Correspondence

Rules for Screw Cutting.

MESSRS. EDITORS:—At several times, during a few months past, I have seen in your valuable paper directions for calculating the relative proportion of the teeth of wheels used in cutting screws in engine lathes. I have taught a great many persons to make these calculations, and I know that a large majority of machinists need some very simple process by which to make them. The last rule which you published I think is the best one for single gearing, and the one which I always use, but I have not seen a plan for getting at the combination in double gearing which is simple enough. Lathes are very easily made to use either double or single gearing for screw cutting, and it adds very much to their usefulness to make them so.

I have a lathe here which I made last fall in that way, and also to cut scrolls with the same gears in the same positions except one gear which is changed, that is to say, if gears are put on to cut a screw of ten pitch, by moving one gear a scroll of ten pitch can be cut.

My plan for calculating the number of teeth to be used with double gears is the following:—Suppose the leader to be 10 pitch; we want to cut a screw of 50 pitch; our gears range from 20 teeth increasing in number by 4 up to 80. I begin with the leader and the largest gear, say 80. Leader, 10×gear, 80=800.

Multiplying the pitch of the leader by the number of teeth in gear, the product I divide by the number of teeth in a smaller gear, say 20. 800÷20=40. The quotient (40) I now regard as the pitch of a new leader and proceed as in single geared lathes, my practice being this, for convenience: Leader, $40\times1\frac{1}{5}=48$; Screw wanted, $50\times1\frac{1}{5}=60$. On inspection we find that the gears are ranged thus: 80 goes on the leader; 20 goes on the stud and meshes with 80; 60 goes on the stud with 20, and 48 goes on the spindle, or the arbor which the spindle drives, and meshes with 60.

Where the spindle drives an arbor at a different velocity from its own this must be taken account of, and we must be governed accordingly, but there are but few builders who make them so; I know of but one (Putnam Machine Co., of Fitchburgh, Mass.) As I had to use a fraction in this example I will change it a little: Leader, 10; screw wanted, 40. Gear, 80×10=800; this dividend by 40, the number of teeth in gear to run with 80, gives 20, which, as before, is our new leader, and we go on as thus: Leader, 20×2=40; screw wanted, 40×2=80; position on lathe similar to the foregoing example. It is necessary to keep the head clear in determining their positions when the right gears are found.

I have been so minute because I know that a great many do not understand the rules as generally given. In one establishment where I have worked, where about two thousand men and boys are employed, I did not find one who could make the calculation for cutting screws with double-geared lathes.

WM. A. CHAPIN.

White River Junction, Vt., March 16, 1865.

Drying Grain for Market.

MESSRS. EDITORS:—In your issue under date of April 1 you have a short article under the head of "damp corn," and editorially ask "Why does this happen?" etc. I will answer so much of the question as relates to the dampness of corn stored through the winter embargo. It is this: Farmers think best as yet to store their grain at home rather than risk it in large cities. This home storage is of necessity where the grain can receive little, if any, treatment in the way of handling or airing, consequently it heats, and loses a certain per centage of its value. This is the reason why so much damp corn comes to market on opening of navigation. It is no new thing, but, on the contrary, is as old as the business. When the winter has been of a certain kind, more dampness shows itself than at other times. Accumulation of moisture is rather a rule than an exception.

It is not for the interest of the farmer, all things equal, to keep his grain at home, but rather to hasten it to market the moment the crop is gathered and ready to move. Could this be done, he saves interest money, and at the same time has his grain where it can be used as a capital to help on the next crop, or, if necessity requires it, for quick sale.

The remedy for this complaint of dampness is plain. Build, in New York City especially, a class of storehouses that will induce the farmer to store here over and above his out of the way places at home. These buildings must be strictly fire-proof, and of such materials as to be *sanitary* with reference to keeping the grain cool and dry, also free from the depredations of rat and weevil.

Fire proof means a building that has no wood in it, consequently will not burn or in any way risk its contents.

Sanitary means constructed of such materials that heating and dampness are impossible, and that rat and weevil cannot exist.

With such buildings the farmer could store here cheaper than at home. Here he would be free from the hard tax of insurance, and from the losses and depreciation consequent upon dampness and waste by insect and vermin. The depreciation by dampness alone would often pay more than six months' storage at New York rates.

Could a thoroughly fire-proof system of storage for grain be instituted here, the farmer would not be long in finding his interest in it, for New York is the great financial and export depot, where his grain will always bring the most money, either for loan or sale.

WM. S. SAMPSON.

New York, March 30, 1865.

[An obvious remedy for damp corn is to store it in ventilated cribs, so constructed that the heat and moisture can ascend from the center of the mass, where it heats most. All grain is not sent to market, and farmers lose as much on that stored for home use as on that sold where heating takes place. A ventilating crib can be found illustrated on page 49, vol. X., SCIENTIFIC AMERICAN.—EDS.

Peat.

MESSRS. EDITORS:—As so much is being said and written upon the subject of peat and its value for heating purposes, and inasmuch from the tenor of the articles one would naturally infer that it was an entirely new thing, I beg to offer a few remarks relative to the matter.

I fully agree with the writer of an article upon this subject which appeared upon page 100, current volume, of your paper in relation to its value for fuel. In Barnstable County, in the State of Massachusetts, of which place I have the honor to be a native, there exist extensive beds or deposits of peat, from which large quantities have been extracted for fuel for domestic uses from, I might say, time immemorial; and it is with emotions not certainly bursting with pride that I look back upon the days of my youth, when your humble servant might have been found toiling to increase his worldly resources at the rate of about twenty cents per day at the not particularly inviting occupation of "turning peat." It usually sold for from $5 to $8 per cord, oak wood selling at about the same price—the peat possessing the advantage that it required no sawing or splitting in order to prepare it for use. On the other hand, however, there is a good deal of waste from crumbling. Especially is this the case with peat from some localities, while from other locations it is very firm and hard, scarcely crumbling at all.

The process of manufacturing is as follows: The peat is dug with a kind of long spade made especially for the purpose, and is spread upon the ground in beds of five or six inches thick, from one to a dozen rods long, and from six to ten feet wide. It has to be tempered with water sufficiently to make it pliable enough to spread it easily, after which it is cut into blocks or cakes about five or six inches square, for which purpose a knife is used, which is usually made by fastening an old scythe to the end of a pole of suitable length. It is then allowed to remain for a week or ten days, according to the weather, or a time long enough to enable it to dry sufficiently to admit of its being "turned," which operation consists in separating by hand, and turning each block upside down, and placing them far enough apart as to admit a free circulation of air for the purpose of drying thoroughly, which generally takes two or three weeks, according to the weather, after which it is ready for housing for use.

For domestic uses, not the least important part is to have it thoroughly dry; if so, it usually burns very freely, leaving no cinders, and making very little smoke. The smoke it does make, however, has a very disagreeable odor, which pervades the whole house.

The ashes were never considered to be of any value—not at all to be compared to wood ashes.

As I have already remarked, there used to be large quantities manufactured every year, but of late, owing to the cheapness and general use of coal, its manufacture has been in a measure discontinued, and the peat bogs have nearly all been converted into cranberry patches, which I believe have proved to be a source of far greater profit.

GEORGE C. PAINE.

San Francisco, Cal., March 13, 1864.

Re-shingling Roofs—Ventilation.

In the summer of 1863, says a correspondent of the *Canada Farmer*, I had occasion to renew the shingles on the roof of my dwelling. Instead of taking off the old ones, I covered them with mortar, and then, with nails about half an inch longer than the common ones, I put on the new, a plan which makes a roof safer from fire, warmer and better every way, than if I had taken off the old, as is generally done, or put the new upon the old without mortar between them. The idea of putting mortar between the old and the new shingles is not original with me, but I was the first, so far as I know, to do it; and I would recommend it to all who require to renovate the roofs of their dwellings, as there is no other way that they can gain so much advantage at so little cost.

Now as to the ventilation of bed-rooms. One small room full of air, used by two or three pairs of lungs, for some eight or ten hours, is not fit for breathing. To keep up a supply of fresh air in my bed-rooms, I have a hole in the stove pipes, passing through them, some two and a half inches wide by three and a half long, with a slide valve, on the same principle that the sliding cover is fixed to the opening of a powder canister. I have the hole about six feet from the ground on the side of the pipe next the bed so that it can be seen when lying upon the bed. I do not find it necessary to close the opening at any time, although it is, I presume, best to have it fixed as above described, so as to be able to do it if required. Through this opening there is a constant current of air from the room into the pipe, as is seen by holding a candle to it, or a piece of rag or paper. The current of air is never reversed, and no sparks ever come out of the pipe, consequently there is no danger from fire, as some might suppose, from having a hole of this size in the pipe, and the effect is that a constant supply of fresh air is kept in the room, and I know of no way in which thorough ventilation can be so easily obtained.

A New Microscope of Astonishing Power.

A foreign contemporary says:—It is not many months since one of the most eminent of living microscopists expressed his conviction that in the production of object glasses with a one-twenty-fifth of an inch focus the microscope had reached its utmost attainable limit of perfection. He added that "it appears impossible to separate or define lines more numerous than ninety thousand in an inch, on account either of the decomposition of light, or some other cause. It therefore seems beyond our power ever to discover more of the ultimate composition of bodies by means of the microscope." It is always foolish to use such "thus far and no farther" language in reference to any department of scientific research, but it is not often that its fallaciousness has been demonstrated within so short a period as in the present case. The above extract is taken from a journal dated December 10, 1864; and yet, already, the one thing which microscopists are now talking about is an object-glass with one-fiftieth of an inch focus, recently made by Messrs. Powell and Lealand, which was described to the Royal Society by Dr. Lionel Beale the other day, and was exhibited at the annual conversazione of that Society a short time since. This object-glass possesses double the power of the one which we were so lately told, and by so

great an authority, was the most powerful we must ever expect to possess, and defines with wonderful distinctness particles which the latter cannot render visible at all. It magnifies three thousand diameters, with the low eye-piece, or, with a Number Five eye-piece, fifteen thousand diameters—that is to say, in popular parlance, one thousand five hundred and seventy-five millions of times! It must immensely increase our knowledge of the lower organisms, and may even aid our researches into the ultimate constitution of matter. And who shall say that even its powers may not be exceeded in time?

MISCELLANEOUS SUMMARY.

SPECTACLES FOR HORSES.—The United States *Gazette* relates the following incident: A gentleman had an old and valued horse whose sight was defective. For some time past the quadruped evinced a tendency to stumble, and to strain his sight at objects close to him, in a manner that set the kind-hearted owner to devising a remedy. The gentleman judged that, with a pair of spectacles, the horse would do as well as when in his prime. An optician ground to order a pair of pebble glasses, about the size of the object glasses of a large sized lorgnette. They were fixed in a frame over the horse's eyes. That animal is now a horse in spectacles, and not an elderly gentleman ever yet showed greater appreciation of the convenience. When in the stable the spectacles are removed.

TO KEEP EGGS.—M. Burnouf recommends, in *Le Belier*, a French journal of agriculture, the following method of preserving eggs:—Dissolve in two-thirds of warm olive oil one-third of bee's-wax, and cover each egg completely with a thin layer of this pomade with the end of the finger. The egg-shell by degrees absorbs the oil, and each of its pores becomes filled with the wax, which hermetically seals them. M. Burnouf affirms that he has eaten eggs kept two years in this manner, in a place not exposed to too great extremes of temperature. He thinks also that the germ may in this manner be preserved for a considerable time.

A NOVEL MODE OF COAL-SELLING.—An exchange says: In London and Liverpool coal is delivered in bags, and some of the Philadelphia dealers, acting upon this hint, have established a new mode of delivering anthracite. The coal, carefully screened, is placed in square iron boxes, each holding about seventy-five pounds. These, to the required number, are placed in appropriately constructed wagons, and the boxes being delivered over the open sides of the vehicle are conveyed directly to the bin without dust or dirt either in the street or within doors. The new plan seems to us to possess many advantages over the old system.

ALUMINUM ethide and methide were recently described by Dr. Odling, at the Royal Institution, as colorless liquids. The ethide boils at 149°, and does not freeze at —18°. The methide boils at 130°, and solidifies at a little above 0° into a beautiful crystalline mass. Both liquids take fire on exposure to air, and explode violently by contact with water. They are produced from mercuric ethide and methide respectively, by heating these compounds for some hours in a water-bath, with excess of aluminum clippings

THE Paris correspondent of the *Chemical News* refers to the following scientific curiosity. If a crystal of sulphate of copper or sulphate of iron be put into a very dilute solution of silicate of potash, a sort of mineral vegetation grows up of the same color as the sulphate. In fact, a miniature forest may be obtained at the bottom of a jar, and by placing the crystal on the top of a layer of well-washed sand colored with a little bichromate of potash; the appearance is given of an artificial soil greatly resembling a natural gravely deposit.

CAR BRAKES.—Mr. A. I. Ambler, of Detroit, who has secured several patents through the Scientific American Patent Agency is about to apply his improvements in car brakes to the Michigan Central R R Mr. Ambler has made this subject a protracted study, and we wish him much success in his efforts to introduce his improvements, which we hope soon to illustrate in our columns.

LONG JOURNEY FOR A LETTER.—Recently a number of the old-fashioned, worn-out mail pouches, from some of the western post-offices, was received at the Washington post-office. In one of them a letter was found postmarked "Vandalia, Ill., March 2d, 1836." It contained information in regard to a lawsuit before "a justis," upon which an appeal had been taken, requiring "twenty days' notice," and came to light twenty-nine years and twenty-three days after it was mailed, having been carried about all that time for ten cents.

BLAKELY GUNS MADE IN MASSACHUSETTS.—The Putnam Machine Company have completed at their manufactory in Fitchburg a couple of 11-inch cannon, of the Blakely pattern, which weigh upwards of 43,000 pounds apiece. The breech is clad with a thick steel jacket, and this jacket is encircled with steel rings, making a thickness of about 12 inches of solid steel around the castings. They are for the defence of Boston harbor and cost about $25,000 each.

VALUE OF RHUBARB FOR DOMESTIC WINE-MAKING.—The cultivation of the rhubarb wine plant is attracting some attention at Fentonville, Mich. Last year two gentlemen procured 1,000 plants and set them out upon half an acre of ground 3x4 feet apart, and from the shoots they manufactured 440 gallons of wine, worth in this and Eastern markets $3 per gallon. It is called American sherry, and is said to possess valuable medicinal qualities, besides being a fine rich-flavored beverage.

ARRIVAL OF CHOICE SEEDS.—The Commissioner of Agriculture has just received another lot of choice seeds, such as he has uniformly received and distributed. Among them are fine specimens of barley, oats, buckwheat, Alsike clover, varieties of bush beans or runners, pearl or round Turkey peas, Brussels sprouts, early short-horn carrots, turnip-rooted celery, large white kohl rabi, and varieties of white and red cabbage.

GOVERNMENT EMPLOYMENT OF WOMEN.—There are about 700 female clerks employed in the Treasury Department, and selected from almost all the States in the Union. Many of them have been rich but are now poor. Their chief business is in cutting and counting new legal tender and national bank notes, and in counting and destroying old ones. Their pay is $720 per annum each, for about six hours close work per diem.

AN EGG CARRIER WANTED.—Eggs are usually packed for market in oats, that grain having been found the best for the purpose. They are apt to get musty, however, and the eggs do not always arrive in good order, by any means. The oats also take up a good deal of room that might be economized, besides being very dear at the present time. Here is an opportunity for the ingenious. Time and money would be saved by a suitable egg carrier, both for market and family use.

REBEL PATENT OFFICE —In our last number we alluded to the operations of the rebel Patent Office for the year 1864. Judging from the events of the past few days we presume that the business at that office has come to a stand still. Commissioner Rhodes, we presume, has gone off with his master Jeff to parts unknown.

RELATIVE DENSITY OF POPULATION.—Ireland still supports 184 souls to every square mile, France only 178; Spain supports only 80 souls to the square mile, Austria only 148, Prussia only 172, Bavaria only 161, Sweden and Norway only 19, European Russia 32. Only Italy, England, Holland, and Belgium are more thickly populated than Ireland.

IT is announced that an inventor residing in Pittsburg, has challenged Sir William Armstrong to a trial in November next; each piece to be fired two hundred consecutive times.

Having a poor opinion generally of Sir William's gun we do not think our countryman would gain much renown by achieving a victory.

High Winds in England.

They have some high winds in England, as may be seen by the following lines cut from the *London Engineer*:—"It may be interesting, in connection with the north-eastern district, to note the fact that a railway train was stopped near Jarrow, last week, by the force of a furious north-west wind."

New Application of Spectrum Analysis.

The *Chemist and Druggist* says: There seems to be no end to the applications of spectrum analysis. With the wedge of glass, chemists, astronomers, and physiologists are opening Nature's safes, and disclosing things of inestimable value. Now, a new metal is brought to light; now, the constitution of the sun's burning atmosphere is revealed; and now a problem respecting the nature of the celestial nebulæ is solved.

In a paper, recently brought before the Royal Society by Dr. Henry Bence Jones, the latest application of spectrum analysis is described. It occurred to the author that it might be possible to trace the passage of substances from the blood into the textures of the body by the aid of the spectroscope, and, with the assistance of Dr. Dupre, he has obtained some very remarkable results.

The metal lithium, which can be readily detected, when in extremely minute quantities, by the spectroscope, was selected as the substance to be traced, and guinea-pigs were generally used for the experiments. Usually, no lithium could be found in any part of their bodies; but when half a grain of chloride of lithium had been given to a guinea-pig for three successive days, the metal was detected in every tissue of the body. Even in the non-vascular textures, as the cartilages, the cornea, the crystalline, lithium was found.

Two animals of the same size and age were taken; one was given three grains of chloride of lithium, and was killed eight hours afterwards; the other, which had no lithium given to it, was also killed. A piece of the lens, 1-20th of a pin's head in size, taken from the former, showed the lithium spectrum distinctly, proving that the metal had penetrated to the very centre of the lens. When the whole lens of the other animal was burnt at once, no trace of lithium could be detected.

A patient, who was suffering from diseased heart, took fifteen grains of citrate of lithia thirty-six hours before her death, and the same quantity six hours before death. The crystalline lens, the blood and the cartilage of one joint were examined for lithium: in the cartilage it appeared very distinctly; in the blood exceedingly faintly; and when the outer lens was taken, the faintest possible indications of lithium were obtained.

Another patient took ten grains of carbonate of lithia five hours and a half before death: the lens showed very faint traces of lithium when half the substance was taken for one examination; the cartilage, however, showed lithium very distinctly.

The importance of these results cannot be questioned. Our most valuable medicines, like the salts of lithium, belong to Graham's class of crystalloids, or diffusible substances; and their rapid action upon the system can now be partially understood. We trust that Dr. Bence Jones will continue his investigations, for the results already arrived at lead us to believe that spectrum analysis may do much for Therapeutics.

The National Debt.

The official statement of the public debt on the 31st of March shows that the amount outstanding bearing interest in coin is $1,100,361,241, the interest being $64,016,631. The amount bearing interest in lawful money is $751,055,128, the interest being $38,819,899. Debt on which interest has ceased, $349,420. Debt bearing no interest, $515,189,287. Total amount outstanding, $2,366,954,077. Total interest in lawful money and gold, $102,836,531.

The following is the amount of legal tender notes in circulation:—

One and two years five per cent notes	$69,522,350
United States notes, old issue	492,104
United States notes, new issue	432,668,465
Compound interest notes (act of March 3, 1863)	15,000,000
Compound interest notes (act of June 30, 1864)	141,477,650
Total	$659,160.569

The amount of fractional currency is $24,254,094. Unpaid requisitions, $114,256,549. Amount in the Treasury, $56,481,925.

PRECISION.—Precision is a good trait of character. A writer in a late number of an agricultural contemporary says that 24 days, 12 hours, 43 minutes, and about 62 seconds is the turkey's natural time to sit.