## Correspondence.

### Cutting Glass Again.

*To the Editor of the Scientific American:*

The simplest way to cut a bottle by heat that I have found, is this: Take ordinary wrapping twine and put two strands around the bottle where cut is desired, tying a hard knot and cutting ends close. Then take kerosene oil sufficient to wet the strings well, apply a lighted match, rotate the bottle rapidly so as to keep heat in a narrow band; in a moment plunge into cold water, and the bottle cracks off smoothly.

I made a plunge battery of 26 cells in this way out of large mucilage bottles and did not spoil one of them.

H. A. DOBSON, M.D.

Washington, D. C., April 17, 1891.

### How to Clean a Plaster Cast.

*To the Editor of the Scientific American:*

To the question asked, How to clean a plaster cast? I have never seen the following recipe given, which has been most highly recommended to me by an ingenious man who has spent his life so far in the working of plaster.

If a cast has not been painted, oiled, or waxed, and allowing it is a bust or statue that is to be cleansed, invert the figure, and from the bottom fill it with water, free from iron, and allow it to filter through the plaster. After the filtering process has gone on for a sufficient time, and the outside surface occasionally washed with water and a soft brush, it will be found, after the plaster has dried, that all of the dust has passed from the pores of the cast and it is again restored to a whiteness that cannot be gotten in any other way.

I have not had occasion to try the above recipe, but send it to you in full confidence that it will do what my informant claims. WILLIAM COUPER.

Studio Ball, Florence, Italy, April 9, 1891.

### Mathematical Curiosities.

*To the Editor of the Scientific American:*

I send you a few of what might be called mathematical curiosities. To any of your readers who have not seen them I think they cannot but be interesting.

1. A finite quantity to the zero power is equal to unity. Take 6 as the finite quantity. Then $6^0 = 1$, since $1 = \frac{6}{6} = \frac{6^1}{6^1} = 6^{1-1} = 6^0$.

2. The zero root of a finite quantity is equal to infinity. Take 6 again. Then $\sqrt[0]{6} = \infty$, since $\sqrt[0]{6} = 6^{\frac{1}{0}}$; but $\frac{1}{0} = \infty \therefore 6^{\frac{1}{0}} = 6^{\infty} = \infty$.

3. The infinity root of a finite quantity is equal to unity. Take 6. Then $\sqrt[\infty]{6} = 1$, since $\sqrt[\infty]{6} = 6^{\frac{1}{\infty}}$; but $\frac{1}{\infty} = 0 \therefore 6^{\frac{1}{\infty}} = 6^0 = 1$.

4. Infinity multiplied by zero is equal to a finite quantity. Take 6. Then $\infty \cdot 0 = 6$, since $0 = \frac{6}{\infty} \therefore \infty \cdot 0 = \infty \cdot \frac{6}{\infty} = 6$.

GEO. D. GUYER,
*Cadet U. S. M. A.*

West Point, N. Y.

### Aluminum at Boonton, N. J.

*To the Editor of the Scientific American:*

I have seen in your journal of April 4 the article credited to the Cleveland *Plain Dealer*, in which it was said: "In the spring of 1890, Eugene Cowles, of the Cowles Smelting and Aluminum Company, notified Mr. Hunt that a concern in Boonton, N. J., was manufacturing pure aluminum by the Hall process, and on this hint the New Jersey company was investigated, owned up, and desisted." This appears to have been part of an affidavit of Mr. Alfred E. Hunt, president of the Pittsburg Reduction Company, and the statement seems to have been made of some use in a law suit.

There is but one concern in Boonton which manufactures aluminum in any way, either as "pure aluminum" or as an alloy. That concern is the United States Aluminum Metal Company, of which I am president. That company has never manufactured "pure aluminum by the Hall process," and has never, to its knowledge, been "investigated," has not "owned up," and has not "desisted."

If Mr. Hunt made this statement, he ought to take it back in the manner in which it was made, and cause the retraction to be as widely published as the statement. I shall write him to this effect. But without reference to what he may do in the matter, I trust this denial may be given the same publicity in your journal as was given the article referred to.

W. T. BARNARD,
*President U. S. Aluminum Metal Co.*

Boonton, N. J., April 20, 1891.

### A Good Use for Old Tin Cans.

To preserve rosebushes, cuttings, or any tender plant just set out from crickets or any winged bugs, cut out the top and bottom of tin cans and place the cylinder over the plants, and keep them there till the plants get strong enough to resist the attack of bugs.

### Cutting a Millimeter Thread with an Inch Leading Screw.

It is possible that many who possess a screw-cutting lathe with a leading screw of so many threads to the inch may wish to use it for cutting millimeter screws. While, of course, it is too much to expect that the absolute value of the millimeter, as given in terms of the inch, can be obtained by ordinary change wheels—and this is not of great importance, since, among other reasons, the two determinations of the value of the millimeter in inches differ by one part in a hundred thousand—yet it may not be well known that a most remarkable degree of accuracy may be obtained with wheels in ordinary use. After some trouble I lighted upon the following numbers, which, with a leading screw of eight threads to the inch, give as a result 25·3968, whereas the inch is 25·3995 millimeters. The wheels are 28 on mandrel, 100 and 36 on stud, and 32 on screw. The error would, therefore, with a perfect lathe, be less than one part in nine thousand, so that a screw cut in this way would for almost all purposes be correct; in fact, it is doubtful if in the case of short screws many lathes could be trusted to cut inch threads more accurately. For leading screws of other pitches, such as 4, 5, 6, or 10 threads to the inch, the wheels can easily be altered so as to give the same result.

Of course it may be the case that this or an equally good arrangement is known to some; but as I had to start working out the combinations of thirteen wheels taken four together, in which each combination contained six sub-combinations, in order to obtain the result, it is possible that it may be appreciated by those to whom it may be of use, but who would rather be saved so much trouble. C. V. BOYS.

Royal College of Science, London.

P. S.—It may be worth while to add that the wheels taken in order—

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 28 .. | *100* .. | 36 .. | *32* | with | *8* | threads | to | the | inch. |
| are the same as | 28 .. | *32* .. | 36 .. | *100* | " | *8* | " | " | " | |
| or as | 7 .. | *8* .. | 9 .. | *25* | " | *8* | " | " | " | |
| or as | 7 .. | *8* .. | 9 .. | *10* | " | *20* | " | " | " | |

where the followers or multipliers are printed in italics. The last sequence of figures is sufficiently curious, and is one that can easily be remembered.—C. V. B.—*Nature.*

### The Mercury Cure for Phylloxera.

PROFESSOR C. V. RILEY,

Department of Agriculture, Washington, D. C.:

The SCIENTIFIC AMERICAN, of this city, published, the 10th of June, 1885, that Mr. John A. Bauer, of San Francisco, Cal., had found a sure and cheap preventive of the ravages of the phylloxera, which consisted in the application to the vine plant of a compound of half an ounce of quicksilver in very minute particles and an equal weight of pulverized clay. The quantity of the mixture had to be half an ounce for each plant. The journal added that the remedy was simple; that it could be prepared, assayed for several purposes, and applied without danger or technical skill.

I consequently wrote to my friends, Mr. John B. Prat and Mr. Paul Griñan, of Barcelona (Spain), on the subject, and I invited them to give a trial to the important discovery of Mr. Bauer.

Mr. Prat wrote to me subsequently what follows:

"I have the deep regret to inform you that our friend, Doctor Griñan, has tried for one hundred times at least to prepare the anti-phylloxera compound discovered by Mr. Bauer in San Francisco. He, Mr. Griñan, has used all the means that science and experience advise, but to no avail, because he has not been able to obtain the assimilation of the mercury and the clay. There must therefore exist either an especial machine or an ingredient unknown so far to us for making the anti-phylloxera preparation, and we earnestly beg of you to inquire about the matter and inform us."

I consequently wrote to Mr. Bauer on the 3d of last March, and up to this day I have not received an answer whatever.

A friend of mine, Mr. MacArdle, who knows you by your high reputation as the best judge in the phylloxera question, has advised me to take the liberty of consulting you on the matter, and it is for this reason that I come to beg of your extreme kindness the favor of informing me how can my friends in Barcelona succeed in making the compound invented by the above-mentioned Mr. Bauer, or whether there is any other practical and easy way of destroying the dreadful phylloxera.

Thanking you earnestly in advance for your trouble, I beg to remain, sir, yours very respectfully,

JOSEPH DE SUSINI.

New York, April 7, 1891.

*Reply by Prof. C. V. Riley.*—I have your letter of the 7th of April, referring to Bauer's quicksilver remedy for grapevine phylloxera. This remedy was proposed in 1884 and attracted considerable attention at that time. So far as I am aware, Mr. Bauer has not published his method of mixing the earth and the mercury. In Bulletin No. 18 of the Agricultural Experiment Station of the University of California, published October 1, 1884, Professor E. W. Hilgard, in treating of this remedy, says there can be no doubt as to the efficacy of metallic mercury finely diffused through the soil in killing phylloxera or any other small insect remaining within its reach for any length of time. In another paragraph of the same bulletin he makes use of the expression, "A soil column of six or eight inches depth, impregnated with the mercurial vapor by intermixture with 'blue mass,' will effectually prevent," etc. In other words, the mixture is spoken of as a simple mechanical operation, and I was not hitherto aware that there was any difficulty with that phase of the application. I was not at all favorably impressed with the remedy at the start, and the experiments made later by Professor Hilgard and his assistants failed, in a large majority of cases, to produce the expected effect. Mr. Bauer's original idea was to place a small quantity of the mixture about the base of the vine, to prevent the underground forms from crawling up, the vapor killing all individuals which attempted to do so. The obstacles to success are, in the first place, that by no means all of the lice crawl up the main roots, but issue from the ground from rootlets near the surface and crawl away to other vines; and in the second place, that soils of differing characters have very different powers of absorbing the mercurial vapor, becoming impregnated to different degrees or not at all.

I regret that I can give you no more definite information as to the method of preparation, but in view of the comparative success of the latest French work with the American vine and bisulphide of carbon injected subterraneously, and in view of the discouraging results of Professor Hilgard's California experiments with Mr. Bauer's mixture, it seems to me that it would be hardly worth while for Dr. Griñan to spend any further time with this mercury preparation.

April 14, 1891.

### Good Roads.

At a recent meeting of the Engineers' Club of Philadelphia, Mr. Thomas G. Janvier read a paper on "The Engineering Features of the Road Question."

This branch of the road question should be divided into three parts: 1st, location; 2d, preparing the road-bed; 3d, laying the pavement.

Location.—The item of expense should be well considered. In this connection, grading, land damages, etc., should not be overlooked. The line should be as direct as possible, remembering that a slight deflection to the right or left, or an easy curve, might save considerable expense in the matter of excavation, embankment or bridging. The grades should be made as easy as possible, not exceeding seven feet per hundred, or less than eight inches per hundred feet. Excessive excavations and embankments should be avoided.

The full width should not be less than forty nor more than sixty feet, but the paved portion need only be from eighteen to twenty-four feet.

The road-bed, or sub-grade, should have the same shape as finished grade.

Pavement.—If intended for very heavy travel, the Telford pavement should be put down, but if for ordinary travel, McAdam will answer. The difference in cost of these two pavements is but slight, and the Telford being much superior, should be given the preference.

A Telford or McAdam road thoroughly constructed and properly maintained will never need reconstruction. The best system of maintenance is that of constant daily attention and repairs. All dirt roads intersecting a paved road should be paved several hundred feet from the intersection, in order that as little mud and dirt as possible shall be carried on to the paved road.

Important points to be observed for keeping a road in good condition:

1. All dirt and mud removed as frequently as possible.
2. The entire drainage system carefully maintained.
3. Constant daily repairs and patches wherever and whenever ruts or depressions begin to show.
4. Careful sprinkling three or four times a day in dry weather.
5. The frequent use of a two-and-a-half-ton roller.

### Soap for Metal Work.

The soaps used for cleaning metal work usually consist of mixtures of vaseline, oleic acid, and fat, mixed with a small quantity of rouge. When freshly prepared, they leave nothing to be desired; but, unfortunately, such mixtures soon turn rancid, and become unfit for use. A new soap for metal work, which is stated to be free from this objection, is made from cocoanut butter in the following way: 2·5 kilogrammes of the butter are melted in an iron vessel, together with a little water, and to the mixture is added, with constant stirring, 180 grammes of chalk, 87·5 grammes of alum, 87·5 grammes of cream of tartar, and 87·5 grammes of white lead. This mixture is then poured into moulds and allowed to solidify. The soap so obtained is made into a paste with water and rubbed over the metal to be cleaned, and finally removed by a dry rag or chamois leather.