not have furnished, anything like this quantity of nitrogen.

In modern times, Daubeny was unable to obtain from leaves oxygen gas free from azote; and Prof. Draper states that he found the astonishing amount of from 22 to 49 per cent. of the gas emitted from the leaves of *Pinus tæda* and *Poa annua* to be nitrogen. The first step towards the elucidation of the matter was made by Cloëz and Gratiolet, who, exposing the leaves of a common pond-weed in water slightly impregnated with carbonic acid, found, the first day, that 15.70 per cent. of the gas eliminated was nitrogen; the second, 13.79; the third, 12.00; the fourth, 10.26; the fifth, 9.53; the sixth, 8.15; the seventh, 4.34; the eighth, 2.90—that is, the oxygen gas grew purer and purer, exactly as if the azote retained in the tissues of the plant, or in the water, was gradually expelled by the oxygen. Similar experiments were made by Boussingault in 1844, confirming these results; and also, later, a set of comparative experiments, with and without leaves, which confirmed the truth of the conjecture as to the source of most of the nitrogen. But, after all, he could not obtain any oxygen gas free from azote.

Boussingault now devised a new method of proceeding, by which he avoided the difficulty about extraneous nitrogen, &c. The average results of 25 experiments, made with a variety of plants, are that 100 measures of carbonic acid gas, decomposed by foliage under the light, gave 97.2 of oxygen gas; and that 1.11 of azote had appeared, which could not have come from the water, nor have been contained in the plant. At this point, Boussingault raised the question whether this gas, which remained after the absorption of the oxygen was really nitrogen. A set of experiments, devised and executed in this view, brought out the interesting result, that the supposed azote—which, moreover, corresponded very nearly with the amount of oxygen gas that had disappeared, was oxide of carbon, *i. e.*, carbonic oxide—also a little protocarburet of hydrogen. So, foliage, during the decomposition of carbonic acid, does not really emit nitrogen gas, but, with the oxygen gas, emits some oxide of carbon and some protocarburet of hydrogen; and these combuttible gases, like the oxygen, are produced only under the light of the sun. These gases constantly accompany the oxygen, when the sun acts upon a vegetable submerged in water impregnated with carbonic acid. Is this also the case when carbonic acid is decomposed by foliage in the air?

Boussingault concluded his paper with the remark, that the earlier observers looked at their discoveries rather from the hygienic than the physiological point of view; that, while Priestley announced his brilliant discovery, by the statement that plants purify the air vitiated by combustion or by the respiration of animals, it is curious that, a century afterwards, it should come to be demonstrated, before the Academy of Sciences, that probably the leaves of all plants, and certainly those of aquatic plants, while emitting oxygen gas, which ameliorates the atmosphere, also emit one of the most deleterious of known gases—carbonic oxide! He closes with the pregnant and natural query, whether the unhealthiness of marshy districts is not attributable—at least in part—to the disengagement of this pernicious gas by plants?

National Finances.—The appropriations made by the Thirty-seventh Congress are as follows:—Extra session, July, 1861, about $264,000,000; long session, ending July 17, 1862, $913,000,000; short session, ending March 4, 1863, $1,100,000,000. Receipts from duties on imports, internal revenue, direct taxes, sales of public lands, &c., and estimates from March 4, 1861, to July 1, 1864, $320,000,000—which, deducted from the above sum, will leave the amount of indebtebness up to July 1, 1864, including the $70,000,000 debt left by the last Administration, $2,627,000,000.

New Telegraph Instrument.—An ingenious German mechanic in Washington has nearly perfected a new telegraph instrument, which is on an entirely different principle from those now in use, and may prove far superior to any of them. He is aided by two wealthy newspaper-proprietors, who supply him with ample means for making his experiments.

# Correspondence

### Was the "Keokuk" a Failure?

Messrs. Editors:—One of the greatest minds this planet has produced—a countryman of ours—on an occasion familiar to us all, commenced his greatest speech in the Senate of the United States in the following words:—"When the mariner has been tossed for many days in thick weather and on an unknown sea, he naturally avails himself of the first pause in the storm and the earliest glance of the sun to take his latitude and ascertain how far the elements have driven him from his true course." I have imitated this example, and avail myself of the "first pause in the storm" which has overtaken the *Keokuk* to examine her bearings, and by a plain statement of facts, which, with your permission, I will lay before my countrymen, leave them to determine "how far the elements have driven her from her true course." I shall endeavor to show that in the short life of the vessel she developed qualities which no other iron-clad hitherto built in this country possessed to the same degree, and that if her armor was not proof against the artillery of the enemy she combined other elements of scarcely less importance, and which should save her from the harsh judgment which a few unthinking minds have passed upon her.

The *Keokuk* was built for a light draft vessel, and, when ready for action, her draft was about 9 feet aft and 8 feet forward. She was a small vessel, being but $159\frac{1}{2}$ long, over all, including ram and rudder. She was designed to have speed, and she attained it, running out of New York harbor at the rate of 10 miles an hour. She was intended more particularly for intricate navigation—to ascend the Southern inlets and rivers—and to do this, it was necessary she should be manageable and obey her helm promptly, which she did. She was designed to be sea-worthy, and she proved herself eminently so. She was thoroughly ventilated, and without the use of artificial means; well lighted in her cabin and wardroom, and her accommodations generally were as good as on any vessel in the service of the same tunnage. The *Keokuk* was intended to be shot-proof against ordnance in use in the naval service of the United States, at the time she was designed, and I have it from the lips of her commander, that he believed she would have proved so; but against such bolts and missiles as the rebels threw (supplied them by our neutral friends across the water), she was not proof; nor were any of the other iron-clads engaged in the action, four out of the seven of the *Monitors* being disabled, although not exposed—as is admitted on all sides—to so severe a fire. She took into action, amidst the most terrific cannonading the world has ever seen, about one hundred men and brought them all out alive, and the most severely wounded—Ensign McIntosh, as brave and true an old salt as ever trod the deck of a ship—is, I learn to my great joy, in a fair way to recover.

The apparent thickness of armor on the sides of the *Keokuk* was $5\frac{1}{4}$ inches, put on in a peculiar manner, viz., bars of iron, 4 inches wide and 1 inch thick, were placed edgeways over the skin of the ship, running fore and aft, 1 inch apart, and between them were placed strips of wood of the same dimensions; over this were laid two plates of iron, each $\frac{5}{8}$th of an inch thick, secured on the edges of the bars by $1\frac{1}{8}$-inch bolts running between them and through the skin and fastened by a nut on the inside of the vessel. The actual weight of metal in armor on her sides, as will be seen from this description, was 130 pounds per superficial foot, equal to a solid plate of only $3\frac{1}{4}$ inches in thickness. On the turrets an additional $\frac{1}{2}$-inch plate over the two $\frac{5}{8}$ths, increased the apparent thickness of armor to $5\frac{3}{4}$ inches, and the weight of metal to 150 pounds per superficial foot, equal to a solid plate of $3\frac{3}{4}$ inches. The question will naturally be asked—why was not the vessel more heavily armored? Simply because a vessel of her dimensions would not support any more. Increase the size of the vessel and the armor may be increased in the same ratio. If vessels clad in eleven inches of solid iron were disabled and placed *hors du combat*, is it to be wondered at that a little vessel, carrying but about $3\frac{3}{4}$ inches of solid metal, could not stand the racket? To recapitulate:—The *Keokuk* proved to be seaworthy; to have speed; to be perfectly manageable, to be well lighted, naturally; to be well ventilated, without the use of artificial means; to have great stability; she preserved the life of every man she took into action, although sustaining the heaviest fire of any vessel in the fleet; but she was not proof against the missiles used by the enemy, nor were any of the other vessels engaged in the action; no part of the machinery of the vessel was disabled or gave out.

This whole business of iron-clads is in its infancy, and we must expect occasional disaster until experience has shown us where the weak points are, and how to strengthen them. Now that portion of the life of a vessel which is passed in action is an exceedingly limited one, and sacrifices too great can be made of creature comforts, of those immutable laws which govern and regulate health—light, air and exercise—to accomplish certain results. In the *Keokuk* I attempted a compromise, keeping in view the points I have named; and I have vanity enough to believe, that if the vessel had been twice her size, with a corresponding weight of armor, she would have passed through the fiery ordeal successfully. I mourn her loss, for I had fashioned her and watched her as she sprung into life as a parent does his first-born child. She carried with her the toil and care of many a weary day and night, and that she has not done better service, is not because those connected with her did not labor most earnestly to that end.

I have stated my case, and leave it with entire confidence to the judgment of my countrymen. The question of success or failure will be by them decided. I am prepared to submit to the people's verdict, whatever that may be; but I am not to be put down with the cry of failure, without at least measuring my strength with those who are raising it and exulting over what they suppose to be my downfall.

C. W. Whitney.

### Breech-loading versus Muzzle-loading Guns.

Messrs. Editors:—In that number of the Scientific American issued on March 7, 1863, I observed a communication (page 150) and an editorial (page 154), both on the above topic; and, as it is a subject on which I have had some experience and to which I have given considerable thought, I also desire to say a few words on it. With the communication I was pleased, because it presented an important truth in so clear a light as to leave no question on the main point asserted. The editorial I read with considerable surprise, at least that part of it which talked about breech-loaders "leaking at the breech," and "the flash of the charge in the face of the marksman rendering his aim unsteady." But when I read further, and found that you did not include those breech-loaders using the metallic cartridge, and that the only evidence of leaking at the breech and the flash was found in the "earlier Sharpe's rifles," I was considerably relieved. Now, I submit that this is not fair treatment of the subject. As to the flash in some of the earlier and defective breech-loaders, it is no more evidence against the perfect ones of the present day than would be the old match or flint lock when quoted as evidence against the perfected muzzle-loaders of modern times. By no fair construction can a party, arguing in favor of breech-loaders, be supposed to mean any but the best; certainly not defective, inferior or discarded kinds. Now, as you admit that neither of those objections lies against metallic-cartridge breech-loaders, and thus, therefore, that kind is the best, and consequently the one, in all fairness, to be used in the contest between the two classes, it seems to me that that objection is done away with—that it has no application in a discussion of this sort. But I go further, and affirm that, whatever may have been the fact with the "earlier" Sharpe's rifle, the present arm of that make does not leak at the breech and does not flash in the face of the marksman; I have fired the carbines and rifles repeatedly since the war began, and I never knew an instance of either. Thousands of them are in use in our army, and I do not believe you can find a man there who will say that there is any trouble on either of those points.

Second, It is objected that the ball may not be entered accurately, and therefore its flight will not be accurate. That is just as true of, and as applicable to, one kind as to the other. It matters not whether the ball be entered at the muzzle or the breech. If its axis does not coincide with that of the bore, its flight will not be accurate. The only question, therefore, is, in which kind of gun is the ball most likely to be placed inaccurately by the process of loading? We will suppose that you have the best of muzzle-loaders—a target gun provided with a false muzzle and starter. The ball is placed on the muzzle and forced in the length of the starter—say three inches. The rod is then applied, and the ball driven home. Now, there are several circumstances which may occur in the operation, any one of which will interfere with the accuracy of the operation. First, it is evident, that if the ball is started or enters the muzzle at all inaccurately, it is by the very process of being forced in, fitted to the bore in that inaccurate position, and will continue so all the way down. Second, though it may be started correctly, yet, when the rod comes to be applied, it may be shoved or turned so as to incline to one side; and as the rod, having a metallic ferrule or socket on its lower end, is not allowed to fill the bore, lest it should abrade or scratch the inside of the barrel, such displacement of the ball is certainly possible, if not quite likely to happen. On the other hand, the case of the metallic cartridge, being made by machinery, is, or ought to be, perfectly straight and cylindrical. The ball is united to the case by machinery in such a way that the two are made as straight and accurate as though composed of a single piece. This is then inserted in the chamber at the breech, where it fits so snugly that there is no chance for it to be moved in the least out of line, and hence the axis of the ball must coincide perfectly with the axis of the bore. Now, I submit that, when this is done, the chances for accuracy are decidedly in favor of the breech-loader—that there is more certainty that it will be accurately loaded than there is that the other will be. But there is another idea to be kept in view here (for, remember, it is which is best as an army gun that is to be decided), and that is the fact that, however nice the false muzzle and starter may be at target and turkey matches, they cannot be used on the battle-field, and that, therefore, we must rely entirely upon the rod as a means of placing the ball accurately in the muzzle-loader. Not only is this true of the battle-field, but it is also practically true with the hunter; whereas the accuracy of the breech-loader is equally applicable in all cases—at the target, in the forest and on the battle-field.

Third, It is objected that the breech-loader is not cleaned by the process of loading, as the other is, and hence is not likely to shoot as well—that it cannot be relied on for a "string" of shots. It is no doubt true that the cleaner the bore is kept, the better the gun will shoot. But my experience convinces me that a breech-loader does not foul any more than a muzzle-loader. The idea that forcing down a ball cleans the bore, however correct it may appear theoretically, is not so in fact. If so, why is it that, after a few rounds, the barrel becomes so foul that the ball cannot be forced down without difficulty—often bruising and jamming it out of shape—a circumstance which, of itself, must prevent accurate shooting? Instead of cleaning the bore, by forcing down the ball, you simply force the residue, which was formed by the previous discharge, down the bore, and add it to that of the next discharge; and so on successively, until finally the barrel becomes so foul that the ball cannot be shoved down, the rifling soon being literally filled with hard residue thus accumulated; and hence it is that sportsmen and hunters almost invariably carry with them a "wiper" with which they clean their gun after every few discharges. Now, all guns will foul more or less every time they are fired; and, as they must be wiped out occasionally, I claim that, even here, the advantage is with the breech-loader, because, being open at both ends, the barrel can be wiped out much quicker and cleaner than in the muzzle-loader. Shoving a wiper down the bore of a muzzle-loader has little more effect in cleaning it than forcing down the ball has; and hence it is that the process has to be repeated over and over again, and fresh cloths or other material applied to the wiper, until, by this repeated process, the residue in the barrel is absorbed or taken up by contact with the wiper, and thus extracted from the barrel; whereas, in the breech-loader, the wiper or brush, being shoved through the barrel, carries the foul matter with it, and thus relieves the barrel at once, in a tithe of time occupied in cleaning the other. There is still another view of this matter, which it is important to bear in mind, and that is, that it is usually the first dozen or so of shots that decide a battle—rendering the attack or defense successful or unsuccessful, according as the one or the other side pours in the most rapid and effective fire; and, as there is no pretense that the breech-loader will not remain sufficiently clean for effective firing up to several dozen rounds, at least, its decided superiority over the muzzle-loader, in such a case, is beyond the possibility of dispute. And even the anxiety of the "profound" head of the Ordnance Bureau to have our army return to the old smooth-bore musket, with the spherical ball and buck-shot, cannot be urged as an objection against the breech-loader, because the ball and buck-shot can be used in that just, as well as in the other.

In your statement, the men in the army provided with breech-loaders are represented as being dissatisfied with them. I do not know of any men, except the sharpshooters and mounted men, who are provided with them; and, from a personal acquaintance with quite a number of them, I find just the reverse to be true. I have talked with many of the former in hospitals here, and in every single instance I have found them enthusiastically in favor of the breech-loaders—with not a single exception. No such service has been rendered in this war as by the sharpshooters on the Peninsula and at Fredericksburgh; at which latter place a single company, armed with Sharpe's rifles, absolutely kept a rebel battery silent for hours, and at a distance, too, at which the ordinary army rifle would have been useless! That certainly don't prove that muzzle-loaders are superior; and the fact that many of the wounded men of that corps carried their breech-loaders with them to the hospitals, and insisted that, when they were discharged, they would carry their "pet" home with them, even though they had to pay full fifty dollars for it, if the Government would consent, certainly does not look as if they were dissatisfied with breech-loaders. If there has been, anywhere in this war, better shooting or more effective service than has been furnished by the Sharpe's rifle, in the hands of the sharpshooters, I have yet to hear of it. It may be that the two companies armed with the 40-lb. muzzle-loaders have made some better shots; but, if so, it was owing to the fact that they were provided with telescopic sights, while the others had only the open sights, and not to the fact that they used muzzle-loaders; but even that I have not yet heard asserted, though I should naturally expect such to be the fact. Instead of their being dissatisfied with breech-loaders, I have every reason to believe that, if the question were submitted to the entire army to-day, it would decide, by a vote of four to one, in favor of breech-loaders. If any one desires to test the question, let the proposition be made to exchange the breech-loaders in the hands of the sharpshooters and mounted men for muzzle-loaders; and I venture to say that we should have such a response at once as would settle the question in short order! Who does not recollect the dissatisfaction—amounting to serious trouble—among the Berdan sharpshooters, when camped in the vicinity of this city, because they were not provided with breech-loaders as promised? Who has forgotten the charge of the Fremont Body Guard at Springfield, and who does not know that their success was owing to the fact that each man was armed with one Colt's rifle and two Colt's revolvers—thus giving eighteen successive shots per man without stopping to reload—and that each man had the disposition to use them, even though some rebel should be "unconstitutionally" hurt?

Again, if it be true that the men are dissatisfied with breech-loaders, why and how is it that we see the newspapers of the day filled with such items as the following:—

> Colt's Patent Fire-arms Manufacturing Company, at Hartford, Conn., has sixteen hundred men constantly employed on arms for the Government. At Sharpe's Rifle Factory about five hundred men are employed. The Government takes all the pieces made.

To the above list should be added the extensive factory recently established for manufacturing the Burnside rifle. Now, how is this? Is it another of the "bright ideas" of the head of the Ordnance Bureau to employ all these establishments night and day to furnish the army with arms that the men are dissatisfied with, and which, at the same time, cost twice as much as the one they are intimated as preferring? The statement does not look reasonable, to say the least.

I do not wish to be understood as advocating the Sharpe's rifle as being the best; on the contrary, I believe there are several other kinds preferable to that for army use, and much cheaper. In fact, I am satisfied that our present army rifles might be converted into breech-loaders in every way equal, and, in several respects superior, to that, at an expense not exceeding two dollars apiece—thus rendering our army at least five times as effective as at present! Whenever common sense and reason shall control our Ordnance Bureau, instead of red tape and old fogyism, I shall expect to see this done, but not till then.

RIFLEMAN.

Washington, D. C., April 28, 1863.

[Our correspondent does not seem to have appreciated the letter and spirit of our article to which he refers. During the last fourteen years we have tested and seen others test quite a number of breech-loading rifles, and we have never been without one during this entire period. Arguments can always be advanced on two sides of any question, and mere opinions do not prove anything. The greatest advantage of a breech-loading fire-arm is not clearly pointed out by our correspondent. It consists in the ease and convenience of loading. For mounted rifle corps this is self-evident, because it is so difficult to use the ramrod on horseback. And, in an engagement of several hours' duration, the labor of using a long ramrod in loading is very severe. Rapidity of fire without accuracy is a disadvantage. It is well known that, in the beginning of an engagement and during its excitement, soldiers generally fire too rapidly even with muzzle-loaders, hence the small number of killed and wounded in proportion to the number of rounds fired. The experience of officers and men in the army who have used both breech-loaders and muzzle-loaders, also that of hunters and expert marksmen, would be valuable in settling this important question. The rifle which possesses most advantages should be used for the army. We made no such broad statement as that attributed to us by our correspondent, that "the men in the army provided with breech-loaders were dissatisfied with them." We said:—"We have understood, from verbal reports, that the large number of breech-loading rifles furnished to the sharpshooters in our army have not given satisfaction. Reliable information on this subject would be instructive." This is a very different statement; it casts a doubt on the accuracy of such reports.—EDS.

### Curing Butter.

MESSRS. EDITORS:—On page 260, current volume of the SCIENTIFIC AMERICAN, there is an article headed "Curing Butter," in which ten drams of saltpeter, &c., are given to every sixteen ounces of butter. Ten drams are an ounce and a quarter, sufficient—when taken into the stomach in proportion with the ordinary bulk of butter eaten at one time—to be decidedly poisonous. This may produce harm, and I have taken the liberty of calling attention to it. Ten *grains*, it seems to me, would probably be enough.

R. H. L.

Baltimore, Md., April 22, 1863.

The article referred to by our correspondent was taken from, and credited to, the *Canadian Agriculturist*. Ten drams avoirdupois ($\frac{10}{16}$ths of an ounce) of niter was probably meant. This quantity is large, but we are unacquainted with a single case which would prove it to be "decidedly poisonous." Perhaps there is no safer authority to follow than Professor Johnstone, for reliable information about butter. He states that the butter made in one district of country differs oftentimes in quality from that produced in another, even though the same method of manufacture be adopted. "In different seasons also," he says, "the same farm will produce different butter. Thus it is said that cows which are pastured yield the most pleasant butter in May, when the first green fodder comes in; that butter is generally the hardest when the animal lives upon dry food, and that autumn butter is best for keeping. These differences may all be ascribed to varieties or natural differences in the pasture upon which the cow is fed. The constitution of the animal is also known to affect the quality of the butter. But from the same milk, and even from the same cream, by different modes of procedure, different qualities of butter may be obtained. For the production of the best butter it is necessary that the cream should be sufficiently sour before it is put into the churn. Butter made from sweet cream (not clotted) is neither good in quality nor large in quantity, and longer time is required in churning. When the process of churning is continued after the full separation of the butter, it loses its fine yellowish, waxy appearance, and becomes soft and light colored. Much also depends upon the temperature of the milk or cream when the churning is commenced. Cream, when put into the churn, should never be warmer than 55° Fah. It rises during churning from about 4° to 10° Fah., above its original temperature. When the whole milk is churned, the temperature should be raised to 65° Fah., which is best done by pouring hot water into the churn, while the milk is kept in motion. Cleanliness is also peculiarly necessary to the manufacture of good butter, as cream is remarkable for the rapidity with which it absorbs and becomes tainted with unpleasant orders."

Butter contains 68 per cent. of a solid fat called margarine, 30 per cent. of butter oil, and 2 per cent. of butyric, caproic and capric acids. These proportions differ slightly at different seasons. Margarine, which exists so largely in butter, is also the solid fat in the human body and in olive oil. It is white, hard and brittle, and may be kept for any length of time by itself, but in the state of its mixture in butter it is apt to absorb oxygen from the atmosphere and become changed into butter oil and the fatty acids. It appears to be a natural food for the human race, as it enters directly into the constitution of the human frame. Butter oil is of a yellowish color; it has the taste and smell of butter, it mixes with alcohol and dissolves in a acusticsolution of potash, forming soap. The oleic acid of butter, when pure, is colorless and transparent, and is remarkable for the rapidity with which it absorbs oxygen from the atmosphere. It is to the capric and caproic acids, which exist in such small quantities in butter, that it chiefly owes its disagreeable odor when it becomes rancid.

As usually made, butter frequently contains some milk-sugar and casein, which are also constituents of milk. A very minute quantity of casein or cheesy matter also induces chemical changes in butter, producing butyric and other acids. In making butter for keeping, it should, therefore, be freed as completely as possible from casein. In many dairies this is done by washing in water, in others by kneading and pressing only. The washing is the most effective method, and is most generally recommended for butter that is to be eaten fresh. In some dairies, however, it is carefully abstained from, especially in the case of butter which is to be salted for long keeping. In curing the butter, Professor Johnstone states that the air should be excluded from it as completely as possible, and the sooner the salt is applied and the whole packed close, the sweeter the butter is likely to remain. With respect to the substances used for curing it he says:—"It is not uncommon to employ a mixture of common salt, saltpeter and sugar. When the butter has been washed, the cane-sugar may supply the place of the milk-sugar, which the butter originally contained. The salt should be as pure as possible—free from lime and magnesia. The quantity usually employed is from $\frac{1}{24}$th to $\frac{1}{28}$th the weight of the butter. The point to attend to, in salting butter, is to take care that all the water which remains in the butter shall be freely saturated with the salt. If you exclude the air, the presence of a saturated solution of salt will not only preserve the cheesy matter from undergoing decay, but will render it unable to induce decay in the sugar and fat which are in contact with it. Such a rigid precaution is really necessary to prevent the evil influence of only half a pound of cheesy matter in one hundred pounds of butter."

The following is one method of salting which has been practiced with success:—"When taken from the churn the butter is never washed, but put into a clean tub and worked with the hands until all the milk is squeezed out. Half the quantity of salt is then added and thoroughly mixed with the butter, and in this state it is allowed to stand till next morning, when it is again worked over, the brine squeezed out, and the remainder of the salt added. It is then closely packed in firkins, some salt sprinkled on the surface, the firkins closely covered up and set in a cool place. Half a pound of the best salt, and nothing else, is employed for thus curing fourteen pounds of butter." Neither sugar nor saltpeter are positively necessary in curing butter.

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### Discovery of a Tin Mine in Missouri.

MESSRS. EDITORS:—It gives me pleasure to inform you, and—through your very valuable journal—the American people, of my recent discovery (in connection with Dr. A. C. Koch, of this city,) of a very extensive and valuable tin mine in the State of Missouri.

From the assays of the ores, which I have made myself and have had made by others, we find the ores will yield, from the tin stone, from two and a half to ten pounds of tin to one hundred pounds of ore. The ores treated thus far have been taken from near the surface and downwards to about thirty feet—the greatest depth to which we have yet sunk. Four or five shafts have been sunk on the property, varying in depth from six to thirty feet. In all of them tin ore was struck within a few feet of the surface, and they are all going down in it, none of them having gone through the lode, and it may reasonably be expected to increase in richness as it increases in depth.

The soil seems to be filled with the tin ore let loose from the decomposed stone by the action of time, and at some of the openings an overlaying of asbestus, from one to two inches thick, is found at about eighteen inches from the surface. Judging from the partial surveys thus far made, from the outcroppings and the general geological formation of the locality, which is primitive in an extraordinary degree, the tin ore must be in abundance—more abundant than iron ore at Pilot Knob.

The lode has a northeasterly and southwesterly bearing, extending nearly one mile, and the two deepest shafts are about three-quarters of a mile apart. The tract embraces about one thousand acres, but the ore is not thought to underlie the whole of it. The great body of the ore lies nestling in a beautiful valley at the foot of three mountains, whose bases approach each other on a gentle slope, and at the head of a ravine running up from Saint Francois river and Stout's creek among the mountains. These mountains are separated by pretty rivulets running down their sides and gathering into one at their bases, making a fine and enduring stream of water, flowing the whole length of the tract, and in abundance for all mining purposes. The ore doubtless extends under what is called the Blue Mountain, if it does not also under the other two mountains.

A company has already been formed, and will go into operation during this year, with every prospect of eventually producing enough tin to supply the American market. HUGH M. THOMPSON.

St. Louis, Mo., April 20, 1863.

[We have frequently directed attention to explorations for tin veins in our mineral regions. Hitherto all our tin has been imported from England and the Indian Archipelego. We hope that this tin mine may not disappoint the expectation of our correspondent and others who desire to see America rendered entirely independent of foreign sources for a supply of this useful metal.—EDS.

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### Armor for Ships of War.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN, I find several statements respecting the iron clads of the Mississippi flotilla, which I beg permission to correct. The article in which they are contained is entitled "Armor for Ships of War" (page 249 current volume of the SCIENTIFIC AMERICAN), and advocates the use of thin iron plates with an india-rubber backing. You stated that "the *Conestoga* and *Lexington* were plated with solid iron 2½ inches in thickness, yet they were completely riddled in the attack on Fort Henry." The *Conestoga* and *Lexington* were formerly transports on the Ohio river, and were altered into gunboats. They have never been plated with iron, neither were they "completely riddled" at Fort Henry, as they were not brought directly under the batteries of the fort as the iron-clad vessels were. You also say that the 2½ inch-plating on the Western gunboats has been penetrated repeatedly, and cite the engagement between the *Carondelet* and the rebel ram *Arkansas*, and the attack of the *Benton* at Haines' Bluff. This is equally incorrect. Having built eight of the iron-clad gunboats of the Mississippi flotilla, I have felt more than ordinary interest in knowing how they have withstood the batteries of the enemy. These eight vessels were all plated with 2½-inch solid iron, placed at angles of 45 degrees. They are the *St. Louis*, *Carondelet*, *Cincinnati*, *Louisville*, *Mound City*, *Pittsburgh*, *Cairo* and *Benton*. Up to the present time not one plate of this iron has been penetrated on any one of these boats, although they are marked by innumerable scars. All of the casualties that have occurred on them have resulted from projectiles that have entered the port-holes on them, or that have penetrated portions of the vessels not covered with 2½-inch plating. My information on this subject is derived from personal inspection of the plating soon after the engagements at Forts Henry and Donnelson, and from officers of the flotilla subsequent to the bombardment of Island No. 10. The *Carondelet* received the fire of the ram *Arkansas* while the vessels were almost touching each other and, although the plating was considerably injured, I am reliably informed that the shot did not go through it. The pilot-houses on all except the *Benton*, were originally covered with plating only 1¼ inches thick, and placed more vertically than the 2½-inch plates. It was in one of these that Flag-Officer (now Rear Admiral) Foote, was wounded by a shell which penetrated it in the engagement at Fort Donnelson. His vessel, the *St. Louis*, was struck 61 times in the attack on that fort.

That vessel, the *St. Louis*, now called the *DeKalb*, was, I believe, the first iron-clad war-vessel ever built on this continent, and the first that ever fought a battle on this side of the world; having engaged, with her consorts, the batteries at Fort Henry on the 6th of February, 1862. She was launched at Carondelet, near St. Louis, on Oct. 12, 1861. While perfection was not to be expected in our earliest efforts, it is gratifying to know that we have lost but one of the first eight iron-clads ever built in the United States (the *Cairo* was sunk in the Arkansas river, by the explosion of a torpedo under her); that we are profiting by the faults discovered in them; and that their 2½-inch solid plates have thus far protected them against rebel batteries. JAMES B. EADS.

St. Louis, April 27, 1863.

[The main facts in the article above alluded to, were obtained from a pamphlet dated Feb. 25, 1863, and signed by W. D. Porter, Commodore U. S. N., and J. L. Jones, Esq., St. Louis, memorializing Congress on the subject of thin plating backed with rubber. The other portions not compiled from this source, were obtained from correspondence written at the West, and if the statements are incorrect we have been misled. The telegraph reports that the *Benton* received a shot through her plating, which killed one or two men on board, on the occasion of her passing the batteries at Vicksburgh, to join Farragut's fleet below. Is this statement also incorrect? Our correspondent has omitted to notice that the article is quoted; and his assertion that the use of thin plates, backed by rubber, is advocated by us, is also incorrect. We would call his attention to the closing paragraph in our article on "Armor for Ships of War."—EDS.

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AN EDITOR'S TRIALS.—As an illustration of the trials of editors, "Irenæus" of the New York *Observer* says:—"The letters coming to the editor, asking his assistance, are so many that he might reasonably employ an agent on a salary to do the work. We made mention, some time since, of a new corn that has been introduced into this country. One of our distant subscribers wrote requesting us to buy an ear of the corn for him, and from week to week to shell a few kernels of it into the *Observer*, until the whole was sent! In this way he would save the expense of postage or express. Imagine, my dear friend, the happy editor selecting one man's paper out of a vast mail list, and cheating the Government by putting a weekly grist of corn into it!"

### Improved Cultivator and Seed-Sower.

As the spring opens, and the sowing season comes around again, farmers will do well to bestir themselves and get their crops underway, else they will be left far behind by their more enterprising neighbors. The seed-sower and cultivator herewith illustrated is of novel construction, and is designed to sow the grain broadcast. In the perspective view, Fig. 1, the frame is jointed at A, and moves up or down, as the lever, B, is elevated or depressed. The seed-sowing apparatus is driven by the wheel, C, from another on the main axle. Fig. 2, in section, explains the machine and its operation more clearly. The lifting-bar, B, is attached to the frame by short chains, thus giving a free and independent motion when passing over obstructions.

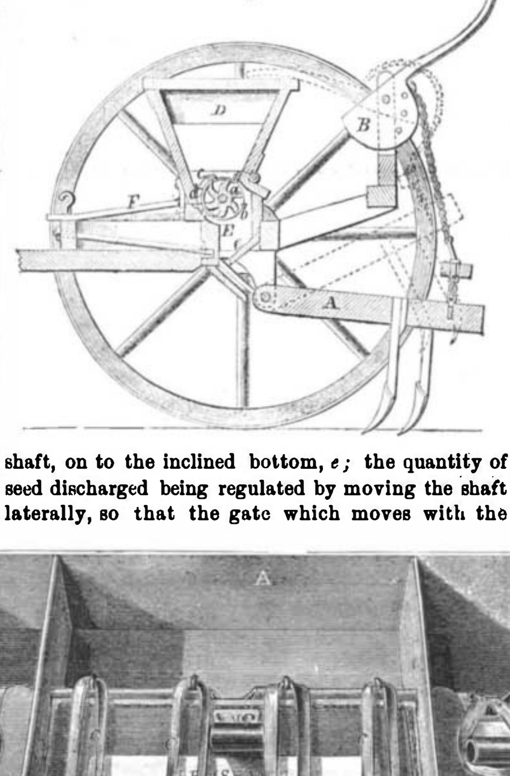
Fig. 1.

TYLER AND JONES'S CULTIVATOR AND SEED-SOWER.

Fig. 2 shows the arrangement of the seed-distributing apparatus. This consists of the box, E, connecting with the upper one, D, on which the driver sits. This box has a shaft running through it, provided with a cylinder. The shaft has a disengaging apparatus attached to it, which is formed by two collars with ratchet teeth; these are thrown into or out of connection with each other as desired, so as to prevent the distributing gear from working, when the machine is traveling to the field to be sown.

There is a lever, F, connected with the shaft, for the purpose of moving it horizontally. The extreme end of this lever projects over the frame, and may be secured by a pin working in a series of holes at any point. The object of thus adjusting the shaft, will be presently shown. The shaft has further attached permanently to it a cylinder; on this there are a series of curved buckets, *a*; on the buckets there is a head, *b*, made of a circular plate having curved slots in it, corresponding to the shape of the buckets. In the center of the head there is a hole through which the shaft carrying it passes, and is allowed to slide freely therein. The curved plate, *c*, covers the upper part of the cylinder and buckets, and has a square opening, *d*, made in it; the inner surface of the plate is not uniform. There is a longitudinal recess made in it to receive still another plate, called a gate, intended to slide laterally in the plate, *c*. This gate is provided with a ledge on its inner side, which fits in a groove made in the cylinder itself; the gate is thus connected with the cylinder so as to move with it. The head also rotates with the cylinder, and is prevented from slipping on it by having its periphery fitted in a groove in the inner surface of the curved plate, *c*, near one end of it. In the bottom of the seed box there are placed double-inclined planes, which form a bottom for the same, and cause the seed to be conducted to the opening, *d*, in the curved plate, *c*; a space being allowed for that purpose between the ends of the inclined planes. The operation is as follows:—The machine being drawn along, the shaft of the seed-distributor is rotated by a cog-wheel on the main axle, when the seeding apparatus is in gear. The seed passes through the opening into the curved plate and the buckets; as these rotate with the shaft they catch the seed and carry the same upward and discharge it as they pass over behind the shaft, on to the inclined bottom, *e*; the quantity of seed discharged being regulated by moving the shaft laterally, so that the gate which moves with the cylinder may cover more or less of the opening. This plate also performs another important function, as it prevents the seed from being broken by clogging or jamming in the machine; it leaves a space between the edges of the buckets and the inner surface of the cylinder. The inclined bottoms are corrugated, and as the seed strikes them in its descent, it falls on the ground and is covered in by the teeth following after.

Fig. 2.

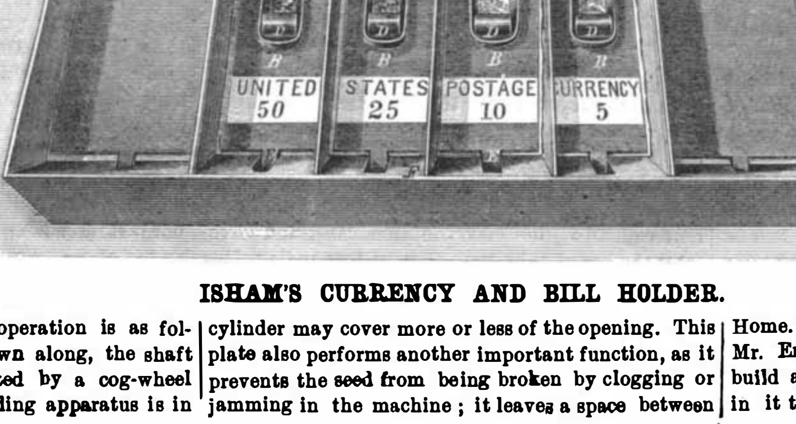


The patent for this invention was procured through the Scientific American Patent Agency on August 12, 1862, by W. M. Jones and S. E. Tyler, of Horicon, Wis.; further information may be obtained by addressing the inventors as above, or D. W. Hall & Co., manufacturers, at the same place.

### Currency and Bill Holder

This illustration represents a new method of holding the postal currency so that it can be readily removed as required for business purposes; it consists of a tin box, A, divided into a number of compartments of various sizes in which the notes of the several denominations are deposited. These compartments are furnished with small plates, B, to which the elastic straps, C, are connected by being passed over a hook on one end of the box and a projection, D, on the plate itself. The opposite ends of the plates have a small tongue, E, which is dovetailed into the slot, F, and while it serves as a hinge for the plate to work on, also permits it to rise as the pile of notes below is increased in bulk. These are the principal features of the holder. The bill file on the left and the letter-holder on the right, sufficiently explain themselves, and they are similarly furnished as regards the mechanical arrangement with the other compartments. Additional spaces are left at the ends of the currency-holder in which to deposit pennies or silver (when there happens to be any in use) as may be desired.

This currency-holder is the invention of George B. Isham, of Burlington, Vt. An application for a patent is now pending through the Scientific American Patent Agency.




ISHAM'S CURRENCY AND BILL HOLDER.

### A Gold Model of the "Roanoke."

A gold model of the iron-clad frigate *Roanoke* was on exhibition at Bailey's, on Chestnut street, a few days since, and attracted considerable attention. It was made by Mr. J. D. Benton, of Wilmington, Del., and is eighteen inches in length, three and three-eighths inches in width and a trifle over two inches in depth. There are nineteen ounces of fourteen-carat gold used in the construction. All the details of the turrets, hatches, guns, smoke-stacks, man-ropes, &c., are made to a scale and are perfect in form. A musical instrument is located below the spar-deck, and when in motion the three turrets revolve and the propeller is worked, and, when placed in the water, she goes ahead in fine style. The musical arrangement plays three tunes—"Star-spangled Banner," "My Mountain Home" and "My Old Kentucky Home." The gold used cost over $1,500. Some of Mr. Ericsson's friends have engaged Mr. Benton to build a gold model of a *Monitor* battery, the gold in it to be worth $5,000.—*Philadelphia Press.*