more power than from the original fall; and being able to raise easily six times the amount of water to only one-tenth of the hight, he would possess perpetual motion of the hydraulic kind. Evidently our correspondent overestimates the amount of water raised, and it should, according to the other circumstances mentioned, read $\frac{1}{16}$ in place of $\frac{1}{6}$.

Screw Threads---Honor to Whom Honor is Due.

MESSRS. EDITORS:—In your edition of April 25th I notice an article entitled "Screw Threads and Bolts—A Uniform System," in which you speak of my system. Doubtless you have before you one of my drawings of the Franklin Institute System, which I published about one year ago, and which has come into very general use in many parts of the country. Now I am not in any way responsible for this system, nor would I claim the honor of originating it.

The committee who prepared this system had it under investigation from April 21, 1864, to December 15th of the same year, when it was reported to and adopted by the Institute and the committee discharged. It consisted of the following named gentlemen: Wm, B. Bement, Chairman, firm of Bement & Dougherty; C. T. Parry, Superintendent Baldwin's Locomotive Works; J. Vaughn Merrick, firm of Merrick & Sons; John H. Towne, firm of I. P. Morris, Towne & Co.; Coleman Sellers, Engineer Wm. Sellers & Co.; B. H. Bartol, Superintendent Southwark Foundery; Edward Longstreth, Foreman Baldwin's Locomotive Works; James Moore, firm of Matthews & Moore; Wm. Sellers, firm of Wm. Sellers & Co., and Algernon Roberts, of the Pencoyd Iron Works. The above committee have given good reasons for the adoption of this system as stated in my circular, and in view of all the facts it is due to them, and to the machine making public, to yourselves and to myself, that this explanation be published, believing that you wish to do justice to all concerned in this matter. EDWARD LYMAN.

New Haven, Conn.

Why is it?---Water vs. Beer.

MESSRS. EDITORS:—I have frequently amused myself by arranging a row of common glass tumblers, and pouring a greater or less quantity of water into each, thereby producing the different tones of the diatonic scale. But the other day on attempting the same experiment with ale, I found that the sound was deadened—that on striking the tumblers there was no vibration, the effect being as if they were cracked. Can you inform me why ale should thus check the vibration, while water only alters the pitch of the tones without destroying their ringing quality? O. T. A.

Geneva, N. Y.

[Beer is to some extent gelatinous in consistency and thus cannot give the ring of the more mobile water.—EDS.

Editorial Summary.

AMMONIA IN COAL GAS.—Dr. Gunning of Amsterdam, calls attention to the fact that coal gas, however well purified, is by no means free from ammonia. The result of some experiments he has conducted, shows the existence of a little over one cubic foot of ammonia, or ammoniacal substances, in every one thousand cubic feet of gas. Attention is called to the fact that where wet gas-meters are in use, the water, being rarely if ever changed, must in time become fairly saturated with ammonia. A meter used for two years in the laboratory at Amsterdam, with a capacity for fifty-seven gallons of water, held no less than nine pounds of these bases. Since coal gas also contains sulphur compounds, there is formed sulphate of ammonia, which, converted by the intense heat into bisulphate of ammonia, attacks the glass cylinders, or chimneys, placed on the Argand gas burners.

CHLORIDE OF COPPER is now extensively used in Germany as a preventive against the cattle plague. The mode of administering the specific is as follows: A solution is first made by dissolving one quarter ounce of the green crystalized salts in spirits of wine. In this solution a pad of cotton is soaked for a time, and is then laid on a plate and set on fire in the center of the stable, the animals' heads being turned toward the flame, so as to make them breathe the fumes. The operation is performed morning and evening, and a spirit lamp filled with the solution left burning in the stable every night. The liquid is also administered internally, with the addition of one half ounce of chloroform for the above quantity, a teaspoonful being put into the animal's drink three times a day.

EXPERIMENTS WITH CATERPILLARS.—A late experiment in the southern part of England has proved that the ordinary caterpillar cannot be made available in yielding, like the silk worm, a profitable article of merchandise. Plantations of ailanthus trees were set out, and many eggs were procured. After hatching, the young caterpillars fed plentifully, attained their growth, and finally made cocoons. So far all was encouraging, but, on unwinding, it was found that unlike the cocoon of the silkworm proper, which sometimes yields a thread two thousand yards long, the filament from the caterpillar cocoons was in short lengths, necessitating carding in order to arrange the fibers, a process very expensive, and furnishing a weak, lusterless material when finally woven.

CURE FOR WHOOPING COUGH.—Physicians in Hartford, Conn., have adopted with marked success a new method of treatment for curing children afflicted with whooping cough. The juvenile patients are taken on a tour of inspection to the city gas works, and while intently engaged in witnessing the various processes employed in manufacturing their evening's artificial-illumination supply, they breathe the not very pleasant air of the gas house. In some way, not very clearly understood, the inhaling of this air is found to cure or greatly alleviate the complaint. This ingenious method of benefitting the youthful mind and body simultaneously has become immensely popular in the place, the people at the gas works asserting that during the last twelve months no less than three hundred cases have been experimented upon, the results, generally, being of a most favorable character.

EFFECT OF EXPOSURE ON COAL.—Prof. Rockwell, has called attention to the deterioration which coal suffers from exposure to the weather, and to the importance of keeping it as dry as possible. Anthracite suffers the least; bituminous the most. According to the experiments of Grundmann, in Germany, coal exposed to the weather in heaps lost during a period of nine months 50 per cent of its value as fuel, and about as much as a gas making material; it undergoes a process of slow combustion, taking up oxygen, and giving off the volatile products of oxidation,—air and moisture playing the principal part, and warmth promoting it; the valuable combustible ingredients are lost, and the injurious ones, as sulphur, oxygen, and ash, are relatively increased. Coke from weathered coal is of inferior quality, losing its coherence.

A WEATHER TOY.—A Bostonian, says the *Commercial Advertiser*, has a toy barometer on exhibition, which consists of a miniature cottage, with two doors. At one of these stands a man, clad in such purple and fine linen as constitute a Sunday-go-to-meeting garb in New England, while at the other appears a female arrayed in like apparel. These twain seem to watch the impending weather. If there are signs of rain, the man, with a noble bravery worthy of a better fate, steps boldly out of doors, while the woman shrinks into the cottage. But if the signs are favorable, the woman goes forth to shop and gossip, while the man stays at home and tends house and baby. A thermometer forms part of the household furniture of this institution.

FRENCH OPIUM. It has been demonstrated in France that opium can be extracted from the poppy, the greatest and almost the only drawback to its profitable manufacture, being the frequency of rains occurring at the time when incisions have been made in the stems, whereby a large portion of the juice is either lost or spilt. Lately M. Lallier has tried the plan of pulling up the plants by the root, in the proper season, and bringing them under shelter, where the incisions may be made regardless of the weather. The plan has answered beyond expectation, and the roots being kept in water during the process, a larger proportion of milky juice is obtained than usual.

THE MEDALS and diplomas awarded to the American exhibitors at the late Exposition, are now on exhibition in Washington. The collection is one of great interest, comprising four crosses of the Legion of Honor; three grand prizes; fifteen gold, seventy-four silver, and ninety-five bronze medals; two hundred diplomas, and a series of photographic views of the Exposition. One silver medal was decreed to the United States government for specimens of settlers' houses; a bronze medal was also struck for the Agricultural Bureau, and one gold medal was awarded to the "*Industrie armoirière des Etas-Unis d'Amérique.*

A NEUTRAL MAGNETIC CHAMBER.—Faraday has shown that if a small cubical space be inclosed by arranging square bar magnets, with their like poles in apposition, so as to form a chamber, within that space all local magnetism inferior in power to the magnets employed, will be neutralized. The same effect may be obtained with electro-magnets as with permanent magnets, and it is proposed in the *Mechanics' Magzine* thus to inclose the compass of an iron ship, as a remedy for the deviation by local attraction. A battery might be constructed to be excited by the sea water flowing through it, requiring no attention as long as the zinc plates lasted.

ENGLISH TELEGRAMS.—The uniform rate for transmission of messages throughout the United Kingdom,—provided the English government decide to take the telegraph lines under its charge,—is not to exceed one shilling for every twenty words, irrespective of the distance sent, and exclusive of the names and addresses of senders and receivers; the same charge also including the cost of delivery by special messenger, within one mile of the terminal office.

STEEL BILLIARD BALLS.—Among other new uses of steel, one of the latest, as we learn from a foreign cotemporary, is the employment of this metal in the manufacture of billiard balls, in place of ivory. Such balls are recommended for their great elasticity and their freedom from any liability of cracking.

CARBOLIC ACID.—A correspondent of the *Lancet* testifies that among the many other virtues of this substance, is its value in odontalgia, or, less technically, toothache. To one drachm of collodium flexile add two drachms of Calvert's carbolic acid. A gelatinous mass is precipitated, a small portion of which inserted into the cavity of an aching tooth invariably gives immediate relief.