INTERESTING CORRESPONDENCE.

WORKING STEAM EXPANSIVELY.

MESSRS. EDITORS :—Your correspondent, Warren Rowell, on page 183 of the present volume of the SCIENTIFIC AMERICAN, in reference to working steam expansively, says:—"When any one foolish enough to believe in the economy of working steam expansively can point to one single experiment in the history of the steam engine as fairly tried at one of the mills, and can show any saving, he will then have some grounds for his belief, and not otherwise." As your correspondent gives an extract from an English work on the economy of fuel, by T. S. Prideaux, as proof of the foolishness of using steam expansively, I beg to point to the following "experiment in the history of the steam engine," as given in a treatise on the steam engine, edited by John Bourne, C.E., (another English work). On page 12, the author says:—"A forty horse engine, constructed by Mr. Watt,, about the time of the introduction of his expansive principle, was found to require about 8½ lbs. of coal per horse power per hour, when working without expansion, and about 6¼ lbs. when the expansion was 1.518 times. The water evaporated from the boiler was, without expansion, .674 cubic feet per minute, and with the amount of expansion already mentioned, .501 cubic feet per minute." The above experiment (if any reliance is to be placed on it) clearly demonstrates a saving of 2¼ lbs. of coal per horse power, in favor of the expansive working of steam. Now, when we consider that the expansive working of steam, either theoretically or practically, was not an invention in itself, made with a view to the realization of an increased power from a given quantity of steam, but that the increased power was the unexpected result of cutting off steam for the purpose of diminishing the velocity of the piston in a single-acting engine, towards the end of the stroke, and that the above cited experiment appears to have been one of a series made by Watt, to determine or ascertain the precise amount of saving; and the result in figures is there given, I, for one, am inclined to think it quite as much entitled to credit as a simple statement or mere assertion (unbacked by figures or any statement of the actual result) of T. S. Prideaux, so triumphantly brought forward by your correspondent: "that a better effect was obtained by using only two cylinders and cutting off at half stroke, than by using the same quantity of steam in four cylinders, and cutting off at quarter stroke." Practically, it appears the engineers on one of her Majesty's screw steamers have demonstrated that, with a given quantity of steam, the effect is inversely as the number of cylinders, down to two, cutting off at half stroke; but why, in the name of all that is comical, did they stop here? Why not pursue their experiments still further;? for if two cylinders, cutting off at half stroke, are better than four, cutting off at quarter stroke, then one cylinder, following full stroke, must be better still, and, theoretically, at least (if not practically), we arrive at the final and inevitable conclusion that *half a cylinder* and *compressed steam* would beat everything else "all tew thunder." Shade of the immortal Watt! in comparison with the "dazzling orbs" that have risen and now shine in the firmament of engineering science, what a "penny candle" wer't thou; *now* may'st thou "hide thy diminished head;" in short, consider thyself teetotally snuffed and forever extinguished.

Apropos of the above brilliant experiment and its equally brilliant result on an English steamer, I have lately read in the papers (and amongst others, in the SCIENTIFIC AMERICAN, I believe) an account of the engines being taken out of an English mail steamer, running to South America, and its being fitted with new ones constructed, as your correspondent says, "for the express purpose of better obtaining the economy due to a considerable extent of expansion;" and the result was a saving of from one-third to one-half of the fuel formerly used; in fact, the experiment was so eminently successful and satisfactory, that the company had decided to take out the engines in the whole line of steamers and replace them with others constructed like the experimental ones. Comparing this with the experiment cited by your correspondent, how are we to reconcile the two accounts; and if such satisfactory results can be obtained from expansion, on a simple mail steamer, surely as good a result ought to be obtained by engineers having the honor of constructing for her Majesty's screw steamers, to say nothing of the advantages of graduating at the "circumlocution office," and an unlimited amount of "red tape."

For further experiments "in the history of the steam engine" (and "fairly tried" at that), I would refer your correspondent to pages 81–82 of the above-mentioned work, where he will find tables with explanations, showing the relative efficacy of different engines—both non-expansive and with different degrees of expansion—and where he will see that "the order in which the different engines stand, in respect of superiority of duty, is the same as in respect of the amount of expansion." Your correspondent further says:—"The proprietor of an extensive manufactory has told me, this very day, the result of the trial of a cut-off which he had on his engine; he said it made no difference in the cost of the coal used whether he cut off at one-seventh of the stroke or one-half stroke." In reference to this broad assertion, I would say that there is a large engine now running within one hundred feet of the place where I now write, and working on the expansive principle, pure and simple—that is, by an automatic cut-off and no throttle valve. This engine will do its work and hold its proper speed with steam at 40 lbs. pressure and cutting off at half stroke, but to supply it with steam at that point requires a lavish expenditure of fuel and considerable exertion on the part of the fireman; but by simply raising the steam to 60 or 65 lbs., the engine then cuts off at about quarter stroke, or less, and the same work is done with about one-third less fuel. However non-expansionists may account for this, I think that people "foolish enough" to believe in expansion, would say that it is owing to the greater expansion of the steam.

Again, the engine in a large planing mill and building let out for mechanical purposes, up town, has lately been taken out and replaced with a new one. Cause, insufficiency of power and the difficulty of maintaining a pressure of steam high enough to do the work required. Cylinder of old engine, 15 inches diameter, 4 feet stroke; valves, the ordinary slide; no cut-off, and regulated by a throttle valve; pressure of steam, from 90 to 110 lbs.; 3 boilers, about 30 inches by 30 feet; fuel made by planing machines and other wood-working machinery. The new arrangement is an engine with cylinder of 24 inches diameter, 4 feet stroke, and running at the average speed of the old one. An automatic cut-off and regulator, capable of admitting steam up to half stroke, or cutting off close to the commencement, as may be required, no alteration whatever to the boilers. Pressure of steam, from 45 to 55 lbs., cutting off from one-sixth to one-third of the stroke. Result, an abundance of power, coupled with a perfect regularity of speed, and a saving of at least one-third of the fuel. Non-expansionists and *sensible* people predicted a failure; but, by some "hocus-pocus" or other, it did'nt fail; neither did the "received notions," in this case, receive any damage.

When engines are made, that are perfectly steam-tight and can be run without friction, and waste no steam in ports and passages, *then* experiments similar to those described by your correspondent may be considered, to a certain extent, as "fairly tried," and, with all deference to the opinion of your correspondent, that engines with the ordinary slide valve and cut-off valve on the back, are constructed "in the most perfect form for using steam expansively," I would say, that some people are rather skeptical on that point; for such engines, in addition to the above valves, are furnished with a regulating valve in the steam pipe, and, what with being strangled at the throttle valve, and strangled at the cut-off valve, and still further strangled in its efforts to get through the port into the cylinder, the steam (if I may be permitted an expression more forcible than scientific) is "just about strangled to death;" and if the users of such engines would take away the cut-off valve from the slide valve, and diminish the strangling somewhat (for such engines, at best, are but mongrel combinations), in nine cases out of ten the result would be more likely to be beneficial than otherwise.

The experimenters at the Metropolitan Mills will have to make some new arrangements and try again, before they arrive at the relative merits of expansive and non-expansive engines. An engine working with a pressure of 90 lbs. of steam in the boiler, and having its action controlled so that it imparts a uniform pressure of from 20 to 40 lbs. per inch on the piston, *might* by a considerable stretch of the imagination, be considered a non-expansive engine, but I would respectfully say to your correspondent that such is not one of the "received notions;" and further, I would say that it is quite possible the "error" found, at such great cost, by the proprietors of the Metropolitan Mills may be simply this, that while they were under the impression that their engines were constructed "in the most perfect form for using steam expansively," their experiments simply demonstrated that they are eminently adapted for *strangling steam.*

JOHN BROUGHTON.

New York, Sept. 25, 1860.

MESSRS. EDITORS:—Your correspondents who assert, and claim to have proved, that no saving is effected by working steam expansively, cannot reasonably expect to have much attention paid to them. Any one who should declare: "two and two do *not* make four; it is no such thing; I deny it," would probably be allowed to all the disputing in that *controversy* himself.

CHAS. T. PORTER.

235 West 13th street, New York, Sept. 26, 1860.

THE NATURE, ORIGIN AND COMPOSITION OF THE METALS.

MESSRS. EDITORS:—After some considerble investigation, I have arrived at the conclusion, deduced from the following facts, that all the common metals are compounds of iron, nickel and copper, having radical properties of which all the others are composed, in different proportions; that when these metals combine, they do not always loose their original properties, but are still real atoms of iron, nickel or copper, attracted or combined with other atoms; that such combination of separate atoms forms an individual atom of the new metal, and that all the original atoms have a common diameter, and that in the case where a metal is drawn into a wire, one class of atoms (say those of iron) form continuous wires or chains of atoms, and that the second class of atoms adhere to them, but have little or no cohesion together.

The following is a tabular statement of the tenacity of wires of 0.07875 inch diameter:—

	Tenacity.	Cal.	Thomson.	Vol. of atom.
Iron	551.37		551.37	43.5
Platinum	.50	275.68	275.63	56, wire 64
Silver	.33	183.79	187.46	128=43×3
Zinc	.20	110.26	110.25	56
Copper	302.00		302.00	44.4
Gold	.50	151.00	149.97	63.5=43×1½
Nickel	105.86		105.86	42.7
Tin	.33	35.28	35.28	99 8=56+43
Lead	.25	26.46	26.46	113.4=56×2

As I was unable to obtain the density of all the metals in the state of wire, these volumes are calculated by dividing the common density of the metals by the atomic weight.

It will be seen by the above table that the second class of metals, or those having a compound volume, have a tenacity of 1-2, 1-3, 1-4, or 1-5 of that of the radicals iron, nickel and copper, in quantities too exact to attribute it to accident; thus, platinum wire has a tenacity just ½ that of iron; it has also a compound volume, or a volume greater than that of iron, nickel or copper, whose volumes are nearly the same; and the difference which occurs arises no doubt from the different densities the metals assume under various treatments, as will be seen from the following table:—

Names of bodies.	Density.
Platinum, coined	22.100
" wire	19.267
Copper, hammered	8.878
" fused	7.788
Iron, wrought	7.788

It will be observed by reference to table No. I, that the sum of the volume of all the atoms is made up of iron and of platinum; thus, silver is equal to 3 of iron; zinc, equal to platinum; gold, 1½ that of iron; tin, 1 of iron and 1 of platinum; and lead, 2 of platinum; but it appears, by reference to table No. II, that this is not the correct volume for platinum, it being calculated from the ordinary density of the metal=22, when the density of the wire is only 19.267, which makes the volume of its atom just 1½ that of iron; but the tenacity of platinum is just ½ that of iron; the inference, therefore, is that platinum is composed of 1 atom of iron, which has the whole of the tenacity, and that to this atom of iron is attached a short atom of some other metal, which fills up the space but has no tenacity. This is further proved by the other metals; gold has 1 volume and ½ volume,

and its tenacity is ½ of that of copper; tin, 2 volumes and ½ volume, and its tenacity is ⅓ that of nickel; lead has 2 volumes and 2 ½ volumes, and its tenacity is ¼ that of nickel; while silver has 3 whole volumes, and its tenacity is ⅛ that of iron. To zinc this does not apply; it has probably 5 very short atoms. From these facts and calculations I conclude that platieum, silver and zinc have each at least one atom of iron, which atom has the whole of the tenacity of the new metal; gold, at least one of copper; and lead and tin, one of nickel. I have assumed that iron, nickel and copper are the primitive and not the compound metals, from the fact which appears by reference to table No. II, that there is no relation to the tenacity of tin and lead, except through nickel, and the same is true of zinc, silver and platinum. I would invite the attention of those who cannot believe these deductions, to consider the curious fact that tin has a volume not equal to 1, 2, or 3 of any other metal, but is equal to the sum of 2. The density and weight of the atoms will be the subject of a future article.

The following table shows the force required to twist one inch round bars of different metals:—

English wrought, 12,063=603×20 or 482−4×25.

Blistered steel, 20,025=603×30+482.4×4.

Shear steel, 20,508=blistered steel+603.

Cast steel, 21,111=shear steel+482.4.

Cast copper, 4,825=4-10ths iron or lead×4 or 603×8 or 482.4×10.

Tin, 1,688=1-10th iron, 1-10th copper or lead+482.4 or 603+2+482.4.

—Lead, 1,206=1-10th iron or 1-4th copper or 603+2.

The numbers 603 and 482.4 are to each other as 5 and 4.

It will be seen, by reference to the last table, that all the metals have a common origin, from the fact that they have all two common units of strength, whose relative values are to each other as 4 and 5; how these quantities arise I have at present no knowledge, but their relation to each other is a fit subject for calculation. It will be seen that they are not only composed of the two whole quantities of strength, but that the natural metals have a rational relation to one another; thus, copper has a strength equal to 4-10 that of iron, and either of them can be divided by either of the units without a remainder, and that none of the others can; from which I infer that had the table contained nickel it would also have been divisible.

From the foregoing, I have arrived at the conclusion that all the metals have a common origin, forming my opinion from the relation of their tenacity, and the fact that their whole strength is made up of the two units of strength, as shown in the last table.

WILLIAM COUTIE.

Troy, N. Y., Aug. 31, 1860.

TWO POINTS OF PATENT LAW.

MESSRS. EDITORS:—Suppose A patents a combination, but afterwards finds his machine will perform to better advantage with a part of the combination omitted. But instead of applying for a re-issue, he sends out B with a power of attorney to sell territory for him, with a model of the altered improvement to be sold under the original letters patent. C not being well posted in nice points in patent law is induced to purchase, and does not discover any flaw until afterwards. Has C any remedy at law?

2. Suppose, also, that attached to the deed given by B to C, there is a printed copy of the original Letters Patent, with claim and specification, all correctly copied, except a single word in the specification, which has evidently been altered to make it correspond with the alteration in the machine. Does this not amount to a fraud, amenable to the laws?

H. C. F.

McGaheysville, Va., Sept. 5. 1860.

[In answer to the above questions, we need only say, that frauds of the kind above stated subject the guilty party to the same penalties when connected with the sale of a patent as when perpetrated in other transactions. The only questions to be considered, when the case is brought before the proper court, will be, whether a fraud has been committed by the defendant, and whether such fraud has caused an injury to the party complaining. If both these are found in the affirmative, suitable damages will be awarded to the plaintiff.—EDS.

HOWE'S PATENT EXTENSION.

MESSRS. EDITORS:—I noticed on page 201 of the present volume of the SCIENTIFIC AMERICAN, an editorial article on the subject of the extension of Howe's patent. It seems to me that the views expressed in that article are taken from the argument of Mr. Gifford, the learned counsel in the case, rather than from the entire case as presented. The most important points were two in number, presented to the Commissioner of Patents for his decision, after it was determined that the invention claimed by Howe was legitimate. First, how much of the value of the present modern sewing machine was due to the invention of Howe; and, secondly, what is meant by the language of the statute, which says that, "if, upon the hearing of the matter, it shall appear to the full and entire satisfaction of said board [now the Commissioner of Patents] having due regard to the public interest therein, that it is just and proper that the term of the patent should be extended, by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity and expense bestowed upon the same, and the introduction of them into use, it shall be the duty of the Commissioner of Patents to extend the patent." Does this mean that a patent shall be extended without regard to the amount the inventor may have realized for his invention, provided said amount is proved to be much less than the value of the invention to the public? Or does it mean that if the inventor has either met with loss in giving the public a useful invention, or has been inadequately rewarded for fourteen years of constant and diligent labor, together with his expenditures, such sacrifice shall be made up to him by prolonging his term of patent? It was contended, in opposition to the grant, that the latter was the proper construction, and that the legislators did not intend to have the present value of the invention to the public, or its saving to them, brought into the question. And it was urged that as Mr. Howe had received half-a-million of dollars for his fourteen years' labor, expense, and ingenuity, he has received more than ordinarily falls to the lot of any man, however talented. This is a very important question in the abstract, and the decision of the Commissioner opens a new era in such cases. Judge Mason refused to extend Burden's patent, on the ground that he had been sufficiently remunerated for his time, labor, and ingenuity, yet, with vastly greater labor and expenditure than Mr. Howe, he had not received a fifth of the money. It would be well to know what is to be the rule of action, the present decision determining that no limit of receipts shall be a bar to the extension of a patent. If that is correct, would it not be better that every patent should be extended, of course, by the payment of a certain sum of money. There being no inquiry at the Patent Office, except into the original novelty. Was the law so changed, it would relieve the Commissioner of Patents from the heavy responsibility that now rests upon him, and the odium which you declare has been cast upon the present able officer at the head of the bureau, and which I regret to hear he has been subjected to, as I am confident it is wholly undeserved.

I should not trouble you with this notice on account of any strictures you have thought proper to indulge in, in relation to the opposition to this patent extension, and I have no desire to defend it—that must stand or fall on its own merits; but the great public question is important. The whole community is interested, as well as one of the counsel in opposition who had both client and friends to defend, although the opposition was entered in his name.

MESSRS. EDITORS:—I am an inventor, and have taken out several patents, some of which are useful and important to the public. My inventions—no matter what I may get out of them—are of vastly more importance to the public than they ever can be either to me or to my assignees. I worked hard to produce these inventions, and the credit is due to me for them—not to some unknown one who might have made them at a later period if I had not. These inventions being the product of my brains, why, I would like to ask, are they not my property as much as a wheelbarrow made by my own hands? The law sets a limit on my otherwise natural right to these inventions, solely from considerations of policy, and not from mere absolute right. The law says I may hold an absolute authority over them for a term of fourteen years, and, under certain circumstances, seven years more, after which the public may freely use them forever. Against this I have no appeal, and must, at the appointed time, surrender all my rights to those who had nothing to do with the toils and troubles attending the production of my improvements.

The author of a book, I am told, has a copyright for 28 years; and why should not the inventor be permitted to have the use of his invention for at least 21 years?

These suggestions occurred to me from reading your editorial remarks upon Howe's extension case. I have for so long a time listened to the views of those who were opposed to the extension, that my mind had become prejudiced against the case, and I thought it would be wrong to extend it further. I however fully agree with your views—they are, in my opinion, right—and every inventor in the country owes you a debt of gratitude for your defense of their rights. I know what it is to contend against the prejudice of men, and to be snubbed as a half-crazy inventor. Many years ago, I got up a valuable invention, and after much patient labor made a nice working model of it. I took it to a large manufacturer in Boston and showed it to him, and asked his aid in trying to get out my patent. His reply was, "if you are a fool, you make a mistake in trying to spot me as one. I advise you to go to hoeing corn; you will do somebody good; your invention ain't worth a cent." I was discouraged and did not get a patent for it. If I had done so, it would have been worth more than $100,000 to me. C.

New York Sept. 23, 1860.

MESSRS. EDITOR.—I see by the SCIENTIFIC AMERICAN, page 201, present volume, that the Commissioner of Patents has decided that $468,000 is not *enough* for a patent, and you defend him in this decision. Will you please inform your readers what is enough?

When Mr. Howe was struggling to get food for his family to live on, if he had been asked the question whether $400,000 for his patent would satisfy him, can there be any doubt that he would have said yes?

That Mr. Howe himself should have greedily asked for more is not strange, but by what process of reasoning the Commissioner came to the conclusion that he ought to have it at the expense of the poor sewing-girls is, most decidedly, a mystery.

MODERATION.

New York, Sept. 26, 1860.

CASSELL'S ILLUSTRATED BIBLE.

We have received from the publishers—Messrs. Cassell, Petter & Galpin, London and New York—the first volume of Cassell's "Illustrated Family Bible." This work is far more profusely illustrated than any edition of the Holy Scriptures that has ever been published.

Nearly half the pages are adorned with large woodcuts, most of them half a page in size, though quite a number cover the entire page. The illustrations consist principally of groups of figures, though maps and bird's-eye views of Egypt, Canaan, &c., are given. The text is accompanied with copious explanatory notes, full of information in regard to the manners and customs of the East, and other matters which elucidate the narrative. The drawings are very natural and spirited, the engravings, the type and the printing are excellent specimens of the art. It is published in parts of 32 pages each, which are issued on the 1st and 15th of each month, at 15 cents a piece. The first volume contains 457 pages, and embraces the books from Genesis to the first book of Samuel, inclusive.

This great work, it seems to us, opens a fine field for active agents to operate in. It ought to be found on the table of every family in the land.

PROSPERITY OF THE PATENT OFFICE.—As an evidence of the activity among inventors and the prosperous condition of the Patent Office, we would state that we have paid into the treasury, to the credit of the patent fund, during the six days previous to going to press (Saturday, September, 30th), *twenty-six hundred and forty-three dollars*,