

FRANKLIN INSTITUTE.

Explosions of Steam Boilers.

[Continued from p. 247.]

(No. III.)

Letter from General Swift to one of the Committee on Explosions, dated
Geneva, New York, July 15, 1830.

DEAR SIR,—During my absence on Lake Ontario, your letter of the 6th instant, relative to the explosion of the boilers of the Helen M'Gregor, was received. I know very little about it, as you will perceive. In March last, I overtook the steam boat on the Mississippi, and made very particular inquiry of the passengers, in order to compare it with the accounts of former days of the explosions of the *Ætna*, and of the Hoboken ferry boat, at New York, &c.

From the inquiries it became soon apparent that a very common ignorance prevailed; for passengers rarely make any useful examination of steam machinery: very few of them knew any thing of the structure of the machine, or of the mode by which the steam is retained, or applied to motion.

Some of the passengers said that the boat, as it lay adjacent to the river bank, was so "keeled over" that one of the wing boilers could not have had any water in it, and that in that position it was when it burst or collapsed. Others said that the steam was not "let off," because the engineer was expecting that all persons would be on board in a moment or two, and thus the pressure of steam became too great and burst two of the boilers, endwise and upward. Others said that one boiler had burst, and another shrunk or collapsed. One of the passengers, who appeared to have a clear recollection, said that two of the boiler-heads, (for there were several contiguous boilers, as is usual,) burst towards the cabin, and came in contact with two iron stanchions, and were by them reflected, (direction changed,) and went through the sides of the bulk heads. All agreed that one boiler was thrown about forty feet from the boat, and struck in the bank with one end uppermost, and the head of the boiler of that end blown out. The iron stanchions, probably, saved many of the cabin passengers, who were at breakfast, from wounds and death. The passengers generally agreed that the boilers were weak: how they came to this, or any other, knowledge about them I know not. *The boat was an old boat.* When I went on board the Helen M'Gregor it was night; "the wreck cleared away;" the hull of the boat apparently little injured. I concluded that part had burst and part had collapsed, and that all the bursting had been upwards and side-wise, and endwise. The published account of a passenger contains as much as any one of them knew, or as any one on board knew, save the principal engineer, who, if a competent person, knew best the actual state of the boilers and machinery.

I am of opinion that carelessness and ignorance, combined, have been the chief causes of the bursting of boilers. No doubt many have

been burst by using or wearing the boiler for too great a length of time; moreover, I do not believe that the state of the boiler is sufficiently often inspected, from its being a tedious operation and requiring a well informed person to make the survey. I have observed many engineers whose care and attention were exemplary, I have also seen those who did not pay the requisite attention to determine the relative state and position of the water and the steam, while fire was under the boilers. I consider low pressure steam boats more safe than high pressure, only because the former may admit of greater carelessness with impunity, than the latter. Much of the safety and strength of boilers depending on the quality of the iron, (used on fresh water,) it is very desirable to determine its durability or toughness by some legal inspection and seal; and whether brittle when hot or cold; and to know whether the plates in any one boiler have equal strength in those particulars before being put together.* The effect of high temperature upon the strength of iron plates, with reference to finding means to resist the effects of the sudden contact of steam, atmospheric air, &c. &c. should be experimented upon.

After all the precautions which theory and experience have suggested, there is one quality in men which will ever make a steam boiler a dangerous companion in travelling—I mean temerity. All know that without careful attention the strongest boiler may be burst, and that heedlessness is one of the common consequences of habitual association with dangerous machinery. From these and other considerations I am satisfied that there is no known safety for passengers conveyed by steam, equal to tow boats or safety barges; the loss in velocity is more than compensated by quiet and safety. Wishing you success in your laudable and scientific efforts for the public good, I remain

Your respectful friend,

J. SWIFT.

(No. IV.)

Dumfries, Virginia, August 20, 1830.

SIR,—A passenger of the steam boat Helen M^rGregor feels authorized to reply to the circular of the Franklin Institute, and briefly responds to the first inquiry; that boilers are often burst by the confidence engineers have in their strength, frequently by neglecting to let off the steam, and sometimes by cracks and flaws in the boiler heads. In the case of the Helen M^rGregor, the boiler-head of the one that exploded was cracked, and the engineer neglected to let off the steam in time: he had his hand on the wrench of the screw to let the steam into the cylinder at the time of the explosion.

Inquiry 2nd. The best means to obviate the frequency of explo-

* The necessity for which is suggested by the effect produced upon the boiler of the *Ætna*.

sions, is to pass a law requiring boiler-iron to be one inch thick; and in high pressure engines that not more than seventy-five pounds of steam shall be carried to the inch; the boats would go slower, but their safety would be beyond question. Boiler-heads to be of wrought iron.

Inquiry 3d. The means to apply those remedies.—Let the Inspector of the customs at each port be directed to examine the thickness of the boiler-iron, to see that the heads are of wrought iron, and that the boilers are carefully rivetted, screwed, and hooped; and that for carrying more than seventy-five pounds of steam to the square inch, on conviction thereof, a fine of 1000 dollars shall be imposed; one-half to the informer, the other half to government, to cover expenses of prosecution, &c.

The boilers of the *Helen McGregor*, six in number, were about four feet in diameter, eighteen feet long, of wrought iron, one-fourth inch thick, with cast iron heads. The head that blew out broke into numerous small fragments, killed several persons, and wounded others.

Boilers should be of cylinder form, long enough to reach across the boat; the diameter about one-fifth of its length; American iron is safer, and less brittle than Swedish or Russian, and I think than English also.

Arrangement in the boat.—Across, so as to have the fire place on the guards, which should, at that point, project into a platform of the form of a segment. In this position, if the boiler heads blew out no danger would be apprehended to those in the bow or stern, above or below. At least nine times out of ten, boilers have blown their heads off, leaving the sides perfectly free from even a crack or flaw. When several boilers are ranged alongside each other, they have a connexion pipe, which terminates in a larger one, conveying the steam to the flues and cylinders. On this large pipe is fixed the safety valve, its form is simple, and may be understood by a school-boy.

Large boilers may be placed with safety on the guards, one on each, which would be quite as efficient, except at sea.

If this meets with approbation it will gratify the writer, whose name may be known of the postmaster at Dumfries.

W. S. C.

(No. V.)

Extract of a letter from Wm. Littlefield, Esq. of Newport, R. I., dated
Columbia, December 2, 1830.

MY DEAR SIR,—In conformity with your wishes, expressed at our last meeting, I took some pains while descending the Ohio, to inquire at every place where we stopped, and from every person I thought qualified to afford information, respecting the explosion on board the steam boat *Caledonia*. I will now give you all I could learn on the subject, though by no means sure that I can throw any new light upon

it. The accident happened near the little prairie, between Memphis and New Madrid. At, or near, Memphis, they had wooded, and had proceeded about twenty-five miles without any thing unusual occurring; there was no boat within many miles of them, and I was assured that they had not the slightest idea either of outrunning a boat below, or of overtaking one above them. Indeed the time consumed in going the 25 miles seems to contradict the notion that the steam was too high, as from the best information it was not short of three hours. There were, I think, eight boilers; that which burst was one of the outside ones, near its centre, and about a foot from the bottom of it, whence it was ripped upwards by the steam a yard or more. One of the persons who saw it, told me that the aperture was large enough to take in a flour barrel. This boiler had a thin place in it which had been cut out the year before, and a new piece put in with *copper rivets*, and in that very place it burst. The boilers had not been cleaned since leaving New Orleans; there had been a freshet in the Missouri, and the water was unusually muddy. There was a sediment at the bottom of the boiler, but my informants differed as to its thickness; that, however, matters not, as they all agree it was baked as hard as a brick, and burnt. These are the facts, and the most probable solution is, that the rivets were burnt off where the sediment attached to the iron.

Since these terrible disasters they are getting much more careful. I am told it was no uncommon thing, a few years ago, to use puddled iron for boilers, when a person came along who beat them down rather more in their prices than they thought they could afford. They have improved their boilers, and now make the heads of *wrought iron*, which unscrew, and are large enough for a man to go in and clean them thoroughly; formerly they placed too much confidence in what they term blowing them out. As long as they keep the boat running, there is no danger from sediment, but if they stop for the night, as soon as the ebullition ceases the sediment deposits, and gets so hard that it cannot be raised again. The boilers require great attention in the western waters, even when the rivers are clear, as they are so strongly impregnated with lime, that an incrustation is formed almost immediately. These facts I think may be relied on: they are derived from the clerk who was in the boat at the time, and who is a man of intelligence, and I should say, of integrity.

I will say a word or two more on your favourite object. No blame, whatever, attached to the captain or officers. The former is now superintending the building and equipping one of the largest and most splendid boats I ever saw. At the moment of the explosion, his brother, the engineer, was standing within a yard of him, and had just tried the gauge cocks, and found the water as it should be. After that moment he never saw him more. The high pressure boats still continue in vogue; indeed, as constructed, on these waters, I think them quite as safe as on the other principle. You are probably aware that there is no such thing as a copper boiler; they are uniformly of wrought iron, generally a quarter of an inch thick. The high pressure engines have a fore and aft motion, which strain them. The

former, too, takes up less room and weighs less, which is an object of great consequence, as they are obliged to use light draught vessels, at least half the year. The one we came down in only drew 14 inches, when light; and 20 inches with 80 passengers and their baggage on board.

(No. VI.)

Letter from a gentleman connected with the *Caledonia*.

Philadelphia, October 27, 1830.

DEAR SIR,—In answer to your inquiry relative to the explosion of the boiler of the steam boat *Caledonia*, while running on the Mississippi, in May, last, I remark that the explosion was at first attributed to some defect in the iron of which the boiler was made; afterwards to the careening of the boat, in consequence of the passengers crowding on one side; but upon examination of the boiler, and of many circumstances since, it is the opinion of her owners, and of many scientific men, that it was the result of *carelessness*. The engineer, who was killed, had high reputation; but had, upon this trip, neglected to “blow out the boilers.” The river was extremely muddy, and the boat was kept in constant motion for about seven days, when some derangement occurred in the machinery, which compelled a stoppage of several hours, (perhaps eight.) This delay caused the mud, which had been kept in motion by the boiling of the water, to settle and become baked to the bottom of the boiler. Upon the application of the fire, the iron was *burnt*, (which is, I believe the cant phrase,) or rendered brittle, and after being out two hours, the explosion took place; the boilers at the time being well supplied, for the engineer had just been trying the gauge of the water. The rent in the boiler was about 18 inches, about one-third distance from the bottom, in the *side*. The boilers were high steam cylinders, about 30 inches diameter, and 20 feet long, with two flues.

The above is, I believe, a correct statement of facts, hastily drawn up, and altogether at your disposal.

Yours respectfully.

(No. VII.)

Letter from Matthew Robinson.

New Albany, Indiana, August 16, 1830.

SIR,—In answer to your letter of inquiry into the facts relative to, and causes of the explosions of steam boilers, I take pleasure in communicating all the information of which I am possessed. The first case to which my attention was particularly directed, was that of the explosion of the middle boiler of the high pressure steam boat *Car of Commerce*, of 200 tons burthen, with five boilers. The after

head of the middle boiler, which was made of cast iron, seven-eighths of an inch thick, gave way; which caused the boiler to jump from its bed 12 or 16 feet, carrying with it the four other boilers. On examination I found the one which burst was an L. flue boiler, the other boilers having straight flues, running through both their heads, which adds much to their strength and safety. The bad construction of this boiler was, in my opinion, one cause of its explosion. Another, and more immediate cause, was the want of sufficient water in the boiler, they having stopped directly before the accident to repair the force pump, at the same time holding on to the steam, that they might be able to overtake a boat which was ahead of them.

The next explosion I particularly noticed was that of the high pressure steam boat *Helen McGregor*, with 6 boilers, 36 inches in diameter, with one L. flue, 17 inches in diameter, in each boiler. These were all L. flue boilers. The after head of the second one, from the starboard side, having been before cracked, gave way; and this boiler breaking its connexion with the others, went through the bow of the boat into the river. We are satisfied there was sufficient water in the boiler. At the time of the explosion, the engine was in the act of performing its first revolution after wooding at Memphis, on the Mississippi.

The third case was the collapsing of one of the flues of a boiler of the high pressure steam boat *Huntress*, 300 tons burthen, on her passage from New Orleans to Louisville. The boat had stopped her engine for a few minutes, for some purpose, and it is satisfactorily ascertained that the water was too low in the boilers; when, therefore, the engine was again set in motion, the explosion took place. Whenever the water in the boilers becomes lower than the uppermost part of the boiler with which the fire comes in contact, the part between the surface of the water inside and the aforesaid uppermost part of the boiler becomes red hot, and cold water being at this time introduced, steam is instantly generated in such quantity that no safety valve of the usual dimensions will allow it to escape, and an explosion is the inevitable consequence.

The fourth case was that of the high pressure steam boat *Caledonia*, on her passage from New Orleans to Louisville. This explosion took place while the boat was steadily running, which makes it differ from most other cases, and we must therefore look for other causes. They are found in the deficiency of the boilers themselves. In the first place, the boilers of the *Caledonia* are made of iron entirely too thin for boilers forty inches in diameter; but a more special cause arose from a patch put upon the lower part of one of the boilers with copper rivets, and the water in the Mississippi being very muddy, they did not keep the boilers sufficiently clean, but suffered the mud to accumulate too much between the flues and the bottom of the boilers; the mud being baked hard prevents the water from communicating with the iron of the boilers.

From the cases above noticed, as well as others to which my observation has extended, I am clearly of the opinion that all explosions, without exception, are to be attributed either to the careless-

ness of the engineers, or the deficiency of the boilers, and that the power of steam may be completely under the control of the careful and experienced artist. More effectual means of precaution might, however, be adopted; and I will mention one which I consider of much importance, which is, that the number and size of the safety valves should be increased. The boat I am now building, of 350 tons, is to have two safety valves of full size.

I hope you will pardon the delay which has arisen in answering your communication.

I am, with much respect,

Your obedient servant,

MATTHEW ROBINSON.

(No. VIII.)

Letter from Erasmus W. Benton, dated

New Albany, Indiana, August 7, 1830.

GENTLEMEN,—I have been called on by Mr. Robinson, of our place, to state some facts respecting the causes of the explosions which have so often happened on our western waters. As I feel a deep interest in the matter, I give some of the particulars of my observations, experience, &c. In the year 1815 I went on board the steam boat *Enterprise* as head engineer, and from about that time have been engaged in running or building, repairing, &c. until the present time. I now carry on the New Albany steam engine and sugar-mill establishment. There has been a great number of explosions; some of them I have been called on to examine, and make an estimate of cost, &c.; of a number of others I have done the repairs, and from observation and experience I beg leave to communicate some of my ideas on the subject.

The first I shall mention is the steam boat *Constitution*, at Point Coupée settlement, in 1817, near St. Francisville on the Mississippi. I was on board a few minutes after the explosion, from the appearance of the boiler it had been nearly dry, and by forcing a quantity of water into it, the head and part of the boiler gave way, and some 13 or 14 persons were blown into eternity by imprudence, neglect, &c. The boilers were made of $\frac{3}{16}$ inch iron, and calculated to carry about 80 lbs. pressure to the inch, and I believe the valve was loaded to more than three times that pressure. There were several others, such as the *Atlas*, *Car of Commerce*, and *Star*, which exploded from similar causes, partly from the want of water, and partly from a deficiency of strength in the machinery. The boiler heads of the *Atlas* I had taken out last summer, and I found them not more than $\frac{3}{8}$ to $\frac{7}{8}$ inch thick, and that of very imperfect cast iron. The explosions of the *Grampus*, *Union*, *Porpoise*, *Huntress*, and some others, arose entirely from the want of water in the boilers. The *Helen M'Gregor* and *Tally Ho*:—the heads of the *Tally Ho*'s boilers were made of sheet iron, $\frac{3}{16}$ inch thick, and in turning the flanches where

the head is riveted in the end of the boiler, the corner was turned so square as to crack the iron more than half off; one of the heads blew out half the way round and threw the boilers out of their stands, which let the steam escape with the loss of only three persons, as there were but few persons on board. I repaired the boilers by putting in new heads, and I found all of the heads in a very unsafe situation. The Helen McGregor's head had been cracked for some time, but as there were so many other boilers in the same situation, I suppose they thought their boilers as safe as others that had escaped. The Caledonia's explosion was occasioned by putting in copper rivets; the iron and copper together will not stand, you find. When wrought iron nails are put through copper flanches, or any other copper, where water comes in contact, the iron will corrode, and in a short time become perfectly loose. There might have been another reason for the explosion of the boilers of the Caledonia; the mud settling under the flue so as to let those rivets get red hot, and copper in that state is of little strength; the boiler iron of itself was scant $\frac{3}{8}$ inch thick, and I believe of very poor quality.

There are several other causes to account for these explosions, besides those which I have stated. When there is a sufficiency of water barely to keep running with safety; if while running, the boat comes too, as is frequently the case, the water wastes very fast, and if the flues do not become entirely dry, they become so nearly so that the water is low on the sides of the boiler above where the fire comes in contact with it; the sides of the boiler become so hot that as soon as the engine is started, the water rises in the boiler, which comes in contact with the hot iron, which generates steam as quick as the explosion of gunpowder. I believe in every instance that has come under my observation, where there was any thing near a sufficient quantity of water in the boilers, it has been the case that in a very few revolutions after the engine has started they have blown up. For example, take a sheet of boiler iron, heat it red hot, and pour water on it, and you will be convinced of the cause. One other cause of explosions is that the cylinders of some boats have become worn by use for some years, so that the packing that is made use of for packing the piston blows out, and with the escape steam works through the force pump and collects in such bodies under the flues, that it sometimes causes the bottom of the boiler and flue to become red hot, as was the case with the Amazon, Herald, Jubilee, and others, but the explosions were attended with less danger.

To guard against those accidents, first, there should be a committee appointed to examine and try the strength of the boiler as often as might be thought practicable, and to give the engineers what weight to carry on their safety valves, and hold the masters, owners, &c. accountable when they carry more weight than what they are allowed; the safety valve, or valves, should at least be as large as the throttle valve, for I contend, that if the boilers are sufficient to keep steam blowing off when the engine is in operation, the safety valve should be large enough to let it escape when lying still with full fires, as is often the case. The safety valves of more than half the boats, now in use

on the western waters, are not more than half the size of their throttle valves, and not more than one-third of the boats have more than one. I have made valves and seats for many of the boats, and I know this to be the fact. You inquire, of what materials the boiler should be made; my opinion is, that good iron is the best for boilers for these waters, because the mud often bakes under the flues, and the iron will stand better when hot than the copper. The old practice of stopping and sending men in the boilers to clean out the mud, has been substituted by blow-off cocks, placed on the stands, or connexions under the boilers, which will answer the purpose for a short voyage, but when coming the distance from New Orleans to Louisville, they make a practice of blowing off once, or perhaps, twice, and I believe in some instances it does more harm than good, for they blow the water out with fire under the boiler, and the mud that is often settled under the flue becomes baked as hard as a burnt brick; I have taken it off when it was almost as hard as the iron itself. The common puppet valve, as now used, I believe to be as good a plan as can be invented. The only difficulty is, that many of the engineers on the river do not know what weight they carry. In the first place, the constructors of engines neither mark their weights nor their levers, and the engineers that run the boats put on old casting, or cord wood, or something else, as long as the valve keeps rising, without any reference to the weight which they should carry. I will give you more particulars hereafter.

Yours,

ERASMUS W. BENTON.

(No. IX.)

Letter from Matthew Robinson, dated

New Albany, September, 1830.

SIR,—In my answers to your first, which I hope you received in due time, I entered into the particulars of four explosions, all of which were caused by a defect in the construction, materials, or workmanship, or in the management of the engines. In all the explosions with which I am acquainted, say seven or eight, it was, in my opinion, in the power of the most superficial observers to have named the particular cause of the explosion. My opinion is that if they will, for all high pressure engines, have straight flues through, and connecting the two boiler heads strongly together, and those boilers and boiler heads of sufficient thickness and quality, with two force pumps, and two safety valves, for each set of boilers, with experienced engineers, who shall have the whole control of the engine, our printers would be called on to give the unpleasant intelligence of but few, if of any more explosions, and we should no longer hear of the death of human beings by such accidents.

To give you the exact size and relative thickness of our boilers would be attended with difficulty; some of them are 16 feet long, and 28 inches diameter, and are four-sixteenths of an inch thick,

and you will find a set of boilers, 18 feet long, and 40 inches in diameter, and three-sixteenths of an inch thick.

With these remarks, I will refer you for further information to Edward Benton, brass founder, New Albany, and Andrew Watson, engineer of the steam boat Fame at New Albany.

N. B. I have neglected mentioning whether the boilers were of foreign or American iron; I believe they were of American iron generally; this, however I do not consider as the cause, but probably the want of a proper system and of experienced engineers. I have long expected these explosions. I have been 14 years here building or repairing steam boats, during which time I have known several men act in the capacity of firemen one day, and the next day I discovered they had been made engineers; and knowing, as I did, that they were not acquainted with any mechanical branch whatever, I dreaded the consequences. Moreover, I have known a man acting as a clerk in a mercantile house here, this being the only business, I believe, with which he was acquainted; the next day I have seen his name in a hand bill, appointed captain of a steam boat.

Please excuse my writing, and accept for yourself and the success of your investigations, my best wishes.

Yours, respectfully,

MATTHEW ROBINSON.

(No. X.)

Second letter from Matthew Robinson, dated

New Albany, September, 1830.

DEAR SIR,—I received the second circular from the Committee of the Franklin Institute. I agree with the correctness of your remarks contained in it, and if the intelligent part of passengers would devote a portion of their attention to the arrangement and management of the engine, they might, in many instances, discover a want of system. The steam boats in 1817 and 1818, were generally 25 or 30 days on their passage from New Orleans to Louisville; in these last four years they have performed the same passage in 9 or 12 days, consequently they have increased their power more than 50 per cent. yet they have not increased the strength of their boilers in proportion to the height they now carry steam at.

Yours, respectfully,

MATTHEW ROBINSON.

[TO BE CONTINUED.]

Letter from Peter S. Duponceau, Esq., accompanying some cocoons produced on the estate of the Hon. Henry Bry, of Monroe, district of Ouachita, Louisiana, and which were deposited at the Exhibition of the Franklin Institute, in October last.

I HAVE the pleasure of sending you a parcel of cocoons, weighing something less than two pounds, for which I beg you will obtain a

place at the exhibition of the Franklin Institute. These cocoons are all that remain of a large quantity sent to me as a present by the Hon. Henry Bry, of Monroe, in the district of Ouachita, in Louisiana, and are the production of his estate. Although not remarkable for their size, they contain more silk than any I have ever seen, or, indeed, that I have ever heard of in any part of the world. Fourteen pounds and six ounces of them have produced, on reeling, three pounds eleven ounces of fine raw silk; which is about three pounds and three-quarters of cocoons to one pound of silk; which is truly astonishing, when it is considered that in Europe twelve pounds of cocoons are required to produce one pound of silk. I am speaking, it is true, of cocoons containing the live chrysalis; but allowing 25 per cent. which is a large allowance, for the loss of weight by baking, and the diminution during the voyage from the interior of Louisiana to this city, it would still have required on the European calculation, nine pounds of cocoons to produce one pound of silk, whereas that quantity was obtained from less than four. I have witnessed this fact, and can attest it of my own knowledge. You will observe that the cocoons are hard and compact; they reeled off quite to the chrysalis, which fell of itself into the basin, without a single particle of silk. I have thought this explanation necessary in order that the extraordinary excellence of these American cocoons may be fully understood.

The next best cocoons I have received this year, were sent me, also a present, by the lady of Thomas Sumter, Jr. Esq., the son of the venerable General Sumter. They were raised on the family plantation at Statesburg, in Sumter district, South Carolina. Five pounds of these produced one pound of raw silk, and no doubt would have produced more, if that excellent lady had not been confined to her bed by sickness, and could have attended herself to the rearing of her silk worms, as I had some before of her raising which did not yield to those of Louisiana. I have kept none of these cocoons, having converted them all into silk. They were of the large kind, and very beautiful.

I have seen cocoons as fine in their appearance as those I have mentioned, but none that produced so much silk; from whence I infer that our southern districts are admirably calculated for this production.

I have not attempted this year to manufacture any silk, as that is not my immediate object. What Mr. D'Homergue did last year, was only to show what could be done, even without the necessary machinery. Since that time a throwsting mill has been erected at Manayunk, at which I have had some silk thrown, reeled by our women in the second year of their instruction, which has turned out very well, one parcel having given only six per cent. waste, and the other seven, though the cocoons were of an inferior kind. I have given the thrown silk to a manufacturer, to be converted into stuff for silk hats. I mean to make similar experiments with the remainder, availing myself as much as possible of our various manufacturers. I find, however, that their looms, and their carding and other

apparatus, are not exactly suited to the silk manufactures, nor is there yet any complete apparatus for the making of sewing silk. But we are proceeding so fast, that next year, or perhaps before, these inconveniences will have vanished.]

I have, therefore, nothing to exhibit this year except these cocoons. I might send skeins of raw silk, as I did last year, but they must either be placed beyond the reach of hands, and then they cannot be well judged of, or they must be suffered to be handled, which soon renders them unfit for use. Besides, the proper test of the value of raw silk is by submitting it to the process of throwing. Silk may appear outwardly very fine, which, in that process, will run to waste.

I am, with great regard and esteem,

Dear Sir,

Your most obedient humble servant,

PETER S. DUPONCEAU.

Philadelphia, October 3, 1831.

P. S. I expect every day, from England, samples of stuffs manufactured from our American raw silk, but it is not probable that they will come in time for this exhibition, which I greatly regret.

Letter from P. S. Duponceau, Esq. to the Editor, on Gensoul's steam apparatus for silk filatures.

Philadelphia, 22nd September, 1831.

DEAR SIR,—In a French work on the subject of the silk trade,* which I lately received, I found a description, accompanied with a plate, of M. Gensoul's celebrated apparatus for conveying, by means of steam, an equal degree of heat to the water contained in any number of basins, employed in a filature of raw silk. Thinking that the publication of this description in the Journal of the Franklin Institute may be of use to our fellow citizens, at a moment when the public mind is actively employed on the subject of the culture and manufacture of silk, I have extracted it from the original work, and have the pleasure to send you a copy of it, and also of the drawing, of which you will make what use you shall think proper.

I am, very respectfully,

Your friend and humble servant,

PETER S. DUPONCEAU.

Report on M. Gensoul's steam apparatus for silk filatures, made to the Agricultural Society of the department of the Rhone, in France. By Dr. Terme.—With a Plate.

GENTLEMEN,—Although you are all well acquainted with Mr. Gensoul's admirable apparatus, still we think it advisable to lay be-

* Du Commerce des Soies et Soieries en France, par M. Leon de Teste, Avignon, 1830.