

never could regain the Influence he ought to have. Brotherton left him entirely on that ground and Boothman says he is worth all the fellows he now employs together. Boothman wd have given up a fortnight ago and told George so - but hoping new measures would be adopted he agreed to stop till he say what wd be done. The Burnley men like Boothman much and said they were persuaded he was both an intelligent man and was anxious too for his Lords.ips interest and I hope there is no danger of his having given a fallacious or extravagant report. He is very anxious to get Brotherton as a fellow labourer in sinking this shaft and the increase of wages wanted by B-n was not for himself but as George had increased those of a boy, neither so able or so experienced as B-n's son, he required the same for his son as the other fellow had.

In my letter to Binns therefor I suggested he wd talk to George Tennant and as we had an excellent sinker close at hand to see if Brotherton might not be restored to his good opinion and his work. I now have to add that Jno Binns arrived while I was at Bolton to dinner n Georges son who was gone after two or three celebrated sinkers was not returned I trust however the business is fairly begun. Boothman and one Beacroft whom he chose as his Partner - Brotherton has returned and chose Silverwood - the other two Leaders are expected and will select their companions out of the present Miners - only old Duke is left at Head of the inferiors and they are busily engaged in opening the veins and Rills where Boothman let off.

You will recollect the reason why we resolved to begin a New Shaft at the time when the Drift or Level was so earnestly in agitation - the latter will be a work of Time and Labour and Expendence - probably be 5 or 6 Months in completing. The Shaft we hope in three Weeks or a Month - the Instant after which is driven thro in the Minerals etc to the Sole they begin to reimburse the cash spent - will work the ~~M~~ mines abreast wherever they please, for from this point they can always get to places which are dry and be digging out whatever they can most readily meet with it. Three or 4 Tons will pay for this Shaft and I trust in 6 Months we shall receive cash fo about 100 Tons. We have the chance besides in the mean time of finding a more easy way of getting to the Drift Mouth. I wishd much to have sent you with this a Sketch of the Ground as staked above ground, but old Johnny is as stupid as an Ass & slower than the slowest of those creatures. He went up ~~o~~ staid there from Friday till Tuesday for the purpose, with a sketch of the Map in the Malham Book in Pikedaw. He has done nothing at it but spoil it and it must be retraced. I am out of all patience. Everything is neglected and nothing but buy buy, buy as dear and sell cheap or give everything away. You will see I am cross, so Lady R. will allow the Rector has not made me "drunk".

(not signed)

Sunday Nt 27 Apl 1806

R 58

MH 109

My Dear L.

You will I hope receive as soon or before this Letter arrives 16 or 17 Specimens of Ochres from Spots not yet I believe sent to Mr ~~Greenes~~ Greenes: whether valuable or how proportionately so, I am unable to conjecture. They go in a small box as usual by Colne Coach tomorrow. I am glad you seem seriously to call The Produce of Martin Heighth A Watricle May it be valuable in any respect, if it will pay its carriage and Labour a small profit will I understand bring in some better metal.

Jas. Hodgson has been to the Bargeman I mentioned, and is just returned from Marsden (where he met him) with an offer from a very respectable House indeed in Leeds to carry the Calamine from Leeds to London at 20sh a Ton. This man whose name is Armitage & lives at Altham near Burnley, sends a Boat every Fortnight to Leeds and will engage to deliver yr Lordsnips Goods from 20 to 40 Tons a fortnight at Messrs Clarkes Warehouse in Leeds "at as cheap a Rate as any other Person will offer to carry them for" "or cheaper" - for ~~his~~ he has little carriage to Leeds going chiefly as Corn Dealer, and the other Companies have got the export Carriage of Coals etc. in which they are chiefly Dealers. So I resolve to see at what price my Burnley Parishioners Messrs Tattersall Fishwick & Co, will carry for. Hodgson also shall go to Gargrave to enquire the average price and also who is the most likely Boat-owner to carry outwards at a safe and easy way. He shall also enquire of the Wharfinger at Gargrave at what rate he will Stow these articles per ton from their Delivery till put into ye Boat sailing to Leeds - under an indefinite supposition of Farts lying a little longer or shorter than others.

Boothman says George Tennant is Dangerously ill, But his complaint being Astmatic I imagine the unnormal Severity of the Spring in these Regions may have brought on this Complaint which a fine and sudden change to day of warm Rain may remove. - It may be a convenient time when he recovers to say, as a New Connection or New Process entirely is formed and will require particular and incessant attention and vigilance in all its Farts, Yr Lordship finds it convenient to appoint an active and hale and determined Person to superintend the Works.

They have sunk 12 yards to the supposed 14 or 15 - so that altho it has been an expensive and laborious Job, we trust Ten Days or a Fortnight at furthest will open our approaches to the Beds of Treasure. Boothman said this morning, No.44 will take 7 years to clear of all its Minerals for they can work in 4 different Directions if you will engage as you often have done for a Market.

Georges Myrmydons however have not been idle the last Fortnight, Two have been searching for the Ochres last Week & they have got a Saloon of 114 abt 2 Tons of pure Raw White Calamine & abt 10 pf Grey, lodged comfortably & dry for extraction whenever we please to order it. Also the Half Tons of the 2 Specimens of Ochre you directed which will be dried and forwarded so soon as we find our best way which shall not be delayed if Diligence can attain the requisite information.

The Cheadle Companys Quota, paid for, is all calcined and laid by ready for filling their Bags, and all Dark Grey as I am satisfactorily assured, not an ounce of White having been brought up, nor is any appearance in the heaps. Their Bags are not arrived, and shd we ~~not~~ or not, fill any Supernumerary ones with Dark coloured (shd there be any as is expected) or return them empty. You have never reported Mr Inglebys Reply to Yr Letter nor have I heard a Syllable abt them only George had Notification of 3 or 400 Bags being sent but they are not arrived.

The intense cold and ~~xxxxxx~~ entire Want of Water render Budling totally impracticable but if this fine Rain continues all night possibly the wind may change and we may finish that Job to which I mean to attend.

Binns is gone again. Hodgson however is civil and attentive and ready to do anything required, and to say ~~that~~ ye truth I can ask him to do things which on some Days I could not decently mention to Old Johnny.

Bateses Son. the Mason at Settle, has taken Darnbrook Barn to build what price do you desire me to say to Young Parker (not Pell) who has entered on Peels for Mother Crosses- as you defer a present exchange rightly I think with the Josephs.....

(details of land lettings.....etc.)

Adieu. I get tired and sleep ill. If it was not for the Castle Banks and the delightful Gardens at G.F. I shd eat and drink and have the Hippocondrics in Perfection.

Be spared however, I go to bed with most ardent Prayers for the Health and Prosperity of all my best and dearest Friends -

remaining

Ever yrs

T.C.

no date

pro Dec 1805.

R 59 3
NH 110

My Dear B

That your Expectations of the Mineral Substances may be realized is one of the first objects of my Heart and I am truly glad to repeat that Boothmans account last night after a close Investigation of the State of their present appearance is most decisive as to the quantity of fine Calamine in every Part - He is equally confident of a great supply of Lead - but my Queries were bent altogether on the best and most speedy mode of getting rid of water so as to work out these riches effectually. He is a very clear-headed fellow and if by Dialling accurately his conceptions are correct I shall not wait for any further directions but pursue his design:- That is to sink a shaft into the heart almost of the Chasm 44 which is the reservoir of water from Chasm 104 on the one hand and 84 on the other, and which (besides its immense supply of mineral) by a very high vault in its roof he says cannot exceed 7 pr 8 Fathom from the surface Eight men - constantly succeeding by couplets night and day may finish this (if the whole is to be blasted) very soon indeed and render the present expanse of getting the mineral out of the earth entirely useless.

What I propose to do under existing circumstances is this- to let Georges Man dial and George according to his letter to come here on Wednesday morning - I will then go up on Thursday or Friday at latest with Johnny Binns and his levelling Principles and descend the Caverns and try if I can find my way so as to be sure the dialling is correct. Boothmans idea is - if the shaft is finished in a Fortnight as he conceives, a water sink will be found for yesterday it was off in the lowest parts - in 44 - so as to enable them to work in all points.

On repeated questions as to where they found most Calamine in Binn's presence he replied "Everywhere" - "Dont bother yourselves about Mineral, there is more Calamine there than can be gotten in my Lords time or in his son's." "In places 6 feet deep of Cal: he has seen and in one place 14 yards wide in chasm 44" and abundance in the rest.

I will mind what you say as the the Furnace - and see if anybody understands or can be made to understand the Zinc White Manufactory:- but I am sure George Tennant wd burn the whole Metallic substance to London out of the Chimnies if the Wind was North, instead of wasting them by water.

(the rest of the letter relates to the possible sale of land in the parishes of Bolton and Gisburn)

F.S" Old Cockshot behaved like a Man - The Blacksmith convicted but adjourned till Ten, Monday morning, to produce the money.

(not signed)

Appendix I. Methods of Production.

p.336. "In the early part of the eighteenth century the Champions of Bristol paid a great deal of attention to the problem of extracting spelter from the ore; and in 1738 the experiments of William Champion were brought to a successful conclusion when he obtained a patent for the "reducing and rendering of a metallick sulphur from calamy or other sulphureous British mineral or minerals into a body of metallick sulphur known by the name or names of spelter or toothaneg." The zinc manufactory which he established at Bristol had an output of 200 tons per annum; and the quality of the metal produced appears to have been of a very high order, for the manufacturers of Birmingham and Wolverhampton, who used large quantities, declared that it was as good as ~~xxxx~~ any brought from the East Indies. In 1750, when the patent expired, Champion petitioned for a renewal, but, since the knowledge of making spelter was known to toears by this time, his request was refused. It was many years after this however, before the new knowledge was applied to the making of brass, although as early as 1739 John Champion patented a method of "making tough and brittle mettals from sulphureous minerals, and compounding the same with other mettals." About the same time, the middle of the eighteenth century, experiments were being made with another ore of zinc called "blackjack", which for long had been looked on as useless, and in 1758 John Champion was able to show how this ore could be used both for making ~~xxxx~~ spelter and brass. According to his patent, "black jack" was to be separated and washed free from any onther mineral and then reduced fine and calcined; next it was to be mixed with charcoal, and by means of a strong fire made into spelter. The use of this ore was evidently a commercial success, for when Watson wrote in 1786 "black jack" was being used for making brass, especially at Bristol; but calamine still held the field, for it was used extensively right down to the middle of the nineteenth century.

p.339 First of all calamine was prepared by mixing it with coal, Pettus writing in 1683. says "they take one part of it (calamine) and two parts of small ground Coalwell quenched, and well mingled; dry them with one another, then pour a bowl-full of water upon the Lapis Calaminaris that it may everywhere suck it in, let it stand an hour and moisten together, but some use urine instead of water, and add a little Allum; this gives the brass a fair colour in the first fire; then they have a crooked instrument and draw all well together ~~3~~ or 4 times. then mingle it with a proportion of Salt, and draw it again with the Instrument twice or thrice, thus the Lapis calimmaris is prepared." The next step in the process of making brass was to prepare the charges of copper and calamine for the pots and or crucibles, which were heated in an oven.

"In one of these Ovens they set 8 pots or pipkins at once, and let them be warm and hot, and when they are so, they take them out quickly and put the calimmaris in them, also they have a shovel made on purpose, that therewith they may take up and know how to distribute ~~xxxx~~ near 46 pounds in such eight pots. Then they lay in every pot upon the Lapis Calimmaris 8 pounds of small broken Copper pieces, and set in the pots again, and then let them stand 9 hours in a great heat, and in this 9 hours are to be taken one heap and half of Coals, and when such coals are burnt out, then stir the stuff in the pot with an iron". After a time the pots were taken out of the oven, and all the brass was poured into "one hole"; before it

cooled it was broken and left so that the pieces lay close to each other. Since the making of brass was a secret, this description by Pettus in 1685 is possibly one of the earliest. but it is interesting to compare it with one given by Houghton fourteen years later. According to this writer, brass was composed of about 2/7 of fine copper, 4/7 of calamine, and 1/7 of shruff or old plate brass. The mixture was put into pots which were then set in the furnace; and after being heated for 10 to 12 hours, the contents of 8 or 10 of them were poured into a larger one. When the whole mixture was ready the dross was skimmed off and the brass was poured between two stones of a "tun weight or more", each of which was elevated at one end. The moulds being filled, were placed in an upright position, and the metal allowed to cool, and so a plate of about 70 pounds weight was obtained.

p.341 The furnace which was circular in shape, opening at top, lined with fire brick - cast iron plate ~~xxxx~~ at the bottom with twelve holes with a larger one in centre through wh. ashes were drawn. Crucibles held 84 lbs made of fireclay. Charge of 100 lbs calcined calamine or calcined blende ground fine and 40 lbs ground coal mixed dry then 2 galls. water on it. After standing 1/2 hr again mixed and sieved, levelled and thoroughly mixed with 66 lbs bean-shot copper.

nine pots charged this way, then 3 cwt broken coal reduced by combustion to coke and poked down among the pots before the furnace was closed. Ten hours heating then central larger king pot (120lbs capacity) taken out, stirred with iron bar and some contents of other pots after stirring added to it - skimmed and poured into moulds.

Dr.Percy estimates copper to increase 50% in wt and brass to equal wt of calamine used.

1779 John Champion senr. patented brass with 4/10 granulated copper 6/10 calamine or black jack and charcoal, and special pots and furnace.

1781 new method by James Emerson of alloying copper and spelter direct.

5

MS no date.

120

Crucibles or Pots made of ye materials which will bear the greatest degree of Heat - best Fire Clay that can be got.

Shape - a Large Oil Jar:- about 2 Feet high - having a round Hole in ye Centre of ye Bottom, as a common Garden Pot, to admit an Iron Tube, of about 2 Inches in Circumference. Each Pot to have a Lid of ye same Materials to fit close and made so as to admit its being luted on with Clay so as totally to exclude the Air - Qu. What is the best composition and how is it best applied for luting ?

Hundred Bricks made of ye best Fire Clay for building the Furnace. And Hundred of Tiles made of Do. for the Floor of ye Furnace. A Dozen of the latter to have a Hole through the Centre of them, of ye same Size as the Hole in ye Bottom of ye Pots.

Heat not to be too strong in ye Calcination.

After Calcination, the Calamine must be carefully picked and ground to fine Powder - then washed in a gentle Rill of Water to free it as is most possible from the earthy matter.

The Charcoal must be ground as small as ye Calamine and mixed with it in equal Quantities.

— The Right Hon^{ble} Lord Riddell
1813

Letter to William Kitchen
October 18th To one Cow — — — — £ 2 7
Do " To Waling Mould Know — — — — 14 5 0
fed at 35/- — — — — 1 15 0
£ 16 17 0

Sattled the above acct.

William Kitchen

1813 Right Honourable Lord Riddell
Nov^r 13 to 2 Shafts — — — — 18 0 1
to 2 6 wheels of Bushing — — — — 4 0 0
to 1 stool & 1 shaft 6 is — — — — 1 0 0
to 2 fiddles & 1 shaft 6 is — — — — 1 0 0
Sattled £ 24 0 0

Oct^r 1th 1813 Rec^d of Math^{ew} Watson The sum
of Ten shillings & Sixpence By His
Lordships Orders for Waling Blacksmiths
Garding wall
10/6 Joseph Metcalf His Mark

The Right Honourable Lord Ribblesdale Esq

To one Half Sest Taxes for Malham Tabor House 7.13.3

To two Portraits ----- 1 - 1 - 5 1/2

8 14 8 1/2

11 Nov 1813

Settled by me Tho^r Huskisson

August 24th 1813 Rec^d of M^r Watson

27 pound 10 Shilling for Gating Hay at
Lrenhou farm -

As Witness My Hand

£27 10 0 John B. Crockett

July 10 1813

Received of M^r Watson for
Lord Ribblesdale for property

£2:10:0 by me John Parker

Lord Ribblesdale,

11th Jan: 1813.

To Gold Hind Esq

To Good

Yours

14th August Settled by me Gold Hind

11 Nov

1012
 1012
 To Mr. Shackleton Dr
 To Clay at Coleridge Mathew
 To 13/4 of Old Glass and imp. - 6 7/2
 To 13/4 of new Glass - 19 6
 To 24 lb put in - 12 0
 To 2 Cyls of put in - 3 0
 To 2 Men wages - 4 0
 To 1 lb of Linn - 1 4
 To 1/2 of Iron of new Glass - 1 12 3
 To 6 lb of put in - 3 0
 To 2 Sack of put in - 5 6
 To 1 Right of put in - 1 0
 To 1 lb of put in - 0 6
 Paid by Notes - Oct. 30th 1013 - 4 8 8
 Paid Nov - 30th 1013 - 9 4
 by Payment of Mr. Shackleton - 9 4

The Right Hon^{ble} J. L. Ribblesdale
 1009
 March 20th To 1 lb of Bronze Paint - 1 0
 To 1 lb of Putty 10 - 2 0
 Sugar lead 6. Blather or. for Tarnhall - 1 2
 June 6th To 1 lb of Black Paint for Tarnhall - 1 6
 To 2 lb of Lamb. Black for Tarnhall - 2 0
 Sep^r 9th To Clay at James Taylor - 4 4
 10 lb of put in 3/4 - 10
 Oct 6th Clay at Coleridge Mathew
 To 20 1/4 put of Old Glass and 2 1/2 10 7 1/2
 To 20 lb of put in 2 1/2 6 0
 Putty & Nails for wood frames - 1 6
 Man & Self - Time fixing windows 6 0
 £ 2 3 5 1/2
 Cr. My Cash Jan 9th 1010 - 2 3 5 1/2
 J. L.

1813

August 3

For Lord Ribblesdale gasburn park

to win trees

9 grate bars 6-2-1 at 15/ 4-17-7 1/2

muddal making 3-6

£ 5-1-1 1/2

1813

£ s d

Nov 4 1813 Cash 5-1-1 1/2

By William Shires

Thirby malham Nov 11 1813

The Right Hon^{ble} Lord Ribblesdale

To Col^l Surgeantson Esq

To 180 ash Trees from Easing Gill wood } £ s d

Bought by Mr. Matt^o Watson } 34-0-0

6th 1813

Nov 11th By Cash Rec^d of Mr. M. Watson } 34-0-0

Robert Preston
for Col^l Surgeantson