Little Sandy Oct. 30th 1813

Sr.

I suppose that you have been looking for a letter from us some time ago but the reason that we did not write we have been looking for you up the has 189 Kittles came to the mouth of Sandy and we is a getting them brought up as fast as we can we have got a good deal of Salt on hand we have not sold much since Sett has left here we doun trust out now Mr. Sett has trusted out a good deal and there ant but one man came for wood to pay up his debt and there is a good many debts that will never be got Mr. Prince is in Green wave for some four years the one that is here is not sufficient to get a sufficiency of wood to keep the furnace going as they ought to there is nothing new here Mr. Prince and family is well and all the hands

Mr. B. L. Ward

Sr. I am your Sincerely

Judey Galwood

Little S S Works
30th Oct.

12½

Mr David L. Mann
Louisville
Jefferson County
Ky.

Bn Mail

F. U. Gatewood
30th Oct. 1813

Little S S Work
Dec. 4th.

12½

Mr David L Hard
Louisville
Jefferson County
Ky

Pd. Atlas

Little Sandy Decr 4th 1813

Sir I take this opportunity to Inform you of
your business at this place that since Mr
White left him there has been but little sale
made the Pump Iron has been breaking constant
until this week they have done something better
the Pump Iron that you sent up there has been
every measure taken with them to make them
answer but it was all in vain the wood off
one but the top one would not stay on the
under one and it could not be made to stay on
at first Mr Prince got a top one made to fit on
the under one and it seems to do very well Ev
Mr Prince will write to day setting in
what he made and as to that say that Mr Tite
has bought Dr Porter of setting of his unsetting
the chance of setting Tate down to the mouth is
been a bad one and as bad to get here but there
is sixty ox wagons will haul for it in a few days
and we shall send off the Lead in the morning
the is knocking down the Price of Tate it sells for
5/3 to 4/4 and given barrel in Wheeling sell for Eighteen
by the Pound that Tite Engd we shall get ten
pounds of it Stollen Iron and Mr Prince that

him has to the same man for Pounds
that Pitt has bought off and he does
Calculate on getting a single pound of him
Mr Pitt has left him so in debt for upwards
of 500$ Protter from Lexington has sued him
for 900$ and has been out after him but he
been gone for 7 or 8 weeks and don't return yet

Mr David C Wade

Sir I am your Humble
Servant
Thos M Gatewood

Little S S Mark
Dist. 4th.

12½

Mr David Hand
Louisville
Jefferson County
N Y

Pd. Stat

sir I am on my way home and not here
but three negro I never found as much
Defficulty in any thing I ever tryed their
is Sum have Gone as hig as one hundred and
thirty dollers such Prices I never heard
you Cant hier a hand with out hargening
with the negro. I went to ~~Mr Brackenridge~~
Mr harrisons and he left it to the negroes
Chaise the was not willing Mr Brackenridge
was not willing I Shud of ret to
you but Cabel Brackenridg had rote
you will have to send hander from home
for the as not to be hired at no prise
I your mo Sofarth Thomas Scott

January 10 1814

To
B D Pet

Thomas Scott
Nov 8th 1850

Stephen Scott Esq
Mt Quaker & Co
Zanesville
Ohio

Sandy Saltworks 14th January 1814

Dr Sir

I take the earliest opportunity to inform of the result of Mr. Scott's expedition to the settlement to hire Negro's — he was able to hire but three and from the repugnance which the people have to their Negros coming to this place and the high price given by others it will be impossible to get any in this quarter — I am told that $130 or 40 has been given for some that has been bought to this place — the Negros themselves are much opposed to coming here not knowing what kind of hands they might fall into — I started two days ago to come and see you and went about twelve miles when my horse failed and I was forced to to return — and having no other horse fit to ride have concluded to content myself until you come up, which I hope will not be long, as Mr Scott will be doing [illegible] as many can be got — Pork cannot be had here for any price — I have offered $3.50, and others are offering $4. I have received from Amy & Bug to the amount of $117

We are making two Furnaces which we started on the third Instant. and are doing pretty well. Salt does not sell at this time, and there is none of consequence in the place except what we have — we have no more hands at present than is sufficient to rost two Furnaces.— Your Grey Horse was the one on which I started and which gave out, so that you need not depend on riding him home when you come up— we are all well except my wife who has been indisposed for several days.

Yrs Respectfully
Thomas Prince

Thomas Prince
11th June 1814

Smith & Stocks
Jany 15th

12½

David L. Ward Esq
Louisville
Ky.

Mail

Marietta 15th February 1814

Dear Sir

High waters has prevented my arrival at this place until last night, and the excessive rise that has taken place in the Ohio will perhaps prevent the Boats from reaching this for seven or eight days hence — I overtook them on wednesday last at the Mouth of Great Kanhawa, and the Ohio began to rise the next day, and has continued to do so with great rapidity until yesterday when it took a turn and I am in hopes will fall, with as much velocity as it raised — if it continues high we shall have hard scrabbling, and I fear, a long trip — I am going down passenger in a small Boat that leaves this place tomorrow morning for Cincinnati to meet them and help them on as far as this, where if things shoud put on a more favorable aspect, I shall leave them and proceed on to their place of destination

I shall make no sales here except

a barrel of Coffee to raise some money for the Boats — Capt Flowers told me when I proposed him that his Cash was exhausted, and that he should want some for the hands and to buy vegetables — he said he thought they had bread stuffs and meat sufficient for the Voyage — but as they will unavoidably be detained longer than he then expected, they may perhaps want a fresh supply of them articles.

They offer me here for Coffee 35 cents which from the best accounts will be nearly as much as it will bring any where, but I am informed by a Gentleman on whose candor I have great reliance, and who has just returned from Phila. that Coffee was selling from 28 to 35 cents, and was expected to be much higher — he paid these prices himself — Sugar was 31 Cents and on the rise — the Boats hands had been sickly but had recovered — you shall hear from me again on my arrival at Pittsburg — in the mean time rest assured that no exertions of mine

shall be wanting to bring this business to as speedy and as profitable a close as the times will admit.

I am with respect & Esteem

Yr Obt Servt

Francis H Gains

Marietta Feb. 17th

28

Colo. David L. Ward

Louisville

Kentucky

Franked

Feb 18th 1814

5 cents

[21 February 1814]

Sunday — 21st Feby.

Dr. Sir

Should it be necessary to have two endorsers to a note which I have this moment indosed, Mr Beale, will you be so good as unite your name with his? I am uninformed of the regulations of your bank, having had no transaction with it except that of drawing upon the bank of Kentucky; but I presume two endorsers are necessary.

Examining last night a series of memorandums, I discovered by an endorsement upon the back of a bill of sale, which I had forgotten that I had made, that I was in error respecting the date of payment of a note given five or six months ago for a slave — the period of its becoming due being the 1st of March, not, as I was erroneously impressed, the 1st of April. Under the influence of this misapprehension I had regulated myself — having even within these four or five weeks extended, without hesitation, on a request to the purport, the time of payment of certain monies into the bank of Kentucky. Collection may yet supersede the necessity of the note, which I should greatly prefer; having no predeliction for bank transactions. To draw upon more distant resources is at present inadmissible — a relative of New-York being now absent in the interior of that state, who negotiates for me the transfer of funds from the opposite side of the Atlantic; — of which, however, even a partial withdrawal, for two years, until lately, has been suspended, in consequence of the excessive and indeed ruinous depression in the rate of exchange. — The return of the above individual to New-York will not be prior to April. — He is, & for some months, has been regulating, for summer operations, an extensive body of land purchased

some years ago upon the St Lawrence — upon which he is erecting villages, & which he is intersecting with made roads, for the purpose of effecting an enlarged settlement of it.

It is my intention to visit the Kenhawa within a fort-night; when I shall have an opportunity, in passing, of examining your saline upon Sandy. — You mean, I presume to erect works there this summer. Let me recommend an entire relinquishment of the present mode of operating, and the substitution of correct & systematic arrangements. Salt from such water as that of Saxon & Kenhawa, ought to be made for 10 or 12 cents a bushel, using slave labour — and I would not have a white upon the premises, except superintendants. It is impossible to keep them from taking the liberty of thinking — & error & injury are the frequent results of their defective judgements. If the process of operation be correctly arranged, thought by the common workman, who merely conducts the meaner details, is entirely superfluous. He has merely strictly to adhere to orders, which are indevious in their effect; & as early as possible, acquire a mechanical routine of action.

Justly constructed furnaces with boilers of correct model, (aided by some crystalizing vats with reflecting covers for pro-ducing round salt, and assisted by simple auxiliaries for acce-lerating spontaneous evaporation) would give, with equal labour, at least triple the product at present attainable. Sixty hands, a dozen of whom might be boys, operating upon nine well construc-ted furnaces & their appendages, would give, in my opinion, a pro-duct, which, by the present mode of operation, would require thirty furnaces, & if I am rightly informed, two hundred & forty or fifty labourers. The supply of coarse or round salt, ought to be essentially incorporated with that of boiled salt; both from considerations of profit to the operator and advantage to the community. Coarse salt is necessary for the preser-vation of salted provisions, in southern climates more especially; &

and it may be attributed to the want of it in this country; that frequent losses have been sustained in its salted meats. After visiting the Sandy property, I shall, if I do not see you in a few weeks, offer you what I conceive the most advantageous improvements for oeconomizing manufactures at it, and the most expeditious process for production by natural evaporation. If there be any subject with which I deem myself correctly conversant, or upon which, in the expression of a positive opinion, I should without hesitation hazard my judgement, it is certainly the one before us. It occupied thought, and time, and enquiry, experimental & other, even before I had an idea of engaging in the pursuit — and opinions, thus formed, have since been either corrected or confirmed by subsequent practical investigations. —

Upon the Kenhawa a company is proposed, that shall supersede, by well arranged and oeconomical establishments, the present works. — The salines of that river certainly present objects, under just regulations, of no common interest. There is not merely great facility of communication with the country bordering upon or not very remote from the Ohio; but there is promised to them the supply of interior Virginia. Gentlemen appointed by the Virginia Legislature (General Marshall & Colo Mercer), have I understand reported the practicability of rendering the river navigable for a considerable distance above the present point of boatage; and, ~~that~~ from the highest point of practicable navigation, they recommend communication with the interior of Virginia by turnpikes. — Should these measures be adopted, there will be opened great increased consumption for the products of the Kenhawa salines; while the interior inhabitants of Virginia will obtain an easier supply of an important domestic necessary, & have facilitated to them the exportation of their extra-productions to a market.

It is not probable that it would be consistent with your

your views upon Sandy, to unite in any enterprize upon the Kenhawa.. yet advantages might derive.

Accept the assurance & offerings of respect.

H. Colquhoun

H. Colquhoun
July 21st 1814

David L. Ford Esq.

Marietta 24th February 1814

Dear Sir

The Boats have just landed at this place, so that it will be unnecessary to inform you that they are making small progress on their Voyage. The water still continues high and from the large quantity of rain now falling there is but small hopes of the river being in tolerable order for Boating for some time to come — all will however be off in a few minutes, I shall proceed right on by land and endeavour to make such arrangements as will enable the Boats to return quick after they arrive at Pittsburg accounts from that place are not very flattering — sugar was selling

three days ago so I am informed by a Gentleman Just landed at twenty five cents — he thinks it will be better — I have sold two hands Copper at this place at thirty five cents. the Boats crews were in want of Cash — some were nearly naked — I let Capt. Stowers have $100. a part of which he distributed among the hands, and has Retained some for buying provisions in case he should want. all is safe so far and the crews [illegible] I wrote you on my arrival here I think the 14th Inst. since which I have had a devil of a Sleigh down the river to the boats and back with them — I don't like much whacking.

Yrs Sincerely
Francis H Gaines

Francis H Gaines
24th Feby 1814

33

Marietta
Feb 24th

117

David L Ward Esq.
Louisville
Ky.

Kenhawa June 3rd 1814.

Dr Sir

My motive for delaying the communication I promised you soon after my arrival here, will be my apology.

There is combined both in the waters of this river and those of Sandy, what is chemically denominated the carbonate of iron, depositing on the application of heat a reddish brown ochre. The complete seperation of this discolouring substance before the process of graining is commenced, it is unnecessary for me to observe is an essential object. It was my opinion, from some experiments I had made when examining chalybeate waters containing the same compound, that it might be seperated by such a degree of heat as may be generated by condensing steam in metallic tubes, passed through water in extensive vats. A degree of heat of 180 or 200 degrees may thus be produced, the latter being within 12 degrees of the boiling temperature, and as this could be produced without cost - that is to say without any additional fuel and labour beyond what otherwise would be used, the arrangement appeared to me & in fact it was the most oeconomical that could possibly be devised. In the waters of Bullitts & Mann's licks, the effect would be complete.

On examination, however, of the waters here, I discovered, that although part of the iron as usual was deposited on exposure to the air, and an additional part

part on the application of moderate heat, yet for the extrication of the whole from the water there was demanded a temperature equal to the boiling point, and indeed that it was necessary ebullition should be kept up for some minutes. A mean immediately occurred, which, if as applicable upon a large scale, as efficacious upon a small one, would still admit of vats or cisterns of large dimensions being employed; and not merely to bring the temperature of the water to that point that completely would effect the seperation of the colouring matter, but to direct the heat thus capable of being applied to the preparation of the brine; whilst the fire or fires employed in this oeconomical process, might partially be directed in correct furnaces, to grain the salt. I was bargaining for some sheet iron which Doctr. Cabbell of Lynchburg had forwarded for pans, when I was conducted to view an attempt which had failed, and which could not possibly have succeeded from various causes, to heat water by passing iron cylinders through a wooden cistern and applying to one extremity of them fire, while the other had a chimney attached. I at once found here what I wanted for a practical exhibition, upon a large scale, of my former experiments, & as they appeared lying useless upon the hands of the proprietor, I proposed purchasing them. The cylinders being in joints of 5 feet, and connected by screws, admitted of being seperated into pieces of 10 feet; which, although longer by at least two feet than I wanted, was not an important objection. The principal difficulty that appeared was to close one extremity accurately and strongly. It happened, however, that the cylinders were a joint property, and one of the proprietors was absent in

in Ohio. It was necessary to wait his return. This has not yet taken place — but I shall be enabled to make use of them next week, or at least to commence preparatory arrangements for devoting them to utility. I have no doubt of the effect, provided the cylinders prove strong enough — being fully impressed, that cylinders close at one end; of sufficient strength to resist a pretty strong action; & likewise of an adapted length, may by the agency of strong fires, operate upon wooden cisterns of large dimensions, so as to effect ebullition; while the heat which is not absorbed in this way, can effectively be directed to the granulation of the salt in iron boilers. The scale of my experiments, though small, certainly admits of just deductions by analogy. Though my cylinders were old gun barrels, yet my cistern was a trough, of no inconsiderable dimensions, & opinions of the effect of a more enlarged scale of operation may justly be formed.

I have gone thus far, to shew you that I had a motive and not an unimportant one, to suspend my communications to you, until I could offer you the assurance of an effective substitute for iron boilers to the extent of preparing the brine — for, although it is less economical than the plan which I deemed of sufficient efficacy, (that of condensing steam & extricating its latent heat in metallic tubes passed thro' vats) yet it certainly is a measure of economy, & under that impression it was introduced into certain specifications of improvements exclusively & legally claimed for my orleans mode.

I shall now enumerate the improvements which I deem the most adapted for economizing manufacture, adding such explanation

explanation as may render their nature and effect more comprehensible.

1st. An effective auxiliary of evaporation greatly increasing the natural influence of solar heat and of atmospherical exposure, to be employed in reducing the water nearly to the state of brine prior to the application of artificial heat.

It is my opinion, by the introduction of this improvement that after deducting all possible expences attendant upon it, it would give a net saving equal to at least one fourth of the whole expenditure incurred in manufacture. It must now involve at least one half of the whole expence to prepare the brine for in the computation is to be included the expence of wood cutters to the extent they are employed for the purpose, as well as the value of the wood itself — the waggons that are employed to haul it — the attendants upon furnaces, so far as their labour may be directed — beside provision for the men, the horses and the oxen. The improvement is equally adapted to winter as to summer as a measure of oeconomy, & may be employed with superior efficacy during the clear & cold weather of the former season.

2nd. If the production of salt by natural evaporation be designed, my crystalizing vats gives a superiority over the vats of the coast with moveable covers, in the proportion nearly as are 7 to 4. A conclusion drawn from a series of experiments, commenced & prosecuted for the purpose of determining comparative effects. The cover I adopt for the accumulation of solar heat by the reflection of the sun's rays, however important in effect, adds not an iota to positive expence.

3rd. The introduction of cisterns of considerable dimension between

[3 June 1814]

between every two furnaces, or their annexation of a more moderate size to single ones, for the purpose, by the direct application of heat, conducted through the medium of iron cylinders, of effecting the preparation of the brine.

4th. The supply of heated water and brine, to the cistern and boilers, by the condensation in tubes, passed through water vats, of a portion of the steam-generated by ebullition in either or in both.

5th Improved structure of furnaces.—

6th Combustion of the smoke of wood or coal fuel and of all imperfectly burned combustible matters.

7th A supply of water to the boilers from contiguous vats, and of a high temperature, without the exercise of manual labour.—

Explanatory.

1st Improvement— founded upon the established fact, that in a proportional ratio to the surface of water exposed is, in natural evaporation, the effect.

The active and simple auxiliary of evaporation alluded to, is recommended by its simplicity, strength and durability.

A horse sets and keeps in motion a strong horizontal wheel with an elongated shaft, which indirectly operates either upon a series of buckets, connected by strong chains, or upon forcing pumps. The buckets were in use by me, chosen for their simplicity, cheapness and facility of repair. The water being elevated to the height of 18 or 20 feet, is conducted into a double series of perforated troughs 8, 10, or a dozen feet apart, parallel with each other & extending length through 100 feet. It is once or twice intercepted in its passage

from the troughs by intervening scaffolds, strongly and permanently fixed on account of the winter seas, intended to break the water in its fall, and by vast increase of surface thus produced, proportionably to accelerate the progress of evaporation. The water finally falls upon an inclined platform of rough planks 150 or 200 feet in length by 38 or thereabouts, from whence it is conducted to reservoirs, with which the machinery is connected. The reservoirs are furnished with covers in separate pieces, capable of being raised at will by an adapted lever, and which when raised present an extensive and whitened front to the south; - thus exposing the surface of the water to the sun, & to accumulated heat produced by the reflection of its rays, in such manner as is adapted to produce effect. —

By this arrangement, while the common mode of spontaneous evaporation, as practised upon the Coast, is yielding its full influence, aided by an artificial accumulation of Solar heat, the active auxiliary of evaporation is regularly performing its functions, with a celerity of effect, (according as the principle shall be extended) * double, triple or quadruple the conjunct operation of the other two. In the several ways in which experiments on evaporation were made, the exhalation as might be expected was much the greatest during the prevalence of dry winds, but infinitely greater proportionable by the effective mean of evaporation described. In calms, with extreme heat, the evaporation from an unruffled surface, was greatly less, than would naturally have been inferred, from the oppressive physical influence on man & the inferior animals. Calms have less effect upon the auxiliary above specified. The rapid evaporation from a body

* an extension of the principle may be effected by increasing the number of machines.

of water falling from some height with an incalculable ex-
-tension of its surface, necessarily must be productive of
considerable cold, creative in the calmest weather of a brisk
current of air, drawn from the dry and heated atmosphere
circumjacent, to the central point where evaporation pro-
-ceeds. The effect results from the natural effort for the pre-
-servation of an atmospherical equilibrium: the cold air pas-
-sing off continually below, the dry and heated air rushing in
above to supply the partial vacuum produced.

2nd Improvement — Crystalizing vats for production by na-
-tural evaporation. — The materials of which they may be formed
will be regulated by circumstances. Where a strongly adhesive
clay is found they may be formed at little expence. The bottom
may be ~~formed~~ of that substance rendered compact by ram-
-ming — floored with planks, with hard burned tile, with slate
or flat stone. It has been my intention for some time to
make experiments for the purpose of determining the best
adapted cement for this purpose. A wall & bottom of rough
stone, grouted with a very liquid mortar, into which, at
the moment of use, was suddenly stirred in some finely
pounded unslaked lime, I think it probable, would answer
the purpose. The covers of the crystalizing vats, being in se-
-parate pieces, attached by strong hinges to the north ed-
-ges of the vats, when raised vertically should present
an extensive front to the south. This washed with lime,
slaked by a saturated solution of common salt, would
generate a considerable degree of artificial heat, and pro-
-portionably hasten the progress of evaporation.

3rd Improvement. — The effect in this instance is produced

from the troughs by intervening scaffolds, strongly and permanently fixed on account of the winter process, intended to break the water in its fall, and by vast increase of surface thus produced, proportionably to accelerate the progress of evaporation. The water finally falls upon an inclined platform of rough planks 150 or 200 feet in length by 30 or thereabouts, from whence it is conducted to reservoirs, with which the machinery is connected. The reservoirs are furnished with covers in separate pieces, capable of being raised at will by an adapted lever, and which when raised present an extensive and whitened front to the south;- thus exposing the surface of the water to the sun, & to accumulated heat produced by the reflection of its rays, in such weather as is adapted to produce effect. —

By this arrangement, while the common mode of spontaneous evaporation, as practised upon the coast, is yielding its full influence, aided by an artificial accumulation of Solar heat, the active auxiliary of evaporation is regularly performing its functions, with a celerity of effect, (according as the principle shall be extended) * double, triple or quadruple the conjunct operation of the other two. In the several ways in which experiment on evaporation was made, the exhalation as might be expected was much the greatest during the prevalence of dry winds, but infinitely greater proportionable by the effective mean of evaporation described. In calms, with extreme heat, the evaporation from an unruffled surface, was greatly less, than would naturally have been inferred, from the oppressive physical influence on man & the inferior animals. Calms have less effect upon the auxiliary above specified. The rapid evaporation from a body

* an extension of the principle may be effected by increasing the number of machines.

by cylinders of iron of 12 or 14 inches diameter and 7 or 8 feet long, or more according to the width of the furnaces, being close at one end, having at the other a flat rim, by which they can strongly be attached to the outer part of the cistern near the bottom. The other extremity is introduced through the mouth of the furnace into the interior and is exposed to the strongest action of the fire. Three or four of these on two opposite sides of a cistern of 4 or 5000 gallons, would, I am convinced, be sufficient to effect the ebullition of the water in it. They must be very strongly & immoveably fixed, as the concussions are very considerable; the water being continually driven out of them with violence into the cistern. It is to this continual concussion and diffusion of heat, that in some degree I attribute the rapid effect which I observed in my little experiment. I shall, I hope, flatter myself, be enabled before long to give you a more satisfactory account. Where the cylinders are screwed to the cistern, means must be adopted to prevent their leaking. A plate of sheet lead may be put, for this purpose, between the iron & wood. It is a soft metal easily receiving the impression of whatever is strongly pressed upon it & will probably answer the object desired. In the inside must, of course, be a rim of iron, to prevent the screws tearing the wood.

4th. I presume it is unnecessary minutely to explain here. By covering a couple of boilers of the dimension which alone ought to be introduced, 150 or 200 gallons, & conducting the steam in tubes of sheet lead or iron through appropriate vats filled with water, such a degree of heat will be evolved as will quickly raise the temperature to within 10 or 15 degrees of the boiling point. The vats ought to have elevation sufficient to admit of the supply to furnaces

[3 June 1844]

furnaces of water being practed by wooden tubes, passing from the front to the opposite extremity - Relinquishing entirely the present laborious mode of supply.

5th Improved structure of furnaces — it is impossible I believe without encroaching too far upon time, to convey any precise idea of what I think the best adapted. If I have time this mail, I will attempt a delineation upon paper; yet, I should prefer seeing my opinions carried into practice here, before I positively advised. The form of our furnaces is unique - peculiar to this country, & to be met with I imagine in no other part of the world. It is my opinion, that retaining the form, they may, with certain modifications be rendered as oeconomical as any furnace of Europe; and they are certainly the best adapted for the species of workmen we, of necessity, must employ.

6th Combustion of the smoke. — I will give you nearly the words of the patent specification, requesting you to hold in memory that the boilers, to which I have reference, are of 150 or 200 gallons, such, in my opinion, as ought alone to be introduced into use.

"In the stationary part of the covers of the 3rd and 4th boilers tubes are inserted of the diameter of 4 inches, formed either of cast or malleable iron, which enter the flue of the furnace on each side by appertures left in the inner wall. These tubes extend towards the chimney parallel with the brick linings, to which they are attached by iron rings, and at the distances severally of two & a half and five feet diverge towards the centre of the flue.

"The water in the boilers 3 & 4 being raised in its temperature to the vaporific point, the steam is forced through the iron

iron tubes already exposed to the influence of intense heat. In its passage it acquires great additional expansion. It enters the flue under the operation of a vivid flame, pressed forwards by the external current of air, loaded with innumerable minute particles of inflamed matter torn off from the burning fuel; and driven by the force of the blast to the interior of the furnace. The combustion of these is instantaneous & the partial decomposition of the highly expanded vapour. A further decomposition evidently ensues — the flame being swept along the flue of increased intensity, consuming all imperfect. burned, oily or bituminous matters, which otherwise would give foulness to the furnace, or which by adhering to the pans would obstruct, as non-conductors, the passage of heat to the water."

4th. Improvement — simple, but not unimportant, as it saves much labour, by superseding the use of the dipper bucket in supplying the boilers with water.

"From the water vat a tube communicates with a series of wooden pipes, extending from the front of the furnace to the chimney; into which by a cock the water, previously heated, is introduced; and over each pan is a faucet or wooden cock, by opening which the pans are filled, without farther interference or effort of the workmen". —

I have thus given you my improvements in the manufacture of common salt, as far as this is practicable without drawings. When you begin to change the form of your present establishment for something more perfect, if I am either in this quarter or in Kentucky, I shall be happy to assist you, for a while, in conducting my improvements into practice.

If I possibly can by this mail I will send you a plan of

the mode I think best of laying off furnaces, for the accommo-
-dation of the workmen and for purposes of economy. If
I cannot at the present, I shall at some future day.

With sentiments of respect & of esteem,

I am, Dear Sir, very Sincerely Yours

J. Colquhoun

nat
-ications
Europe;
Decid of

works.

of the

David L. Freeland Esq

Newhaven Ch 4 June 50

David L. Ward Esq
near Louisville
Kentucky

Paid 5 and one
postage 1
4

Mr Ferguson

Kinhawa 23rd June 1814.—

Dr Sir

About a fortnight ago, in conformity with the voluntary promise I made you some time since, I had the pleasure of communicating to you principles of operation for the manufacture of common salt, which might successfully be directed to diminish, in the ratio of a half or two thirds, present expenditures. It might do more than even the latter, provided there was an adequate extension of the active auxiliary of natural evaporation described, and provided the separation of the colouring matter could be effected without the application of strong heat. Even with a limited extension of the evaporating auxiliary, & with the inconvenience of being compelled to employ the direct action of heat, either in cottons or pans, for the purpose of decomposing completely the carbonate of iron, the reduction of the expenditure of manufacture will not be less than I have specified.

I now inclose you a rough yet, I believe, comprehensible sketch of my plan of furnace. The boilers I have supposed to be oblong, with spherical bottoms; but, although this form if it could safely be used of considerable dimensions, is certainly to be preferred to any other of cast metal; yet the round boiler may be made to supersede — and round boilers, though of 200 gallons, could safely be introduced into use.

At Colo Owings's works on Slate creek, I saw a pattern of very excellent form of the latter description, but of inadequate size. It was of an hundred gallons — the

the diameter, I think, of 4 feet 4 – the depth of 2 feet 2 or 3, being accurately or very nearly a half sphere. I certainly should prefer boilers of another shape, of the capacity of not less than 160 or 80 gallons; yet, if circular boilers of middle size are to be adopted, I know none more applicable than the above.

I wish you could get the pattern of Irvings, or have one cast from it & transferred to Brush-Creek. Mr Irving's iron is not inferior nor to any of the western country, provided his more distant banks of ore be recurred to; but as a source of supply either for your works, I presume, or those of the Kishacoquillas, Slate would be less convenient than the establishment on Brush creek.

I have remarked, at the close of my explanatory observations, when describing the furnace of which the sketch is inclosed, that, in propriety, the tubes for the decomposition of water and combustion of the smoke, ought to have a lining of copper. – Why, you will say, not of copper entirely? – Simply, because the copper would quickly burn out – whereas, if the exterior of the tube or tubes be of cast metal, they would last for years. Instead, however, of mentioning in my last letter the propriety of lining the iron with copper, I decreased merely the length of the unlined iron tube directly exposed to the action of heat; for, in my specification deposited by Mr Clay in the Office of State, I gave 7 feet of tube lined with copper, for the purpose of effecting a high degree of expansion in the vapour; whereas I merely mentioned iron tubes of five feet for the most remote covered boiler from the fire, to you directed.

directed to supply vapour for the purpose of decomposition;— and two and half for the boiler least remote from the fire, and applicable to the same purpose.— And, if we add to the extent of tube more directly intended to be exposed to the action of the fire or of heat, a foot of perpendicular where it enters the flue, & likewise the diverging part of the extremity; all together, there appears as much unlined iron tube exposed to the direct action of heat as safely can be exposed, without hazarding the decomposition of the water prior to its coming into contact with the matters it had to consume.— This is all important — for no decomposition ought, if possible, to be suffered, prior to the highly expanded vapour coming into contact with the combustible matters it is employed to destroy.—

There are some openings for advantageous speculation in this quarter not unworthy attention.— I have hinted the facts to Mr Beale & Mr Haudin, & I would to yourself. In situations where wood with difficulty is attainable, wells with common furnaces attached and with contiguous land can be purchased in fee for about the same price that a common furnace would rent for for four and twenty or twenty months — & for less than a furnace accurately & oeconomically constructed would yield, in net proceeds, in half the time. The payments, too, would be gradual & in salt, with the exception, perhaps, of a trifling advance of accommodation — for salt here may in truth be said, from the excessive & profuse expenditures incurred, to be almost the only medium of exchange. It is to be considered in addition to what I have stated, that the wells, with ma-

-chinery,

-chinery adapted (not very perfect, but which might quickly be modified) yield an adequate quantity of water for three or four furnaces, such as are in common practice, and which give a proceed of from 60 to 100 bushels per day according to their extent. The facility of purchase above specified, in particular situations, although originating in perceptible causes, may not long continue. — It arises from the excessive waste of labour and of fuel now incurred, combined with the difficulty of procuring both — and from the belief, at present prevalent, that stone coal cannot with success be substituted for wood-fuel. — An error — yet a pardonable one — for it certainly cannot be substituted with effect unless there be introduced an entirely different construction of furnace ~~of~~ of boiler — or unless a mean be adopted for the combustion of the smoke.

But were a purchase to be effected of the above nature, it would not be the purchase of a mere well, but of a well with an hundred, a hundred & fifty or 200 acres of land adjacent, which, though nearly divested of wood and in general unadapted for cultivation, would still afford some narrow low grounds & other cultivable soil, and would extend upon the river a third or a half a mile or upwards. — By opening new wells, therefore, a measure that would now be deemed absurd as the fuel is nearly exhausted, additional water could be obtained, leading to a farther extension of oeconomical works and to a consequent supply of salt in a year or so, sufficiently considerable to give some controlling power over other establishments — so far at least, were the

[23 June 1814]

the measure deemed important, as to effect the monopoly of sale, or regulation of the price. Whether this were thought advisable or not, the property obtained and which probably could be extended upon the river on either side, with little sensible appropriation, might be made a seat for the production of 80 or 100,000 bushels of salt yearly, at cheap rates — or it might be rented, perhaps, for a third thos amounts or upwards, considering the more oeconomical works and improvements that would be extended with it. I am in this instance certainly within bounds, for a single well equal to the supply of four furnaces, now rents, in two instances, with the boilers and right to fuel, for 20,000 bushels of salt or thereabout, — two furnaces and sixteen slaves, with two waggons & oxen, renting for 16,000 bushels, on a lease of three years — the kettles to be replaced at the expiration of the lease, or 1200 $ paid — the slaves, of course, to be returned, with the usual exceptions in case of fires.

The preceding observations have arisen from my impression that considerable pecuniary advantage might permanently be derived, from partial appropriations here under justly regulated principles of operation. These might be considered already as partially bestowed upon some, with whom I shall participate — further to extend them to a few acquaintances, and confine them to their use, would be more satisfactory, tho' with profit, than to invest them strangers. I have no design to make a permanent residence here. Pursuits of a more enlarged character, than the state of things here at present open, are necessary to excite prolonged exertion, where the common impulses which in general ~~excite~~ stimulate to acquisition operate feebly. The coast offers a sphere of enlarged action of sufficient attraction, and has been the subject of some correspondence. But the present insecurity of the Atlantic coast would

involve too much hazard, although the high price of salt might probably warrant considerable risque. But although my residence may not be of long continuance here, it will be sufficient to regulate fast principles of operation, and to extend them to purposes of utility. That I have it in my power to offer them to you at your Saxony works, is a source of gratification. — I shall merely add, that should a friendly associate in the prosecution of the object hinted at, some respectable man permanently resident upon this river should be incorporated. Mr Lawrence Washington & Mr Howell Lewis, nephews of the late Genl. Washington, reside about twenty five miles below this, & possess extensive estates I have not yet visited them. — The first, indeed, is not of my acquaintance — the last, one of many years. Other & truly respectable men are to be found less remote.

The weakness of a well meaning man who projected the plan of boiling water in extensive cisterns, which I observed to you in my last had failed, prevented my getting the iron cylinders at the period I expected, for the purpose of applying them upon a different principle. He arrived about a week after I last wrote; but, upon my proposal to purchase them as useless to him, so convinced did he become of the still possible utility of his plan in consequence of my application (as he could not he said conceive any other) that he determined upon a repetition of his experiment before parting with them; although his previous failure had certainly been completely demonstrative. I regret, hence, that I shall not immediately have it in my power to give you positive evidence of the practicability of using wooden cisterns

cisterns for the first process of manufacture — that of preparing the brine, as mentioned in my last. —

You will perceive from the nature of some of the improvements described to you, that, at Mann's and Bullit's licks, salt might still be made with advantage, though the price should sink greatly below what it now is, or yet has been. — The waters of those salines might, in part, be usefully employed in the manufacture of salt by natural evaporation — and in that way they certainly could produce at half the cost at present incurred. Their waters have one advantage over those of Saxby, and of this river, however inferior they may be in the quantity of salt combined with them — which is, that their colouring matter does not require artificial heat for its seperation. This may completely be effected by mere exposure to the rays of the Sun — the discolouring compound being, in the chemical nomenclature, known by the name of sulphuretted hydrogen. Unless I am very greatly de[illegible] there is no iron. —

Believe me with sentiments of respect,
Very sincerely yours.
J. Calhoun

When I left Louisville I requested you in connection with Mr Beale, to endorse a note, inclosed to that gentleman, of the amount of 500$, wanted for a specific object which I expressed. Finding that I could not be in Kentucky at the date it became due, I inclosed a second to Mr Beale for negotiation. I have not heard from that gentleman, but presume it operated an assimilated effect with the first. My desire to do something determinate before leaving this & the unexpected detention by indisposition of Doct. Cabell of Lexington, made it a matter of convenience for me to renew again. I hence wrote to Mr Beale two posts ago to the effect that it was impossible to obtain a stamp. Neither Mr Steele nor any other

D. L. Ward Esq.

other I could hear of upon the river had one. I wrote to Belle pré, the nearest probable place, but a Mr Sommers whom I addressed, I since learn, had been absent from that place for some time, attending to his professional duties. This information only reached me by a gentleman who practices in the same courts. In my last to Mr Beale, I requested him, should I find it impracticable to obtain the necessary stamp that he would enter his own note for the present, and I flatter myself that you would endorse. I will see that there is no further trouble incurred by the period it becomes due. I mention the circumstance to you now, in apology for suffering both yourself

Lincoln & Gillespie

David L. Rand Esq.
Near Louisville
Kentucky

Lincoln

and our mutual & very excellent friend, to incur this trouble. The arrangement I expected to have made in New York, is yet incomplete, in consequence chiefly of the prolonged absence of the individual, in the interior, in whom I reposed to effect it; and in part, perhaps, from the delays incidental to intercourse or communication with Boston. —

L.

I have endeavored in the section of the furnace, to convey some idea of the manner in which the tubes might be introduced for effecting the combustion of the smoke, & have exhibited the first boiler as covered. It is not the first, however, that ought, but the third; and if the boilers be large, one boiler, with tubes passing back toward the front, and forward toward the chimney, would be sufficient; tho' it not seemed more economical to carry additional boilers for the purpose of generating heat; or making of water or its vapour, a species of fuel. In propriety, the tubes after their entrance into the flue ought to be lined with copper. Steam passing through strongly heated iron tubes is decomposed. In passing thro' copper tubes similarly circumstanced no such effect is produced. – It is an essential point that decomposition should not take place, until the highly expanded vapour enters the interior of the furnace.

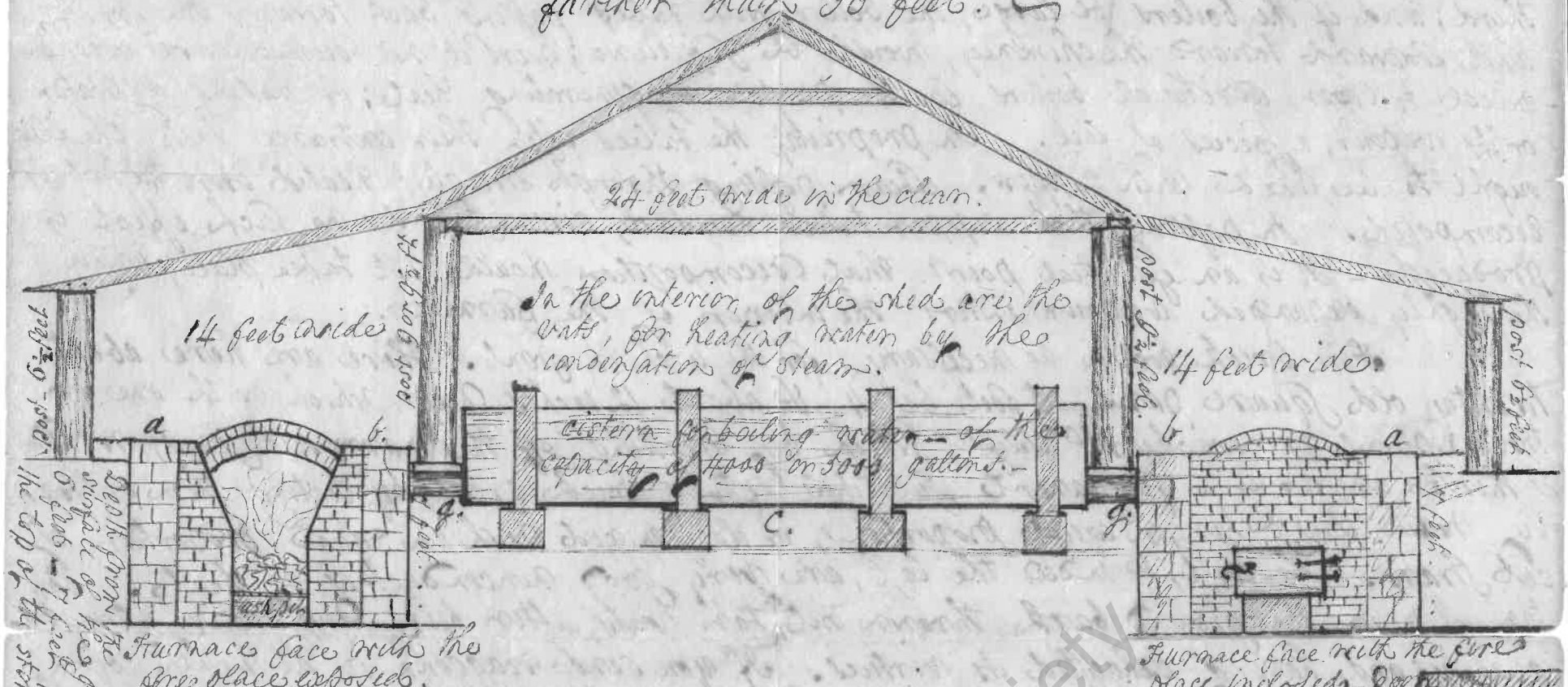
Fire brick would be necessary for the arch in front. There are here about twenty old square pans 8 feet by 4 & about 12 inches deep, which with one or two exceptions, are cracked & useless, which by breaking off the narrowest sides, would I think answer as a permanent substitute for a brick arch, by coating them outwardly with clay & tar, in equal proportions, or clay mixed with an equal proportion of cut straw. The first, & indeed the last, are very good nonconductors of heat. By tar I mean the ground bark, thrown out, tar vats, after being divested of astringent qualities and having exhausted its virtues. If you send waggons to the north of Savory & without expectation of return by them, it might possibly be worth your while to carry back in them three of these old pans for a couple of arches, provided they could be lodged at the mouth for a trifle. I could devise some mean of having them deposited there. – I saw nothing of the kind upon Savory that I recollect that would answer. – However your sand stone, (that which you use for your furnace walls), coated with a couple of layers of tar & clay beat & made firm while drying, or clay & straw, or sand & clay plastered on & beat into compactness with small round faced mallets, would, with some trifling occasional repairs of the outer coating, last for years.

The angles given to the tubes introduced into the interior of the furnace in front are fanciful. The tube can be carried along the outer part of the side wall, contiguous to the boilers, and inserted into the side or top of the arch at will. – After being exposed to the fire for some feet, it may turn towards the middle, either at a right or acute angle, as I have laid down. –

Back of your houses is a situation which struck me when I examined it, as adapted for the erection of such works as I recommend. The level contiguous to the river extends back perhaps 120 or 150 yards of nearly equal elevation, and then suddenly descends 4 or 5 not 6, 6 or 7 feet – beyond which, towards the South is a dead level, the soil an adhesive clay, covered with old stumps. Provided this last level does not overflow, for I observed there was a communication with the river, the declivity above referred to offers an admirable position for the fronts of the furnace, the boilers to extend towards the river; – and would save much digging & expence of wall. The flat below would be well adapted for cisterns on a large scale – & the machinery of supply for the furnaces and the purposes of natural evaporation, by standing upon the first elevation, would gain a very important advantage.

By the bye, I would seriously advise you, if you decline square boilers and have not already supplied yourself with others, instead of the 100 gallon pattern which I mention in my letter, to take that of 280 or 300 gallons. It is 8 feet 3 inches in width, & about half that depth. – Ten of them would be sufficient for a furnace, & almost the whole of the heat of the fire might twice be used by condensation of the steam. – The attendance, too, would greatly be reduced. The mass of metal in them gives quality, & the same metal in small boilers would not stand. I had two of them of old slate metal that resisted the most intense heat. Then, by my process boiling water or brine rather is supplied to them. –

Front view of sheds for two furnaces, with an intermediate shed for water vats. The middle shed need extend back no farther than 30 feet.



Explanations.

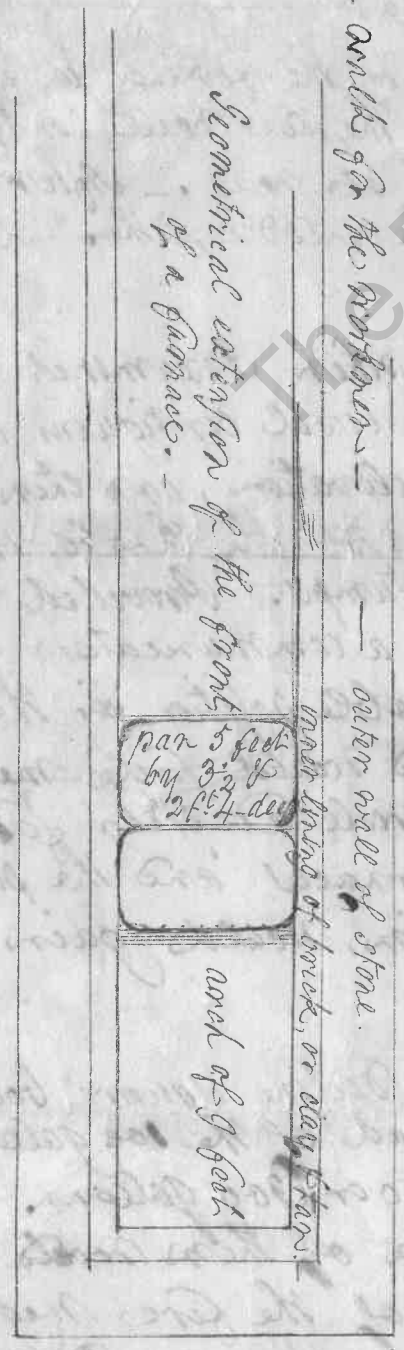
a. Walk for the workmen when engaged in lifting salt.

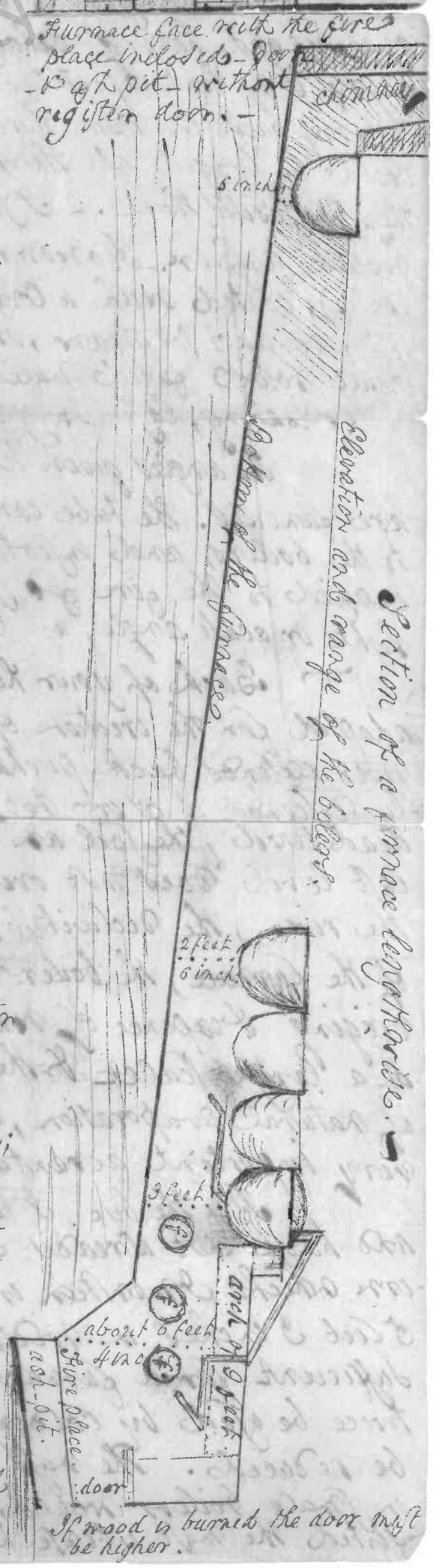
b. Walk for the workmen when supplying water to the boilers. The person walks behind the pipes which extend from the front boiler to the chimney for the purpose of supply, and merely draws a spigot or turned wooden cock. A boy of ten years old can thus give an efficient supply of water to a couple of furnaces, without hazard either by night or day.— Heated brine is thus supplied also, divested of its colouring matter.

c. Front vat for boiling water by iron cylinders attached to it by screws, and introduced into the interior of the furnace. The cylinders must be considered as on the inner side of the front post, the first being about 6 feet from the outer face. The cylinders enter the furnace as at g. g.—

The section of the furnace is necessarily shortened from want of room; the proportions are adapted to the length laid down, however. Hence in a furnace of greater length, some little modification would be requisite.

f. f. f. may be considered the apertures, through which the iron cylinders are introduced. They ought, however, to have been placed nearer the bottom of the arch.





Sandy 2d July 1844

Sir

Mr Prime arrived too late on Saturday evening to write you by the last mail but as there was nothing material transpired during his absence there was nothing to say more than what Mr Prime was able to inform you of when he was with you.

I am sorry to say that the water at this place still continues weak, and am of opinion that there is nothing to be made by working it — but little more than 150 Bushels of Salt can be made per week which you know will not do — the adjoining water is as bad, and Bruce has employed Deering to sink him a gum just within the lower line of the water left. from this it appears that Bruce thinks his present water too poor, and this better than ours Stratton's still continues good, they say they make 300 a 400 Bushels per week, but I think their account of it is somewhat apocryphal — Scott is doing pretty well he came very near ~~300~~ 280 last week — he has employed a Mr Blankinship who is an excellent Kettleman, and who will contin

F. H. Brown

as long perhaps as he shall be wanted
Scott gives him eight dollars per week
which is higher than usual, but since
he has been with him upwards of
10 Bushels of wheat has been made more
agreeable to Scott's statement, which if
correct is well worth the extra wages —
the new pump is started at Scotts, and
does pretty well — they have been
boring in the rock about two weeks, and
has went above thirty feet, the rock
is hard, and they say flattering —
I will suggest the idea to you of putting
a gum down just below the lower line
of the water lift so as to be on a par with
those already sunk in that quarter, and
which are preparing to be sunk there
if no other good could be derived from such
a step it would perhaps be the means of
bringing us all upon an equality, to speak
in a military style — it will weaken the
force of the enemy if it should add no
strength to our own side of the question.
Now for Dick Deering's Patent rights
this man has come on from the City of
Washington with as he says three patent
rights, one for pumping water, in

which he claims the invention of the double crank and single shaft, and no more. one for sinking gums in which he claims the sand auger, and a late mode of splicing gums, (he has given up the sinking of them by weight) — and the other for lift boylers and tubes. — how the people here may be affected by his two first patent rights I am not a sufficient Judge of such matters to hazzard an opinion — its probable that he is the first that has applied the Do. crank to the drawing of water, although it may have been used in other machinery before, and whether he can support his patent for merely applying it to a different use is a question that requires better information on that subject than I possess, to decide — I think he is the inventor of the sand auger, and will recover something from those who use it — he has appointed W. Bruce his agent, and there is great threatening and parradeing, about his rights how it will all end, must be left to time to determine. — provisions are likely to be very scarce here, and the prospect of a supply from the interior bad. Francis H Gaines

Inclosed is a bill of articles wanted here.

Apple Stanley & Walker
30 July 1814 3 125

Wm David L. Ward
Louisville
Ky.

Paid
9 Aug 1814

Sandy 6th August 1814

Dear Sir

Mr. Sett's last letter informed me that your Sugars in Phla were sold and that Gratz's account was not so large as what I had reported had been left with him — on reference to the account of Messrs Anshutz's left with you when I was down you will find that they forwarded on to Gratz

Sugars	248	bbls
Sold	17	do
had on hand	8	do
making	273	barrels

which was the amount of the Cargo.

I directed Gratz to pay Anshutz's $2500 for the purpose of paying Paul — there will be a surplus of cash in his hands which had better be applied to the payment of the balance of the nail debt, which with the eight barrel sugar which they have no doubt sold will more than pay off the nail account — it will be necessary for you to write to Messrs G. & C. Anshutz directing them what to do, and to forward on to you a statement of the whole transaction

It is likely you will have left Jefferson before this letter reaches you. I write it for the information of Mr. Pattison — McTiny and Stratton have arranged their business in such a manner that you will get none of their hands — the water continues very weak of course there is but little salt making — If you decline sending goods here this fall I shall consider myself out of your employ. since my arrival from Phila. as there is nothing for me to do that will at all justify you in detaining me — my own business will keep me here until in the fall I can do yours in the mean time, and shall keep my head quarters at your house — did you ever observe that where there was but little for a man to do he was very apt to nothing? Scott & his wife have both been sickly for some time past, now on the recovery —

Yrs Respectfully
Francis H Gaines

Bacon scarce

Thos. H Guess
6th Aug 1814

Q1

Little Sandy Salt Works
6th August 1814

12½

David L. Ward Esquire

Louisville
Kentucky

Sandy 20th Aug. 1844

Dear Sir

I have nothing new to write you by this mail — the Boat landed on monday evening last, every thing safe — their detention they say was occasioned chiefly by the high water the hands are all at work — Scott and his party are getting gums, and the rock borers going on as usual — nails for shingling flooring &c will be wanted and I think you had better send up by the first opportunity your Auger for boring pipes — as it might be wanted, it might be well to send the nails by the same conveyance

Yrs &c

Francis H Rains

N.B. a few wrought nails for making doors &c.

Little Lady S. Works
27 August 1814

12½

Dana L. Ward Esquire
Louisville
Ky.

Fa. Ward
20 Aug 1814

Sandy 3.d September 1844

Dear Sir

I have apprised you a letter by the last mail but one of the arrival of the Boat &c have but little to communicate by this mail,— Bullett will start his Boat about Tuesday next by whom I will write more fully, inclosed is his receipt for 700 Bushels of Sub wood have taken his note but had no stampt paper and I believe that notes of that size are not good unless they are on stampt paper — if you are doubtful you can take his note at Louisville — Scott has just commenced sinking a few set of gums — other things going on as usual — Beef sells strong. &c. in haste

Yours &c

Francis Gaines

Catlettsburg Ky Sept 5

David L Ward Esq
Louisville
Ky.

Ad

Francis H Gainy
3d Sept 1814

Sandy, 17th Sep. 1814

Dear Sir

I have only time to tell you that Stott has got the gum nearly down at this place, and has got water as well as can be ascertained at this time nearly equal to any in the licks, he is now lodged on a lump of a Rock which may probably be broken, we are preparing to bring it to the furnace the rock will promise to be good another vein is struck since my last — a tube will be wanted and perhaps a copper one will be best, in that case we shall have to get one made in Lexington, I should like to hear from you on this subject, I have no doubt of good water being got there

Yours

Francis H Gaines

S. Sullivan's
17 Sep.

12½

David L. Ward Esq
Louisville
Ky.

J. M. Gaines
17 Sep. 1844.