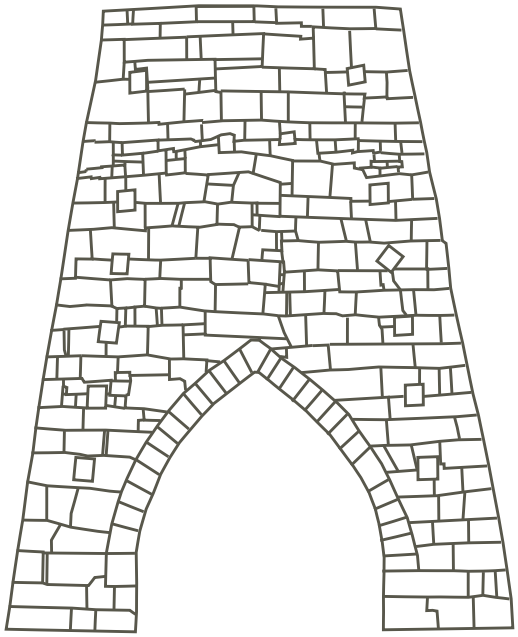
Friends of Beckley Furnace Inc.

Research Report

The Notebooks of William Wallace



Prepared by: R. Paddock
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Contents

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Acknowledgments

A number of people have contributed to the making of this transcript and deserve to be recognized.

First and foremost are Frank Kobliski and Phyllis Dower. Frank held on to the material from William Wallace and Phyllis served to facilitate the donation of the material to the Falls Village - Canaan Historical Society. They both deserve credit for recognizing the value of this material and seeing to it that it was preserved.

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Ed Kirby and Fred Warner of FOBF helped edit the transcript, spending hours reading it over and marking typing errors and places where the text was confusing. Their efforts resulted in a much more readable document.

This material represents a mojor addition to the body of knowledge about Beckley Furnace and the Barnum Richardson Company.

-Dick Paddock, December 2007

The notebooks of William Wallace

In October of 2007 the Falls Village – Canaan Historical Society received a donation from Phyllis Dower of Winsted on behalf of Mr. Frank Kobliski.. The donated material consists of letters, photographs and notes assembled by Mr William Wallace. Mr. Wallace was the superintendent of East Canaan operations for the Barnum & Richardson Co. from 1911 until his resignation in 1918. His notes include descriptions of the plant and equipment and also give considerable insight into the daily operations of the plant. The key items of the collection are four notebooks and two manuscripts. This document is a transcription of those items. The original documents comprise handwritten pages written single space in pencil. Handling them degrades the writing by smearing the pencil marks, so this transcription was prepared to preserve the contents of the notebooks. Some portions of the original are not legible or contain abbreviations unique to Mr. Wallace. In those cases the text has been edited for clarity. Such changes are in square brackets []. In all other cases the words and descriptions are true to Mr Wallace's text. The location of the text in the original source is indicated by the letter S and a number enclosed in braces {} giving the page in the notebook from which the text was transcribed. All of the source material has been scanned and placed in a digital library so that the original material can be studied without handling the notebooks themselves. The scanned images are, in fact, easier to read than the original document. While Wallace did number some of his pages, the numbering is unreliable and the tags in this document refer to scanned image numbers rather than Wallace's page numbers. The four notebooks are identified by their covers, yellow, brown, tan and a "composition" book. The yellow notebook contains the most material and some of the details are repeated in slightly different versions in the other books. Wallace appears to have been dismayed that the history of iron making in Connecticut in general and the Barnum & Richardson story in particular did not receive any attention from mainstream historians and he set out to correct what he saw as a gap in the industrial history of the United States. Unfortunately he was never able to publish his work. This transcription will let others read his words.

Part 1: The Yellow Notebook

{S1}**Writer's actual knowledge of process, raw materials, furnace operation, waste disposal etc.**

In July 1910, the writer at the request of the [president] of the CNE RR Mr. O M. Laing thru his assistant Supt J W Clark prevailed on me to come to E. Canaan, Ct, for 30 days to run their station there, till they could get a man to take it steady. After this took place, they didn't attempt to find a man and being under a heavy bond I was forced to stay much longer against my will.

The firms engaged in manufacturing here were W. J. Davis sawmill at Whiting River, NE Lime Co., Hotchkiss Bros, Lime Co., NE Lime plant on Lower Road, the Conn. Lime Co. and Barnum Richardson Co. operating 2 blast furnaces, [and Connecticut] Lime Co.

The operating heads of these concerns in order mentioned were, Warren J. Davis, Charles Johnson, George Dedrick, Dewey Canfield, Arthur Freeman and lastly BR Co. Supt James Fuller, foremen David Roger & Alvah Fuller, Mr. Fuller's brother, Office manager G. W. Cowdry jr.

The products [were] lumber, ties, timber and poles, Lime & flux stone, lumber, feed, pig iron. The last mentioned concern was a subsidiary of Barnum Richardson Co. of Lime Rock Ct.

Some months after I came, Mr. C. W. Barnum came to me and asked if I would take a position as assistant office manager under Mr. G. W. Cowdry. which I accepted. Some 7 months later as business was slow asked for leave of 3 months to go home. Two weeks later, was called back as Mr. Cowdry had resigned and I succeeded Mr. Cowdry. Little did I realize how important this change was to be on my entire life.

At this time the B. R. Co. owned and rented to employees 23 houses (good) at an average rental of $1.50 per week. This included home, garden, barn, chicken house and nearly all employees kept cows, pigs & chickens. Firewood was free, furnished by Co., and for summer [S2] all charcoal for cooking was free too.

There was a depression on, which accounted for only 1 furnace [being] in blast, the Beckley furnace or lower furnace as it was called.

The Company[’s] plant consisted of 2 blast furnaces #1 Forbes & Beckley; 2 engine rooms, 2 water power blowing works, sawmill, grist mill, 1 stone crusher, 1 compressor, a car repair shop, blacksmith shop, about 20 charcoal storage sheds each of 90,000 bu [capacity], 1 ore shed & trestle, 1 hoist operated for transporting ore, flux & charcoal from storage & cars to tophouse of the Upper or Forbes furnace. There were also two beautiful stone dams for water storage. In the engine houses were 2 coal fired boilers & 4 gas fired as auxiliary power. In case water became short. [One] stone crusher & a compressor gasoline power, 1 turbine & water wheel for blowers at both furnaces. the annual production of both furnaces averaged 10,000 tons of iron all at that time graded by fracture chill, foundry grades #1 - #2, chill grades #3-4-4½-5-6.

[There is considerable confusion in the notebooks about which furnace is which. The furnace built in 1832 by Samuel Forbes Adam had been demolished in 1899, and thus there was no Forbes #1 in 1910 when Wallace started working in East Canaan. The furnaces he refers to are Beckley and the furnace back from the river that was the last one built in East Canaan. Today that furnace is called #3. In this opening description Wallace identifies Beckley by name and calls #3 Forbes #1. In later sections he swaps them around. This may have been due to the effects of age on his memory (these notes were written 40 or 50 years after the facts they describe) or may just be simple errors. In any case there were two furnaces and one can usually discern which one he is talking about.]

From 1910 to 1915 over 35,000 tons of iron were accumulated in our yard due to slack business. On both sides of the highway from #1 to #3 iron was piled leaving just room [for] a team + wagon to go thru. The selling price of Salisbury Charcoal Iron in 1912 when I first went there was $28.00 per long ton. The cost to manufacture $32.40. A very bad situation. By eliminating all outside contract work i.e. slag duty etc., cutting force to actual needs etc. we succeeded in changing the picture from [selling price] $28.00 to [selling price] $30.00 per ton & production cost cut to $29.95. Price from 1915 climbed to $65.00 per ton & costs dropped to $25.00.
{S3}

Late in the spring of 1912 the trade had pretty much switched from iron graded by fracture to purchasing by analysis. Thru this method they could get perfect control in their cupola's, and it seems a few thought to gain information which would permit them to get the same results in the cupolas in [tensile] strength & chill with cheaper and lower grades of pig iron. They soon learned that as Thomas A. Edison said: "There are many attempted imitations of Salisbury Pig Iron, but not one satisfactory substitute, and if the day should come I can't get #5 Salisbury Pig Iron Thos. A. Edison will have to go out of business."

At this time may I call attention to a fact little known or remembered. At the Worlds' Fair in Paris in early 1900's, Salisbury Chilled Charcoal Pig Iron won the Blue Ribbon & Gold Medal as the world's best pig iron. Its [tensile] strength per square inch was 2 ½ tons greater than any other iron in the world plus fact that no other iron yet made had ever equaled it for uniformity in depth of chill.

In grading by fracture it was graded as #1, #2, #3, #4, #4½ ,#5, #6. Numbers 1 & 2 were classed as high grade foundry iron. Very soft, strong and so easily machined.

#3 was the lowest chilled iron. Its texture being fine grained & tight due to the carbon being more combined and depth of chill about 3/8 to ½". #4 was high grade [foundry] with a chill of from 5/8" to over 3/4". # 4½ about ½ solid chill. #5 solid mottled chill. #6 solid silvery chill. The last 2 grades were almost impossible to machine.

No other RR car wheels ever made have been able {S4} to equal BR Co. wheels for wearing qualities or durability.

To give one an idea of what a solid chill meant, it could not be bored, ground, chipped or machined. A near by power plant installed a new high speed water turbine to operate their generators. The end of the shaft on the bottom rotated in a socket in a large manganese steel plate. This plate was very large, thick and heavy. Each year, however this plate due to wear had to be replaced. This entailed a shut down, loss of power and 4 or 5 days labor to remove turbine, disconnect from generators, removed from pit with all this reversed to install the new plate.

After 2 or 3 years the Power Co. officials raised heck about the expense & loss of power. The Sup't was telling me about it. Told him he could easily cut it out by making us up a pattern & we could make him a chilled plate. This to him was a great joke and he was very sarcastic in his reply so I left. The following spring, 1916, he sent up a pattern. We took it to Lime Rock made up the plate with 2 rings installed in it to greatly facilitate the placing or removal if needed. That plate installed in 1916, was in the plant giving excellent results from then till the plant was shut down in 1933 and when plant was junked the plate was good for years & years of wear yet.

Every car wheel they made was guaranteed to be free of defects for 5 years. If any ever showed up that wheel would be replaced free. No other concern could or ever has been able to do this.

{S5}
In the summer of 1912 Sup't Fuller & his brother were dismissed after a big fire, and Mr. Wm M Barnum who succeeded Mr C W Barnum as Pres. announced to me that I was the new Sup't. I

tried to convince him he should get some one else, but he wouldn't. I took over with James McCormick & John Colligan as my foremen.

The chemistry lab

About March 1913 Mr Barnum announced I was to report to Hartford the following week for a course in chemistry upon completion of which they would equip a complete lab and I would in addition to all my other work make all analytical tests for the Co on ore, iron, copper, bronze, coke, etc. This I did 4 days per week from eleven till noon when I finished. The lab was equipped with the best of everything & I became chemist. I now had more titles than any king it was really funny. Gen'l Sup't., Office Manager, [Purchasing] Agt., Accountant, Pay Master, Traffic Manager etc. A real busy job. In addition to all that had to go to Lime Rock as needed to assist Mr Bradley, Treas.

Finally they agreed to discontinue the water powered blowing system and install high speed steam rotary blowers i.e. we went from pulsating blast to steady blast, achieving marked increase in output, reduced costs & more efficient operating. It was a most pleasing result & reward being much appreciated by the Co. as well as the men.

We were now using an average of 86 to 96 tons of ore per day. Producing from 40 to 51 tons of pig and in no way sacrificing quality, and better control. We consumed about 5000 bu of charcoal per day to 5300 bu or 4 carloads. All our storage shed filled here, Lime Rock too. Never had things been better in years.
{S6}

A Word about furnace crews etc.

Each furnace operated on 12 hour shifts. Each crew poured twice. A complete crew consisted of 2 furnace fillers & helpers, 4 charcoal forkers, 2 foremen & helpers, 1 iron breaker, 2 engineers in the [engine] house. At #1 were 4 charcoal car unloaders, 3 ore handlers & flux men. Two teams each with driver on slag duty & drawing iron. At Beckley furnace ore was drawn from cars to tophouse by teams. All of charcoal and ores had to be stored by teams. We had 1 carpenter at car repair shop, 1 blacksmith, and 14 outside men. There were over 3 miles of RR track sidings one RR track scale for weighing of all ore & outbound carloads & [empties]. It was not unusual to have 40 or 50 carloads in the yard day after day. Charcoal & ore. The [freight] bills averaged $45000 per month. [This figure is hard to believe, it probably has too many zeroes.]

Our ores at first came only from Amenia & Ore Hill. Later Weed Mine at Boston Corners was opened. Three ores of different characters. Usually 4 cars of Amenia per week, 12 to 16 cars of Ore Hill & 3 cars of Weed. Each was consumed in different amounts i.e. the mixtures were changed as the occasion called for.

The cars or carts for charging (filling) the furnace were for 150 years made as follows: Wrought iron carts with cast iron wheels for the ores and flux. The charcoal cart of wood entirely. In filling to [empty] it was with these wood carts necessary to bang the dump end hard against the tunnel head to insure these dumping clean which necessitated a carpenter working steady to repair them & replacing burnt or broken parts. this we cured by making the box of galvanized

iron sheets giving a free flow thereby reducing maintenance.

{S7}
Zinc Oxide
A furnace in blast had to banked twice a year to remove a material which collected on the lining. This material was the result of a condensation forming layer upon layer which if not removed would completely seal the furnace at about 10' below the top. This had been done in every hot blast furnace since 1835. The material was exceedingly heavy more so than most any one ever saw. A horse dump cart completely loaded was all the horses could haul & it would invariably break the axles. It was too heavy to cross the bridge with so had to be dumped on the side. It intrigued me so one day when the men were removing it I took some to the laboratory analyzed it and the results confounded me. Ran 3 samples with the same result. To confirm I sent samples to [Hartford] Lab & Davenport & Keeler, they both confirmed my findings.

Then I set out to find a market and did @ $80 per net ton of mineral content. It being 95% pure cadmia [zinc oxide] we gave long tons to get net mineral content i.e, one long ton 2240 for 2000. Carload after carload was picked up shipped till 10 cars had gone. The buyer had instructions to send the payment to the Co.'s main office at Lime Rock, but sent it to East Canaan. The day it came Mr. B. came up & as he was leaving asked him to wait. Gave him the [check] to give to Mr. Bradley. He looked at it & read the legend on stub starting to laugh saying we don't have zinc, don't make it & haven't got any some one is crazy. Then noticed the amount nearly choking over $18000. Then he was sure it was crazy saying so. I then told him all about it, gave him the correspondence etc. telling him now I've paid you for my [chemistry] learning.

{S8}
He took the correspondence sat down & ordered me too. Then he said "For Pete's sake how much of this stuff is here." Told him I didn't know, it had been collecting 100 years or more. [Six] more cars had gone that were not on that [check]. "Why can't we do this at Lime Rock ?" So told him they could & when finished here would show them what had to be done there. He told me my salary was increased $75.00 per month the following Monday.

The World War broke out, with a bang orders flooded us, the price jumped to $45.00 then $65. We hired every available team & man loaded cars day & night till we finally [moved] all 35000 tons plus daily production. It was unbelievable, our production costs had been brought down to $26.50 so the net on iron was $38.50 per ton. On all iron to US Navy yards at Kittery Me., Portsmouth NH., Mare Island [CA] etc. Each car traveled on a navy blue & white envelope, as did all iron for use by armed forces to Wm. Cramp & Sons. US Shipping Board etc. Chilled Roll Foundry Co., Birdsboro Steel, Jones Loughlin, PRR etc.

Selling the slag

In 1913 we succeeded in finding buyer for the 150 year accumulation of slag. They formed the New England Slag Co. shipping 15 to 25 cars of slag aggregates and fines. By 1915 quite some talk was had on building a destructive distillation plant to make our own charcoal. The theory was good but decision bad due to poor & insufficient advice & preparation.

The operators of slag Co. were W. B. Herbert & a man named John Strain. They built a large crushing & screening plant moving 20 to 25 carloads per day for a number of years.

{S9**}**
Charcoal Dust
Also in 1914 it was apparent we still had a waste problem that if possible must be made self sustaining charcoal dust or screenings as they were called. Ever since the shipments started there were when cars were unloaded 100 to 150 bushels of dust. This had to be loaded in wagons taken to dump, where in a few days it would draw moisture enough to create spontaneous combustion & burn. To clean the cars, draw it away & dump cost a great deal. A market was found in Peekskill NY. They took all we had as fast as we could load it and furnished the bags to put it in. Now this waste turned into a very profitable deal. Also, it netted me another raise. Charcoal cost then 4 ½ [¢ per] bu and we were selling the screenings @ 6 ½ ¢ FOB cars.

The chemical plant

The idea of building the acid plant was put into being in 1915 by forming of the Connecticut Chemical Co. which in turn was controlled by BR Co. They did not follow the advice of Benj. Bussman who was the originator of this industry that they should build in 5 seperate places a 20 cord plant so as to always be sure of adequate supply of wood due to fact it would reproduce itself every 20 years, but adopted idea of a man locally & absolutely unfitted to make recommendations having no knowledge of either the iron business or acid plants. Building a 60 [cord] plant here at E. Canaan capacity 60 [cords] per day or 2500 bu coal ½ of our needed daily [amount].

The plans were drawn for a 60 [cord] plant to be built here and it was. This meant instead of being independent this must depend on their present source of supply for 50% of their charcoal as 60 [cords] would only yield 2500 bu per day while we needed nearly twice that per day.

At this time they employed a consulting engineer at an enormous salary to go over mines, furnaces, forges & everything. He, in his report, recommended that {S10} a General Manager be employed over all plants. This was done. [The new General Manager] was a brother-in-law of the consultant. The new man was Robert Durrett from the Charcoal Co., of Ain? in Mich.

As soon as he landed he placed 2 brothers-in-law as Supt & asst Supt of Ore Hill & Weed Mines. I was like the blind leading the blind.

Neither the consulting [engineer nor] any of the rest knew what they were doing and got away with murder. The Genl manager knew nothing of furnace practice nor chem plant either. A number of colored men from Big Stone Gap Va. were brought here to work & placed in plant. They were good men but the heads of plant & Durrett in a few months were so hated by them that the plant was a mess. Production went down, equipment became defective, etc. It was awful. I was not in any way connected with the chem plant although Mr Bussman spent weeks training me in operation of it so I know every thing needed to know to make it a success.

This plant used 25000 [cords] per year of wood & all wood must be seasoned 8 to 12 months

to be usable so it entailed a large inventory of 30 to [40 thousand cords] at the plant & in the woods.

Wood, ore, charcoal, [empties] for loading {S11}

Pig iron, slag, acetate of lime and alcohol.

Finally things grew bad at the plant & the Co. officials all came up, and after a meeting Mr. Durrett was relieved and the chem plant came under furnace supervision. The wood procurement became a bad mess about which nothing could be done as the man in [charge] answered only to Lime Rock. Things were bad and couldn't last.

The war grew worse and with embargoes ensuing it became critical. We were solely & wholly supplying the sinews for our army & navy on certain grades [of iron]. Our stocks of charcoal disappeared here & Lime Rock, the coke for foundries too. Finally only enough was left for 6 days operation. So with thousands of bushels of charcoal on the way held up by rail embargoes & jams it was necessary to go locate these cars of both materials & get them in quick. About 130 cars in all strung out from Connellsville Pa. to Canaan. This was done, resulting in 4 days of clearing the situation & in 3 weeks everything was back to normal

Manganese both by reason of price & supply was short and sorely needed so we developed more than enough for our needs selling some from Ore Hill mine.

With starting of chem plant some one lost their head cancelling all charcoal contracts with Manufacturers Charcoal Co. of Bradford Pa. which is what bought on most of the trouble as they couldn't get it in their heads the chemical plant only produced ½ our needs and we must continue ½ the contracts. The damage was done, we were forced to buy charcoal at 25¢ per bu instead of 5¢ etc. it was clearly evident this sort of management {S12} could only end in bankruptcy. I called it Mr B's attention. Nothing was done so I resigned & enlisted in the Armed Forces. I was gone a year & a half came back & was sick 6 months. In the [meantime] the BR Co. went in [receivership] then bankrupt which ended the operation of one of the United States' oldest continuously operated companies dating from 1754. It was a crime, absolutely no need for it and on contrary should have resulted in their being bigger, better and the peer of any iron [manufacturers].

The originator of the destructive distillation plants called father of the industry was Benjamin Bussman of Hancock NY. He built all these many plants and designed & built our plant.

He was a wonderful man, universally liked, a personal friend of Theodore Roosevelt, as well as many, many more men of equal prominence in their field.

{S13} **History**

There were many men of prominence connected with early American pig iron production. The Livingstons of Ancram had furnace & 5 forges there. William Miles sr. & jr. of Copake Iron Works [manufacturers] of famous Hillsdale Plows. The Scovilles of Salisbury, Richardsons; M.B. sr & jr with W H Barnum, Wm. M. and CW Barnum who was also State Senator, Richard & William and Walter Barnum.

Col. Kniffen of West Stockbridge, Hon. Samuel Colt owner of Richmond Iron Works of Pittsfield Mass. Mr. Woods of Cheshire furnace, Cheshire Mass. Messrs. Welom and Eaton of Amenia NY.

Much much more could be written if one were so disposed, and very interesting this baby industry which grew up in NE has become a long tailed procession with passing time. US Steel, Bethlehem, Republic, Jones Loughlin etc. With demise of BR Co. thus ended a most famous career. Never yet has the Salisbury Iron been [superceded] for quality.

Facts unknown. After the Civil War the Bessemer Process gave steel a boost & the steel men set out to drive NE furnaces out of the picture so as to completely control Government business, which eventually happened.

At a [Congressional] meeting the fight became pretty hot & the old gentleman who owned Cheshire challenged steel crowd to a duel. He said he would go home build a cannon of iron, ship it to Boston Navy Yard that would out last & out shoot [anything] the steel people could produce. They accepted and he {S14} came home built the gun, shipped it to Boston and [awaited] their meeting. They never came, he shipped his gun home, broke it up and died of a broken heart.

Barnum Richardson Co. owned the patent on chilled rolls, a most valuable patent, but rested on their oars too long. The patent expired and the business went to firms like Terrell Foundries, Chilled Roll Fdry Co, & others. Few know of WH Barnum's expansion of the car wheel business and that the Co. had a large car wheel foundry in Chicago supplying the CM & St. P RR & others.

Nor were they aware that the Co. had thousands of acres of the best woodland in CT. Mass. & So Vt. with great stands of hemlock, spruce & pine, none of which was cut for charcoal burning. there was a large charcoal kiln at New Boston the remains of which are now gone.

Nor that in 1917 we burned about 50 pits of charcoal to help keep going, These pits were burned off by [illegible] Younge & his sons of Colebrook River Mass.

CW Barnum

That Mr. CW Barnum knew practically every man employed by the Co. at Lime Rock, Canaan, Amenia, Ore Hill & Weed mine. Knew whether they were married, how many children they had & where they lived. I never saw anything like it, and he loved to [meet] with the men & their families. If they had serious trouble some how he was first to know & first with help.

{S15}
One employee's wife had a cancer. Mr. Barnum inquired for her of her husband. He told him her only chance was an operation which he couldn't afford. Mr B. came straight [to the] office. Had a check made out for $500., called Mr. Richardson's man who was outside with a horse carriage Jim Cummings. Said "Jim take me down to this mans house." When they arrived he jumped out ran in left [check] on table came out and told her husband to get her to Pittsfield as quick as the Lord would let him & left. Next morning the man came to office with [check] gave

to to CW and said “I can’t do it I never could pay this back.” Barnum was mad he nearly hit him and said you fool “who asked you to pay it back. Get her up there today or I’ll kick you out of town.” This was but [one] of many, many acts of kindness of which few knew. Mr. Richardson was the same type of man as were his sons.

There is a factor in manufacturing of Salisbury iron which any known technical man would say was a crazy notion. Through study of ore analysis, iron analysis, slag analysis & furnace operation it seems apparent to me that there was one item that contributed to its great strength uniformity & depth of chill and machining qualities. It was zinc. This element was evident in all ores etc in an infinitesimal but uniform amount. This & other things. I firmly believe I am right in my conclusion by tests.

{S16}

In 1917 the writer was made Asst Gen’l Manager and it only added to my troubles.

The first few years with BR Co. at Canaan many problems had to be met and solved. At this time & for a long time previous there was no cooperation or good will between Supt at Canaan & Supt at Ore Hill Mr. John Perkins. tried to have him come over, but no, so went to Ore Hill. It helped. We had a serious problem with the unloading of ore in winter as between time cars were loaded with wet ore from washer & it arrived at our unloading trestle it would freeze solid. the cars were wooden ones with no hopper, the ore having to be shoveled off. This was crazy as we had to put 6 or 7 men on a car with sledges & bars breaking it up to shovel it off. A 2 day job. asked Mr. Perkins to load it in hopper bottom cars so we could open pockets, turn in live steam & let the ore run through. We would only have to trim the ends. No sir, he wouldn’t. So had the [freight] agent Martin put in steel cars anyway & had New Haven RR condemn old wood cars. When this was done the war broke out, Perkins come over to Canaan. I showed him how easy it now was & from that time on we were friends, and he was of great help man many times.

A peculiar thing would occur at almost regular intervals. Every one knows sulphur tends to reduce strength of iron when in excess. If it ran too high it was quickly evident to all as it invariably gave a crooked chill apparent to all upon breaking the iron, but there was exceptions.
{S17}
At intervals we would get a bed of iron at one furnace with a bad crooked chill. It could or could not be what we expected i.e. special car wheel iron. If it were no man could break it & we had to use a drop. This iron was kept separate for Lime Rock. Its tremendous [tensile] strength was unbelievable.

We had accumulated 27 tons of this unusually strong iron when they received a call from Bethlehem Steel for a car of our strongest toughest iron. Mr Barnum came up to tell me & to have us be careful. No one knew iron better the he, so I suggested we send a car of this iron the them. He saw how tough it was when we gave it the drop test, but hesitated. So I said we would send it & guarantee it to do the work or give it to them. He agreed. It went, they received it, analyzed it, rejected it. Mr B went down & succeeded in having them use it and it was excellent. Don’t ask me why, but the man who ordered the car rejected was a relative of the Pres of [Bethlehem]. He was so mad he prevailed on the Co. to cancel all orders to us which

cost us 250 tons per month. Mr. B. went down and came home with a renewal of orders & a compliment for us on our iron. This was a case of technical guidance being wrong with actual practice.

It is to be remembered this type of furnace was very hard to keep on an even keel. It had but three tuyeres, was filled & of a necessity had to be filled by hand. Again a piece or iron of 100 pounds weight could {S18} and would if thrown in at the top to the front tip the furnace & cause it to go cold & black causing a complete shutdown. So one can see how careful one must be to have good furnace fillers in top house under almost constant supervision. It cost $1000. to stop and a like [amount] to start up.

Four men and a boy

In 1913 times were bad, many men traveled the roads from place to place looking for work. Some times 10 to 15 a day [would] come to office & offer to work for enough to eat & a place to sleep. There was a standing order that no one, not [even] employees would be allowed in the furnaces at night and there never were until one night about 5:00 4 men & a boy came and asked if they could stay in engine room or furnace as the old man with them was sick. It looked as though he was headed for pneumonia.

The old man was clean, well shaven & so ill it was beyond me, I couldn't turn him down. Gave him a note to night boss to let them stay in lower furnace top house where it would be nice & warm & gave them all the charcoal bags they wanted to sleep on. The #1 or upper furnace was down for relining masons due in morning.

Went [into] town bought them all I thought they could eat. A box of Bromo Quinine & went to saloon bought a ½ pint of whiskey & took it down to them. {S19} Showed them how to cook the steak on a shovel over tunnel head & warm can of soup. Told them to give the old man the [quinine] & liquor & left. Next morning at 8:00 they all appeared at office wanted to scrub floor, wash windows or anything to pay for there lodging which was out.

Then the old gentleman told me how good he felt, that he and his grandson were trying to get to Syracuse to his daughter's. Said "You may not believe me, as I don't look like much, by I am a first class chemist. Will you hear my story and do some thing I tell you ? If so it will pay you 100 times for your kindness." I said OK.

He asked when we were going to start work on the furnace repair. I told him at once. "Do you use fire clay ?" I said yes. "Harbison Walker ?" Yes and I knew then he was no fake. "Would you trust an old man do what I say ?" I told him depending on what it was. He told me you have on your clay bin far better clay for your relining than Harbison Walker can give you & if you will do as I say you will get 6 to 8 months longer run in your furnace I guarantee.

Asked him how. He required a large tank or kettle to heat water, some cattle salt & a fireplace. We talked it over. I sent for the mason explained it to him & [he] said he was convinced & we went down to [the] furnace. {S20}

We had a cast iron water trough used for horses so had foreman lay up bricks and set kettle on. the old man told them [to] fill it up with water & put a good fire under it . Asked for me to get

In every run of slag there were pieces of iron from say ½ of lb to 5 lbs. We used to pay sons of our employees ½¢ per lb to pick this iron out of the slag after it was dumped on the slag bank, and about 4 times per year the teams would pick up the shot iron as it was called weigh it and take it to the top houses of each furnace. If and when the furnace went bad this iron thrown in with each charge in the furnace would greatly help in bringing it back to normal.

Blowing equipment

The original type of blowing works at these furnaces was same as originally installed from the start of hot blast operation in 1835. They consisted of two wooden cylinders of matched tongue & grooved pine, looking for all the world like two water tanks. They sat on raised frames about 14' above the floor. The diameter & depth of the cylinders varied at each plant. The power originally was water. Later steam was used as an auxiliary. The mechanical make up was: The base &top of each blower was cast iron. In the top of each cylinder was 14" square hole on inside was attached a White Oak piece of leather 16 to 18" square balanced with a weight to assist in easily opening & closing for intake or expulsion.
{S22}
The piston head was of soft wood about 6" thick. All round the edge was a layer of White Oak leather. this protected the cylinder walls and piston heads, but when the leather would dry out the blower would make a noise with each stroke like a scream that would be heard two miles. A mixture of sour cream & Sun Ray stove polish would have to be put on each cylinder to soften the leather & stop the terrible noise. This would do for six months or more.

When the slag was drawn off as it spread out on the casting house floor the men would take a hose and by wetting the slag while hot it broke up in small pieces which made it easy to load into the dump wagons .By the same token if we knew of mineral wool and its uses we could have produced it in vast amounts & very cheaply. But as we sold the slag banks accumulated in 150 years for $50000 not having to touch it that was best.

In 1914 a man named McKenzie came up from near Pittsburgh and said he was sure we could develop a method of making beautiful tile from the slag. His idea seemed good, so he and I went at it. First in order to make clear his plan was as the slag cooled it developed on the surface a hard & finished surface as though it were polished. The slags varied in colors: white, gray, buff, brown, light & dark green & blues also blacks but very little black. By the color and texture of the slag as each run was made we knew exactly how the furnace was working as well as the grade of iron the next run or bed of iron would be. We really ran the furnace from the appearance fo the slag & disclosures in tuyeres. This man and I put up sand molds & made beautiful hex tile, but we went haywire. The top we had, but foolishly we kept trying to get the same result on the bottom & couldn't. So gave up. If we had [only] had sense enough to realize the unfinished rough bottom was needed to make a good bond.
{S23}
By the color of the slag if we knew what iron we wanted for shipment all that was necessary was to increase the burden or lighten it to achieve the desired results. It was also possible to tell what was going on by the color of the smoke coming from top house vent stack, but this was neither accurate enough nor too dependable.

When the Company stopped all local charcoal burning operations & closed the coal banks along the railroad where cars were loaded we had about 40 small Company owned charcoal

cars used only for this service between the banks & the furnaces's.

Pit charcoal has much greater [tensile] strength than mineral coal therefore it could carry more burden in furnace but the difference was more than made up in price. Incidently a bushed of charcoal weight 20 lbs. On a charge for the furnace using 100 lbs the coal necessary to make it cost $4.00. the weight and number of charges per day depended entirely on what kind of iron you were making, ie. soft iron meant lighter & more numerous charges. High chill iron heavier and fewer charges. Of course changes in pressure varied too. In order to preheat the air for the blast, gas was taken off the furnace near the top and piped down to the heating ovens where it burned fiercely heating the large [cat iron] oven pipes & the air passing thru to the tuyeres into the furnace.

For a long time after the chem plant started the Co. employed a civil engineer to survey our woodlands owned & those bought. Finally after the Genl Manager Durrett came he set this man making a design for filling the furnace by the bell & hopper method ie. equal distribution of coarse and fine ore. Looking his work over one day told him he was wasting his time s it couldn't work. He told Durrett who was mad and & hopped me. {S24} I was mad too, so told Durrett in plain language he didn't either know furnace or chem plant business & proved it to him so he admitted it, but [he] was going ahead with this anyway. Finally one day he asked me why this bell hopper arrangement wouldn't work. So told him to go down to casting house & study the furnace sit up an hour then stay there thru one draw. If he couldn't figure it out I would explain it to him. He did but was unable to see anything so came back. We took a walk up the river and I showed him the reason which he readily knew was right so when we came back he had Mac destroy his drawings. I told him they pay you $6000. per year for your service. If they ever hear of this you won't last a week and don't forget Mr. B. & Mr. Richardson have been furnace men [for] years & years & it would take a man 10 times as smart as either he or I to lead them into such a thing. So that ended that.

Slag Jewelry

One of New York's famous jewelers came up one day with Mr. J. C. Alley of Alley & Paige ore brokers. and when he saw the slag with its beautiful variegated colors he was like a school boy. He picked up a bushel bag of various colors taking them back to NY. [There] he went to work cutting, forming & polishing it making up 6 gorgeous stick pins. One for himself, 1 for his son, 1 for Mr. Alley & 1 for his son + two for me: a beautiful green one & the other a robins egg blue. One was stolen from me. The blue one I gave my son-in-law. These 6 were the only ones ever made. We called them the iron industries birth stones and truly they were.
{S25}
At Lime Rock the company operated a blast furnace, a grist mill, a car wheel foundry, a general foundry & machine shop. The Supt was Mr. Chas Weisinge. He was rated as the best man in the country on bar chills and shrinkage tests. The car wheel foundry worked steadily & utterly on car wheels for the New Haven RR as we made all their wheels. Each wheel guaranteed free from defects for five years or replace any bad wheel free. The replacements never amounted to enough to say so. The wheels outlasted the equipment. Griffin Car Wheel

Co. never produced a wheel to compare with ours & can't do it now.

It might interest some people to know what firms bought our iron so from memory will try to list all I can as follows:

1. American Locomotive Co.	Three separate plants
2. Baldwin [Locomotive Co.]	
3. Bethlehem Steel Co.	
4. American Steel & Wire Co.	Worcester Mass.
5. Washburn Wire Co.	Pawtucket RI.
6. US Navy Yards	Kittery, Portsmouth etc.
7. Am[erican] Chain Co.	[Bridgeport] Ct.
8. Pratt & Cady	[Hartford Ct.]
9. Collins Co.	Collinsville Ct.
10. Sessions Co.	Bristol Ct.
11. Farrell Foundry	Waterbury, Naugatuck , Birmingham
12. Turner & Seymour	Torrington Ct.
13. Smith Bros	Westfield Mass..
14. E D Jones Co.	
15 Griffin Car Wheel Co	Chelsea & Troy.
16 American Brake Shoe Foundry Co	Ramapo NY.
17. Philbrick & Booth	[Hartford] Ct.
18 Norwich Foundry	Norwich Ct.
19. Cumbria Steel	
20. Chilled Rolled Foundry Co	Vandegrift Pa..
21. Birdsboro Steel Foundry Mach. Co.	Birdsboro Pa.
22. Wm Cramp & Sons	Baltimore.
23. US Shipping Board	Wash. DC.
24. Jones & Loughlin Steel. Co	Penn..
25. C. M. & St. Paul RR	Milwaukee Wis.
26. Mexican Government	Monterey Mexico

27. A firm in Brazil This iron (10 carloads) invariaby [t] on the steamer 'Condor' of Grace Line

28. Railway Steel Spring Co.	Hudson NY.
29. Stanley Works	New Britain & Bridgeport
30. Bullard Machine Tool	[Bridgeport]
31. Hendy Co.	Torrington Ct.
32. Yale & Town	Stamford [Ct.]
33. Penna. RR Co.	Altoona Pa.

[Numbers 34 and 35 not used.]

36. A firm in central states where I can't remember but it routed NH, L&H, CNJ RR, BO, CV, to either So. Ohio or Ky.
37. Thomas Edison occasionally got a carload of #4½ & 5.
38. I think Pressed Steel Car Co.
39. A Canadian firm, name not available
40. GE Co. also a C. I. pipe Mfr & many smaller foundries located all over. They used Salisbury Iron in mixture to strengthen their iron & could use more scrap.

Our Mines

Amenia Mine at Amenia N. Y. produced about 2 to 4 cars per week of ore. This ore was different in texture, structure and melting. It was used in our mixture from 1/8 to 1/3. It was almost a must to have a good inventory of it, as if a furnace started to go bad, by increasing the content of Amenia it was easy to overcome the difficulty & get back to normal. Its physical properties in the iron when produced were the same as Ore Hill.

Ore Hill mine, at Ore Hill was the only mine in Ct. operating where formerly we used ore from the Chatfield Ore Bed now Deep Lake Farm and Davis Ore Bed in Salisbury. At Ore Hill the power plant was steam, for the mine pumps, hoist or skip, crusher, washer and drills. Not one piece of modern up to date equipment. The drills for instance were solid steel shank drills. The drills heavy cumbersome old fashioned steam drills & had to have bipods as a man couldn't handle it alone. Mr Perkins would not change anything so as long as he remained except for the trick worked on ore cars every thing would stay as is. Ore Hill Mine was 856' deep at its lowest point.

It was clearly apparent that the ore costs were too high and as a result of years of working the mine had to be closed in the not [too] distant future. The Co. was anxious to secure if possible the Maltby mine which was operated for 4 or 5 years by a Pa. concern called Thomas Iron Co. they did much development and mined ore much cheaper using modern equipment. The Co. sent the writer to NY to try to get a price on the Maltby estate. There were two old sisters living on Madison Ave. They advised they didn't care to sell as they had all the money they needed and that the property was there, no bother and if they sold it that it would just mean worrying till the money was invested & then worrying about the investment. {S28} Finally explaining that the Co. wanted it at any price they would consider they set a price of $75,000. This I knew the Co. wouldn't pay & they didn't. So we opened the Weed Mine at Boston Corners NY. which to me seemed an error as there were 2 better located mines each with a breast (developed) of over 75' of solid ore that could quickly be made ready & operated with not half the water trouble & plenty of manganese, also low sulphur.

[However] we finally started shipments, slow it is true, but opening a new bed is not easy. The rim rock was too high in sulphur so that we could use very little in our mixture. This ran in 6 months when it began to improve as we got to body ore. there we hit good grade & enough manganese to kill the sulphur. Also production markedly improved. The costs were not too bad.

All our mine timbering was done with white oak & the best. Incidently Ore Hill mines lowest point is 854' below the surface.

For the record, a mine was opened and operated down near Dover by Mr. Wm. Metes jr the ore being used at Copake Furnace. this was the most efficiently operated and low cost mine ever operated in the area.
Trouble over royalty on ore paid with owner I understand caused friction that ended in closing it.

Other mines of good ore Sharon [Station], Morgan [and] Kelly.

Knights of the road

As a result of allowing the first group of unfortunates to stay in the furnace at E. Canaan, no one was ever turned away after that on winter nights. All the Knights of the Road knew the story and [many] of them plus many good men benefitted as a result. Finally one morning four men came to office at E. Canaan. Their spokesman, a big 6' Scotchman asked if we ever needed carpenter, bricklayers, laborers, moulders, helpers etc. Upon being informed at times we needed them badly he said any time in the future you do just tell the first hobo you see what you want. Ask him to pass the word and in 3 or 4 days you will have plenty, and they will be the best.

Not long after this a firm loaded with War orders begged us to take on some special work for them. Our men in our foundries were all trained to a regular line for work and the Co. was afraid to try it as the patterns showed the castings were complicated. At last they decided to try & Mr. B. asked me if I would see if I could learn of any moulders being available in Pittsfield, Torrington or [Hartford]. I saw a hobo that afternoon, told him the story & asked him if he would do it. He eagerly agreed and 4 days later the [first] one showed up.

He came into town from Amenia way and certainly was a sight. Wearing a brown derby, a large pair of spectacles, and old long coachman's overcoat green with age & gaiters. CW saw him coming & calling Milo Richardson, Weising & I said "My Lord, what is this coming ?" The man came straight to the office, walked in , took off the derby saying "Who do I see to go to work ?" CW asked what he could do. "I'm a first class moulder." "Okay" CW said, "Go over to the wheel shop & ask for Sid Vosburgh." Out he went {S30} and in less than an hour he had the respect of every one in the shop. He was good and knew more tricks and shortcuts than [anyone] could imagine. when Mr. B. found this out, he arranged for board & room for him at the Rocky Dell Hotel and he was set. In a weeks' time they had to stop the hiring, this they didn't know how to do .ie. stop men from coming. I never let on how they came, but told them I would stop it so next one showed up told him to pass the word we were OK.

From then on, we never lacked moulders & good ones. These men were, bums, hobo's and unfortunates [travelers] going from place to place [foundry] to [foundry] large or small learning every trick in the trade. When they came with us, in a few days there would be some one man in our regular force he liked and would show him to do his work quicker, better or easier, and when he left the Company was the one that gained for within a year we wouldn't hesitate to take the job of putting up any kind of casting.

So many stayed only a week to 10 days Mr. B. kicked on it. He didn't want any more hired said they were a nuisance, but when it was pointed out to him how our work had improved & our men thru these men's experience, our position now and then he said "Let them come." We can compete with anyone in the foundry game now and when he learned how it came about I never saw a man so pleased.
{S31}
The Chemical Plant

the plant was all in [one] building build in form of letter L. The main part in basement held the

brick bases and firing boxes for the steel retorts.

The first floor held 6 retorts to which were attached 12 condensers. [Two] tubular boilers generating steam for the stills, a settling tank into which all raw liquor ran from the condensers. When the liquor was settled all tar came to top. This was pumped up to the tar still & all alcohol and acetic acid taken off. The tar was returned to the boilers for fuel. On second floor 6 evaporating pans sat on top of the retorts. Into them from acetic acid still came the acid to be mixed with high calcium lime to be evaporated & bagged for shipment. In room on the east end were the primary & secondary stills and alcohol still & column.

Just outside the plant on east side were 12 steel coolers. This was discharge side. Standard gauge rail tracks extended from loading siding on west side in & thru retorts & coolers, hooking up with sidings an [east] side. On east side of the plant was a large storage tank 25,000 gallons [capacity] for wood alcohol which was loaded into tank cars. On south side of plant was rail track on trestle up which small cars of charcoal were taken to be dumped into the large cars to take the coal to furnaces. The small cars were taken up by a steam hoist.

When plant was in full operation, every morning the retorts were emptied into #1 coolers & wood cars at same time hauled into retorts & doors closed hermetically sealing them. The coal in first cooler was at same time hauled thru into #2 coolers, [cool] charcoal taken outside for loading to furnace.
{S32}
The large charcoal cars when loaded were taken to RR track scales, weighed & placed so we knew each day total [bushels] of coal produced. Another siding ran into & thru plant for cars of coal to burn under retorts & box cars were spotted on it for loading acetate.

The charging & loading of retorts, drawing of coolers took about 5 minutes as the minute the retort doors were opened coupling made between wood cars & retort cars & coal cars in coolers the whole string quickly pulled into position so there was no time to lose to avoid a fire which broke out immediately [when] the retort doors were opened, this was extinguished when #1 cooler doors were closed and another days run was in progress.

Mixed hardwoods of this area yielded as follows

Per cord of 128’
- 11 gals alcohol
- 43 bu charcoal
- 235 lbs acetate of lime

60 cds; 660 gals alc, 2500 bu c coal, 14000 lbs acetate daily

Alcohol at $1.00 gal	$16.50
Charcoal [at] 25¢ bu	10.75
Acetate [at] .07¢ lb	16.40
Total/cord	$43.65

60 cords brought $2619.00

Had Mr. Bussman's advice been followed this plant would more than paid for itself in 9 months.

From the 43.65 take 15.50 which covered price of wood, insurance, fuel for retorts & administrative acct's & payrolls a profit of $28.00 per cd per day or $1680.00
{S33}
$1680. in 300 days would have admitted of a dividend.

About Jan 1918 I saw no hope of stopping the monkey business which if continued could only bring bankruptcy and said so, resigning & gave them 16 months to live. Joined the army & that is it. I have given as much of the picture as possible. Although much more could be said of the approaching demise of one of America's oldest, proudest industries in operation 1734 to 1922. It could & should be running now. In 1918 while I was recovering from illness, the BR Co. was placed in hands of a receiver.

The projected blast furnace which construction was started & never finished

It was located 300 feet west of chem plant, was to be a 100 ton job but never operated. The man who claimed to have designed it obtained blue prints of the Charcoal Iron Co. of ? in Mich. with oven design and those of another furnace. He tried to take the two and from them he expected to come up with a design he called his own. He was caught, the Company sued for 1/4 a million for infringement of patent immediately a similar suit was started by a Canadian firm of like amount. This was the beginning of the end which came in 1922 when BR Co. was auctioned off [piecemeal] by bankruptcy auction. All plants sold for junk, all property sold for a song & chem plant sold as is, torn down & moved to W. Va.
{S34}
I might add as it would have been easy to make high silicon iron tried to have the Co. allow #3 furnace to be used to make it. They wouldn't regardless of the fact the price of high silicon warranted it. They had all the business they wanted so that was that.

It wasn't possible to have them mine & ship manganese from Ore Hill which we could produce it in quantity with a high content.

Our #2 iron for instance, a soft iron, ran about 2.50 to 3.00 manganese.

phos	.22 to .24
sulphur	.02 to .05

#4

mang	.68 to .80
sulph	.02 to .05
p	.22

The last firm to buy Salisbury Iron & use it was Farrell Foundry & Machine Co. of Waterbury Ct. they at beginning of [WWII] agreed to take 75 tons of salamanders i.e. large pieces breakable of high #3.

It was to be broken there & approximate analysis given of each piece as broken. If any piece didn't stand up to figures given it was theirs free. This iron was picked up by Mulville & Sons

for me with steam shovel & their trucks delivered it in 1941. So it can be said Salisbury Iron never failed the Country in time of war although it no longer is made.
{S35}
At Lime Rock office were Mr CW Barnum, his son Richard, Milo B. Richardson jr, Samuel Bradley, Treasurer, Chas. Weising Fdry Sup't, Hugh Cummings Accountant and Newman Athol who assisted Mr. Weising. Mr Amundson was Fdry Foreman in [charge] of machine shop.

All iron, scrap or otherwise was brought to Lime Rock by teams in fact everything in or out moved that way & it was a big handicap. There were no trucks (automobiles) in those days.

After the Co. ceased to exist Mr. CW Barnum's house in Lime Rock was destroyed by fire & he moved to the hotel Bishop in New Haven where he died really of a broken heart. His brother Wm. M soon followed & then his son Richard. There are only 2 left: Walter of Old Lyme Conn. [and] William of New York. Mr. Wm. Barnum's sons Mr. Webb & Milo Richardson are gone as is Chas Perkins & his father of Lakeville and Mr. Eaton of Amenia a clean sweep. The mines filled with water & all buildings torn down & only the main office building stands opposite the old Rocky Dell Hotel now Lime Rock Lodge remains.

Many a Yale student remembers the Rocky Dell, its dinners [and] pie baked & cooked by the famous Mrs. Winterbottom.
{S36}
Strange as it is firms are organized to drain tremendous areas in other countries , build hundreds of miles of RR to sea to transport ore, load it in ships, transport it 1000 miles to be unloaded and reloaded in cars for transport to Penn. furnaces.

This is especially true, when, here in the Harlem Valley of NY are millions of tons of high grade ores rich in manganese [and] hematite. Ore enough for all we need for 100 years. This ore contacts excellent dolomite lime stone for flux. A furnace say at Amenia or Sharon or Millerton [could be] set adjacent to mine. The ore could be produced, crushed, washed & carried directly into furnace without a stop, no transportation problem. All the flux needed would be hauled in by truck everything in one's hands to do with and to make it possible to produce the best of pig iron. No one wants it. Why ? All surplus ore tonnage could be sold in Pa. or Troy or Boston or Bridgeport. In theory the greater tonnage produced lower[s] the costs and at same time give[s] RR a load west for [empty] coal cars.

Shortly after I took on Mr Fuller's duties, Mr C W Barnum came up and we went over every inch of ground & all thru the both furnaces. As business was slow and we were each week adding to the considerable amount in the yard it was not a sight to cause one to get excited. Finally we returned to the office. Mr. Barnum sat for some time looking down toward the furnace when suddenly he asked "Bill, how much time is needed to get #1 ready to run ?" Told him 3 to 4 days to complete filling the furnace so it was ready to run, finish setting & connecting water jacket etc.

[At this point in the notebook, Mr. Wallace started to repeat page numbers. The most likely explanation is that he mistook the 3 on page 36 for a 2. In any case the actual page 37 is labeled 27 and the numbers repeat until 37 is reached for a second time. Source page tags from now on will not agree with page numbers in the notebook, but give the correct image file

number for the original source.]
{S-37}

Managing hard times

“All right, Bill, start her Monday morning without fail.” This was 1913. I couldn’t believe what I heard, said “Mr. B we are not shipping over 2/3 of our production from #3, how can we afford to run #1 ?”
“Well I’ll explain it. You see, Bill, in good times and in spite of higher wages outside our men [stayed] with us and the Lord knows we needed them. Now we have all over the country plants close[d], all work stagnated, many, many men unemployed and a desperate outlook to most people. Our #1 crew are not working they of course know they won’t be dispossessed and don’t have to worry about rents, but they need money and they look for us to stand by them. Now, this can’t last much longer i.e. the depression, as they stood by us we will stand by them. I will borrow 20000 if necessary to do it & pile every inch of space with iron till the break comes. Then will be a rush of orders [and] we will be ready to fill them. Prices will jump & every one happy. You’ll see I’m right and I’m right.”

Calling the men for #1 Saturday I told them just what he told me. The effect was beyond my ability to describe. I never saw so much happiness expressed, nor so much of a will to work. Several remarked it's the best Company in America to work for. There was in the air after the furnace was started something of expectancy. The thing itself was disclosed 10 days later. the crew wasn’t full as usual, but the way the men pulled together we didn’t need any more so we didn’t hire any. The men no longer worried. Explaining the results to them made it clear that the less men we had to hire, the more work for them and they knew it.
{S-38}
Clay from Stevens farm
Sand [from Stevens farm] & [illegible] lot.

It is to be known that there were in all 3 furnaces not just 2 as most think. The furnace no on knows of here now was located just south of the lower eng. room & grist mill on E side of road. Across the road was located old office & 5 coal sheds. All traces of #2 furnace have disappeared built [about] 1790 it was stopped in 1820’s. at [site] of this old furnace is where after the flood in [1955] I found the only pig of cold blast iron ever found or seen by any one since 1835. Whether to give it to Society of Cincinnatti for Wash. headquarters or for Anderson House in Wash DC I haven’t decided.

[Mr Wallace’s story about the first East Canaan blast furnace is not very accurate. Modern research indicates that this furnace was constructed in 1832 by Samuel Forbes Adam, grandson of Samuel Forbes who died in 1828. This furnace was demolished in 1899 as it was deemed impractical to upgrade it. Old newspaper stories indicate that at the time of demolition it had not been used for “some years”. Other stories indicate that it was used on and off until the 1880’s or so as a backup to the other two furnaces. The exact date it was last used has not been uncovered as of the date this document was prepared.
The fate of the cold blast pig is also unknown.]

Other employees
Batista Carmello

Albert Hyde	
John Garrity	Blacksmith
Angelo Pigga	
David Roger	Foreman

{S39}
Mason for lining furnace J. Viola, GB Mass.

Employees at #1 - 3 & yard

1.) Henry Bagnaschi	Furnace foreman
2.) Andrew Simoni	Coal forker
3.) J. O'Reilly	Engineer
4.) Ned Beebe	
5.) B.Cantedore	Ore man
6.) Chas. Cantoreggi	Foreman
7.) Louie Carmello	Filler
8.) Battista Carmello	Laborer
9.) H. Schermerhorn	Carpenter
10.) I Wheeler	Blacksmith
11.) John Zucco	Slag handler
12.) M. Casey	Laborer
13.) Enrico Bagnaschi	Fireman
14.) Pete Bonfanti	Filler
15.) Frank Bonfanti	Filler
16.) Geo Smith	Teamster
17.) Fred Perdrizet	Fireman
18.) Geo Wilson	Teamster
19.) James Wilson	Weighmaster
20.) Father Wilson	Laborer
21.) N. Pedrolino	Coal forker
22.) C. Bianchi	Breaker
23.) F. Rossigo jr.	Ore handler
24.) Ed Wilson	Teamster
25.) A. Prusetta	Ore
26.) A. Pizza	Coal
27.) M. Spadaccini	Fireman
28.) J. McCormick	Foreman
29.) J. Colligan	Foreman
30.) J. Mussolini	Filler
31.) [A.} Battachi	Filler
32.) Andrew Zucco	Filler
33.) Angelo Prusetta	Laborer
34.) Enrico Brazzi	Fireman
35.) Frank Rasiega Sr.	Coal forker
36.) Le Roy Lamb	Watchman
37.) Tim Sweeney	Carpenter
38.) E. Rasiega	

{S40}
Every morning at 6, noon and 6pm the whistle of the furnace reminded people of the town to set their clocks. No one ever thought to see these days.

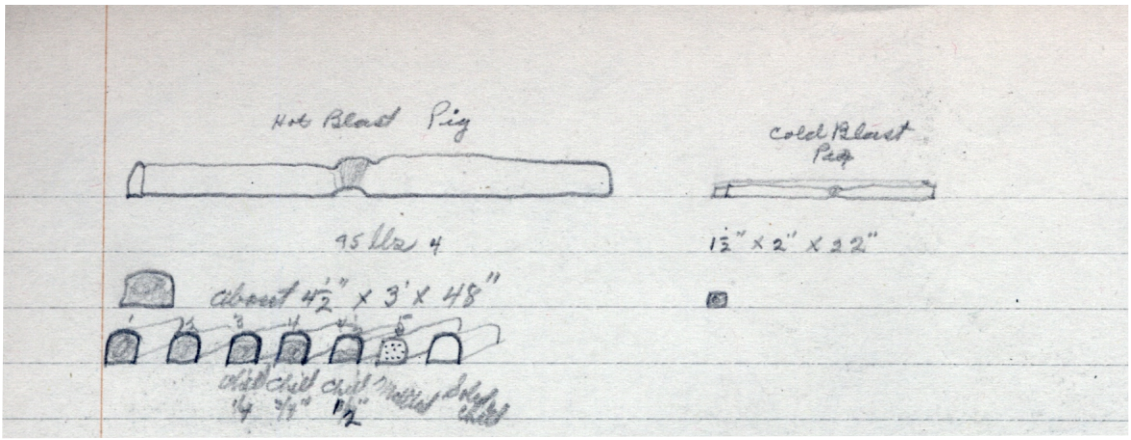
People of Canaan never evidenced the slightest interest in the furnaces, totally ignoring the historical importance of it and many had never seen the iron poured or been near them. The town fathers never spoke of the Barnums or Richardsons. In the summer month nights the wealthy Norfolk residents and hotel guests used to drive down to see the iron poured at 11pm. It was a wonderful sight, one never to be forgotten. The red hot molten slag running like water, sparks shooting all around them, huge clouds of steam as water was turned on to break it up. The stream of molten iron running down into the pig bed making a pattern of red like a grill in the sand, finally the cutting off of air pressure & stopping [plugging] the notch & it was over.

The Holley family of Lakeville who's horn has been tooted so long & loudly were never anything of importance in the Colonial or later times of furnace operation or mining. Many beside those mentioned here should have appeared [in] past writings but were left out and they had plenty to recommend them to a place in history too. It's a shame.

Hazeltine - Forbes - Ethan Allen, B Arnold, Miles, Linvingston, Scovilles, Barnums, Richardsons, Maltbys, Colt, Woods, Kniffins, VanDeusens, Lamb, Whittleseys, Bradley

[Six pages of figures appeared in the original source at this location. Those figures have been removed to the appendix along with 3 other drawings of the Beckley site.]

{S46}



On east side of river below site of #2 furnace was located a forge and rod & slitting mill. Also here were made ship anchors and some bar & chains.

During [Revolutionary] war all cannon cast at Lakeville were cast solid & had to be bored out. Iron was taken to Colebrook Ct. were a small plant was for making steel. Here it was made into steel brought back to Lakeville, made into drills for boring the cannon. This big drill ran by water power. As the boring was never true, it required each gun to be tested by firing to determine how much the gun was off before shipping to New London by teams.

The cannon on battleship “Constitution” are all made from [Salisbury] iron. Never once did a gun made of Salisbury [iron] crack, break or explode from [Revolutionary] War to end of Civil War. Some record.

{S48}

The Payroll Robbery

There was an incident never before publicly revealed until now. I presume known only to two people, Mr. Phelps Hurlburt Nat’l Bank of Winsted and myself. The payroll robbery of Barnum Richardson Co’s payroll.

It occurred as follows: Mr. Geo. W. Cowdrey Sr., Office Manager for the BR Co. took the train to Winsted with his satchel to carry the money in on his return, called at bank delivered checks & received the money.

The train arrived on which he was to return to East Canaan. Mr. Cowdrey climbed aboard. Just as he was about to enter the coach he was held up at gunpoint, the satchel taken, his diamond ring & stick pin. He was ordered off the train into the station. He had no alternative.

Mr. Cowdrey immediately returned to the bank reporting what had happened, gave his personal check & received payroll money again which he delivered safely. Before going he had bank promise to keep the incident confidential & that they would also have police give it no publicity. No one was ever apprehended & incident apparently closed. A secret until recently. However, a few years after the robbery an old house not too far from the RR station being demolished a small satchel entirely empty was found in an old toilet water box. It proved to be the one taken from Mr. Cowdrey. Not even BR Co. or his family ever heard of this.

{S49}

Sharon Village

A retired sea captain, Weed, settled in Sharon. He was a very religious man and shortly built a hot blast furnace beside the brook running westerly down into Sharon along road leading to Cornwall. This furnace did not operate very long as the owner would not allow it to operate on Sunday, but required the men to bank the furnace at 12 o’clock midnight on Saturday and it remained banked until 12 midnight Sunday. This is a terribly expensive move, one no furnace could continue long and live. The cost to do this would be around $1500. so it soon ended as a noble experiment. They say “The road to ruin is paved with good intentions.”

Sharon Valley furnace was a good operation & at one time BR Co. controlled its output of pig,

So. Canaan Furnace

South of the Hunts Lyman Co. furnace in Huntsville Ct. which was in charge of Samuel W. Bradley lived a farmer who had worked in the Ore Hill at one time. He found an ore on his farm he thought was good iron ore & tried to have Mr. Bradley & BR Co. to make a days run on it. At

last when it was decided to close down this plant Mr. Bradley told him to bring up his ore. He did, they ran it thru, the output looked for all the world like any other iron except much brighter, but the pigs could be broken into many pieces by one blow of a 2 ½ lb hammer. No one knew what it was, no one ever had to find out and perhaps never will. This is just as Mr Bradley related it, but he regretted they didn't have an analysis made as he felt it was manganese he said.

{S50}

Copake Furnace

This furnace property of Mr. Wm Miles was equipped with a blower equipment designed and built entirely of cast iron in his foundry.

Cylinders were really something to see and piston head on the upstroke had only ½" clearance even slightly less as Will Miles showed me. He told me every designer he showed his drawings to said first it couldn't be cast in one piece and second couldn't operate safely with such small clearance, but both these facts or warnings were proven unfounded. They worked perfectly & noiselessly of which fact he was justly proud. It was a shame to destroy them.

Chatham: All pig iron cast in Chatham furnace was inscribed when cast: :Chatham Salisbury Iron".

In 1928 the writer called on Mr. T. Kennedy of Mystic Iron Works, (Everett Mass.) [at their] office in Boston to try to get a contract to supply Mystic Iron Works with their flux stone of which they used 65 to 70,000 tons annually. I asked for half their tonnage. Mr. Kennedy advised he couldn't give me ½, it was all or none. Showed him how much our flux was superior to any he could get anywhere else which he readily agreed was so, but under the set up with Old Colony Trust Co. who really contracted Rockland Rockport Lime Co. they had to buy from them. He gave me permission to go down & inspect the furnace which I did. While watching the furnace operation thru tuyeres the Sup't came, wanted to know who I was, what I thought I was doing & who gave me permission to come in there.

Told him who I was and asked him how he ran this furnace keeping it going in its present condition
{S51}
and that Mr. K. had told me to look the whole place over. He took off his hat and said you seem to know a furnace. Told him maybe and that I couldn't see why he didn't run into bad trouble with a furnace in such sticky shape. We talked of his problems for a long time and surely he had to be a sort of magician to succeed. After taking leave I again talked with Mr. Kennedy about the flux, our furnace operations at Canaan and the ores. He became very much interested and said late in May he was coming to Salisbury to stay 2 weeks at the White Hart Inn and wished me to meet him to go over the ore question with idea of opening a mine of which he asked me to act as Sup't for him. But attack of flux proving fatal it never took place, ending what would have meant much to the Harlem Valley & much more to Mystic Iron Works.

[The "attack flux" here probably refers to diseases like dysentery which cause dehydration as opposed to flux for the furnace. In Mr. Kennedy's case whatever the disease was proved

fatal.]

In Canaan #1 & #3 furnaces where the brick lining from hearth joined the bosh often the lining would deteriorate in operation allowing fire & gases from melting to get behind brickwork between it & walls. This defect which increased throughout blast till furnace was blown out created a sort of condensation of vapors when they passed thru the wall which being slightly cooler caused a condensation forming blocks or sheets of beautiful crystals variegated in colors white, yellow, purple, & green. This material was mostly zinc oxide coloring being affected by manganese or sulphur, but was beautiful & extremely hard.

[This marks the end of the numbered pages in the notebook. The text continues with a series of lettered pages, followed by a series of pages with no identification at all.

The Lettered Pages

{S-52A}
History and histories are 2 different things as anyone knows. Our greatest historians however make errors either of commission or omission. How or why only they could say. This is especially true with regards to New England historical facts of the [Revolutionary] period. The omission from the greater or more prominent accounts perhaps has not been noted at least lets hope so, as there were individuals just as important and who's work and endeavors with attendant results were just as viral to the effecting a successful conclusion of the terrible struggle of the Colonies against England as the more apparent efforts and results attained in the successful promotion of all Colonials either those in administrative capacity of the armed forces.

From the above I would point out the fact that nowhere in published history, as such, had anyone included the kind, source or quantity of ordnance production, its location as to manufacture, source of raw materials, transportation and uses, nor those [who were] charged with the responsibility for their successful results. Nor who or where the [meager] supply came from or was made.

Surely all are familiar with the names of John & Sam'l Adams, Calhoun, Alexander Hamilton, Washington, Knox, Lafayette, Rochambeau, Von Steuben, Schuyler, Allen, Arnold, John Paul Jones, Perry, Putnam etc. [But what about] Ancram NY and Sterling NJ or the work on mining, manufacturing of iron, the source of fuel, the products produced, the plants & equipment or the products or men such as Joshua Porter, Samuel Forbes, Elisha Forbes, John Hazeltine, Geo. Caldwell or Jacob Ogden or any of the civilians in executive, managerial or skilled capacity or the others who produced charcoal, ore or transported the results to various depots or the tremendous difficulties to be overcome. Upon these men depended the success or failure of Washington's efforts & those assisting him
{S-53B}
The work of these men all ties in with effort at Salisbury (Lakeville). From the Davis, Ore Hill,& Chatfield & Morgan iron ore mines came the ore smelted in the furnace at Lakeville & Ancram about 5 to 6 tons per day. At Lakeville also was a foundry, forge, pattern shop and water powered boring plant. This furnace in the Colony for making pig iron was built by John Hazeltine of Uxbridge Mass. Samuel and Elisha Forbes of Canaan Ct. and Ethan Allen of Cornwall. Ct. They in turn sold to Chas. Caldwell of Hartford Ct. and Geo Caldwell of Salisbury

who continued till Dec. [1776] when they transferred their holding to Richard Smith of Boston Mass. who had control of iron converting works at Colebrook where iron was converted to steel to be made into tools. This was an extremely remote location. Tools for boring cannon & other purposes were produced there also. Livingston furnace at Ancram was associated with 5 forges.

With opening of Revolution Richard Smith fled to England [He was a Tory] leaving this plant at Colebrook in charge of his clerk Jacob Ogden. This work burned 3/20/1781. Prior to this it was confiscated & taken over by Colony Gov. Trumbull as he did the Salisbury furnace etc. 1/9/1776 when he sent Col J. Elderkin to Lakeville to see how quickly the furnace could be blown in and any repairs needed. There was some work to be done. Gov Trumbull gave Col Elderkin £100 pounds to get it going so that he appointed Col Joshua Porter as manager in charge of all operations. He had as foremen or overseers Henchaw & Whiting. Charcoal for fuel was had from local pits operated in Cornwall,, Sharon, Sheffield Mass., Salisbury etc. The Master Colliers were Capt John Welch & Simon Strong. The pit colliers were local residents in these areas & indians.
{S-54C}
The foundry for casting cannon produced cannon of about 1 ton in weight (18 pounders) cannon & swivel guns also 12-9-6 pounders even 2 & 3 [pounders].

The boring house or mill using steel drills from Colebrook bored the cannon which were all cast solid. There was also a furnace, barns, a bridge house. The guns and shot cast went to shops, field pieces into forts & batteries from assembly points in [Hartford], New Haven Norwich, New London & Middletown.

All transportation by horse drawn vehicles, a long tortuous job, and hard, of up to 120 miles. Bad roads, mud, snow etc. caused much grief.

Other articles produced balls, grape shot, grenades, castings, forge hammers, [cast iron] tubs or tanks.

Stationed here were officers & 4 or five squads acting as guards also acting as patrols.

Col. Joshua Porter was a Yale graduate & a physician. The Salisbury, Ancram and Sterling furnaces one can see performed vital duties as did those engaged in mining, burning charcoal, the teamsters, foundry men, carpenters & furnace men. Contributing invaluable help & security to the successful work of the Armed Forces.

Think of it. Washington risked his all when he took over as Commander-in-chief. If captured, he would be tried for crimes against crown, shot or hanged, his estate confiscated, family dispossessed in other words lose his life & his all and be caller a traitor. All success depended a great deal on these 3 furnaces and their additional facilities. Of these 3 operations at most all three couldn’t produce over 6 to 7 tons per day of iron. Every pound as precious as life to him & his men and equally as important as the victories achieved.

From these furnaces came also some of the iron used to make up the chain across the Hudson. The data on behind the lines activity I believe is just as essential to students of history as anything else in order to clarify all phases of wartime activity there and establish its value,

its problems and give credit to those responsible.
{S-55D}
Only a single pig of cold blast iron of the kind & dimensions used in Revolutionary times has ever been found, the writer has it.

The pig is 1½" X 2" X 11" [and] weighs 11 pounds.

Pigs as we know them are much larger & weigh 96 to 98 lbs. today & have ever since the advent of the hot blast furnace.

In old days all work was by hand, no machinery, cranes, lifts etc. like now. So [the pigs] had to be small for handling in forges. Also cold blast iron is different than hot blast or cast iron i.e. it was more of a malleable iron.

The furnaces then were smaller, stacks lower, hearth & bosh lines likewise. The equipment for blast which was pulsating consisted of 2 leather bellows like oversized blacksmith bellows operated by water power with a wheel with offset shaft similar to sketch.

[The original document had a sketch here that was not clear enough to merit reproduction]

Air to hearth of furnace one bellows on exhaust the other on intake. This is too crude but hope it gives the general idea.

{S-56E}
In 1910 the writer came to Canaan or rather East Canaan at request of O. M. Laing Pres. of C.N.E. RR, thru G. W. Clark their Sup't to stay 30 days, so as to give them an opportunity to locate an Agent to take over when I would then return to Erie RR, who furloughed me at my request to accommodate Mr. Clark a great friend of my father. After I took over, it was quickly apparent why 22 men had come & gone from this position in 14 months.

The industries served in East Canaan at this time were as follows:

W. J. Davis Mill & yard	Whiting River	Lumber, timbers, poles, piling, ties Lumber
Hotchkiss Brothers Lime Co.	E. Cannan center	Lime, agrilime, flux
Canfield Brothers	E Canaan center	Lime, agrilime, flux
Barnum, Richardson Co.	Lower Road E. Cannaan	Pig iron
Connecticut Lime Co.	Upper rd E.Canaan	Lime
N. E. Lime Co.		
East Canaan Creamery		

Incoming Shipments by rail:
Cord wood, barrel staves, heads, hoops, charcoal, iron ore, fire bricks, soft coal anthracite

Carload outbound:
Pig iron, lime in bulk & in barrels, flux stone in bulk, RR ties, poles, piling, lumber

timber, hay, straw, apples

Retail Business served CL or LCL [carload or less than carload]

Moore & Roger	Groceries LCL
Stratton Bros.	"
M. Warner	"
Daly's Coal Yard	Anthracite coal

{S-57F}
The East Canaan stations yard limits were from Whiting River east to frog [track switch] for entrance to siding at Conn. Lime plant. There was an average of 80 cars loading, unloading & [empty] on hand every day. Quite an assignment for 2 men to handle. There was never a day which when finished it was possible to say all the work was done.

In later part of 1910 or early 1911 a new lime Co. came in to being on Homer Allyn farms. The Allyndale Lime & Marble Co. owners F. W. Barhoff - Maj. Goodrich of Hartford & others.
1911
the writer was offered the position of assistant to Mr. G. W. Cowdrey Jr, manager for Barnum Richardson Co. by Mr. G. W. Cowdrey to serve in the office as accountant, asst paymaster etc. also telegraph operator as there were 2 direct wires from Hartford there. It was also Western Union office.

In the fall of 1911 Mr. Cowdrey resigned & the company appointed me to his position.

At this time we operated 2 blast furnaces #1Forbes, #2 long since abandoned & fallen down, #3 Beckley furnace built in 1872. A grist mill, a saw mill with planer, jointer etc. for making all sorts of dress lumber. Two engine rooms. 2½ miles of RR siding, a set of RR track scales, blacksmith shop, car repair shop & long iron ore trestle with ore bins.

[Note that Wallace's nomenclature for the furnaces has changed again. In this section he identifies Beckley as #3. Beckley was built in 1847, not 1872 as was the actual #3. In other parts of his notes Wallace calls Beckley # 1 Forbes. The basic facts are correct, however, in 1910 Barnum Richardson had two furnaces in East Canaan. One was Beckley furnace located on the Blackberry river by Furnace Hill road, the other, furnace #3 located some distance from the river about a mile west of the first. A third furnace did once exist in East Canaan. It was built by Samuel Forbes Adam (Not Samuel Forbes) in 1832 and was demolished by Barnum Richardson in 1899.It is this furnace that Wallace calls #2. Contemporary research identifies the three furnaces as follows: Furnace #1 built 1832 by Samuel Forbes Adam, demolished 1899; furnace #2 built by John A. Beckley in 1847, still standing; furnace #3 built 1872 by Barnum Richardson Co.., demolished circa 1928.]

Water powered blowers at upper furnace #1 [Beckley] were located in the upper engine room. Water powered blowers for lower furnace were located in grist mill. At #1 was a low speed Corliss engine used as auxiliary when water was low. Steam being generated in marine boilers (2 tube) in boiler room attached to hot blast oven & heated by furnace gas as was blast. At lower furnace coal fired boilers operated blowers at low water periods.

There was an excellent fire protection system with hydrants at all advantageous points 4" line

with electric driven pumps at lower furnace & steam pump at #1.
{S-58G}
Also at #1 furnace were 7 charcoal storage sheds each of 90,000 bu capacity. At lower furnace adjacent to top house were 5 more, down the hill from top house on level of casting house were 8 more. Just around east end of these were 3 more all of same capacity & kept filled. So our inventory in storage was 2 million [bushels]. Quite a fair size.
In addition the company had 22 houses for employees which rented at $1.50 per week with garden, small barn & yard. Each family had pigs, cow, chickens etc. All were furnished fire wood free the year round & they could have all the charcoal for cooking they wanted free.
the stacks of both #1 & #3 furnace were about 35 - 45' high. Each furnace had 4 arches with tuyeres in 3 as front arch had none.

At #1 the oven for hot blast was in separate building at #3 attached to stack in top house. Air from blowers to oven moved thru 14" galvanized pipe the joints tarred & wound with bed ticking to prevent leaks. Pressure ran from 3/4 lb to 2½ lbs.

In use were 8 sheet iron ore carts 4 for each furnace and 70 charcoal carts (100 bu cap.) for charging furnaces divided about 20 for #1 and 50 for #3.

At #3 was the tremendous bank of slag of 50 years accumulation and #1 two large banks of 120 years accumulation. Some of this slag was beautiful, it was variegated in color. White , gray, buff, light green, dark green, blue, some black, some was porous & fluffy & would float on water, the rest being solid, hard to the point where it would cut glass. The weight per cu. ft. was 77 lbs.

All burning of charcoal locally in pits was abandoned in 1905, both here, Lime Rock and Richmond and the charcoal from then on came thru Manufacturer's Charcoal Co. {S-59H} of Bradford Pa. agents for over 75 chemical (destructive distillation) plants located at various points on Erie, NYC, NYO&W [and] D&H railroads. All our coke for [foundries] in Lime Rock came from Cornellsville Pa. but Lime Rock furnace charcoal came from the same source as ours.

We received our ore by rail from Ore Hill via CNE & from Amenia , NY via rail via NYC & CNE. Lime Rock ore was drawn by teams from Ore Hill. Amenia came to them NYC, CNE and NHRR.

The average length of a blast was 10 months when it would be necessary to blow out & repair hearth, bosh & sometimes barrel but mostly the complete lining was every 2nd run. Originally fire brick came from Albany & New Haven then it all came from Harbison Walker at their Penn plant with fire clay too. Benezet clay was the best.

Adjusted 1912 prior to this 75 men

A furnace crew at #1

2 Fillers & helpers	4	1 Blacksmith
4 Charcoal forkers	4	1 Carpenter
2 Engineers (boiler)	2	1 Watchman

2 Firemen	2	6 Teamsters
2 Helpers	2	4 Ore handlers unloading cars
		1 Weigh & yard man
At # 3		2 Foremen
		8 Laborers or bank men
2 Fillers & helpers	4	
5 Coal forkers	5	
2 Firemen	2	24
2 Helpers	2	
2 Engineers	2	
1 Iron breaker	1	
[Total	30	

[Mr. Wallace's numbers add up to 54, a substantial reduction from the 75 men cited earlier. He does not discuss how the 24/7 operation of the two furnaces affect this number. The numbers above suggest that it took a total of about 100 employees to keep things going. A few of the titles mentioned in the right hand column may not have been needed all the time (eg. carpenter) but most were. This is a substantial number of employees for East Canaan.]

{S-60I}The cost of making iron in 1910 was $32.40 per ton. [The] 1910 selling price $28.50, not good.

Poor supervision, to the point of carelessness.

1911: same till change

1912: Sup't Fuller & his brother both dismissed because of absence all thru big fire which for a time threatened everything. [September] 1912 I was appointed to Mr. Fuller's position and appointed 2 men foremen: McCormick and Colligan. Laid off some help not needed and took time to renew the whole set up.

Had advocated selling slag banks for some time, but everyone laughed. I secured buyers [in] New York who bought it all setting up crushing plant & storage bins. They moved it at rate of 24 cars per day & sale netted BR Co. $50,000 - which was anything but a laughing matter and for first time the slag was no longer waste but a profit.

1913 Costs down below $28.00 selling iron at $35.00. Better.

1914 Ever since 1905 all charcoal screening from cars unloaded which ran 100 or 150 [bushels] per car had been dumped on slag piles where it caught fire (spontaneous combustion) and burned. Through an arrangement with R. MacKellar's Sons Co. of Peekskill NY. we sold all we had as fast as it came for 6½ ¢ per [bushel]. The charcoal cost 4½ FOB Canaan so it no longer was a loss but a profit. We made a car load of screenings in less than 3 days having so many cars coming in steadily.

1914 The Company just after I took over made arrangements for me to study chemistry in Hartford. Upon completion of which they installed a completely equipped laboratory at E. Canaan. I did all their analytical work on ore, iron, coke, bronze, etc slag, etc. {S-61J} As a result it was a complete success.

From the beginning twice each year each furnace had to be banked a platform made down inside the furnace & it required 2 days to remove a substance which formed & attached itself to the furnace lining layer upon layer until if [not] removed would have sealed the furnace tight shut. This material, no one knew what it was, but no one ever saw anything to compare with it in weight. The teamsters trucking it away did not dare fully load their wagons as a full load would invariably break the axles, nor did we let it go over the bridge to the slag dump. It was all unloaded as drawn in one spot. Each removal netted 5 tons or 10 [tons] per year on each furnace - 20 tons.

Taking a specimen to the laboratory analysis proved it to be zinc oxide 95% pure. I sent sample to chemists to check my findings which they confirmed. Found a market for it in Phila. Pa. @ $100. per ton mineral content so we gave long tons to take care of 5% impurities. Instructed them to send all checks to Co. at Lime Rock. After 9 cars had gone, they sent check to East Canaan and Mr. Barnum came up that afternoon. When he was leaving [I] asked him to wait a minute & gave him the check to take to Mr. Bradley. He looked it over reader the legend on stub and laughed saying "Bill some one is nuts we have no zinc, don't make any & never will." I said "Look close." "Now I know some one's nuts, this [check] is for $20,000." "Sure" I

said, “Come here & read the correspondence.” He did and was completely stunned. “Bill,” he asked, “How much of this damned stuff is here ?” So told him I didn’t know but it had been thrown out since 1800 at rate of 10 tons per year. {S-62K} At that rate it will easily wipe out our bond issue so said “Sure, and there have been 2 or 3 cars since these that are not in this check. Guess that pays for my training in chemistry.” He said “It does, [and] your salary is increased $75.00 per month commencing Monday.”

[It is not clear why the zinc oxide had become an unknown substance. A newspaper article published in 1899 talked about East Canaan furnaces being down to remove zinc, so it was known. No mention was made of selling it at that time but it is hard to believe that they would just pile it up. It appears that somewhere along the way the knowledge of the zinc deposits was lost. It is also odd that Mr. Barnum did not know about it as one would expect that knowledge to have been passed on to him along with all the other information he had about his industry. Whatever the case, the rediscovery of the zinc certainly worked out to Mr. Wallace’s benefit.]

Almost the same procedure was gone thru when the check for the first 6 or 7 cars of charcoal screenings came which netted me $50. a month more so both Co. and I benefitted.

Now all our waste was profit, not a loss. In 1912 - 1913 hard times prevailed all over the US & men out of work, not bums, were coming in asking for a chance to work for 50¢ a day to get money to eat on. We had only one furnace running & had piled up a lot of iron. Mr B. looked down at #1 and asked “How soon can you start her ?” “Any time you say.” I answered. “Alright, start her up as quick as you can.” I asked him “How can we ? We are piling up iron now.” “Bill” he said, “When times were good & help scarce, our men stood with us, now times are bad, work scarce so we must stick with them. I’ll borrow $250,000. if necessary to pile up iron. Then when the turn comes we will be ready to fill all orders.”

So we eliminated all outside contract work for removing & dumping slag & did it with our own teams & men.

By selling the slag & zinc oxide, laying off surplus help, cutting out contract on slag, getting our pig bed sand from our own bank etc. we eventually reduced cost to $25.00 per ton with iron selling by 1915 at $45.00 When the turn came we employed every man & team we could get & loaded iron night & day. So Mr. Barnum’s idea was a honey.

Our furnace produced annually 12,000 tons. {S-63L} Our iron was originally sold by fracture, till we had the laboratory installed, as chemist it required too much of my time.

The grading was:

#1 - Very soft iron for excellent machining
strengthening of mixtures, no chill.

#2 - Slightly harder closer grain with
same strength & qualities. No chill.

#3 - Chill on it from 1/4 to 1/3 " deep. Excellent
for chilled rolls etc.

#4 - Chill on it ½ to 3/4 deep of tremendous
strength

#4½ - Chilled 2" to ½ of pig.

#5 - Solid chill & mottled

#6 - " " silvery iron

#5 and # 6 could not be bored, ground, filed or cut.

We had for steady customers who used all we could produce:

American Steel & Wire Co.	Worcester Mass.
American Locomotive Works	3 different plants
Baldwin " "	
American Chain	Bridgeport Ct.
Bethlehem Steel Co.	Bethlehem Pa.
American Brake Shoe Fdry Co.	Ramapo NY.
Birdsoro Steel Fdry & Mach Co.	Birdsboro Pa.
Bullard Mach Tool Co.	Bridgeport Ct.
Collins Co.	Collinsville Ct.
Cumbria Steel	Pa.
Chilled Roll Fdry Co.	Vandergrift Pa.
Cramp. Wm. & Son Co.	Phila Pa.
C. M. & St. P. Ry Co.	Milwaukee Wis.
Eastern Malleable Iron Works {S-64M}	Branford Ct.
Farrell Foundry & Mach Co.	Waterbury & Birmingham Ct.
GE Co.	Schenectady NY
Gzriffin Car Wheel Co.	Boston Mass.
Jones Co. .E D.	Pittsfield Mass.
Jones Laughlin Steel Co.	Pittsburgh Pa.
Artillery Fdry Mexican Govt.	Monterey Mexico

Norwich Fdry mfr of furnaces	Norwich Ct.
Pratt & Cady	Hartford Ct.
Philbrick & Booth	"
Penn RR Co.	Altoona Pa.
Sessions Foundry	Bristrol Ct.
Smith Co. H. B.	Westfield Mass.
Stanley Works	New Britain & B'port Ct.
Railway Steel Spring Co.	Hudson NY
Turner Seymour	Farmington Ct.
U. S. Shipping Board	Various
US Navy	Portsmouth, Kittery, Boston, Mare Island
Brazilian firm	10 cars per year by steamer "Condor" Grace Lines
Yale & Towne	Stratford Ct.
Pressed Steel Car	?
A Canadian firm (Com Car Fdry)	
Washburn Wire Co.	Pawtucket RI
A firm in Ohio I can't remember	
Thomas A. Edison (#5 was his spl.)	New Jersey
E. Lee Foundry	Lee Mass.
American Chain Co.	B'port Ct.

Any firm faced with a tough proposition would eventually land in our offices. We were a sort of Court of last resort.

I had now been promoted to Ass't Gen'l Manager. Surely BR Co. never had it so good. Plenty (too much) business, wonderful profits. Increased production & efficiency.
{S-65N}
We installed rotary blowers (high speed) at #3 which every one predicted wouldn't work, but they did perform perfectly and soon put them in at #1 with all the same predictions only more so [?] a large crack in stack which we had tried to close unsuccessfully two or three times till finally we packed it with asbestos feathers which did the trick. No. 1 responded far beyond our greatest hopes, production jumped from 17 tons steady to 22 tons then 24 tons where she held. The steady blast sure beat the pulsating blast, and everyone was happy. These blowers were made for us by B. F. Sturtevant Co. of Hyde Park Mass. They also made a set for Mr. Colt's furnace at Richmond Mass.

Operations of furnaces was not too tough for by careful check at tuyeres & watching slag the fireman & foreman knew at all times what was going on. This was really the control for the run. Soft fluffy slag for #1; hard whites, buff & gray #2; greens #3; #4 greens and blue; 4½ too - for 5 & 6 very dark especially when too hot which caused immediate changes in weight of charges i.e. light & increased number of [charges] for low iron, heavier and fewer for high chill iron. Mixtures of ore too had to be changed from time to time as necessary. A large tonnage of the Amenia was available at all times because in case of sticking or bad operations we increased Amenia as it smelted so easy & added shot iron which straightened her quick.

The charcoal carts used for filling the furnace had never been changed or improved since original was built. they were entirely of wood with a door or gate in rear hinged on top & latches on bottom. They held when filled 100 [bushels]. To completely empty them it was necessary to

bang the rear against tunnel head to get all {S-66O} coal out. This resulted in much damage to frames, gates etc. from the repeated banging loosening bolts etc. Also this extra time over the tremendous heat harmed the wood badly. There were always ½ dozen or more carts in car shop for repairs. Labor, bolts, fittings etc. was more expensive than ever anticipated when carefully checked. So we designed a cart using as sides corrugated galv. iron sheets, a galv. iron plate on bottom & galv. sheet for gate reinforced with angles. When finished it was quite a joke among the men but first time it was used proved its efficiency & worth. It dumped clean & no banging. Six months use with no repairs needed was proof enough of the economy of gradually rebuilding all carts.

At this time it was noticed we annually spent some 10 to $12,000 for tools, steel, iron etc. paying cash, so calling on our suppler asked him for at least 2 or 3% discount for cash which he refused. Contacting small supply houses asked them if they would be interested in a bid for our requirements for 6 months of tools, bars, rods, sheets, bolts, nails and other items. They all said yes so going thru [previous] years invoices which ran pretty uniform year after year prepared a list to cover next 12 months.

The successful bidder was lowest by $37.00 on 1 year's supply. This same list the previous year cost $12,000 - the total bid on same was not quite $5300. as we received discounts from list prices of 40 & 5 & 50 even 50% & 5%. The shipment came in a box car which was to be sent up to our plant without being opened but agent unloaded it all on platform, called firm who had previously supplied this & he spent ½ a day checking it with agent's permission then {S-67} called Lime Rock told Mr. Barnum what he thought of me & what he would do with a man like me, giving him list price total for the items. Mr. B. came up immediately. He was angry & puzzled but asked me about the unusually large bill & lot of goods. I showed him previous [amount] paid the retailer over $2000, gave him journal record of each purchase & all invoices asked him to compare the bid price with local dealers & totals. He spent an hour or more & ended by asking who the wholesalers representative was. Told him, and he said "Get them down to Lime Rock tomorrow. I'll have a nice order for them." The result was he took all the business the company did at Lime Rock, Ore Hill, Weed Mine & Amenia. The amount almost caused the salesman to faint. He came to see me on his way home to thank me & was so excited he couldn't sit or stand. So we saved another $6000 annually or 50¢ per ton nearly. {S-68}
Originally BR Co. operated Chatfield & Ore Hill together under one man. The Chatfield mine adjoined Ore Hill on what is now Deep Lake Farm. When the Sup't died the Company turned it over to John Perkins who was in charge of the Davis mine.

Davis mine was big but open pit. It had gotten very deep & costly to operate so it was closed down & Perkins had Ore Hill only as Chatfield was abandoned too. Ore Hill & Davis had plenty of manganese but Ore Hill ore gave more strength & better chill. During WWI we extracted from Ore Hill all manganese needed in foundry in Lime Rock. Sent some to Sessions & previously shipped some car lots to one of the firms in Penn, 600 tons. It was very rich, near 70%.

In Ore Hill we had yellow ochre strips. Red & white horse, so called, like flint & in places there was streaks of graphite.

The plant here & equipment consisted of boiler house, hoist house for skip, compressor room

& shop.

All drills were antique drills being solid shank steam driven hammers. This whole thing was crazy as the drills & hammers were heavy, cumbersome & hard to handle. Not good on footage & hurt production. A crusher house, washer & screens where impurities were removed, then ore ran directly into cars. The mine was 854' deep, had 3 levels. Some drifts were over 1/4 mile long. It was rapidly approaching abandonment which only the war staved off. All efforts to have Mr. Perkins abandon obsolete equipment & put in Ingersoll Rand hammers & hollow steel drills were refused {S-69} and no efforts of mine or Lime Rock could budge him, so that was that.
{S-70}
Salisbury Iron

#1 & 2 were called Low iron or foundry grade
3 & 4 - 4½ were called high grade iron for special purposes
5 & 6 were called solid chill iron for special purposes.

At the Paris Exposition in 1902 "Salisbury Iron" received the title of the "World's Best Iron" which gave it the blue ribbon & gold medal.

No other pig iron could or has yet equaled it in [tensile] strength per square inch.

Not other iron could or has equaled it for its uniformity & depth of chill.

It is purported to have a record in Government Ordnance in that no cannon made of Salisbury Iron ever exploded or proved to be defective.

The #5 & 6 iron could not be drilled, filed, ground or cut. It is a matter of record it out lasted & out performed in every way the best manganese steel by 16 years which could have been increased to indefinite time had it been further tested.

One great mistake the Company made was in not placing a premium price on their chill iron of at least $5.00 per ton. The consumers I have talked with admit that is so, as today several right now would pay almost any price to get it.
{S-71}
About 4 years ago, I went to see a friend Mr. Wm. Stouye who was retired and was residing in Litchfield. He formerly was a foundry Sup't for American Brake Shoe & Foundry Co. later in same capacity with Hendy Machine Co. of Torrington.

In course of our conversation he suddenly said "I am going to tell you a story, Bill, it's a true one of an experience I had while doing work for Thomas A. Edison."

"At the time this occurred I was in charge of foundry work for American Brake Shoe & Foundry Co. near where Mr. Edison had his laboratory etc. He was at the time experimenting with a new needle for phonographic records. It was about 1924.

Having tried different steels or needles made from them, he discarded steel as every test was dissatisfactory on account of the scratchy sound made by the needles. Next he had us make

up stock of Norway Iron. This too proved unsatisfactory. Mr. Edison came over and said ‘Bill make me up some stock of Salisbury Iron.’ I told him this was infeasible as we had none and the Barnum Richardson Co. manufacturer of it had gone out of business and there was no Salisbury Iron to be had. He said ‘Yes, there is, I have about 7 tons and will send 2 tons over. Make it up into needle stock as quick as you can.’

Next day we received the iron and in the mean time we had raised the bottom of one cupola to run off the small heat. We made up the stock and delivered it on a Saturday morning. I heard nothing further until about 2 am. Tuesday morning when the phone called me out of bed. It was Mr. Edison calling to say the needles made from Salisbury Iron were working perfectly. {S-72} ‘‘Now Bill,’ he said, ‘I am going to tell you something. If the time ever comes I can’t get Salisbury Iron to work with, that’s the day Thomas A. Edison can quit trying to do his kind of work because there are any number of imitations of Salisbury, but not one satisfactory substitute.’ And that’s some recommend.” I thanked him for this information and now pass it on to all.

End of Yellow Notebook

Part 2: The Brown Notebook

{S-1} Industrial History of US in 7 books, by Albert Bolles. Henry Hill Pub Co. Norwich CT. Illustrated 1978-

First iron mining in America was done in Va. by colonists of Jamestown. The stony ores of it were found in 1651. In [New England] it was at Saugus Mass, then the famous hematite ore of Ore Hill was discovered 1632, ore with 50 & 60% net iron content.

[The year 1632 is not correct for Ore Hill. That discovery was made in 1731.]

This ore was a life saver during the [revolution] and [was] the means of supporting the population of Conn in profitable industry for 195 years. The Salisbury Ore Hill mine [supplied] Barnum Richardson Co. with ore up to 1922.

New Jersey, Pa., N.C., Maryland and NY. were also mining ore 20 to 30 [years] prior to [the Revolution].

Historical interests of many people vary but grow steadily. Here in this area one may find historical surroundings with long deep roots of both metallurgical & historical not often found combining and including not only individuals but industries, manufacture & raw materials plus production. Colonial, Revolutionary, 1812 & 1861 all have their place in the picture even 1918 & 1941. Quite an accomplishment for BR Co. Until 1920 there was in full operation iron ore mines operated until this time from as early as 1720. Davis, Ore Hill, Chatfield. The main operation originally was Davis Mine (open pit) midway between the villages of Salisbury & Lakeville [opened] by Thos.Lamb. Ore HIll or Old Hill is about midway between Lakeville and Millerton. Maltby ore bed & furnace were just about 1 mile NE of Millerton NY. Chatfield is an extension of Ore Hill laying just SE of Ore Hill in what is now Deep Lake Farm. Weed mine [a completely new one] is located a few miles N of Millerton above Boston Corner lying between the NYC RR and CNE Ry. north of Boston Corners station. Amenia mine is located on edge of village of Amenia. Sharon mine located S of Millerton at Sharon {S-2}Station is another good bed.

The ore Hill mine at time of closing was 854' deep at lowest level and a new 3 stage pump with marine motor is still there. Drifts ran out nearly to center of Lakeville, out far under the lake and were so near ground level on W side of hill, Millerton side, One could stop his car and hear the blasting plainly & drills.

At Ore Hill the operation was preposterous in that it was all steam operated. Equipment antiquated & changes impossible to make as Mr. Perkins would resent all suggestions of improvements. The ore was brought up in skips, washed and crushed then screened to remove all impurities possible such as any red or yellow ochre, white or red horse (flint) or graphite etc. [It was] loaded directly on to cars from screens at rate of from 2 to 5 cars per day.

Ore for Lime Rock was hauled by teams. Mules were used in the mine to haul ore cars to skip. The mine was heavily overstaffed, but it was useless to point it out. Manganese was plentiful, so sulphur held no terror at furnaces. Before receivership came, Mr. Perkins was retired being superceded by a man unfamiliar with the situation or methods which should have been used.

They stripped the mine. The dirt & tailings from crushing & washing were carried in troughs from crusher across road (to S side of it) from office location.

When Weed mine was first opened the rim rock ore was heavily impregnated with sulphur necessitating its use in mixture at furnaces as to mixture having very careful watching with consequent small consumption until this was overcome. When body ore was hit, it was very {S-3}good.

Amenia ore was excellent and very easily smelted also it was different in structure and color making it easily apparent to the eye what ore it was.

Some times in our furnaces, as they were tricky at times, when trouble appeared, Amenia [ore] was to the trouble as a rule what cod liver oil is to kids. Very necessary and very reliable. Amenia mine shipped E Canaan usually 1 car in two days. There are now other ore mines partially of valuable & easy procurement such as Kelly & Reynolds, Morgan, Sharon and Copake. also in Conn on state border are 2 or 3 mines, good ones. These mines were closed years ago because of the excess of manganese, one mine being underlaid by a large bed of it, the thickness of which was never ascertained.

The Maltby mine, really an extension of Ore Hill mine is excellent ore. This mine after Maltby furnace closed was operated for a long period by the Thomas Iron Co., both as open pit & drifts. They shipped the ore to Penn. and mined it at very low cost.

The ores of the Harlem Valley start on So end with magnetics. The Lilley Foster mine which closed down not too long ago then N runs limonite, brown hematite to Cheshire where the ores become high [phosphorous] thence N toward Ticonderoga magnetic into Adirondacks.

If it were of any consequence, there are many more good pits which in times past produced a lot of good ore but listing them would be useless.
{S-4}
The Barnum Richardson Company, granddaddy of all furnace operators really went to town so to speak, with the advent of Wm Barnum under whose leadership they grew & developed by control & ownership until they were handling output of Sharon furnace, Amenia, Irondale, Lime Rock, Kent, Richmond, Cornwall Bridge, Hunstville, East Canaan, Van Deusenville, Richmond Mass, Chatham, & Copake NY. Many families in fact laid foundations to large fortunes in this industry.

The Miles Sr & Junior, the Livingstons of Ancram, Beckleys, Scovilles (founders of Scoville Manufacturing Co.), Forbes, Kniffins, Colts, Woods etc.

Wm. H. Barnum though was the genius responsible for many advantageous moves. He was a born leader with a faculty of being able to see 3 or 4 years ahead on a clear day. He broadened the scope of the Co's car wheel business into a major industry by establishing Salisbury Chilled Iron car wheel [foundry] in Chicago Ill, which supplied 180 wheels per day to many western RR's. He became pres. of Housatonic RR, a Congressman [then] US Senator and grew so enthused over politics he was instrumental in election of Grover Cleveland. His energy being completely spent on politics BR Co suffered. This was really the first sign of the worst to come. No more expansion, the patents so valuable the Co. controlled on chilled rolls

was allowed to lapse. Some furnaces discontinued etc.
{S-5}
After Lamb built his forge at Lime Rock and opened Davis Mine a real blast furnace was built in Lakeville and one by Livingston at Ancram where Livingston built 5 forges too. At Lakeville was the furnace, a trip hammer operated by water power, drill for boring [cannon], horse operated, a foundry, rod & slitting mill. All the steel drills for boring the [cannon] were made in Colebrook steel works originally started by the owner of Lakeville furnace, Richard Smith, a Tory.

Mt. Riga furnace was outgrowth of a forge there , then Seth King & John Kelsey commenced to build a furnace in 1806 but were unable to finish it so it was completed by Messrs Coffing & King in 1810 but this furnace in no way contributed to Revolutionary War as it wasn't in existence then.

There are furnace stacks in fairly good state of preservation at Roxbury CT, East Canaan CT, Dover Furnace NY, & Richmond Mass. All the rest have almost disappeared.

In 1910 when the writer went with BR Co. the executive heads were Milo B. Richardson Sr. [president], C. W. Barnum V.P., S. W. Bradley Treas., M. B. Richardson Jr. Sect'y R. W. Barnum V.P.

Mr Richardson died and the set up changed to C. W. Barnum Pres., R. A. Barnum V.P. Treas. M. B. RIchardson Jr. Secty, S. W. Bradley Asst Treas.

Foundry set up Chas Weising Supt assistants Boardman & Amundson. Furnace supt don't remember. Mr. C. W. Barnum was succeeded by his brother Wm M. Barnum of New York.
{S-6}
Copake furnace, [operator] and owner Wm Miles of Twin Lakes, closed down in this period and sold the foundry in Hillsdale NY. Samuel Colt who purchased our Richmond furnace at Richmond Mass. was running full blast with a Mr. Williams as Sup't.

Cheshire furnace was closed & owner Mr. Woods of Cheshire retired.

Col Kniffin of W. Stockbridge who with his father had operated the West Stockbridge furnace was still living.

Hunstville, Cornwall Bridge, Kent and Sharon Valley furnace also Maltby's [were] closed and abandoned.

At East Canaan the greatest center of blast furnace activity were located in all 3 furnaces, although never at any time were but two in operation at once. They were known as Fores #1, Forbes #2, Beckley furnace #3. Forbes stack was 9 1/2' X 45', #3 was 9' X 35'. Lime Rock 9' X 32'. Forbes #1 originally wasn't that high. Its stack was raised about 10' when new overhead bridge and top house were built. Also a tremendous stack gas explosion occurred which today shows the crack in E side caused by it. The stack was ringed by 2 sets of white oak timbers held by large rods to prevent widening. we experienced a little trouble by gas leaks as it expanded with heat. Tried mortar, then bricks & mortar then successfully overcame this by forcing in and tamping in so called asbestos feathers while the new high speed rotary blowers

were being installed. They worked successfully. We also, at this time, took out the 4 two tube marine boilers & installed 2 B & W high pressure [tubular] boilers.
{S-7}
Steam from those operated also the Corliss engine in old eng house when water turbine was also in use. So we had everything. Engine house, saw mill, boiler & engine house, seperate gas fired blast heating ovens, steam hoist in the tophouse, blast furnace & casting house, 5 charcoal sheds & office with laboratory, ore sheds & trestle, blacksmith shop, car shop & RR track scale all at Forbes #1.

Ore stored about 20,000 tons i.e. in bins & outside. Charcoal stored about 45,000 bu.

Across river was accumulation of untold millions of tons of slag variegated in color, complex in structure from hard dense slag to fluffy white that would float in water.

Also at #1 or its vicinity were 12 Co. houses. In center of [East Canaan] village 4 E of office on both sides of highway, 3 on top furnace hill, two across river, 10 in all. The office and laboratory was opposite the upper dam & across road from [charcoal] sheds.

Lower furnace #3 had 12 houses, barns, ice house, grist mill with water wheel for blow works, engine house with rotary blowers, boilers cold fired, stone crusher, gas engine, screens etc. for flux and 15 coal sheds filled, or about 1,350,000 bu coal. Also a tremendous slag accumulation.

New England Slag Company plant consisting of crusher, storage sheds & bins, conveyors 2 RR sidings & turning out daily from 18 to 25 carloads of slag.

At this time some pig iron was being loaded remaining from 35,000 tons accumulated between {S-8}1911 & 1914. We had then about 2 1/2 miles of RR sidings at the plant i.e. BR Co which later was increased to 3 1/2 miles at which time we operated our own switch engine, a Lima locomotive. As we were [obliged] to maintain our own track we had a crew of the best track me in the area. We had to have, because of grades, curves & heavy traffic in ore, charcoal, pig iron, [wood and slag]. Practically every day saw us with from 50 to 100 cars on hand.

Refractories for furnace stacks consisted of soft & hard burned & pressed fire brick and bottom blocks.

Sizes 9" & 13" Bottom blocks [about] 12" X 12" X 12
Shapes, splits, soaps, straight, keys and wedge
All brick was Harbison Walker
(Benezet clay) no fire clays as such used, we had a better one
Originally used Albany & New Haven fire brick
Flux was dolomite from Conn Lime Co. quarry
Charcoal obtained from Manufacturer's Charcoal Co.
Bradford Pa. This [charcoal] was a byproduct form the
chemical plants in No. Penn, Sou NY also at
times PRR, DL&W, Erie, NYC and O&W RR.
All patterns for pig iron beds were made
in Torrington of hard maple

When the Forbes #1 went into operation with high speed blowers we had to lengthen the pig beds to accommodate the increase in each [run] as the output jumped from 16 to 25 tons per day with no sacrifice in {S-9}quality

Our output annually [jumped] to 12,500 tons an increase of about 1500 tons.

Don't ever let anyone tell you the furnace died out as result of competition. We had no competition as nowhere else could iron like ours be had. Also our iron always commanded a premium price over all others of from $2 to 4.00 per ton. Just business as ordinary kept us humping to fill ordinary orders.

At this time we could boast that we were the only iron furnaces where there wasn't an ounce of waste. Our pig iron netted a good profit, our slag turned us in a profit, our cadmia removed from stacks showed a nice profit & our charcoal screenings turned in a nice profit. Does this look like food for bankruptcy ? I guess not. The real cause of the demise of the furnaces & foundries & Salisbury Iron had not been told and may never be, but, it was not lack of business, lean ore or lack of profit, we just about kept up with demand that's true. remember this situation in 1914 prevailed until the end. All I can say at this time is mismanagement & waste.

Lime Rock was quite an experience in many ways.

It was quite a baseball town, Each year there was a game at which every player who reached third base received a schooner of beer {S-10} and a special treat awaited overnight guests in the fall. If they were at all inclined toward coon hunting, well they were initiated. C.W. & several more including Bill Call with dogs and guest would set out. The dogs were let out over on [adjacent mountains] & hunters took off as the dogs seem to have turned, the guest was stationed to watch when they returned if they did & others were to scatter doing the same. They, however, were meeting at a prearranged place and would congregate at the rocky Dell, Falls Village Inn or Hunt Club as the case might be, while the unlucky guest hunter sat & sat some times till near morning when they would all appear from different directions, pick him up half frozen & all tramp back to Lime rock with no coons & a played out hunter guest.

Then at the wheel foundry outside on the deck were always 50 to 60 wheels. Sid Vosburgh was an accomplished man handling them. Always among the wheels would be a pattern which from even a short distance couldn’t be told from the real thing. A stranger arriving was given a look being told the diameter etc. & weight of each wheel was 900 lbs. Sid would be busy rolling 2 at a time into the ground.

Later the visitor from the office would be watching when suddenly Sid would, with one hand, pick up a wheel sort of toss it up using both {S-11} hands, set it on his shoulder then balancing it (what to the watcher was a 900lb load) reach out with the free hand, snap another wheel to rolling position & roll it in the shop carrying the other on his shoulder to the astonishment of the visitor who would invariably refer to Sid as some man. He now had a story to tell when he went home.

Then there were such things as stench bombs, itching, sneeze powder etc. drinking glass

perforated all way around ½ inch or so below the rim. One trying to use [it] would always get drenched. Fake fingers, all blood, that had been brought over from accidents in the shop, fake snakes coiled on your wagon or auto seat. Never a dull moment. Even the old penny watching game, odd man out. Rigged poker decks. all the comforts of home.

One thing both Mr. Richardson and Mr. CW Barnum both knew their furnaces. No one could fool them. Both knew every employee by name, whether he was married or single, his wife & kids and this included Ore Hill, amenia, East Canaan & Lime Rock. At night CW liked nothing better than to sit on the porch at the Rocky Dell with the men. They had some sessions. He was never too busy to stop & talk a minute, no matter where or who he was with. the men all loved & respected him. He enjoyed old Bill Call with his wild stories told with such a straight face. Mrs Winterbottom, chef of Rocky Dell, was famous for her meals & pies as many a Yale or Hotchkiss man could tell you. Also traveling men.
{S-12}
All charcoal, scrap iron, coke, moulder's sand etc. was brought up from [Lime Rock] station by teams which drew back car wheels, chilled rolls, and castings of all kinds, loaded each way every time. All teams were owned by Charlie Vosburgh.

The Episcopal church was the apple of their eye and the Co. a large contributor. They even paid a the salary of a man who worked steadily to keep the cemetery in beautiful condition. Sam Bradley being treasurer, the church used the double envelope system for collections, and once a year Sam would open them all & would always ask me to come down & help. The one half was the parish funds & other mission funds, necessarily the envelopes were small & Mr. Bradley was big man his fingers larger, rather fleshy, so he had trouble getting money out of them. This one time I had the Parish end and he had the mission end. Saw he was having trouble, finally he became exasperated trying to get a couple of pennies out. suddenly he laid it down placed both hands on the desk saying "Wallace, this may be wrong for me to say, but I'm damn thankful there's nothing smaller than a cent." So I said "Here, you take mine & I'll take yours." So we exchanged & had no further difficulty.

P.S. Before I forget. the peak daily output of E Canaan #1 was 25 tons, Beckley #3 - 18 tons. #1 furnace we could hold on [foundry] grades almost continuously while #3 could be held there [for] certain intervals then make #3-4-4½ for each {S-13} time as necessary, then back to foundry grade.

The company could & should have put a premium price on #3-#4 & #4½ iron of at least 5 or $10.00 they could easily have do so, without any injury to sales. At the same time it was fully justified because in producing these grades production dropped which made it justifiable but Mr. B wouldn't do it, although he knew it was right. It would have raised income by at least $600,000 - per year.

It may be the way things were going it was just as well, as it would only [have] delayed the inevitable, although if they hadn't run in receivership [when] I come home from the War & recovered my health I would have gone back, I suppose, and might have been able to clean house enough to have pulled it out. Who knows, but by that time the parties to blame were scared and could easily have been trimmed down to pint size knowing one false move and everything would be known. One at a time they could have been removed & eliminated and BR Co. would still be in existence. The outbreak of WW2 was or could be the first major conflict in

which BR Co. Salisbury iron was not to serve the country. It seemed a shame, so I had bought the cleaning up privilege when the bankruptcy sale was held which included all the old salamanders in return for assistance in locating woodland acreage. Mr Stone of Lime Rock gave me the okay to leave them {S-14} until such time as I might be able to find a buyer. Now I went after a buyer and found one in the Farrell Foundry & Machine Co. of Waterbury. They needed it & wanted it so we made a deal.

I was to deliver these pieces ranging in size from 2 tons to 6 tons & when broken with their big drop giving them the approximate analysis which the recorded. In event any analysis given did not turn out to come within the range permissible, the piece was to be theirs free.

Fortunately there wasn't a single failure, all iron proving satisfactory. They were the last firm to use Salisbury Chilled Iron.

When I made the offer to Mr. Griggs or Riggs to give an approximate analysis as soon as each piece was broken, a man in his office at the time quite sarcastically said "Wise guy, going look at a piece of iron & give the analysis" so I asked Mr. Riggs as they had 2 or 3 M tons in the yard if we could break a few pigs to test me out. We did, they had the analysis of it all. When we finished he looked at actual analysis & compared it with what I had given saying "I don't know how you do it, but bring me your iron, we need it."

In all some 75 tons were delivered. Loaded & drawn on trucks of Mulville & Sons of Norfolk so Salisbury Iron didn't fail our country in any war yet.

[Of course no Salisbury Iron has been used after WWII, but the fact that the last use was in the 1940's is remarkable in itself.]

{S-15}
The company houses at East Canaan, some 24 in all, were rented including garden space, quarters for horse, cow, pigs & chickens @ from $1.50 to $1.75 per week. The amount was deducted weekly while men were working, but no charge then or later if sick, injured or temporarily laid off. With this the tenant [received] all fire wood for winter free and all charcoal needed for cooking free in summer. Electric lights were also installed in 1915.

Very few of these employees are left. They are as I remember Chas Bianchi, F. Rossega, M. Spadaccini, N. Daloni, D. Rogers.

There is a rather humorous incident occurred. Day after day I watched the slag run off, saw it cool and its variegated colors and texture intrigued me no end. Finally the idea occurred to prepare a bed for it, have [a] mold made to cast it, so to speak, as brick or tile, but didn't. Finally a man names McKenzie from Harrisburg or Pittsburgh Pa came to me with the idea of making it into hex shaped tile. We made the patterns, prepared the molds, & poured our tile. They turned out beautifully, perfect in shape and so beautiful whether the color was solid or variegated, with a wonderful surface smooth as glass, but the bottom was rough and uneven. This had we had sense enough to realize it, was just the ticket for laying it or binding it, but somehow we concluded the bottom should be as good as the top which we couldn't get & never should. We had a new product, a beauty, an didn't realize it so threw it all out & forgot it.
{S-16}

The #1 furnace stack being 10' higher than #3 created two separate situations. #3 we could operate steadily on grades #3, #4, #4½ [and] #5 over extended periods without fear of too much trouble. #1 with its 10' extension changed the operating procedure greatly as it worked best on #1, #2 and #3 or was a hotter furnace.

One would naturally think this would make a difference in amount of cadmium recovered. [While the text here plainly reads cadmium it may be that Wallace was talking about zinc oxide, also known as cadmia, which formed inside the stack..] It did some, as the amount at #1 increased perhaps ½ per ton every 6 months.

As this type of furnace must of a necessity be filled by hand i.e. a bell and hopper couldn't be used because it would give equal distribution of coarse & fine ores which prevented to some extent the free passage of the blast. Whereas by hand filling all coarse ore fill to the back & fines to sides & front which as these furnaces had tuyeres in but 3 arches there being none in front everything worked smooth.

One thing, #1 could be tipped anytime & cause a tremendous loss of output & money by anyone tossing anything weighing over 150 lbs to the front when filling where #3 the same thing at #3 might or might not happen. This caused us to be very careful to have dependable men filling there.
{S-17}
All ore from Ore Hill the first 3 years was shipped in low side flat bottom gondola cars and had to be shoveled off which took [3 or 4 men] all day, each car. During the winter [the] wet ore froze into a solid mass & required 6 to 8 men with shovels, picks, bars & sledges 2 days to unload.

Attempts to have these cars taken out of service & steel low side hopper bottom cars used in their place were useless. So I had the RR condemn these old cars & substitute the hopper type. With these all we had to do in winter was open pockets, turn on steam hose & cars unloaded themselves effecting a substantial saving.

In the furnace where for years the cinders or slag removal was done by contract, the Company teams were used which we had to have anyway so the cost of contracting was eliminated.

Due to allowing some men of the road, one of whom was ill [to stay in the furnace out of the cold weather] the Company received a benefit which amounted to saving thousands of dollars and made it possible to gain 6 to 10 months longer run on each furnace without relining and we never had to buy fire clay after that. [The complete story of this incident is in the yellow notebook]

The slag plant brought about recovery of iron from the slag in sizable amounts, as well as cadmium.[Here again Wallace may have meant zinc oxide or cadmia]

Salisbury ore and iron made in E Cannan served the US during WWII thru products produced by Farrell [Foundry & Machine] Co. of Waterbury CT so Salisbury hasn't [failed] you since 1732.
{S-18}
There are two men who can give a realistic & amusing lot of incidents of Lime Rock days.

Harry Amundsen of Lime Rock Ct and Hugh Cummings formerly of Lime Rock now with [Hartford] Steam Boiler Co., Hartford CT.

[The following time line appears on an isolated page in the notebook.]
{S-19}
Thos Lamb forge Lime Rock using Hendricks or Davis ore - 1732

1748 - Lamb sold land at outlet, furnace pond Lakeville to Benj. Williams, J. Stoddard & Wm. Spencer who built a forge. After this a Mr. Morehouse, Jno. Dean, John Pell, Gideon Skinner, J. Jones, Eliphalet Owen, Jno. Cobb & Len Owen were at different periods proprietors. They called it Owen's Iron Works. In 1762 Leonard Owen sold out to Jonh [Hazeltine], Sam'l. Forbes & Ethan Allen who built the first blast furnace in this area. later Chas. & Geo. Caldwell bought it & sold it to Richard Smith of Boston in 1763. He was a Tory & on the outbreak of hostilities fled to England leaving his bookkeeper named Ogden in charge.

Forbes furnace #1 was the first furnace built being on the site where its stack now stands about 1/4 mile below E Canaan post office. Another built about 1790 had now disappeared entirely on the same side of the road about 1/8 mile below lower dam. It was discontinued around 1829. In 1872 Beckley furnace known as #3 was built across the road from this site & there is enough left of it to locate it easily. The lower office, so called, was on west side of road too, just north of 2 Co. houses on that side.

[The East Canaan information above does not agree with the 21st century understanding of events. The furnace now termed Forbes #1 was built in 1832 by Samuel Forbes Adam as the first East Canaan blast furnace and part of the Forbes operation. This furnace was acquired by Barnum Richardson in 1858 and demolished in 1899. Thus was long gone before Wallace first came to East Canaan in 1910. The furnace he calls Forbes #1 was built by John Beckley in 1847 and still stands. The furnace built in 1872 was indeed called #3, but was not the one built by Beckley. There is some mention of an "air furnace" in East Canaan at an early date. It may this facility that Wallace is talking about when he mentions a furnace built in 1790 and discontinued in 1829. This furnace, if it existed at all, was thought to be at the Beckley site. If so, the dates of operation are not in conflict with the dates of the known furnaces. It seems that accurate information on the history of the East Canaan works was not available to Wallace when he came to work there. Another item of interest is that 19th century newspaper accounts discuss shutting down furnace #1 to remove the zinc oxide deposits from the stack indicating that the presence of the zinc was known earlier and that Wallace rediscovered it in 1914. It appears that information on both history and operation was lost prior to Wallace's arrival at East Canaan.
In the next section of notes Wallace gives a history of iron making in the United States. He does not cite sources in this section, but it is likely that the material comes from "Industrial History of the US. in 7 books" by Albert Bolles. Henry Hill Publishing Co. Norwich Ct., published in 1878 as this book is noted on the top of the first page of the brown notebook. The accuracy of this material has not been checked.]
{S-20}
Iron birth and those responsible.

1. Raleigh found iron ore in Carolina. In 1610 ore was sent to England by Jamestown Colony. A forge was built in Virginia, also at Falling Creek Va. and iron was successfully made in Va in

1621, fuel was charcoal, by John Berkely with his son Maurice on 5/20/1622. The works were destroyed by Indians and all residents of the area massacred. The business wasn't resumed until 1712.

2. The next attempt at making iron was at Saugus Mass using bog ore. In 1637 the Colony gave Abraham Shaw the okay to go ahead, but it was 1643 before things were really started. In 1648 a furnace at Lynn was turning out 8 tons per week. This same Co. in 1648 built another furnace in Braintree. In 1652 a forge was built at Raynham.

3. John Winthrop started a iron works, the first in Ct., at New Haven, but didn't complete it so the first built & [operated] was by Cap't Thos. Clarke in 1656.4. Rhode Island produced iron in 1675 at Pawtucket. This works was started by Joseph Jenks.

5. Excellent ore was found in N.J. by the Dutch & a Co. of people from Ct. started production as early as 1654 a Shrewsbury, Monmouth Co. N.J.

There has always been a dispute as to whether the pioneer works in N E was a furnace or a bloomery as furnaces were scarce.
{S-21}
"Much ado about nit" For years a great deal has been said and written about the Besemer process for making steel, that it originated in Europe being brought to this country by a Mr. [Holley] of Lakeville, Ct. and all writing up of the iron industry here has given [Holley] a great boost as the Besemer man, so to speak.

This is not true, it seems, and is backed up by recorded facts in "The Industrial History of the United States" by Albert [Bolles] issue of 1878, page 214. An Englishman had the reputation of having invented the Besemer Process, but the first person to suggest it and make an experiment with it was, according to Mr. Swank, an American in 1851 a Mr. William Kelly of Eddyville Ky. He made a few [trials] and obtained a patent in 1851. Henry Besemer secured his 1st patent in England in 1855 four years later. The process in this country is carried on under a combination of the Kelly & Besemer patents so Mr. Holley's claim is somewhat clouded.

Anything on record that Besemer Process hit Salisbury iron a death blow is hardly a fact. Salisbury Chilled Iron had something Besemer couldn't eliminate, the list of customers grew & grew and at the time of the Company's demise it would have continued to grow had proper management been exercised. If one were lucky enough to have 500 tons available for sale today he could practically name his own price.

End of Brown Notebook

Part 3, the Tan Notebook

[The tan notebook contains several different versions of the early history of iron making in Connecticut. It appears that he was trying out slightly different ways to tell the story. The consistent theme is that the Salisbury iron industry in Connecticut, and Barnum Richardson in particular have been poorly treated by historians and that the full story deserves to be told. The sources he used to obtain this material are not cited and the “facts” presented here have not been checked.]

{S-1}
Colonial History of Salisbury Iron etc. up to 1863

There are many things and events connected with ordinary history and in connection with the Revolutionary History some very vital facts , mention of certain men and items not recorded in the main histories. Whether these are the result of commission or omission I don’t know, but no more important reports could possibly be left out, so here I am trying to bring the facts to public notice for what they are worth.

the Colonies in early 1770’s were practically unprepared for any kind of warfare. No [ordnance] or viable means of securing any quickly and in volume.

Shortly after the battle of Lexington & Concord plans were made by the gov’t & patriots for Ethan Allen of Cornwall Ct. to make a try to capture Fort Ticonderoga. Plans were made to get supplies. A contract for shot etc was given Mr. Robt. Livingston of Ancram N.Y. to be produced from their furnace & 5 forges at Ancram N.Y. but tenant troubles & an attack on his works which were so wrecked as to block it prevented the orders being filled. Col Samuel Holden Parsons of Lyme Ct. is credited with the plans for the attempt on Ticonderoga according to the Record of Ct. page 292-3 Volume 1.

The fortress surrendered to Ethan Allen 5/10/1775 with all stored, 150 to 200 cannon, balls, shot, flints, powder, new gun carriages, etc. A land slide.

About 1762 a furnace was built in Salisbury, that part known as Lakeville to make iron from Davis & Ore Hill mines by John Hazeltine, Ethan Allen, and Samuel & Elisha Forbes of Canaan Ct. It passed into the hands of a Richard Smith a merchant of Boston Mass. who also owned a works in Colebrook Ct. for making steel. With the opening of hostilities Smith fled to England leaving these iron and steel holdings in charge of his employee a Jacob Ogden of New Jersey.

All these works were confiscated by the {S-2} Conn. Council of Safety. Gov. Trumbull & his council took steps to take over for purposed of making iron, casting cannon, shot, grenades, anchors etc.

Col Jeddiah Elderkin was appointed to investigate & report to Council and on his report was based action to take over everything.

Feb. 1776 Lemuel Bryant of Mass. was employed as cannon founder, men named Carver, White and Aldham hired as moulders.

Joshue Porter made chief Provider & Works Overseer.

Here were cast all thru the war cannon of [illegible] all sizes of 6 up to 24 pounders. They were cast solid & bored out with steel drills from Colebrook.

Transportation was a problem with only teams to depend on, ad roads, long haul, snow, mud etc. An 18 pounder weighed 1 ton so it was 1 gun per team.

Charcoal suppliers for furnace came from Cornwall, Canaan, Sharon, Sheffield, Salisbury and NY state. Master Collier at Lakeville was Capt John Welch & Simeon Strong. There were many colliers burning charcoal American & even Indians (Chief Coleman, Indian from Oblong was one) There were 8 or 10 teamsters, pattern makers, banksmen or men who received & measured charcoal & took care of storing it under Samuel Forbes. Men cutting wood & drawing to pits. Two experts to fill furnace.

The plant here now was a furnace, casting foundry or molding house, boring mill, furnace barn & bridgehouse & guard house + a water powered trip hammer. Drilling out bore of [cannon] was powered by a drill using horses for power.
{S-3}
Hundred[s] of cannon & tons of shot were cast here during the war, Anchors and field pieces for [coast] defense, ships, forts, and batteries. These supplies were drawn to supply depots or Hartford, New London, New Haven and Norwich where carriages were added for distribution.

Every precaution and effort was made to insure no stoppage of the production. Everything possible was done to make improvements, increase size or guns etc.

Under original ownership, production of iron per day from furnace was from 1½ tons to 3 on 250 bu [charcoal] per ton. The blowers for the blast just bellows of leather, water driven. the air pressure for blast of a necessity was very low. Truly from such accounts as are to be had boring cannon was done by horse power - 1 horse being used to work the crude machine.

Officers and 4 or 5 squads of soldiers were stationed here at all times as guards & to form patrols. This works & furnace was the only source of iron & ordnance in New England at this time. Without it the Revolution would most certainly have failed.

Thomas Lamb built a forge at Lime Rock Ct. using ore from Davis Mine in Salisbury about 1732, then came Lakeville furnace, Lamb's new furnace and Forbes furnace at E. Canaan Ct. where there was a rod mill, slitting mill, foundry & shop. Later, one by one, some 40 other furnace were built.

[What follows is another version of the same story, with somewhat different style, and more details on some of the personnel]

{S-4}

Why is it that all writers of historical events like history of our country from its settlement until now in covering all its wars give much space to events, persons both public citizens, the political and military with victories & defeats well recorded but they commit the sin of either

omission or commission intentionally or otherwise of failing to give the complete story of individuals, methods, trials & tribulations, the effort and excellent accomplishments of almost impossible feats or production, transportation and performance. Those responsible are equally so for their effort yet none get mention or medals.

How many people know of the pitiful situation of the N. E. Colonies, New York & New Jersey with relation to be able to wage war. There were no manufacturing plants to speak of, no stocks of military or naval equipment to be had. No [ordnance] supply, no powder or lead stock and no steel mills and only 3 blast furnaces: Sterling N.J., Salisbury Ct. and Ancram N.Y. with a total capacity of less than 6 tons per day.

In all New England there was just one source of iron & ore for making it to be had. This furnace & a small plant for converting iron into steel was its only possibility and these two plants were closed as the owner, a Tory Richard Smith fled to England with outbreak of hostilities leaving his clerk Jacob Ogden in charge.

The furnace in Salisbury was built in 1762 by John Hazeltine, Sam'l Forbes and Ethan Allen. They mined ore in Davis Ore Bed and Ore Hill Mine (Lakeville) sold 2 or 3 times prior to acquisition by Smith.
{S-5}
At Ancram N.Y. Mr. Robert Livingston of Columbia Co. owned a furnace and 5 forges at Ancram N.Y.

(In Sterling N.J. was a furnace & mine owned & operated by (under) name of Sterling Iron Works.)

General Washington when nominated by Sam'l [Adams] at the meeting for the purpose of selecting a man for Commander-in-Chief had no previous knowledge of Mr. Adams decision, nor did he know of the fight between Sam'l Adams & John Adams over who it should be. When Mr. Adams who was sitting next to Gen'l Washington arose and proposed his (Washington's) name offering total command of [Revolutionary] forces which was unanimously accepted. He jumped from his chair, ran into a side room there to seek divine guidance, came out & accepted.

In so doing how many realize his position from that time on ? He was, if captured, liable to punishment by death as a traitor for crimes against the Crown. All his estates confiscated and loss of family, everything he held dear. <u>What would you do in a like position ?</u> Secondly, he had no military equipment or supplies with which to equip the army, no great industries to lend their support & the poorest transportation facilities ever an army was faced with.

One bright light however showed, that the of Gov. Trumbull in Colony of Connecticut, a very capable man as time was to reveal.

The guns had hardly ceased at the battle of Concord and Lexington before he and his Council of Safety had perfected a plan and put it into action to secure cannon, guns, powder, shot etc. through the capture of Fort Ticonderoga in Colony of New York by surprise attack to be made under Ethan Allen of Cornwall Ct.
{S-6}

Robert Livingston received a contract fo furnish cannon, shot etc from his plant at Ancram for this expedition, but was prevented from fulfilling it by rent troubles. His tenants rebelled and attempting to destroy the iron works did so much damage all possible thought of participation had to be abandoned at that time.

In meantime Gov. Trumbull & his Council seized the steel works at Colebrook and iron works at Salisbury & sending Jedediah Elderkin of Windham to both places to learn the possibilities of a quick resumption of both plants. Upon receiving the report which showed both to be ready for immediate resumption with a few men or repairs, men were appointed to secure each operation and action taken to immediately get going as follows:

Overseer in full charge: Col Joshua Porter N. E.'s only furnace. 8/18/1776. This 1st furnace was built in 1762.

Jacob Ogden applied for exemption from draft for 10 men, one an Indian, (Records of Ct. Vol. 2 page 237) again in 1780 he applied for exemptions of all at Salisbury stating he couldn't continue the important work unless it were granted.

Founders for making cannon were Samuel Bryant of Middleborough Mass.

Moulders: D. Carver, Z white, D. Oldman.

3/18/1776 Col Joshua Porter was appointed Chief Provider & Overseer of Works. His managers were Henshaw & Whiting.

Charcoal was produced in Cornwall Ct. by S. Miles, John Mile. Miles & T. Rowley are recorded as regular suppliers. From Canaan Ct. E. Jackson, from Sharon T Walton, Z turner & E. Bailey. Sheffield Mass. S. Kingman, Salsibury C. & H. Owens, Oblong NY. E. Jones, A Grimes, J. Fox & S. Calkins.

Mast colliers Capt John Welch & S. Strong also N. Porter, W. Mathews, E, Calkins, T. Ficks of Colebrook Ct.
{S-7}
Teamsters: B. Williams, A Hanchett, R. Whitcomb, J Holmes, E. Sheldon, H Sage and N. Gilbert.
Ore diggers:J. Pudney was one, there were many more.
Furnace fillers: E. Whilem? & J. Owen
Pattern makers: N. Parker, and J. Camp
Chief Banksmen: David Forbes
The entire plant here was:

1 Blast furnace 1 ½ to 3 tons [illegible] per day
1 Boring mill - operated with a horse
1 Moulding house (casting)
1 Furnace barn
1 Guard house
They also had a water powered trip hammer

Many wood choppers, teamsters, and pit burners too. All output was transported by teams to

destination depots at Hartford, New London, Norwich [and] New Haven. At these points cannon were mounted on carriages.

Products

Cannon from 3 to 24 pounders.
Grape shot & balls. Pots. Pig Iron. Hand Grenades, Castings. Forge hammers. Swivel guns & chains.

Guard consisted of Officers and 4 or 5 squads of soldiers.
Cannon went into coast defenses, forts, field pieces, & ships of al types.

Hundreds of cannon were made during the war & after.

Prior to erection of Lakeville furnace all operations were in forges. Iron being produced by Sinking process by which ore was reduced to a spongy mass in ball form of malleable nature & from that worked into rods, plates etc.
{S-8}
The Lakeville furnace, as were all others built up to about 1840, [was] cold blast. The blast produced in a bellows similar to a blacksmiths bellows, and capacity & production ran equal [to Lakeville] i.e. 1½ to 3 tons per day.

Stacks were 30’ to 35’ high.

In 1835 the hot blast was brought in from Scotland.

All furnaces of a necessity were located on streams for water power for the blast apparatus. This was very fortunate as water power was needed more for this new type hot blast furnace.

The new type blowers were wooden cylinders with wooden piston heads & wooden crank shafts driven by water power.

The cylinder head of cast iron with a square hold for intake with a leather flap inside weighted to a fine degree to insure positive closing in upstroke. Air was forced out into stuffing box, piped into ovens, thence thru cast iron bed plate with U-shaped bustle pipes into line of furnace. Here a circular bustle pipe distributed the blast thru 3 bronze tuyeres each having a mica covered peek hole for observation of working of furnace inside the hearth section. The hearth was a cast iron water jacket thru which passed cold water. This in turn lined with fire brick. The bottom was covered with fire clay bottom blocks, the {bosh] lining fire brick and above the [bosh] hard pressed & hard burned fire brick.

Brick used were 9” and 13” keys, soaps were straight and splits.

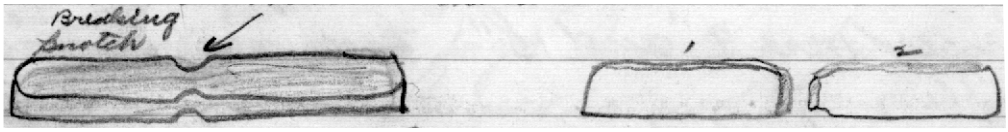
To start the furnace, the hearth & bosh was filled with cord wood stood on end & filled till just room for man to move. The [furnace] jacket was put in place {S-9} & the wood then lowered from furnace top till filled, then balance of space filled & packed with brush. when ready, fire was started in hearth, as it progressed a very low pressure was turned on which was gradually increased to 3/4 lb. As wood was consumed & brush settled charcoal was added and after 24

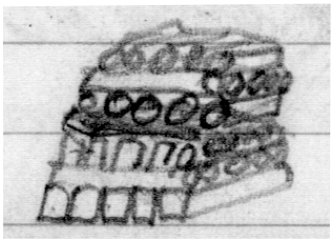
hours if all was well very light charges or ore & limestone added. These were very slowly increased with corresponding small increase in blast as called for till she was ready for first run off. After this she was burdened for all she would carry which produced high chill iron then such changes as were needed in pressure & charges manipulated to give grades desired. The blast originally usually were 9 to 12 [months] before run out for relining.

Annual output average of 4500 to 5000 tons per furnace.

Pigs of iron from the old cold blast furnaces were much smaller than those from the hot blast furnaces. This was due to that for years and years all iron work was by hand and of a necessity work was easier with this size of pig which was 1½“ X 2” X 10 to 12” weighing about 10 - 12 lbs. Also it made transportation of a delivery much quicker & easier. A pig today is larger in all ways and average weight is 95 lbs. Port Henry cast 2” sw pigs in old days.

Pigs are double, by this I mean are so made from bottom as to be easily broken in half after cooling, each double when broken is 2.



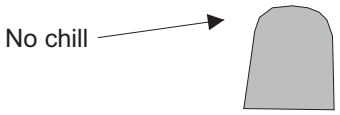


Iron was piled in storage, usually 20 pigs high, a ton gross 2240 as 10 lbs is allowed per cwt for sand.

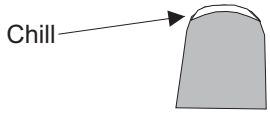
[These numbers do not add up. Assuming that Wallace is measuring weight using English hundredweights (cwt) a hundredweight is 112 pounds, consisting of 4 quarters of 28 lbs. each. A long ton is 20 hundredweight or 2240 lbs. Other sources give a “pig ton” as “a ton plus a quarter” or 2268 lbs. with the extra quarter being the allowance for the sand stuck to the pigs.(This amounts to about 1½ lbs sand per pig.) If 10 lbs were allowed for each hundredweight then a gross ton would be at least 2440 lbs. If you use US hundredweights of 100 lbs each with 10 lbs per cwt for sand you get a gross ton of 2200 lbs, not 2240. Earlier in the notebook Wallace gives the average weight of a pig as 95 lbs. It is very hard to believe that one pig would have nearly 10 lbs of sand stuck to it, so 10 lbs per cwt does not make sense no matter which system is used .]

[The next page in the notebook gives details on grading. It appears to be the continuation of another page as it does not flow smoothly from the page just prior to it. There is no indication of any missing pages, so this is a bit of a mystery.]
{S-10}

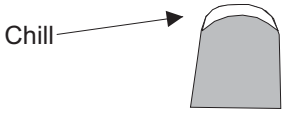
In addition soft iron #1 and #2 foundry grade, open or coarse grain iron high graphite carbon, no chill.



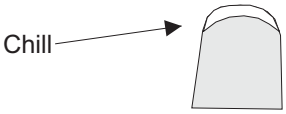
#3 chill of which runs 1/4" to ½ "



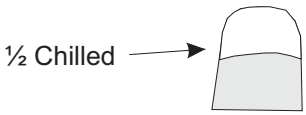
Much finer [grain] lower in graphite carbon
#4 - high chill ½" to 3/4" deep.



#4½ - light grained, very strong and carbon much more combined.



#5 - ½ pig chilled ½ very fine grained, low in graphite [carbon]



#6 Solid chill. Silvery iron

This #6 in fact #5 is impossible to bore, file, cut or grind.

All iron prior to 1910 practically was graded & sold by fracture.

The [tensile] strength of “Salisbury Iron” is 2½ tons greater per square inch than that of any other iron yet made in the world.

The wearing qualities i.e. resistance to friction is by actual test 20 times that of any known manganese steel, possibly 50 times.

{S-11}
A word about charcoal as fuel & some idea of difference in yield [tensile] strength by actual practice.

Pit burned charcoal yields 45 bushels per cord (bushel 20 lbs) It is hard, doesn’t break up or disintegrate with handling like retort coal. Whole sticks were taken from pits which when tapped with a metal object [would] cause it to ring & not break carrying much more burden.

On he contrary, retort burned charcoal is dead & lifeless comes out into storage all broken up. Yield of retort coal 40 bu per cord. A box car when unloaded would show at least 80 to 120 bu of screenings. It also required more coal per bu to carry the burden, but the price more than compensated for difference.

In a chemical or retort plant when completely burned a cord of wood yields:

11 gallons of wood alcohol 2 times distilled
230 lbs. of acetate of lime (Lime added to acetic acid)
42 bu of charcoal
Tar and wood oils

Average acid plant 20 [cords capacity], some were of 80 & 100 cords. This is daily.

All wood for an acid plant must be seasoned 1 year. All woods used are hardwoods. (No chestnut - hemlock or pine or spruce used.) chestnut had too much tannic acid.

Ore Hill ore was best of all for chill & [tensile] strength. Amenia ore is good, and is easily smelted proving to be a life saver when furnace in trouble.

Davis, Chatfield & Weed were excellent too. Although Weed was a pain in the neck at first.

{S-12}

Other good mines Kelly, Morgan, Maltby, Liet, Chiever & several others at Richmond Mass. Copake ore is excellent ore too.

Cheshire ores were high phosphorous suitable for stove plate and agricultural work a/c more fluid but strong.

Sharon ore excellent.

Below Brewster ore is magnetic. Above is hematite up to Cheshire it is high [phosphorous] thence up to Ticonderoga turning gradually to all magnetic again & so on thru Adirondack region.

In early 1800's a furnace was built at Port Henry producing good iron.Tthey cast their pigs square 2" X 2" X 18" cold blast compared with 1 I found 1½" - 2" X 11". Although at Salisbury the pigs were about 90 lbs each bearing name & date mark.

1 There were in all several chains made for hooking the Hudson. One chain made in 1776 was made in vicinity of Monroe NY. this chain weighed 186 tons.

The chain across the Hudson at West Point to Constitution Island to E. shore links weighing 100 to 150 lbs each. this above chain. In winter it was drawn in by windlass being replaced in spring. It was never disturbed by English.

2 a similar chain half its diameter and 1,800 feet long made in the Ringwood Iron Works N.J. was stretched across river from Anthony's Nose to Fort Montgomery in Nov 1776. It broke twice and the English broke it & passed in fall 1777.

3 Another was stretched across from Pollepel Island to W. shore consisting of spars pointed and the ends united by iron links,

{S-13}

Some iron and links, it is claimed, were made and sent to Fishkill NY. (Evidently these were repair links) from Ancram and Lakeville. There is a claim Hanchetts Forge on Canaan Mt. made up some links. Can find nothing to substantiate this.

I have given names, places, identified jobs in connection with operations etc. just so one can get some idea of the importance of these operations, the tremendous transportation problems all by horses & wagons showing that with bad roads, rains, mud, snow and ice plus the long haul, the tremendous & heartbreaking effort needed to try & keep pace with needs. Hours meant nothing to these men nor did they ask or seek honors & glory yet without their knowhow and willingness to do their part the whole effort could have gone flat.

There is on item of small importance perhaps, but worth mention. On top of each office of all these plants was to be found a large bell. These bells originally were for warnings of danger, to tell the employees when their shift was over, a new shift due, fire, unusual reason which for any cause to need assembly of me & residents.

{S-14}

Iron industry and mining in Ct., Mass, and E. NY. grew rapidly after the [Revolutionary] War. Some 35 or 40 furnaces were established. It was a little Pittsburgh till after the Civil War.

Until the end of the Civil War all cannon were made from iron from this area as good specifications called for Salisbury Iron or its equal.

[Holley] brought over from Germany the Besemer process & the backers immediately set out to discredit this area's ores & irons never quitting till only Barnum Richardson C. & Wm. Miles

with one of two more were left. They too ceased operation leaving only BR Co.

The famous battle of the “Monitor” & “Merrimac” iron clad armored ships was the first battle of its kind. The [armor] plate for our northern ship was made in East Canaan by a man named Dr. Harvey’s process.

Salisbury iron was used in Gov’t work during all wars the US had from before the [Revolution] up to and including WW2. The last firm to use Salisbury Chill iron was Farrell Fdry & Mach Co. of Waterbury. It was #3 iron.
{S-15}
Eastern NY.,western Mass. and Ct. for over 150 years have held a place in the historical & development thru the years which seems sadly neglected. Whether thru omissions, commissions I do not know and can’t find out, except in on instance which is hardly worth mention.

Ever since 1890 interest in the industrial area of this section on part of outsiders dwindled to zero.

Since 1900, the general public passing over route 44 from Hartford to Albany or [Poughkeepsie or] vice versa enjoyed the beautiful scenery, foliage etc. passing thru a small town just east of Canaan called East Canaan. Here since 1760 dwelt an industry which grew and grew. Originally started by Col Forbes who built it up from 1 blast furnace to two and later Richardson Co. who acquired it as a subsidiary built a third furnace, Beckley or #3 in 1872.

[Mr. Wallace’s identification of Beckley furnace does not agree with contemporary understanding, see page XX for a complete discussion of this issue,]

Here was an industry with an international reputation as was evidenced by destination of shipments of their pig iron which had no equal for [tensile] strength nor uniformity and depth of chill.

As people passed thru this little hamlet with the passing of time, they noticed the lime plants, but most knew absolutely nothing about the existence of the furnaces located on the lower road, of the fact the over 10,000 tons of iron was produced here each year.

Local people in Canaan knew the furnaces were there, but never to my knowledge did any one but the doctors ever come up thru that section or evidence any interest in it, yet the business men really owed their existence to this & the lime plants of E. Canaan.

In 1915 BR Co. started to erect a destructive distillation or chemical plant in the meadow south of CNE station. It was a 6 retort plant, capacity 60 cords per day and complete.
{S-16}
By this is meant retorts, settling tanks, primary, secondary and tar stills plus alcohol column. A large dry or evaporating floor with 6 evaporating pans for preparation of acetic acetate of lime & two steam boilers.

After the distillation of tar the residue tar was pumped under boilers as fuel for generation of steam for stills. The distilled alcohol was pumped to elevated storage tank.

Acetic acid was pumped to dry floor and 2400 bu of charcoal was loaded into RR cars (Co. owned) being transported to #1 & #3 furnaces as fuel. Aside from this, it was still necessary to buy in open market 2500 bu more daily.

There was no waste from this plant.

The plant wood yard was capable of storing 15 to 20 [thousand cords] all of which wood had to be seasoned for 1 year before carbonization either here or on the job.

Later they started erecting a 100 ton a day blast furnace & hot blast oven. This project was the beginning of the Co's difficulties as the designer, so called, some how secured plans of one of the furnaces of the Charcoal Iron Co. of Newbery Mich. and another on one owned by Canadian Car & Foundry Co.

Taking the two he picked out features of both and [combining] them came up with a blueprint he claimed as his own. However these firms learned of it sued BR Co. for infringement of patent to the aggregate of ½ million [dollars]. This plus other shady deals spelled ruin.

Thus ended the operations of continuous operation since 1760 of America's oldest operation Co. It is believed the 2nd oldest was the famous Collins Co. of Collinsville Ct., which today is plodding merrily on as Am's oldest company & unquestionably is with a world wide reputation for quality. Here in WW2 were made the knives for England's Commando troops.
{S-17}
Salisbury charcoal iron was the only iron from which could be produced fool proof car wheels. The Company formerly beside supplying all the wheels for the NY, NH & H RR but had and operated a 180 wheel foundry in Chicago supplying western railroads. Later this was sold to CN & St.P. Ry. I understand.

Every wheel they made carried a 5 year guarantee i.e. if any defects showed up in a wheel within that time they would replace it free. No other firm could or dared offer such a deal.

The replacements were not worth notice, and the wheels usually lasted longer than the equipment upon which [they were] installed.

Scrap wheels from obsolete equipment always commanded a differential in price. The manufacturers of chilled rolls were especially interested.

After outbreak of WW2 as BR Co. was nonexistent, the Farrell Foundry Co. of Waterbury purchased 75 tons of Salisbury Chilled Iron salamanders which they broke up with their 2 ton drop. This and they were without doubt the last people to use Salisbury Chilled Iron. Also it kept an unbroken chain of important historical value in that this made it possible to claim Salisbury Iron had served the US in every war from & including the Revolution. Quite a record.

The Barnum Richardson Co., at one time operated 10 furnaces. It had a large car wheel shop in Lime Rock and one in Chicago, a regular foundry & machine shop at Lime Rock too, plus a mine at Amenia, the Davis between Lakeville & Salisbury, the Old Hill & Chatfield west of

Lakeville and Weed mine at Boston Corners NY. & mines at Richmond Mass. Also they operated a sawmill 7 2 grist mills, one at East Canaan and one in Lime Rock.
{S-18}
Their furnaces were at East Canaan:3, Lime Rock: 1, Huntsville:1, Cornwall Bridge:1, Sharon:1, Irondale NY.:1, Richmond Mass.:1. Controlled output of Chatham furnace Chatham NY. & VanDeusenwille Mass. also a wonderful chemistry [lab] fully equipped at E. Canaan.

They were forced to abandon a mine because of excess of manganese. Joseph Adams, a chemist & geology instructor at Yale, later was engaged for a time by the Co. to check their ore deposits & analyze their ores. He told the writer all the whole story after he retired, also he proved there are 3 places which manganese is easily come by, in fact he gave me his analysis of ore from numerous deposits which ran very high.

It was for years a common sight at Lime Rock depot to see hundreds of car wheels stored there for shipment and a like amount of wheels removed from obsolete cars shipped back for remelting to go to Lime Rock foundry.

End of Tan Notebook

Part 4 - The Composition Book

[The Composition book is the only one of Wallace's notebooks that is dated. It was written in the fall of 1957, some 40 years after the events he discusses in it.

It contains two more versions of the early history of iron in the Salisbury area as well as some more details about the mismanagement that led to the demise of the Barnum & Richardson Company.

There are several pages of numbers that give the chemical composition of both ores and end products. In some cases the abbreviations for the components are hard to interpret., nevertheless they have been included in this transcript.]
{S-1}
The first production of iron in New England was at Saugus near Lynn Mass, being produced from bog ore. Late as its production increased ore was brought in from New Jersey. A feeble attempt to expand with same resources was recorded in New Haven area, but the real permanent and most gainful production of ore & iron came from western Connecticut, eastern New York state & western Mass. The other 2 ventures played out.

Records and publications have fully covered the early phases, owners and operators apparently not without bias in some instances with intent to create a fictitious [colossus] by eliminating everything & anything which might contradict or supercede the individual covered or to take from him the master [role] by eliminating all mention of the great iron men.

To endeavor to correct errors of omission & commission, let's start with this statement. Salisbury Charcoal Iron is the one {S-2} iron in the world with any number of imitations but no substitute. In previous writings the principal & important men connected with & responsible for the development of the industry were honestly & carefully recorded up until about 1856, but from that time on the main owners , producers and those most directly concerned & connected with its development have been studiously given no mention. This is almost malicious because it omits all the real developments and all important happenings that bid fair to have made this area a real factor then, now & always. i.e. the Pittsburgh [illegible]

I am listing here as well as I can the principal men engaged in this work in the order of their importance & may I add that the only furnaces worthy of mention as major factors are Lakeville furnace, Livingston's furnace & 5forges at Ancram {S-3} Lamb's furnace, Forbes & Beckley furnaces at Canaan, Miles furnace at Copake, Richmond Iron Works, Richmond Mass., Cheshire furnace, Cheshire Mass. Van Deusenville & Glendale furnaces & Chatham NY. Each in towns so named. Hunts furnace, Kent furnace and Sharon furnace & Irondale.

True there were in all 38 furnaces & forges that operated one time or another but for such short periods that they never influenced or affected the industry to any extent, dying natural deaths while the rest progressed.

The only men after 1856 who count were the Barnums, Wm. M. Barnum & CW Barnum M. B. Richardson Sr. & Jr. also MB Senior, father. Wm. Miles Sr. & Wm. Jr., the Scoville family of Lakeville, Mr. Samuel Colt now of Pittsfield Mass. The Woods at Cheshire and Kniffins in W. Stockbridge, Maltbys of State Line NY.

{S-4}
Barnum Richardson Co. formerly Richardson Barnum Co. of Lime Rock were the hub of the whole industry. Est. 1734.

They operated & owned 1 furnace at Lime Rock, 1 at Huntsville, 3 at East Canaan, 1 Millerton, Maltby's and Richmond Iron Works, Richmond Mass. until around 1907 when they sold to Mr. Colt. Added to this by agreement they, for a time, controlled the output of these furnaces plus that of Chatham, Copake, Chapinville or Scoville furnace and Van Deusenville, Sharon Valley, Irondale

They operated Amenia ore bed, Ore Hill, Davis, Chatfield and Weed mines although the Weed, the last mine opened, was practically a baby as it started in 1916 being located near Boston Corners. (Livingston at Ancram had 1 [furnace] & 5 forges using Ore Hill & Morgan mine ores, later Copake.

[The characterization of Weed mine as a "baby" is not entirely accurate as this mine had been worked in the 19th century, closed, then reopened in 1916. Wallace notes elsewhere that there were problems with the purity of the ore at Weed until deeper deposits were uncovered. This may explain why the mine was closed for a time.])
{S-5}
In addition to this the company operated one large car wheel [casting[foundry in Chicago making 180 wheel per day & car wheel shop [capacity] 80 wheels & foundry for general casting & a machine shop at Lime Rock and lastly a 60 cord chemical plant at East Canaan.

Wm. H. Barnum was a born organizer, a man of great intellect, keen as a razor, and a builder. However unfortunately for the industry he became interested in politics at which time he was both [president of Barnum Richardson Co.] and the Housatonic RR. Applying himself to politics in the manner he undertook everything [else] he eventually was made chairman of [national Democratic Party] responsible for the election of Grover Cleveland but the iron industry suffered by his neglect.

The story is that the steel manufacturers were making hay while {S-6} this took place. By stories and influence [they] made inroads in the business, they offered steel to supplant Salisbury castings and with skilled sales pressure seriously affected the situation so that they abandoned the Chicago branch. (Sold it it to C M & St. P. RR) Mr. Barnum then set about controlling all output in the region, which he did.

[Wallace makes no mention here of the Ensign foundry in Huntington West Va. While it did not bear his name, W. H. Barnum was also president of this enterprise and it clearly stated its connection with Salisbury in its advertisements. The Ensign family associated with this works was from Sharon Ct. and doubtless good friends with the Barnums. The combined capacity of the three car wheel foundries probably meant Barnum controlled most of the car wheel market for some period of time.]

Also, from time way back, BR CO. made & furnished the Housatonic RR [illegible] with all their car wheels, each wheel guaranteed for 5 years or be replaced free and replacements were [nil]. The wheels outlasted the cars.
{S-7

BR Co. were the originators of chilled rolls and none could equal them for uniformity & depth of chill. Added to which was their unusual long life but the patents were allowed to lapse and others took up the production but they were forced to buy [Salisbury Iron] to maintain quality.

Mr. Barnum's health became bad, then came the gradual dissolving of output control, the sale of [Richmond Iron Works] to Mr. Colt.

The writer came to BR Co. in 1910 at which time the country was in a depression which steadily grew worse. It was not uncommon to see from 16 to 20 men walking the roads nor to have them offer to work at anything to get something to eat.
{S-8}
At the peak of this with but 1 furnace running, Mr. Barnum, CW who now was new [president], came up after ordering Lime Rock furnace started & ordered out #1 blown in. I asked him what we would do with the iron as there was no market. He said "Bill, this is the best time to produce it we could have, for our men [stayed] with us in good times, we must stick with them thru this by giving them steady work while others are laid off. I will run these furnaces full blast till times change if we have to mortgage everything we have. When the turn comes we will be ready to serve the trade, have an organization, & sell iron at fancy prices." How true this was. With the outbreak of hostilities in Europe we hired every man & team we could get.
{S-9}
To load iron night & day, our piles had grown to 35,000 tons. It was piled everywhere we could find space & both sides of the road to Canaan from the upper furnace to lower with just room for teams to go thru. In no time it was gone & we were nearly crazy trying to fill orders at $60. per ton instead of the old price of $28.

Mr. Barnum's health began to break about this time and he was succeeded by W. M. Barnum of NY, his brother, an especially able man, member of a large law firm. He seldom came around leaving the management to others and eventually trouble came in the form of unworthy accepting the services of a consulting engineer at a fabulous salary who was just a bluff, but he got {S-10} away with it, fostering into the Co. his brother-in-law as Mine Sup't., the other [brother-in-law as Sup't of the Co. plant & another as Gen'l Manager all at handsome salaries, but wholly unfitted for their responsibilities.

He condemned everything the writer had done or contemplated doing. Condemned our #1 furnace, ordered it abandoned, & set out commissioned to lay out & build a modern 100 ton furnace at E. Canaan, his biggest error. He also ridiculed some operations at the [chemical] plant at which time the father of this industry who had built all the plans in the Co. was operating it. Was promptly slapped down in front of all the Co. officials but he maintained his colossal bluff & was allowed to go ahead with the process. He acquired plans of a [?] furnace and those of [?] of Mich and set out from these to draw plans & design his furnace resulting [in] 2 lawsuits after the furnace was nearly done for infringing of patents aggregating $500,000 added this was another suit of 1/4 million by a Canadian concern. These 2 were enough to wreck them but in addition to this $165,000 in funds were missing thru fraudulent manipulations of another employee. In less than 2 years and poor old BR Co. had to bow its head. Added to this the Griffin Car Wheel Co. was working tooth & nail to push them out of the car wheel business.

In spite of all this [Salisbury Iron's] bright light still shone untarnished and the [company's] array

of customers, some of whom I list, was ever after the iron.
{S-12}

Bethlehem Steel Co.
Birdsboro Steel Foundry & Machine
American Steel Wire Co.
American Locomotive Co. & Baldwin [Locomotive Works]
Railway Steel Spring\
Chicago, Milwaukee & St. Paul RR.
Pierce RR Co.
Chilled Roll Foundry Co.
Jones, Loughlin Steel
William Cramp & Sons [Foundry]
[United States] Navy
Washburn [Wire] Co.
Farrell [Foundry & Machine]
A large firm in Brazil
Mexican government
Stanley Works
Sessions Foundry
[General Electric] Co.
... and others

{S-13}
At this time BR Co. was in full control of Amenia, Ore Hill & Weed mines, all operating. Ore Hill continuously since 1750 Weed, the youngest from 1915. [See page ? for notes on Weed.]

Ore Hill ore by outsiders was always belittled as being too lean & not enough manganese. This was I believe the outcome of efforts during W. H. B's tenure to hurt the Co., but this was far from true. Ore could be had to run 55 to 60% iron if we wanted it, but that we did not want because the running of ore over 47% metallic tended to reduce the [tensile] strength, so our mixture ran with various changes as necessary from 1/8 Amenia 3/8 Weed & ½ Ore Hill to 1/4 Amenia 1/4 Weed balance Ore Hill etc.

Changes were needed to produce grades & chill too. As for manganese, we never were embarrassed by lack of it, & even {S-14} got out all we needed during WWI for the foundry.

Everything possible has been done to create the impression that Harlem Valley ores are too lean for economical smelting operation. All this talk is by people who have absolutely [no] personal knowledge [acquired] by either contact with mine or furnace operations and such wordings as have come forth in the last 20 years as to why the industry died are worthless and [all] of the information [used] was furnished by 1 man who never had any connection with the industry in any way shape or manner.

Such articles as that with book ["Housatonic"] are worthless and in no way tell the true story.
{S-15}
The author of the book did not attempt to contact anyone interested directly in the operation of the industry or Barnum Richardson Co. In no part of the article he published did he mention any member of either B. R. Co., the Miles's, Scovilles or Mr. Colt, who now resides in Pittsfield, only the Holley's who were only an incident & detriment.

there are millions [more] tons of good ore in that valley. Ore Hill mine which [produced] for 200 years was but a speck of the whole area.

Analysis Tables

[The Composition Book contains three pages of tables that give chemical analysis data on ore and pig iron. In addition there is some data on the strength of pig iron. While most of the abbreviations are understandable, two of them cc and gc are unique to metalurgy and stand for combined carbon and graphite carbon respectively. The tables reproduced here as written in the notebook.]

Analysis of Iron - Canaan Lab 1916

		CC	GC	Phos	Mang	Sul	Sio
	#1	0.57	3.07	.21	2.81	.03	1.13
	#2	2.05	1.34	.22	1.05	.025	1.10
	#2	2.05	1.28	.20	1.07	.01	1.31
	#3	0.56	2.84	.22	.60	.02	0.95
	#4	0.98	2.55	.22	.65	.03	0.59
14							
	2	.99	2.74	.24	.91	.19	1.25
	3	.78	2.86	.22	.87	.02	0.80
	3l	.76	2.79	.22	.88	.02	1.03
1914							
	2a	0.99	2.96	.24	1.57	.01	2.85
	2B	0.71	2.69	.26	1.62	.01	2.27
	3a	1.12	2.47	.26	0.77	.05	1.22
	3B	1.02	2.34	.23	0.77	.047	1.27
	3L	0.76	2.87	.24	1.17	.03	1.71

{S-}

1914 - apr							
		CC	GC	P	M	S	Sio
	2	0.71	3.09	.29	2.05	.005	1.63
	3	0.66	2.93	.28	1.10	.01	1.93
	4	1.02	2.54	.25	0.78	.01	0.86
4/28							
	2	.85	2.84	.28	1.25	.003	2.18
	3	.85	2.93	.26	1.01	.009	0.85
	4	.85	2.56	.24	0.76	.02	.85

Tensile Strength

#3 & 4	1” bar	41882 lbs/sq inch
#5	“	46000 “
2+3		40000 “ 42000

	1	2	3	4	4½	5	6
FE	92.37	92.31	94.66	94.48	94.08	95.68	
GC	3.52	2.99	2.50	2.02	2.02	-	
CC	0.13	0.37	1.52	1.98	1.43	3.83	
Sio	2.44	2.52	0.72	0.56	0.92	0.41	
P	0.25	0.25	0.24	0.24	0.25	0.24	
Sul	0.01	0.02	T	0.04	0.035	0.03	
Mn	1.28	1.12	0.86	0.76	0.68	0.60	

Ore

M	S	Sio	P	Fe
2.49	.06	10.40	0.159	48.55

Lime Rock

	cc	gc	M	P	S	Si
2	.924	2.50	.99	36	.03	2.40
3	.894	2.55	.77	32	.04	2.00
4	.926	2.33	.54	30	.06	1.45

Furnace regular men

2 Firemen
2 Helpers
1 Iron breaker
2 Fillers
2 Helpers
2 Ore men
3 Coal forkers

14 men 1 furnace, 32 for 2 furnaces
2 engine men
16

1 blacksmith
1 carpenter
2 foremen
6 teamsters
6 Laborers
16

1 Weigh master & time keepers
1 Watchman

32
16
2
50

[While the next section starts out as yet another description of the origin of iron making in the Salisbury area, it goes on to describe some of the tools and techniques related to production and is therefore worth reading despite the repetition of some material.]

Iron was first produced in New England at Saugus Mass., bog ore was used. Later as ore production from this source became more difficult etc, ore was brought in by boat from New Jersey. An attempt to expand so to speak, caused a furnace to be constructed at New haven Ct. using New Jersey ores. After a short period, both those enterprises ceased operation.
{S-20}
In mean time discovery of excellent grade of ore in large quantities was made on what was at that time a part of the famous "Livingston Patent" just East of Millerton N.Y. and about the same distance west of Lakeville Ct. This later became known as the famous Ore Hill mine. Adjoining Ore Hill is the Chatfield mine or what is now Deep Lake Farm. Midway between Lakeville & Salisbury and West of main highway is located the Kendrick mine, later called the Davis mine from which the first furnace built by a man named [Thomas] Lamb in 1734 secured his ore.
{S-21}
The furnace built in Lakeville came next [in] 1762, J. Hazeltine, Samuel & Elisha Forbes and Ethan Allen built this & operated it until 1768 when [they] sold out to and Englishman named Richard Smith a Tory who upon outbreak of Revolution fled to England abandoning his holdings here. The colony of Ct. immediately took over operating it for exclusive benefit of Revolutionary forces. Forges, foundry & large trip hammer were operated here and products were anchors, [cannon], solid shot, rods, bars, and plates. In conjunction with this operation & to expedite the production & completion of [cannon], a small forge & steel plant was opened at Colebrook Ct. Here steel was made. The steel was made into drills which when taken to Lakeville were used by horse power to bore out the [cannon]. It is to be remembered that [iron] produced prior to construction of Lamb's furnace was made at the several forges by what was called {S-22} the sinking process which produced a sort of malleable iron without having to pass thru the pig iron stage. In reality it was like an enlarged blacksmith's forge and iron produced was spongy mass of metal which by stirring gradually took the form of a ball which when removed was worked into rods, bars, nails, spikes etc.

It is to be remembered that about the time Lamb built the 1st furnace here that the Livingston furnace & 5 forges were also built at Ancram NY. It was Columbia Co. & New York's 1st furnace. This furnace obtained its ore from Old Hill mine, Morgan mine & later Copake. Livingston was commissioned to build some wheels for Ethan [Allen's] attack on Ticonderoga but just then tenants & rent troubles in the patent developed becoming hot & the tenants attacked his works at Ancram damaging it so {S-23} he was unable to fulfill his assignment. During the Revolution the whole of New England effort depended on operations at Lakeville. The only iron available in the Northeast was Lakeville, Ancram and Sterling Iron Works, Sterling NJ.

These original furnaces as were those to follow had to be located on & adjacent to streams dependable for water power to supply the blast.

The equipment in the beginning for the blast consisted of a [mammoth] bellows like those much smaller used in blacksmith shops which operated by water power on a eccentric. Later the cylinder type blowers were adopted.

The maximum capacity of the original cold blast furnace was 1 1/4 to 2 3/4 tons per day. More often 1½ tons.
{S-24}
all furnaces built up to 1833 were this type. After this a number were converted to hot blast which greatly increased production up to as high as 17 tons per day.

The oven for the hot blast had 2-4 or 6, according to furnace, cast iron bed plates or boxes [through] which the cold air passed into syphon pipes. Each box carried 16 to 20 pipes thru which it passed becoming very high temperature passing into bustle pipe at furnace then thru the tuyeres in the 3 arches to the furnace hearth.

Temperature control of the hot blast ovens was had by dampers on top which were changed as furnace conditions called for.

Livingston furnace at Copake was on site of the present paper mill. The forges, 1 near the furnace, one on opposite side of stream, 1 near the dam & 1 on west side. One was washed away in a flood in 1839, 2 torn down {S-25} the others converted into houses.

Furnace was demolished in 1854.

In July 23, 1775 Livingston wrote a letter reporting the raid by county renters who wrecked his plant so he couldn't furnish wheels & shot expected of him for the Ticonderoga & Crown Point expeditions.

After Revolution Copake & Lakeville iron went into sleigh shoes, nails, [spikes], rods, bars, chains, cake and mill iron & castings.

The old Kendricks ore bed later the Davis was an open pit. First owned by Thos. Lamb, later by heirs of Samuel Forbes. Sulphur of iron was discovered on Barrackmatiff Hill at Moore's mine. Sugar Hill.

A pig of iron from the old cold blast furnaces had no comparison to pigs of the hot blast furnaces and as we known them although pigs of present day size carrying name & "Salisbury Iron" and date were made too. As all working in iron was by hand and [transportation] by horses or oxen, pigs were very much smaller in

width, thickness & length, {S-26} i.e. a pig of cold blast iron of which only one is known to be [existent] is owned & was found after years of search by the writer. It is 1½“ x 2” X 11” weighing 11 lbs as compared to pigs we know which weigh 95 lbs.

In the beginning the charcoal fuel for these furnaces and all thereafter was burned in pits of from 50 to 75 cords. A cord of wood converted in pits yields [an] average of 45 bu, and had great strength coming much from the pits in full 4’ lengths.

All furnaces from 1833 operated in hot blast as fast as conversion could be made with the resultant increase in output from 2½ tons per day to as high as 17 tons.

There is a chart made a few years ago [giving] all 38 furnace locations from beginning to 1922 fairly accurate. [Thirty eight] in all are listed but there were more in NY state which it doesn’t show.
{S-27}
With the advent & installation of hot blast, all blast machinery was still designed for pulsating blast & water power.

The installation being 2 wooden cylinders intalled in either horizontal or vertical position. These cylinders were of 3” tongue & grooved pine, with cast iron bottoms & tops. The intake was 2 square holes with a grill, inside was a large piece of White Oak leather which dropped back allowing air to enter on down strike, delicately weighted to as to immediately close with up stroke to create compression air being forces into stuffing box there to pipe line to ovens for heating at pressure from 3/4 lb to 2 3/4 lbs.

With passing of time and to take care of water shortage, steam was brought into play as an auxiliary.
{S-28}
Later high speed rotary blowers were designed by B. L Sturtevant of Hyde Park Mass & installed in the only furnaces left i.e. Richmond Mass., & E. Canaan Ct.

Two engines & two blowers for each furnace. These gave a steady blast and higher pressures could easily be had. They functioned perfectly as did the furnaces contrary to all dire predictions and again production increased.

In 1905 all burning of charcoal in [New England] ceased as charcoal was available in unlimited quantities from by-products of the destructive distillation plants of [northern Pennsylvania] and [southern New York] at much lower prices, in fact 4½ cents per ton delivered. This charcoal was not to be compared with pit coal for [tensile] strength and more bu could be used per ton of iron, in spite of which it was much cheaper. This change wreaked havoc among farmer producers and created a labor problem with so many pit operators & woodsmen, {S-29} choppers, teamsters etc being displaced, but shortly the brass mills of the Naugatuck Valley &

lime plants of Housatonic Valley absorbed them all. As these plants used wood for fuel.

The writer came to Canaan in 1910 being employed by Barnum Richardson CO. of Lime Rock in 1911 where he was employed till 1918 when I entered navy service, later the army.

There were two tools of the trade most essential to charcoal handling. One was the charcoal [fork] the other the charcoal basket. These [latter] items were unlike any other basket made. They were an exact duplicate in shape and make up of a clam shell and a heaped [charcoal] basket was rated as a bushel. There 20 or 30 left in a shed when auction came and no doubt were burned as they were {S-30} only of real use for the purpose they were designed for. These were also stone forks for forking the flux stone. A charcoal fork was at least twice the size of a stone fork and were really a very handy article for other purposes.

Ore carts were made wholly of iron with [cast iron] wheels. [Charcoal] carts were made of wood, some with iron wheels, some wooden. Later these carts were lined with [galvanized] iron to expedite dumping.

The furnaces at East Canaan were the only furnaces ever to operate with no waste in later years as all slag, all [charcoal] screenings and cadmium plus iron were sold at a profit. [The word cadmium here, probably refers to "cadmia" or zinc oxide] As for the chemical plant its only waste was ashes from fireboxes under retorts & waste liquor from stills.

[Pig iron] sold at premium prices.
Charcoal [illegible] at 1/3 more than [original] cost
Cadmium as high as 100 per ton, not bad. [once again, probably cadmia or zinc oxide]]

Does this look like an operation headed for [bankruptcy] ? No. That was another matter.

End of Composition Book

Part 5, The small manuscript

[The small manuscript is written on 8½ X 11 unlined paper. It comprises 14 sheets written on one side and is not dated. Mr. Wallace's handwriting in this manuscript is much harder to read than in the other items, perhaps indicating they were written at a later date when the ravages of age had asserted themselves and affected the quality of his penmanship. Whatever the case, the material in this manuscript contains more illegible items than the all the others combined. It contains versions of events described elsewhere including the traveler who made the furnace lining, rail yard operations, the Thomas Edison story, the election of Grover Cleveland, the challenge to the 'steelmen' to make a cannon, and the stolen furnace plans. Little new material is revealed, but this material is included here for completeness.]

{S-1}
Shortly (2½ years) after I went with BR Co. we installed high speed rotary blowers at both furnaces using the old pulsating blast in fall, winter & spring when water power was available.

Every one said the new blowers would not work and that all our employees were men who had worked for us from 10 to 50 years they wouldn't play ball, weren't going to be cooperative, but quite the reverse was the outcome. They were just as interested as we & not better cooperation could be had even to submitting suggestions some of which were good.

The tonnage at #1 jumped from 16 & 17 tons to 24 tons per day & #3 did well too. We substituted ten low side hopper bottom cars for ore enabling us to unload a car of ore in the winter almost as quick as summer using steam to thaw the ore out.

Costs in 1910 were $32.00 per ton. By 1917 they dropped to $25.00. Price of iron FOB cars 1910: $28.00. By 1917 - jumped to $65.00

During 1912 & 1913 times were bad, unemployment awful. It was an everyday occurrence to have from 2 to 10 men walking the roads looking for work to offer to work for 50¢ a day just to get {S-2} money for food. Up to then never had anyone (hoboes or others) been allowed to stay around the furnaces at [night].

One cold [night] 6 men & a boy showed up, [one], an old man, had a terrible cold. So [I] gave them a note to [the night] foreman to let them sleep back of oven at #3 & not bother them. Got them food, whiskey & quinine for the old man & left.

Our #1 had just been shut down for relining and next AM they all showed up at office asking if they could scrub the floors, wash the windows or anything. Told them no. Then the old gentleman spoke up saying he felt fine and would like to do something for me and would I listen. Told him yes. He asked, "You use fire clay,

Harbison Walker perhaps ?" I said yes. He said "You have a far superior product your using to stop the notches with. May I explain ?" So told him yes. He told me he was a chemist even if he didn't look it & he would show me how to get 6 months longer blasts if I would let him. {S-3}
He told me to get a large tin dipper & a sack of material, a common article, and asked if we had a large receptacle to heat water in. I said yes.
"Okay, if you will have some men put it on brick about 1 foot & ½ off [the] ground, fill 3/4 full of water, bring me what I mentioned & follow my instructions I guarantee you will get 6 to 10 [months] longer blasts."I called on our mason, he listened, then said it sounds good. "What are you going to do, Bill ?" I said we will try it, if it fails they can fire me. So we did.

When the furnace was ready we fired it and after it had been running 14 [months] Mr. B. mailed me asking how long had #1 been in blast. I told him. He said "Good heavens, run her out. Are you crazy ?" He was a good furnace man so I said come on with me. Took him down to furnace and said "Take a look in those tuyeres and if you still want her run out, OK."
{S-4}
He looked in all 3, straightened up and said "I'll be damned, use your own judgement. I'll never question it again. I don't know what is going on of the explanation, but you sure must & when you do run it out, call me, I want to see it"

Ran it 6 months more and ran it out but could have gone longer. He came up when we removed the jacket plate & brick, went in and came out saying "Let's get to the office, I want the story." When it was told, he said, "It proves that bread cast upon the water returns four fold."

He was a wonderful man. He knew every employee by his first name, all [about] his family and had a heart as big as [a] house. Let serious illness, strike an employee's family or an accident and he was right on hand to see necessary care was possible or financial help available free of all strings to effect a happy outcome. but no one came to him in his last days.

We wound up by selling charcoal screenings that had been thrown away for years for 1½¢ per bu more than they cost us and the cadmia [zinc oxide] taken from the furnace {S-5} twice each year averaging 10 tons @ $80 to $100.00 per ton metallic content which was 95% pure zinc oxide. The slag banks, an accumulation of 150 years, was sold for $50,000 and BR Co. was on the way up if left alone.

Too much efficiency of the new efficiency system increased expense, caused duplicated effort, confusion & trouble but never eliminated the necessity for taking the physical inventory annually. The perpetual inventory never worked and I doubt if it every has anywhere else.

Between the furnaces, slag plant and [chemical] plant we averaged 80 carloads &

[empties on hand] daily. Charcoal, wood, ore inbound & pig iron, alcohol, acetate and slag aggregate outbound.

An inventory of at least 20,000 cords in [yard] at all times was a necessity as the wood must season 1 [year] before being carbonized.

The engineer who designed the furnace was accused of pirating or infringing the patents of 2 large [corporations] & Co. was sued for infringement in 2 suits aggregating nearly ½ million dollars. This was the beginning of the end as the Canadian Car Foundry Col. & Charcoal Iron Co.[brought] suit. Then misappropriations plus other fast work [brought] them to their knees & bankruptcy. In all this the Griffin Car Wheel [Company] was interested to the extent that it would eliminate their strongest competitor.

No one yet has ever made a wheel to compare with the [Salisbury] Chilled Car Wheels, probably never will.

A former [foundry] manager of the American Brake Shoe [Foundry] Co. told me they did a good deal of work for Hon., Thos A. Edison, and after 1922 he was working on an improvement in recording the human voice and they made up the stock for the needles of steel at his order. {S-7} When the needles were tried out they were unsatisfactory in that they scratched too much so [they] tried Norway Iron. This too was not good. So Mr. Edison came over & told him "There is only [one] iron that will do it. Get Salisbury Iron, make up the stock from that." He said "I told him that was impossible as the firm had gone out of business." He replied "I have 600 tons & will send you over [one] ton." He did, they ran [off] a light heat, made up the stock and delivered it on a Sat A.M. Mr. Stoye said "Do you know what happened ? Edison called me in the middle of the night in the following week saying 'Bill, we got it. [That Salisbury] Iron is perfect and when the day comes T. A. Edison can't get [Salisbury] Iron to work with he will fold up as an inventor.'"

There are many imitations but not [one] satisfactory substitute.
S-8}
During Cleveland's campaign the situation was critical. The Company had the tape recording telegraph instruments in use at their office in E Canaan. As the tension mounted, Mr. B. learned the election could be clinched by Florida vote. He arranged a code message in case he needed funds which Sam Bradley, the [treasurer] at Lime Rock would get. In it, if he needed $20,000. he would wire Sam to send him 20 mules.

He went down and found 30,000 would swing it so wired Sam as follows: "Sam send me 30 mules." and he carried Florida electing Cleveland.

In 1912 the writer was then [General] Manager at [East Canaan], these old instruments, in perfect condition, with rolls of messages on them, were in the office

taking up valuable space. On one of them that message is supposed to be. These 2 instruments, complete, are now in the Ford Museum at Dearborn, Mich but they know nothing of this.

At this time, Hon C. W. Barnum was [president], shortly after this he was succeeded by W. M. Barnum of New York.
{S-9}
Added to all this were mismanagement & waste in wood procurement [department] and later in construction & operation. One blunder alone cost $40,000 - and another $15,000 - so how could the grand old Co. keep going ? That's what happens when you hire wallpaperers to do your plumbing. Bankruptcy was the conclusion or strongly possible outcome but to this day Salisbury Chilled Iron has never been equaled for [tensile] strength, uniformity, or depth of chill and thousands of tons of pig iron made on 2 tons of ore per ton of pig. For reasons it was impossible to use ore higher than this in metallic content without a sacrifice in quality.

Our Richmond furnace had passed into hands of the late Hon. Sam'l Colt of Pittsfield who ran it for years until 1922. They (BR Co.) were operating 3 mines; Ore Hill, Amenia, and Weed; 3 furnaces, 1 car wheel shop, 1 general foundry plus the [chemical] plant. All this died for no good reason & could still be in successful & profitable operation and Salisbury Iron today would still bring a differential {S-10} in price of from 2 to$ 3.00 per ton [over] all other irons. There is yet no satisfactory substitute as stronger iron and chilled castings defied grinding, cutting drilling. Surely father time had a serious and [unbeatable] competitor in this material. The only one he need worry [about].

In deepest sorrow for their passing & with sincere respect to their memory I dedicate this to the finest men I ever knew: Mr. Chas & Wm M. Barnum, M. B. Richardson, Sr. & Jr., R. M. Barnum & Walter, Sam Bradley, Wm. Miles, Sam'l Colt, Chas. Kniffin, G. W. Cowdry Sr. & Jr.

In conclusion may I say that Yankee invention genius owed much of its celebrated reputation to the availability of [Salisbury] Iron to provide the sinews?? of successful quantity production to world markets. Even Collins Co. of Collinsville will pay tribute to Salisbury Iron.

[The final pages of the manuscript appear to be somewhat disjoint and may be out of order or simply stand by themselves.]
{S-11}
Up to about 1905 all charcoal was made for these furnaces in this area in pits or kilns. Barnum [Richardson] Co. acquired thousands of acres of woodland & had crews cutting & burning all over W. Mass, Ct and E. NY.

Then came the acid plants in So. NY. & No. Pa (1905) producing thousands of bu [of charcoal] per day, [as] a byproduct. The Co., thru the [Manufacturers Charcoal] Co.

& Standard [Charcoal] Co. of Bradford Pa [bought] 80% of it, shipping it in by rail from as far out as Olean NY and [Ulysses] Pa.

Up to the conclusion of the Civil War Salisbury Iron was the U.S. govt's specification for [ordnance]. The USS. Constitution was equipped with [about] 50 cannon 16" and 32 - cannon 24". [He probably means 16 and 24 pounders here as there has never been a naval cannon with a 24" diameter barrel.]

After the war the Bessemer process came into the picture and the steel men of Pa. set out to dethrone the iron cannon. The battle in [Washington] was bitter and finally the old gentleman representing the Cheshire Iron Co, {S-12} Mr. Woods, who the furnace at Cheshire became so enraged he challenged the steel men to a duel of guns. He told them "I will go home and build a cannon of iron [that] will out shoot [and] outlast anything you can build, tested any way you want. Ship your gun to Boston Navy Yard, I will do the same and we will see who had the best guns and we settle this once & for all.

He did. The steel men didn't dare compete, so he shipped his gun back to Cheshire, broke it up and died heart broken.

BR Co. made all the car wheels for the NY, NH, & H RR. Each wheel guaranteed free from all defects for 5 years. Any failure in that time & the wheel would be replaced free and replacements were not worth consideration. The wheels outlasted the cars.

When the Co's patent on chilled rolls expired, it brought into being the roll [manufacturers] such as Chilled Roll [Foundry] of Vandergrift Pa. - Farrell [Foundry] & [Machine] Co. of Waterbury etc.
{S-13}
The W. Stockbridge furnace run by Co. Kniffin was the only anthracite user. At Sharon a furnace was built in the village by a former sea captain who was very religious i.e. to the extent that he refused to operate it on Sundays having the furnace banked Sat. [night] & returned to blast Sunday [night]. His furnace soon closes [on account of] losses.

In 1916 BR Co. decided to build & operate a chemical plant (destructive distillation) capable of using 60 cords per day. It was built together with a new 100 ton blast furnace in the large meadow S. of route 44 across CNE RR tracks opposite E. Canaan station at a cost fo $350,000 by the Connecticut Chemical Co., a subsidiary of BR Co.

By carbonizing 60 cords per day, the output of charcoal for our furnace use was 2500 bu per day, 660 gal wood alcohol, 10 tons of acetate of lime and the tar was used under boilers to make steam for the stills refining raw liquor to alcohol and acetic acid. The acetic acid was pumped into evaporating pans on top of retorts

where high calcium lime was mixed with it and evaporated, being bagged for immediate shipment.

Operating in conjunction with retorts were 2 sets of coolers -12 in all. They operated their own switching engine as we had nearly 5 miles of track included that serving the NE Slag Co.
{S-14}
Part Henry NY. Historical [account] of Port Henry discloses one of the first furnaces in the country was built here in 1822 by Messrs James [&} Dalliba.. It was a cold blast furnace and we used to make pig iron. Port Henry pigs were 2" X 2" X 12". Later several furnaces were built using anthracite. This eliminates Port Henry as a source of iron for the chain or chains across the Hudson.

End of Small Manuscript

Part 6, The long manuscript

[The long manuscript is so called because it is written on legal size paper, not because it contains a large number of pages. It comprises two parts, one a set of loose sheets clipped together with paper clips, the second a set of sheets still bound together as they were in the tablet. They appear to be portions of the same legal size tablet. There is limited continuity between sections and indeed from page to page in the loose sheets. It may be that the loose sheets are simply out of order in some cases. They appear here in the order in which they were found.]

In 1731 on land appropriated by Yale College on which land lived a Mr. Bissell iron ore of an excellent quality was found. Two years later Phillip Livingston of Albany NY. and some others received a grant of 100 acres of land and began taking out ore Later [with] Thomas Lamb [they] set up a bloomery or furnace at Lime Rock Ct. 5 miles from the ore bed. where in [1732] a blast furnace was built. This furnace was followed by a foundry for making castings from pig iron of all kinds and chilled rolls, a car wheel foundry and machine shop [and] also a grist mill. all of which as Barnum Richardson Co., [It was] founded by Milo Barnum associated with his son-in-law Leonard Richardson, followed by his son Wm. H. Barnum who in addition to being New England's greatest iron master, US Senator, leader of the Democratic Party electing Cleveland was the founder of Barnum Richardson Co. manufacturers of the famous "Salisbury Iron". He in turn was succeeded by both his sons C. W. Barnum and Wm H. Barnum under whom in 1922 the Company ceased to exist. They at one time operated a large foundry & car wheel shop in Chicago, owned or controlled in addition to Lime Rock 3 furnaces at East Canaan, one at Huntsville, Richmond Furnace, Richmond Mass., Cheshire Furnace, Sharon Valley furnace, Sharon Valley Ct. as well as Chatham furnace, Chatham NY. and had a working agreement with Fred Miles of Copake and with his sons.
{S-2}
To get back to Salisbury, the ore mined in 1732 was carried on horseback in leather bags & Ousatonic Mass. as well as other points later in like manner.
In 1740 some of Livingston's heirs who still mined part of the grant's mine erected a furnace or iron works at Ancram NY. using ore from the Old Hill mine.

In 1762 John Hazeltine, Samuel Forbes & Ethan Allen [bought] land & built a furnace at Furnace Village near Lakeville at outlet to the lake which afterward sold to Chas. 7 Geo. Caldwell of [Hartford]. It produced 2½ tons of iron in 24 hours from 3 tons of ore using 250 bushels of charcoal. Its blow works consisted of a pair of large leather bellows operated by a water wheel. In 1768 control of this furnace passed to one Richard Smith a rank Tory who upon the outbreak of the [Revolution] fled to England. The [Governor] of Connecticut then ordered the furnace seized. It having been rebuilt in 1770 at outbreak of hostilities the legislature authorized the Governor's appointee, Col. Jed Elderkin to spend £1,450 [pounds] to outfit the furnace which was done and operations began again with 59 men. Iron was made 1 ton to each 2½ tons of ore and 95 [bushels of] charcoal.

Here if anywhere history was made. Benedict Arnold, Ethan Allen, John Jay, & [Governor] Hammond were all directly interested.
{S-3}
"Great oaks from little acorns grow". This surely applied to the iron industry of America.

From a humble and almost insignificant start in Saugus Mass. to the present mammoth production, the greatest of all industries in the world, as well the oldest known to man, as science and research have proved.

From Abraham Shaw, Robert & [Bridges] 1637 of Mass. to the Carnegie, Bethlehem, Taylor & U.S. Steel. Then this infant industry destined many times to wave the nation in time of war to today when it directly and indirectly gives employment to the bulk of our citizens in peace.

From the first iron pot (still in existence to the [mammoth] cranes & machines of today all in almost 300 years we lead the world.

It seems strange indeed that the history of the first and most important industry of New England and the nation as a whole is so neglected. There is no industrial writing that covers it as a whole hardly worthwhile. {S-4} Apparently no great amount of thought or effort to record its growth or development as a whole had ever ben made, yet the iron masters of the early days, their descendants and those of today may well be proud of their work. They, more than any other single group, have been responsible for the success of our nation as a whole & and its safety, for they have given us our mines, our furnaces and steel mills, our factories using their products of their mills, the foundries, the railroads, the machinery for construction of buildings, highways, bridges, tunnels, electrical plants, water works, [steamships], [aeroplanes], battleships, artillery, oil wells, natural gas and thousands of things too numerous to mention.

The history of the industry on Mass. Ct,. R.I., & Me. is as follows with reference to ore & iron only.
{S-5}
the first iron produced in the colonies was the result of activities of Robert Bridges in about 1638 for in [November] of 1637 the General Court of Massachusetts granted Abraham Shaw “One half of the benefits of any coles or yron stone [which] shall be founde in any common ground [which] is in country’s disposing.” Robert Bridges took samples of the bog ore found in the meadows of Saugus, near Lynn, to London to aid him in securing capital and in the forming of a company to manufacture iron from it. He succeeded in interesting 11 English gentlemen in the venture to the extent of 1,000 each and formed the company of undertakers for the iron works. Upon his return a furnace & forge was built on the west bank of the Saugus River above Lynn that produced 7 tons of iron per week.

the second venture comprised a like equipment at Braintree Mass. in Norfolk Co. in 1643 when a grant of 3000 acres of land was made to Mr. Winthrop and his partners of Lynn Mass. Their furnace was built in 1646 and ceased operations in 1653 because of scarcity of ore.

The third iron enterprise was [created] at Taunton in 1652 which commenced operations in 1656 known as Taunton Forge and Leonard Iron works. This plant to operate and grow over a period of over 200 {S-6} years until shortly after 1865 when it operated 4 forges 2 hammers and 2 water wheels when it ceased operation. In 1668 Henry Leonard at Rowley, 25 miles north of Lynn established an iron works and in 1674 his sons Nathaniel, Samuel and Thomas tired to operate but couldn’t make it pay, so Henry went to N.J. where [he] engaged in the same business.

1732 Van Deusenville Furnace

1758 Charlotte furnace Middleburgh
1765 Lenox furnace
1830 Glendale furnace
1860-1923 Richmond
1848-1907 Cheshire
West Stockbridge
Stockbridge

[north of Pittsfield toward [Williamstown]
1845-1866 Lanesborough furnace

In 1784 there were 76 iron works in Mass. In 1798 - in Bristol, Plymouth and Norfolk were operating 14 blast furnaces, 6 air furnaces, 20 forges, rolling & slitting mills. By 1804 the greater portion of ore used in Mass. furnaces was boated up from New Jersey at $6.00 per ton. The first steel works in Mass. was 1785 by Eliphalet Leonard. See Boston [?] 1826.

For over 100 years after its settlement in 1620 Mass. was the chief seat of iron works in this continent. The [first foundry] for hollow ware was in Plymouth - King's Furnace, [rebuilt] in 1725 rebuilt in 1816 and operated till 1839.
{S-7}
Hopewell Iron Works at Taunton 1739-40 in bog ore produced bar iron succeeded by rolling and slitting mill by John Adams 1776-1777. [First furnace] to smelt ore [in] Plymouth built 1702. Lambert, Despard & Barber. [First] slitting mil in colonies erected at Milton, 1710.

Development of rich brown hematite of western Mass. started 1731 when ore was carried from Old Hill Mine in Salisbury to Housatonic furnace in leather bags by horseback. The Lenox furnace built 1765 made pig iron and was noted for its unusually high stack at that time of 28' and had one tuyere. It was torn down in 1881.

The furnace at West Stockbridge owned & built by Col. Kniffin, whom the writer knew well, was the only furnace in NE to operate on hard coal and was called the Anthracite Furnace.

At Richmond Furnace which was originally a cold blast furnace was purchased from owners by Richardson Barnum Co., afterward Barnum Richardson Co. of Lime Rock Ct. and changed to hot blast. They in turn, about 1910, solid ti to the Hon. Samuel B. Colt of Pittsfield, who operated it until about 1922 and it was torn down in 1924. This furnace produced iron the Salisbury grade except that it ran a little higher in sulfur, just about .01 above it, but was a wonderful iron for chills and for strength. There are 8 mines located around this section which produced & shipped ore. Richmond furnace was hot blast with pulsating blowers [two] originally, then were added 2 high speed engines. B&W boilers {S-7 back} and Sturtevant rotary blowers. They produced their own electricity, the boilers having enough capacity & were fired by flue gas from the furnace. [The furnace had] six tuyeres & 4 arches, hand filled.

Operated on ore requiring almost 2 ton 4 [?] per ton of iron. The iron sold by fracture till almost 1912.
Graded:
#1 soft
2 foundry

3 low chill
4 high “ car wheel
4½ car wheel & chilled roll
5 mottled
6 silver

{S-8}
The Cheshire furnace built in ---- by ---. ceased operations in ---. At the close of the Civil War the owner, a man well known, learned of the attempt being made in Washington by the steel crowd to have the Gov’t discard and discontinue further use of cast iron cannon. He immediately went down to do battle, which is just what happened, and the result of the fight was indecision on the part of the Gov’t to adopt the steel guns entirely all at once. The old man challenged the steel crowd to a duel. He told them if they would ship one of their cannon to Boston, he would build a cannon & ship it there [too] and he would guarantee to out shoot & outlast anything they could produce in their line. He come home, built his cannon, shipped [it] to Boston & awaited arrival of the steel crowd with theirs, it never came. Whether they were afraid to compete or what is not known but the old man shipped his gun home, broke it up and died of a broken heart.

{S-9}
Conn
After the settling of New Haven closely followed Massachusetts in the manufacture of iron.

J. Winthrop Jr. who came from Lynn to New London obtained permission to engage in iron production in 1658. He and one Thos. Clark started a works at New Haven consisting of a blast furnace & refinery which operated until 1666. Then followed the commencement of ore production & smelting in Salisbury from the famous Old Hill mine situated about 1½ miles from Lakeville village on the old Livingston Manor property. This mine has operated continuously from its start in 1732 until 2 years after the close of the World War, producing a high grade of brown hematite ore rich in manganese, low in sulphur & phosphorous. The mine at the time operations ceased had [reached] a depth of 750 feet and drifts ran out in all directions ot different levels as far as half a mile.

No iron has ever yet been produced to equal it in tensile strength or durability by 4½ tons. No cast iron gun ever made from it’s ore ever proved defective, no other iron ever had equaled it for depth or uniformity of chill and Barnum Richardson Co. using this iron were the only firm to successfully manufacture chilled iron car wheels with each of which they dared give a 5 year guarantee.

[S-10}
This ore mine and the furnace at Furnace Village produced tons of iron for making of cannon, cannon balls, anchors, etc. for the Revolutionary army. Also iron for the chain across the Hudson and we in a large measure can credit this old furnace with being one of the main contributors to the success of the cause for without it we surely would have failed.

There are several other mines western Ct. and furnaces were afterward built as follows:

1	Lime Rock
1	Falls Village
1	Mt. Riga
1	Chapinville [Taconic]
1	Huntsville
1	Cornwall Bridge
1	Kent
1	Bull's Bridge
1	Roxbury
3	East Canaan
1	Sharon
1	" Valley

14	

{S-11}
All the furnaces in Ct. used Old Hill ore also Chatfield, Leet, Scoville, Sharon. East Canaan and Lime Rock furnaces were shut down in 1922 and demolished in 1926

[It is not clear what Wallace meant here, The Lime Rock furnace was not demolished and still stands in the 21st century along with Beckley furnace in East Canaan. One of the East Canaan furnaces was demolished in 1899 and the other after the 1923 closure, but portions of it lasted at least until 1935 when photographed by Charles Harte.]

At East Canaan the original furnace was a cold blast furnace [with] open hearth producing about 27 tons per week. Later, about 1833, [it was] converted to hot blast with a water jacket & 6 tuyeres. The stack was raised and flue gas used under 6 tubular boilers as an auxiliary to the water wheel operating the blow works. Later the tubular boilers were replaced with B & W high pressure ones & 2 high speed rotary blowers installed and the same was done at the lower furnace. This took place in 1916 when a 60 cord chemical plant was built to manufacture charcoal for the furnace, wood oil], acetic acid, tar and alcohol.

In 1872 the last furnace was added at E. Canaan: "Beckley". The stack of this furnace is as fine a piece of masonry work as one will see anywhere. There is nothing left. In 1918 at the peak of its production, East Canaan plant operated furnaces #1 and 3 on ores received {S-12} from 3 separate mines: Amenia, Weed and Old Hill, the ore being mixed 1/8 Weed, 1/4 Amenia, 5/8 Old Hill which was the mixture experience had shown would produce the required grade and permit use of the new mine ore.

[Once again, Wallace has incorrectly identified furnace #3 as Beckley. The lower furnace, or #3, was definitely built in 1872 but it was the upper furnace that was built by John Beckley in

1847. Why Wallace did not know this is a mystery.]

The company owned thousands of acres of land all over [western] Ct., Mass. & E. NY state where hundreds of men were engaged in chopping wood, ties, lumber & poles for the plants' consumption.

There were 19 storage sheds for charcoal capable of holding 90,000 [bushels] each, filled at all times, large storage for ore of which some 2500 to 4000 tons were stored.

Two old style 2 cylinder blow works & separate water wheels for each one at #1 - fired with flue gas at #3 with coal. The air pressure was never allowed to run above 1 7/8 lbs.

The output of #1 averaged 24 to 28 tons per day #3 18 to 20.

Ore used per ton of iron produced: 2.2 to 2.5

Charcoal used per ton 135 bu. to 145

Flux [used per] charge 172 to 210 lbs.

No. charges per day 65 to 74

No. men each furnace 15 or 30

No. men outside, labor 25

[Total] 55
{S-13}
Prior to construction of the chemical plant pit charcoal was abandoned for chemical plant charcoal from Pa. & NY. purchased from [Manufacturers Charcoal] Co. Bradford Pa.

Millions of [bushels] traveled east to us each year in car lods of almost 1400 bu. from Hancock, Roscoe, Peckville, Cooks Falls, Deposit, [Livingston] Manor, Skinner's Falls, Elk Brook, Olean NY, Grants Pa. and many other points.

Prior to the war the price was 4¢ F.O.B. cars which during [the] war run to 25 per bu. F.O.B.

With the abandonment of these furnaces the [chemical] plants were pressed for an outlet and Richmond furnace continued operating only about 3 years after that which closed the market for [charcoal] to them.

The chemical plant [illegible] first & only like the furnaces stopped at the same time all due to a condition not to be laid to lack of sale for the products of either of the quality of quantity of the products or even costs.

Remember Old Hill mine never had any modern up to date equipment or method used. The ore is rich enough and there is enough left to do any furnaces for 50 years, yes, a hundred. No steel every made from it I'm sorry to say {S-14} and I think the steel people overlooked a very

excellent opportunity in that line.

Thos. A. Edison said he wouldn't know what to do if he couldn't get [Salisbury] iron.

The customers of BR Co. & Richmond furnace were almost the same
[This list has been edited for clarity and to remove duplicates.].

C. M. & St. P. RR [Chicago, Milwaukee & St. Paul]
P.R.R. [Pennsylvania Railroad]
[American Locomotive] Works
Baldwin [Locomotive Works]
Birdsboro Steel [Foundry & Machine]
Thomas Iron [Foundries]
Chilled Rolled [Foundry] Co.
US. Navy - every Navy yard - Portsmouth, Kittery, Boston
Sessions [Foundry]
Railway Steel Spring
Ramapo Iron Works
Farrell [Foundry & Machine]
W. R. Grace Co. for Brazil
[Mexican Government]
US Shipping Board
Washburn Wire Co.
[American] Steel Wire Co.
Griffin Car Wheel Co.
Wm. Cramp & Sons
[American] Chain Co.
[American] BS & [Foundry] Co.

There was also at Canaan operated a fully equipped laboratory for analytical work of any nature.
{S-15}
Lime Rock, the home of the Co. operated a furnace, a car wheel shop, a machine shop and [general] casting [foundry]. It was situated 1½ miles from the RR station at Lime Rock.

Here were produced pig iron, car wheels & chilled rolls all manner of castings but outside of rolls & the whole plant was engaged practically all production for the NY NH & H RR.

The location added to costs tremendously & should have been moved to Ore Hill and should the furnaces at Canaan have been abandoned and one good furnace built at State Line and a foundry and with iron poured directly from the furnace the cupola would have been done away with, costs reduced on {?} iron at least $3.50 per ton or iron and [manufacturing] costs of [foundry] cut beyond any one's idea.

No [foundry] could produce castings so suitable for machining or with as fine a chill, castings greatly reduced in bulk and width poured with added instead of reduced strength resulting in saving of floor space, less stress on buildings, increasing market for this iron.

Do no be misled {S-16} that the ore is too lean. The ore was mixed to get quality & strength and due to that ran 42 to 47% fero but 50% ore or higher could have been used. And I believe if it were it would still have a considerable edge in strength & workability on all other irons.

The Roxbury furnace operated in steel ore, so called, and until a few years ago was in a fair state of preservation. The mine and all property is now owned by Columbia University NY. now used for meteorological work.
[Illegible paragraph]
{S-18}

1st the ore, location
2 Where disposed of & used
3 Transportation
4 Mines, how worked
5 Processing
6 Equipment
Fuel
Source
Method of prep
Transp.
Storage

Furnaces
Lyke
Location
Equipment
Output
Operation

Owners or proprietors

Incidents

[Sheet 19 of this manuscript comprises a draft of a rather cryptic letter
which is unrelated to the iron industry or any other topic in the rest of the manuscript. It appears to discuss Wallace's failing health and in particular his loss of hair. It is omitted here.]

{S-20}
[This page begins in mid topic. Perhaps the preceding pages are missing or out of order. This portion of the manuscript was still bound together with the glue that held the original tablet together, so the succeeding sheets are in the order in which they were originally written.]

Here were produced cannon from 4 lb to 32 l, guns for the continental army & New England privateers, cannon balls, shells, grenades, anchors, chains, bars, potash kettles, kettles for the army etc. The fuel being entirely charcoal. In all the surrounding country was being cut wood for the charcoal pits with men working day and night to produce charcoal. Summer [months] only, no sheds.

The records of legislative acts of this time give ample proof of the tremendous importance of this undertaking and of the activity. A powder factory was ordered built here by the legislature also.

In the meantime other ventures which were byt flashes in a pan were made such as the forge on Mt. Riga built in 1781 by Peter & Abner Wordin afterward owned by David Ball and the stack still stands on Mt. Riga at then [south] end of the lake. In 1806 Seth King & John Kelsey started to build a furnace but were unable to complete it and it became the property of [Holley & Coffing].

Ore Hill ore value increased by leaps & bounds as did the iron business of old Litchfield Co. Lakeville furnace was rebuilt in 1831 and was the oldest in the vicinity, producing from 5 to 600 tons per year operating about 5 months in the year.
{S-21}
By 1830 furnaces at & near [Salisbury] were producing 18 to 20 thousand tons of iron annually, worth $32.00 per ton in addition to tons of bars, wrought iron, heavy castings, anchors etc.

By 1800 there were 50 bloomeries or forges in Litchfield Co. and within a radius of 50 miles from Salisbury 30 furnaces in Ct, Mass., and NY. Litchfield Co. was [third] in production of iron nails in America. In 1830 the first foundry for melting pig iron was built by Milo Barnum, later associated with his son-in-law Leonard Richardson, followed by Wm. H. Barnum etc. as shown before.

At one time the government voted to take over Old Hill mine and Lakeville furnace and operate them as a vital necessity and protective measure. they called after the Civil War for samples of all the best known irons of the world to be submitted for tests and no other iron came anywhere near the equal of Salisbury iron for strength. The nearest in [tensile] strength per sq in was 4 tons short. No gun ever made of Salisbury iron ever exploded or broke by usage and the Navy's guns for years were made from it till the steel guns came in.
{S-22}
Coming along down thru the years such prominent families as Scovilles, Miles, Beckleys, Mr. Colt, Richardsons, and many others are worthy of mention as iron men. Keen rivalry and intense hatred was stirred up which did not die out. Scovilles & Barnums continually hitched and Miles was none [too] friendly with them at times.

Harveyite, an armour plate, [was] first made by a Mr. Harvey during & after the Civil War at East Canaan.

[The work of one “Dr. Harvey” was mentioned by Thomas Richards in his series of articles about industrial activity in East Canaan that appeared in the summer of 1899 in the Connecticut Western News. What little Richards says about Harvey tends to minimize the significance of Harvey’s work. Richards’ articles have been reproduced in the FOBF research report titled “Memories of East Canaan Industries”]

There were other mines worked to a large extend such as the Davis, Chatfield, Kent, Amenia, Sharon Station, Maltby, and Scoville. Any others in this region are not worth mention except as a matter of record.

A word about fuel. Charcoal (Pit charcoal) later replaced by chemical plant byproduct was far better and would carry a larger burden per [bushel] than the [latter]. In the beginning the forges & furnaces had no storage and only operated during 5 to 7 [months] of the year. Later large coal sheds for its storage were built. At Canaan 15 sheds with a capacity of 90,000 [bushels] each were kept filled.
{S-23}
The Barnum Richardson Co. were probably the largest land owners in the state or became so under Wm Barnum, buying up woodland & farms all over northern Litchfield county, southern & western Mass. and for years [colliers] worked day and night burning coal. Hundreds of men were busy chopping wood & hauling wood to the pits and charcoal to the shipping points on the RR and drawing into the furnace by team. The company owned a fleet of some 60 box cars of their own made for nothing but charcoal as the business increased and easier & quicker methods of [transportation] were needed. Mr Barnum planned to build a railroad from Canton to State Line Mass., branching off the CNE main line east of Cherry Brook Ct. thence NW up thru Riverton, Colebrook, Otis etc to the B&A. The roadbed, bridges [and] culverts were completed but no ties or rails laid.

About this time the large chemical plants of [southern[NY and [northern] Pa. [were] seeking a market for millions of [bushels] of charcoal offered their product at such a low price with accompanying low freight rates, pit charcoal could not compete so an immediate switch was made effecting considerable savings {S-24} throwing all men out [of] employment who were connected with the pit coal industry.

On the other hand ore first delivered to the forges & furnaces on horse back in leather bags changed to teaming and wagon delivery and with the coming of the railroad the rail [transport] supplanted the teams.

As to mechanical equipment, the first furnace with [either] open or closed hearths with the blast produced by water wheel & leather bellows changed to water wheels direct connected with two horizontal wooden cylinders with cast iron bottom & head, wooden connecting rods & piston heads covered with leather. Sucking air in on the down stroke thru an opening with the top with a leather valve closing with the up stroke of the piston and air compressed passing out thru a valve under the head to the hot blast oven. The pressure never exceeded 2 lbs on these lines and was varied as conditions required. After these were discarded for high speed rotary blowers of either direct connected or belt drive which also increased efficiency of control & production.
{S-25}

As to the furnaces, they all consisted of square stone stacks about 30' X 30' tapering toward the top. the bottom of the stack contained 4 arches. In three were the tuyeres connected with the bustle pipe which in turn was connected with the hot blast oven. On all later day furnaces hot blast the hearth and bosh were [enclosed] in [cast iron] water jackets thru which, in pipes, continually flowed cold water. thru the peep holes in the tuyeres, in which was a mica disk, one could look at any time to see the action & condition of the furnace. In the fourth arch was the cinder and iron notch.The iron when the ore melted went to the bottom of the furnace & the slag, or cinder, floated on top, each being drawn at regular intervals and the casting house crew working 12 hour shifts consisted of 2 fire men [two] helpers and an iron or pig bed breaker. The casting bed for each draw was prepared in sand with wooden patterns called pigs also. The notches being closed with clay.

The firemen could tell by the color of the slag just what action was taking place in the furnace and it was necessary to be a least 24 hours ahead in either lightening the burden, changing oven temperature & air pressure or [illegible].
{S-26}
On top [illigble] the top house, after the furnace was lit and warmed enough to permit adding the charges or ore & lime stone, the operation consisted of dumping regularly 2 carts of charcoal, a cart of ore and required amount of limestone.

55 [bushels] charcoal
from[1200] to 1800 lbs of ore
[from] 178 to 220 [lbs] limestone

All according to the condition of the furnace or the desired grade of iron to be produced. The number of charges seldom running over 76.

A heavy burden meant producing high grade chill iron #3, #4, #5.

Analysis of #4	Sulfur	Phos	Mang	CC	GC
	.02	.21	.70-.80	2.50	1.25
[Analysis of #3]	.015	.21	.80-.90	2.10	1.50

A light burden producing soft foundry iron.

#1-2 `	Sulp	Phos	Mang	Si	CC	GC
	.01-.02	.19-.21	1.10-2.00	2.5	.75-1.00	2.20-2.60

It required 100 to 115 [bushels] of [charcoal] per ton
[It required] 2 1/8 to 2½ tons ore per ton [of iron]

Do not be misled by the fact that the ore use of 2 1/8 to 2 ½ meant ore of 50% couldn't be had because there was a very excellent reason for it pertaining to producing iron of the required strength & that would {S-27} give you uniform chill.

History repeats itself every so often & in 1915 the war being on, a consulting engineer was

sent up to recommend changes. His advent together with that of another was the beginning of the end.

A chemical plant of their was recommended which in itself was not an error, but instead of locating a 60 cord plant at Canaan they should have created 3 60 cord plants at different locations on their tremendous land holdings. Waste, carelessness and inefficiency etc. in this field together with the attempt of the consulting [engineer] to take the plans of furnaces of 2 separate companies & from th 2 copy enough to evolve a furnace of his own which brought on law suits for infringement of patents added to which conditions at the mine with a new management unqualified for supervision in that mine just made it impossible for them to take it, so they folded up which was the end of the Salisbury iron in the market.
{S-28}
The industry served the country's armed forces from 1762 to 1922 the list of customers at the time of their closing was:

C. M. & St. P Ry Co.
Penn RR Co.
Sessions [Foundry] Co.
Birdsboro Steel [Foundry] & Machine
Chilled Roll [Foundry] Co.
American Locomotive Co.
Baldwin Locomotive Co.
- and a number of others

[More comprehensive lists are given elsewhere in the notebooks]

The chemical plant built to furnish fuel for them was a 60 cord plant consuming 20,000 cords per year producing 600 gallons wood alcohol per day, 12,000 lbs acetate of lime and 25,000 [bushels] charcoal. The furnaces produced each from 5500 to 6000 tons annually. The ore coming from 3 mines: Amenia, Old Hill and Weed mine by rail.

The real blast furnace, not forges, were located [in] Litchfield Co. at Kent, Roxbury, Cornwall Bridge, Huntsville, Falls Village, W. Cornwall, Bull's Bridge, Lime Rock, East Canaan, Lakeville, Mt. Riga, Macedonia, Sharon, Sharon Valley and Taconic [Chapinville]
{S-29}
Repeated attempts to fill these furnaces by machine resulted in failures for a very definite reason.

There being a place for tuyeres in 3 arches only, the fourth not being able to accommodate one, the equal distribution of fine ore would not permit this low pressure to function properly which resulted disastrously. The filling by hand allowed the coarse ores to roll to the front and the fine to the back. The pressure going thru the fine ores from the tuyeres nicely by with some to spare gave good circulation thru the coarse ores in front permitting uniform temperature.

There is a humorous incident connected with Sharon Furnace. The old [captain] owner was very religious and would not permit operation of his furnace on Sunday. So every [Saturday] night she was banked till midnight Sunday. Well the Bank of England could not run the furnace in that manner so the old man had to quit.

{S-30}
1731 iron ore of an excellent quality was found about 3 miles west of Salisbury, now the famous Old Hill mine, and shortly after Philip Livingston of Albany N.Y. obtained a grant of land of 100 acres for the purpose of diggin ore which was started very shortly after. This ore was sold & transported to Ousatonic Mass.. The ore was carried in 2 large leather bags or pouches carried astride a horse, as the demand increased the ore was carried to Salisbury, Lime Rock, Hanchetts forge on Canaan [mountain], Colebrook, Ancram N.Y.

Then came wagon transportation and the ore was carried thus to all the above points, Hunstville, Sharon, Millbrook & Wassaic N.Y. & Amenia N. Y.

This was followed by rail [transportation] by chich ? the ore was sipped to Chatham N.Y., Richmond & Cheshire Mass., Glendale, Housatonic, Van Deusenville, [West] Stockbridge, Cornwall Bridge, Kent and East Canaan Ct. The mining during the early part of this period was under Capt. Bartle & his son who were followed by John Perkins and his son Charles both still living.
{S-31}
In 1740 some of the Livingstons who at that time held a ½ interest in what is now Old Hill mine erected an iron works at Ancram taking from Old Hill.

The mine was mostly underground although there was also extensive open pit as is evidenced by the condition there now. The equipment was the boiler, compressor house & hoist house on the top of the hill just west of the highway crossing with the CNE RR, the crusher & washer & loading dock located half way between the above 2 points and the office on the roadside, a blacksmith shop and pump house.

The company in later years owned quite a lot of dwellings which housed the families of many of the men who were sons and grandsons of the original miners, except for a very few Italians who came in after 1912.

The main vein or body [of] ore is very rich in mettlic iron and the drifts had been run out in all directions some nearly ½ mile. and they had reached a depth of 650 feet up until Mr. Perkins left all mine timbering was done with the best of timbers, his successor stripped the mine and used inferior timbers and the quality of both ore & iron was lowered.

End of Long Manuscript

Drawings & Sketches

The Yellow Notebook contained several pages of drawings and sketches detailing aspects of the East Canaan furnaces and other buildings. They have been consolidated here in this section along with other sketches that William Wallace drew of the Beckley site (which he called “Forbes #1”)

The sketches comprise full size pages and thus it is difficult to add notes to them while still preserving the entire image. In this section each one appears on a separate page with annotations on the back so that they can be removed or copied for instructional use.

Wallace shaded some of the drawings with pencil which gives them a gray cast that is very difficult to remove. Despite this problem, the drawings show some interesting details of the furnace and associated buildings.

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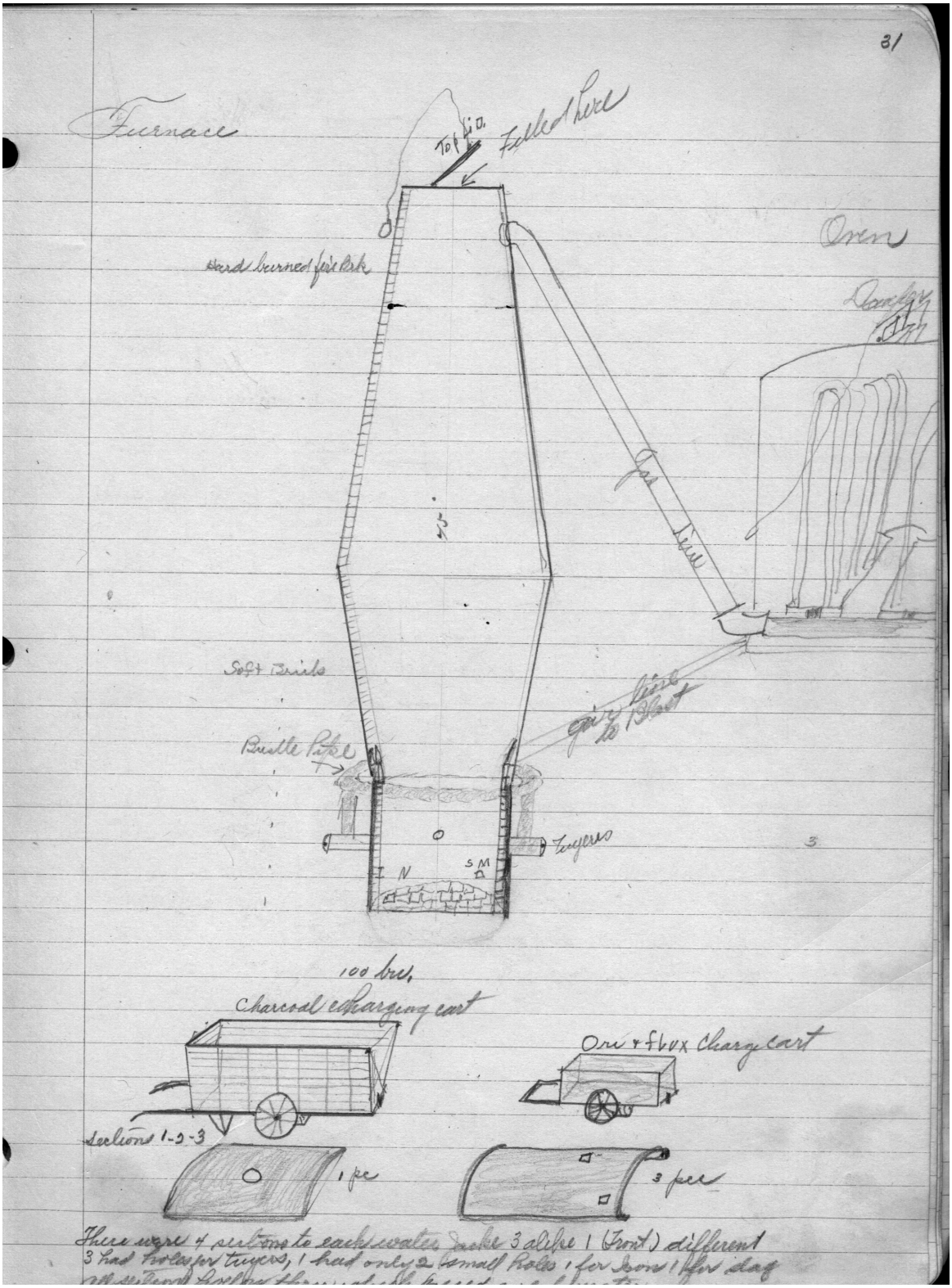
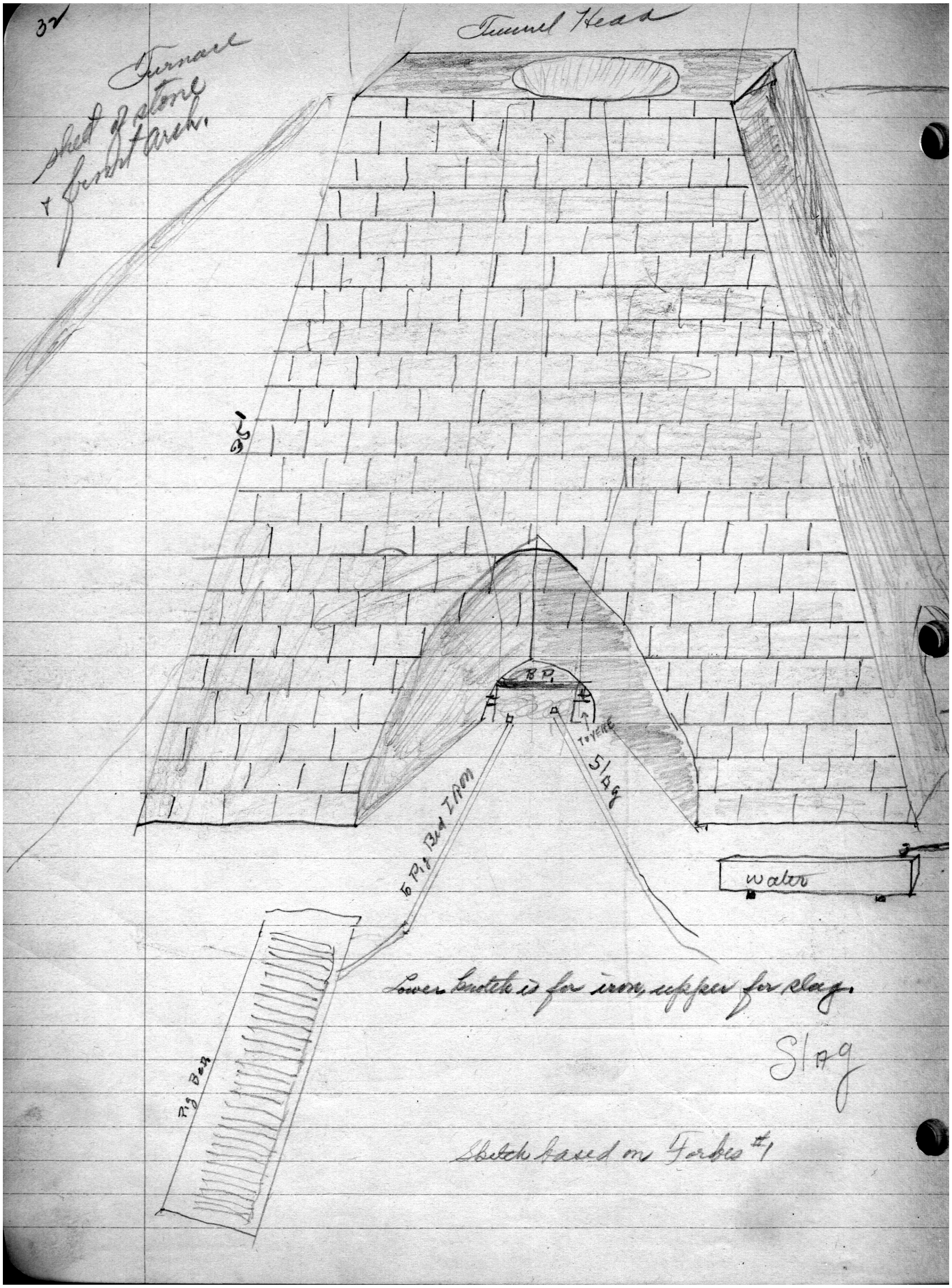

31
Furnace
Top Lid
Filled Level
Oven
Hard burned fire brick
Soft Brick
Bustle Pipe
Tuyeres
N
S M
100 bbl.
Charcoal charging cart
Ore + flux Charge cart
Sections 1-2-3
1 pc
3 pc
There were 4 sections to each wagon 3 alike 1 (front) different
3 had holes for tuyeres, 1 had only 2 small holes 1 for hose 1 for dog

Notes: Furnace stack drawing

This drawing shows the furnace stack from the south. Note that the stove is shown located on the east side of the furnace with the hot air supply running into the east arch of the furnace. The piping shown is consistent with the belief that the hot blast pipe passed through the existing notch in the east retaining wall. It also supports the idea that the east arch was rebuilt to accommodate the blast pipe when the stove was relocated to the hill from the top of the furnace.

Based on the text in the notebook it seems that Wallace has mislabeled the water jacket components, as he shows the one with the tap holes as being used three times and the one with tuyere holes being used once. It was most likely the other way around.

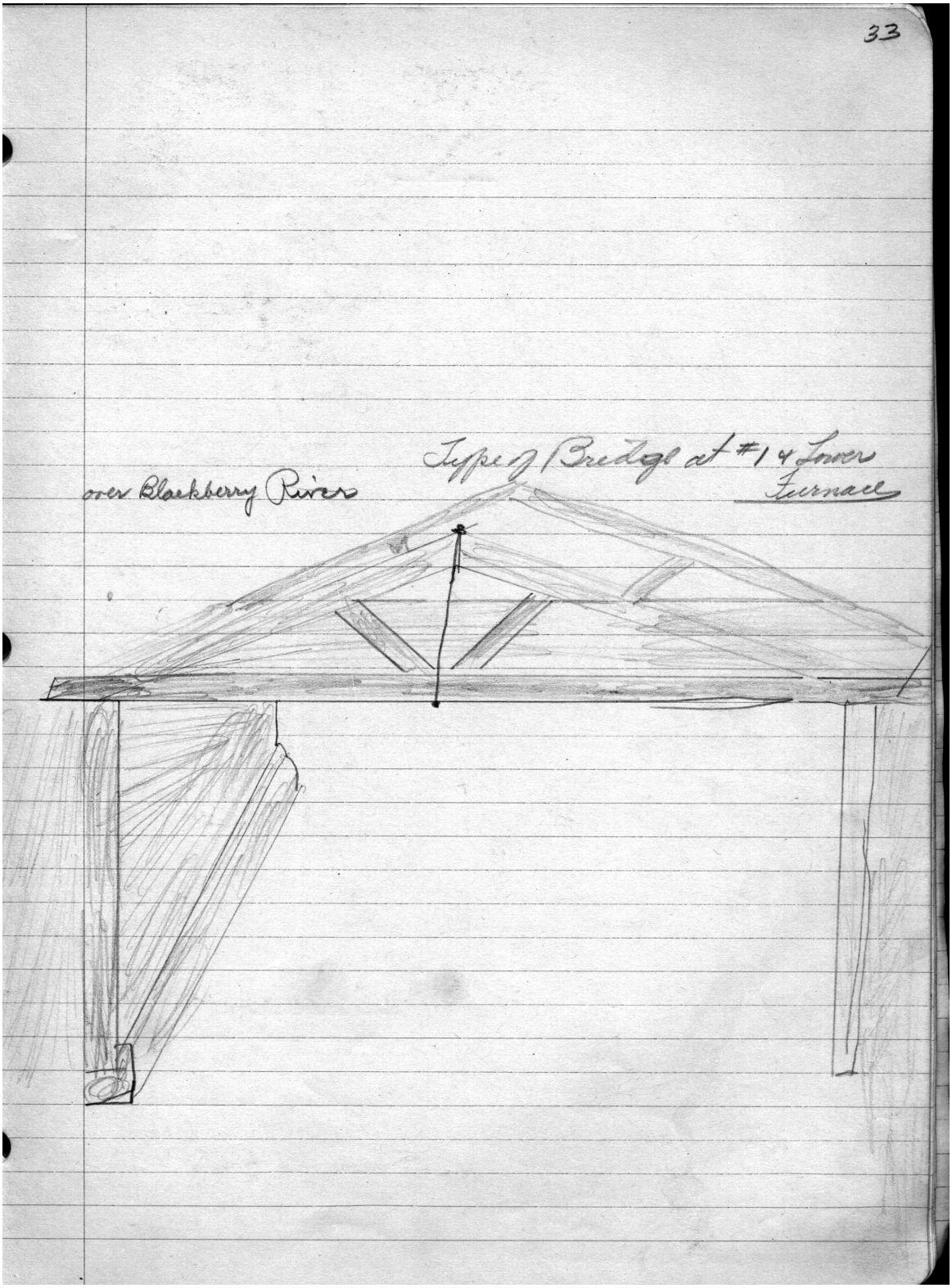
The size of the charcoal cart shown in this drawing is a bit of a surprise as it is much larger than either of the surviving examples, as it has a 100-bushel capacity.


32
Funnel Head
Furnace
sket of stone
+ front arch.
B.P.
Tuyere
Slag
Pig Bed Iron
water
Pig Bed
Lower notch is for iron, upper for slag.
Slag
Sketch based on Forbes #1

Notes: Casting arch drawing

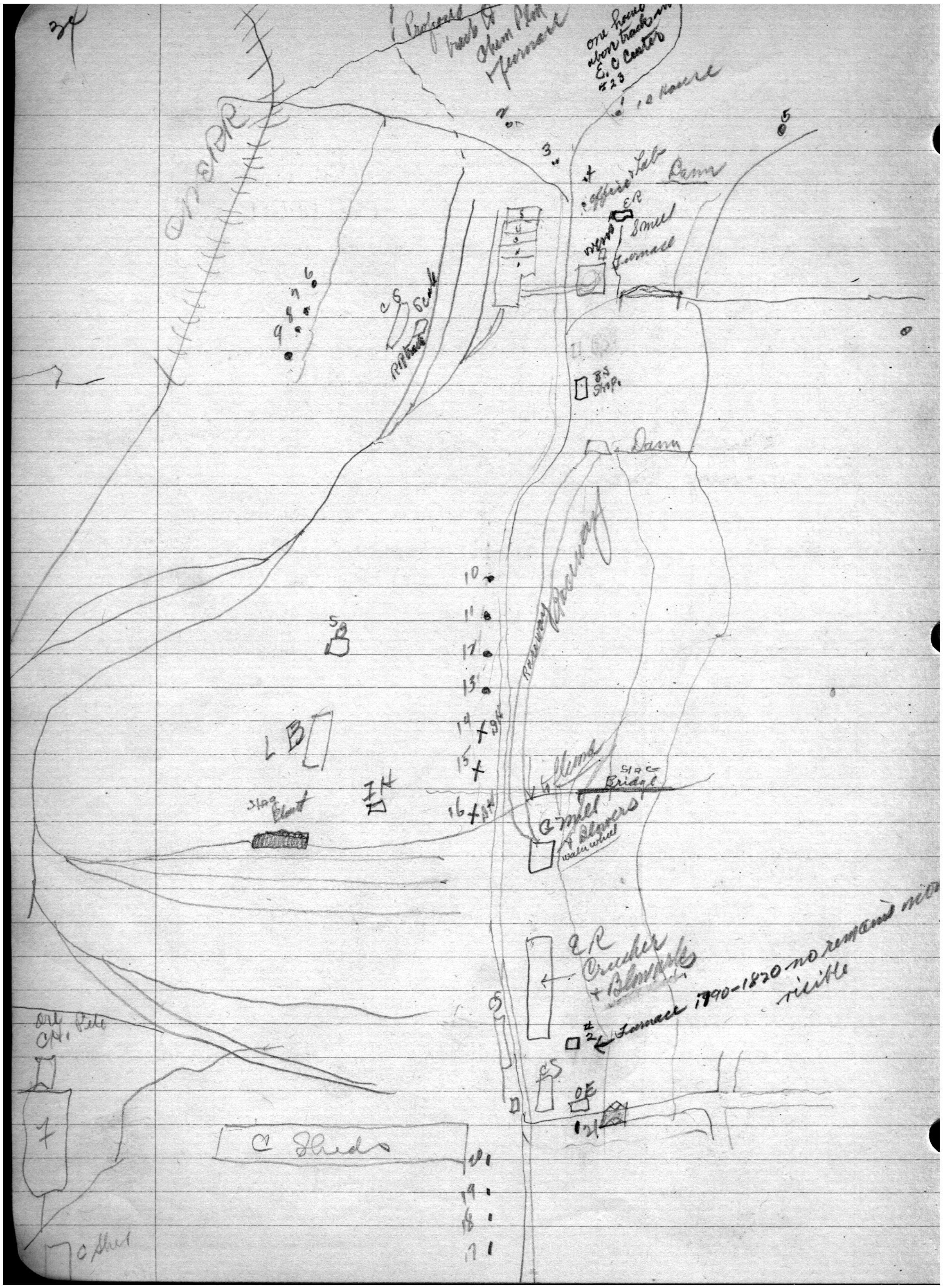
This drawing shows the casting arch. Note that the tuyeres in the north and south arches are visible indicating that the masonry did no completely fill the casting arch.

The location of the pig bed, tap hole and slag notch match the locations that had previously been inferred for them. The water trough to the right of the arch was used to supply water for cooling the slag. Wallace indicates that cold water was put on the slag to cause it to crack, thus making it easier to remove.


33
Type of Bridge at #14 Lower Furnace
over Blackberry River

Notes: Bridge drawing

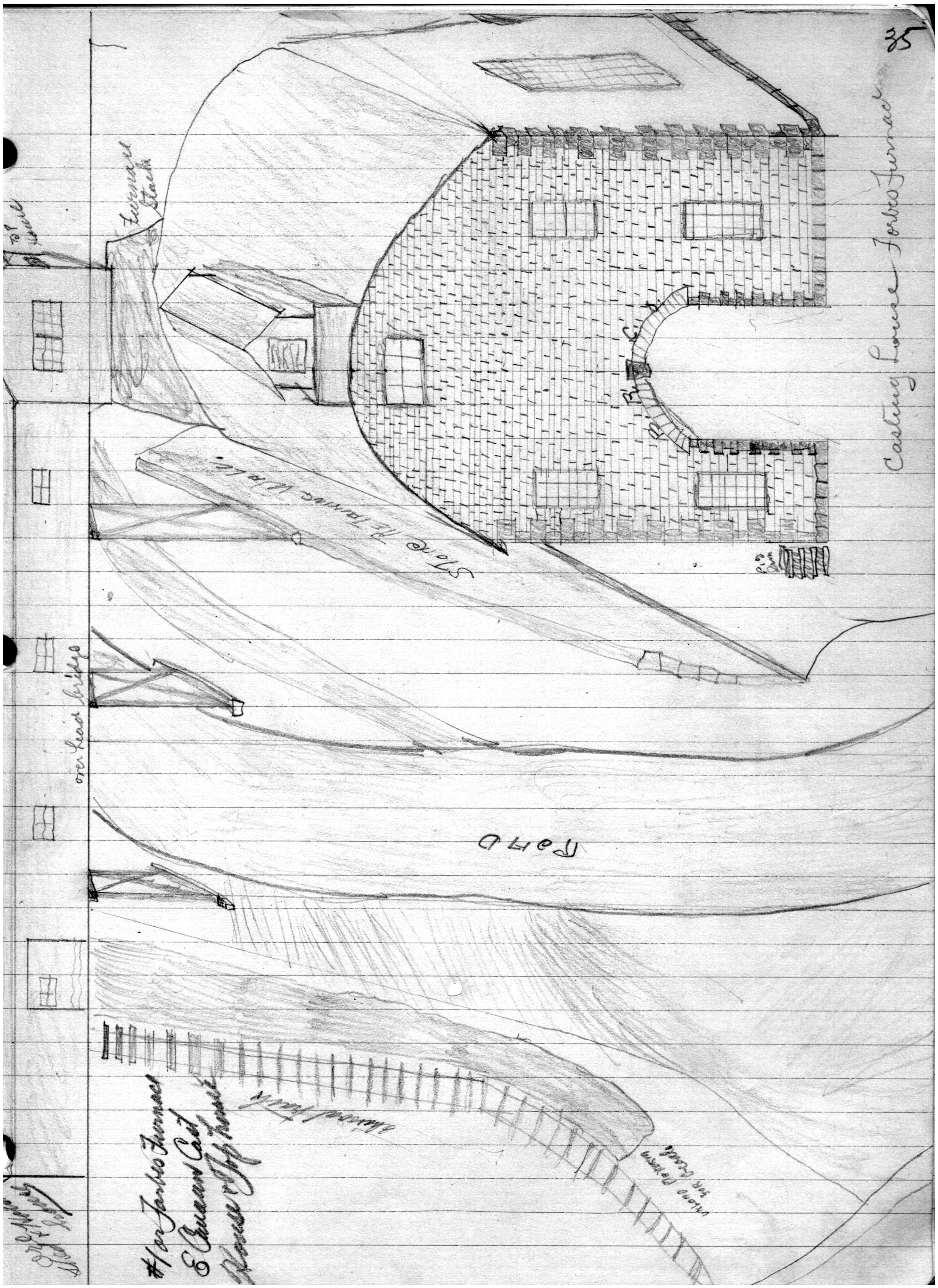
This drawing shows the bridge at Beckley that was used primarily to transport slag across the river to the slag heaps. It also permitted access to the charcoal hearths on the mountain south of the site.


Dam
Dam
Bridge
Raceway
LB
C Sheds
ER
Crusher
Furnace
one house
10 house

Notes: East Canaan area map

This map shows the major components of the Barnum & Richardson facilities in East Canaan. The only one missing is the chemical plant which was located off the top of this view. The slag plant is shown just below and to the left of center indicating that this view depicts the sites as they were circa 1915.

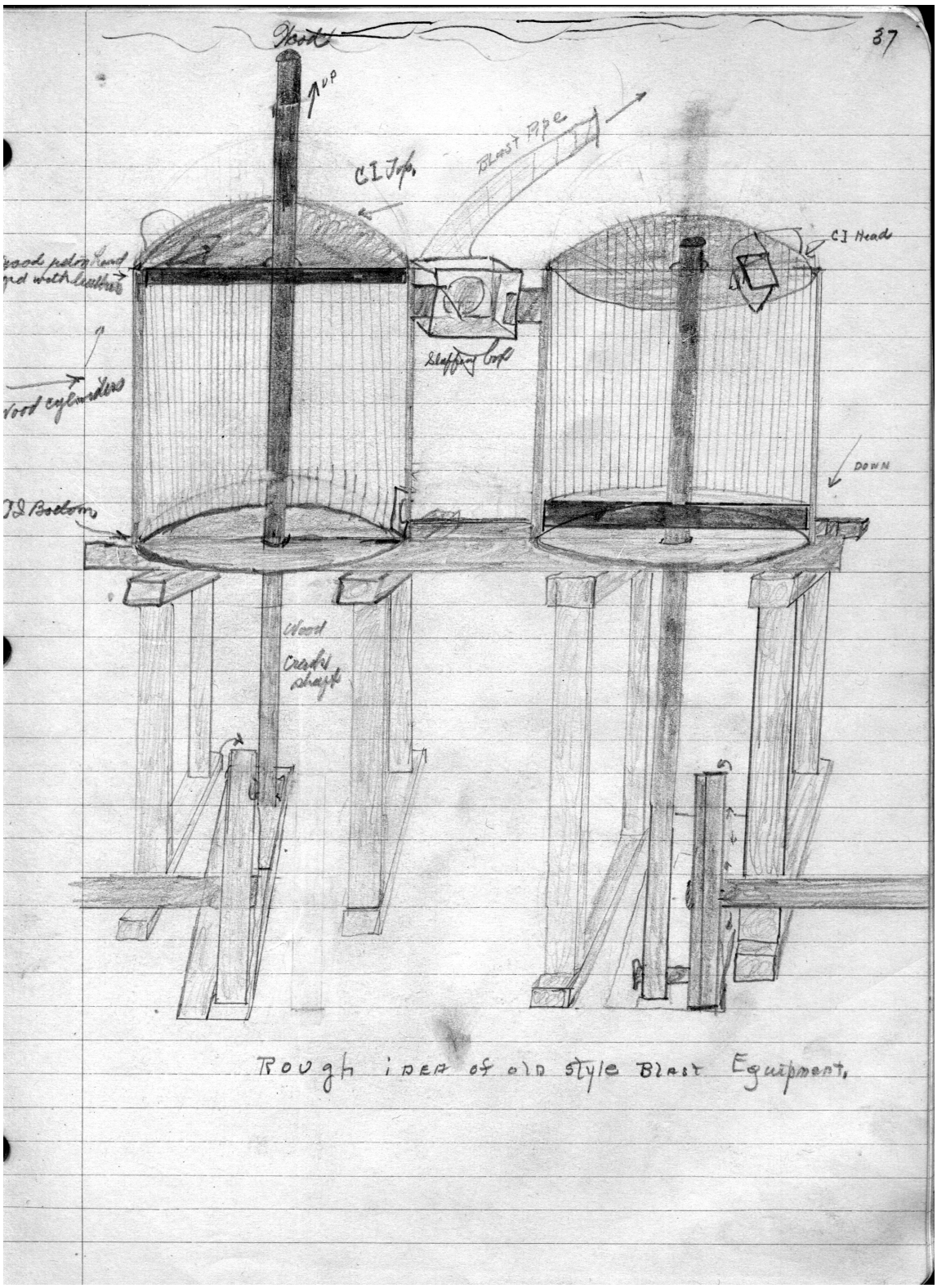
The numbered dots indicate the locations of company owned houses for the workers.


Casting House Forbes Furnace
Furnace Stack
over head bridge
Pond
35

Notes: Casting house view

This view duplicates a photographic view of the casting shed and furnace stack taken looking east from the driveway leading to the furnace complex.

It does not reveal any new information.



Rough idea of old style Blast Equipment.

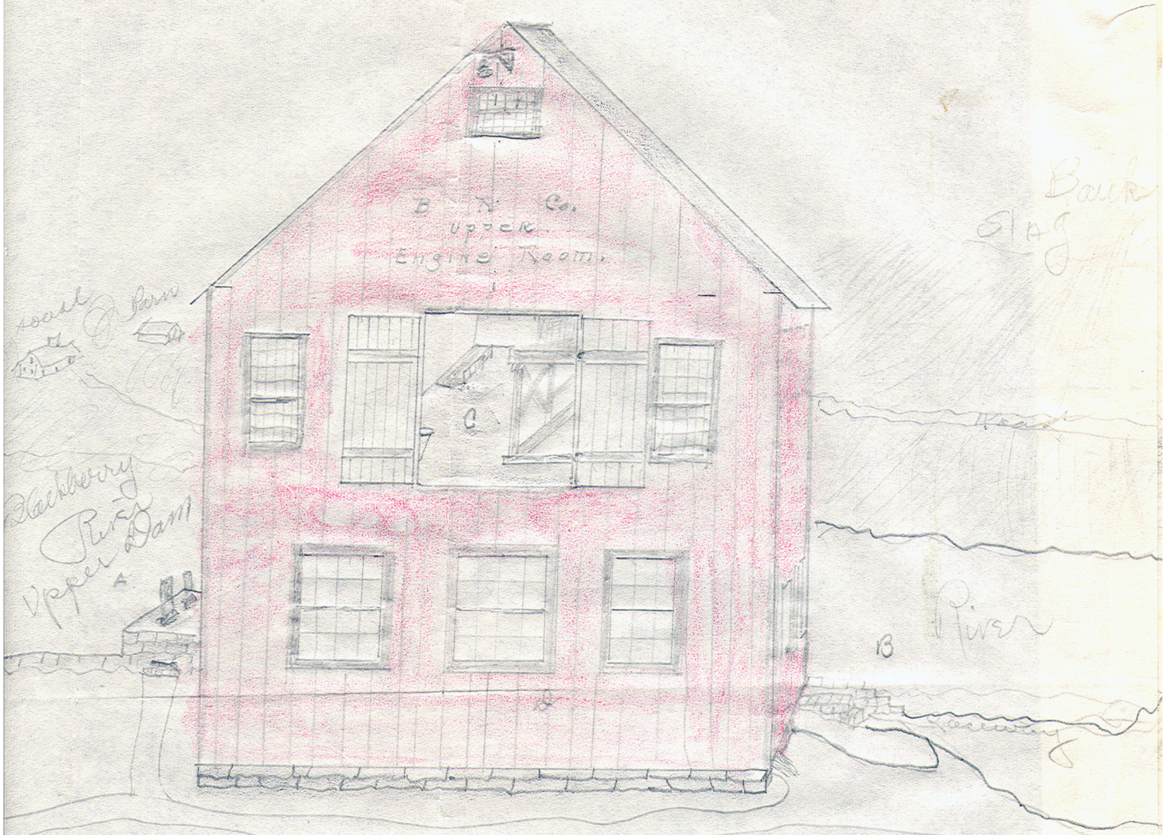
Notes: Blowing engine

This drawing shows a tub based blowing engine. It is not clear that ir represents the one installed at Beckley as it does not appear to match the foundation of the engine house. The drawing also does not show the wooden flywheel Wallace mentions in the notebook as being part of the Beckley blowing engine.

Key components of tub based blowers are shown here including the stuffing box which was a device used to maintain pressure as the pistons reversed direction during each cycle.

Notations on the drawing identify the type of leather used to seal the pistons and how it was lubricated.

Neither the drawing nor the text in the notebook indicated how the piston rods were sealed where they passed through the cylinder heads.



Blower Works + Engine House at Forbes #1 Furnace.

This engine house contained 1 Low-speed Corliss Engine, waterwheel, two cyndrical cylinders with wood pistons, piston heads, wooden crank shafts and driven from large wooden fly wheel with an eccentric, and Low Speed Corliss Engine.
The piston heads were edged with White Oak leather and lubricated with Sani Pay shoe polish mixed with sour cream.

A Water controls for pen stock + wheel. raceway from mill
C Blower Room + work shop. Engine room + pump room.

East Canaan, Conn.

Notes: Engine house

The engine house stood just west of the dam. It housed a large hydraulic turbine in its basement which originally supplied power to the blowing engine on the first floor. The use of the second floor is detailed on the drawing.

This structure was upgraded to steam power around 1915 and contained a high-speed rotary blower.

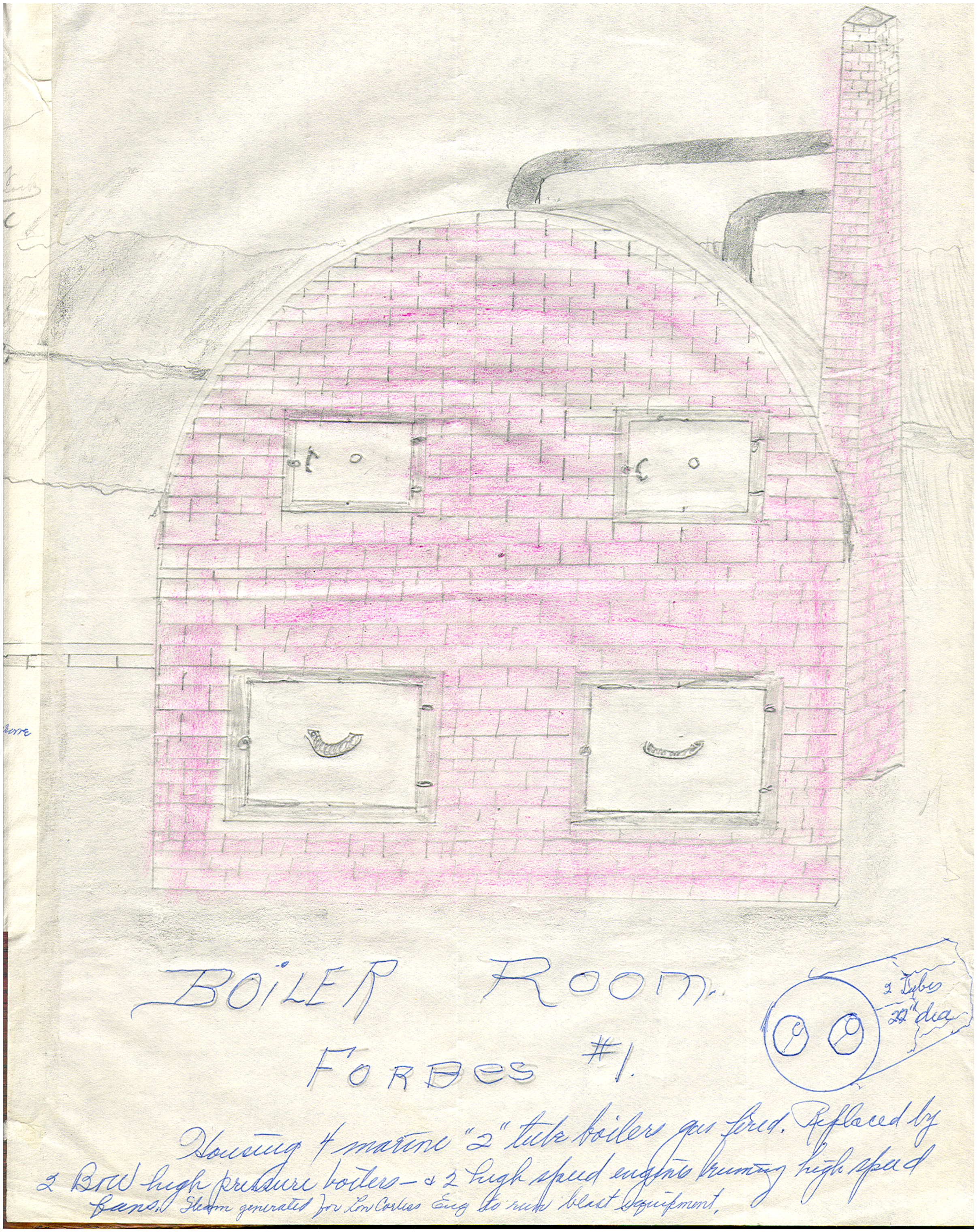
No trace of the mounting structures for either the engine or blower have yet been discovered within the foundation of this building.


SAW Mill
at
SAW.
Blackwater River.

Notes: Sawmill

For years the existence of a sawmill at the Beckley site has been a matter of conjecture. Previously, the only evidence that supported its existence was a notation on an old map. The discovery of a Leffel turbine in 2006 confirmed both the location and existence of the sawmill and that it had been present at least since 1877. This drawing adds the information that the mill was apparently still operating in the second decade of the 20th century.

There has also been considerable debate about whether the sawmill made lumber strictly for use by Barnum & Richardson, or sold it to the general public. The fact that it had tools for planing and finishing lumber strongly suggests that it made lumber for general consumption as B&R would probably not have needed large quantities of finished lumber.


BOILER ROOM.
FORBES #1.
2 Tubes
22" dia
Housing 4 marine "2" tube boilers gas fired. Replaced by
2 B&W high pressure boilers — & 2 high speed engines running high speed
fans. Steam generated for Low Corliss Eng to run blast equipment.

Notes: Boiler house

Several old photographs of the Beckley site show two small brick structures located just to the east of the main smokestack. Their function is not indicated in any of the photographs.

Mr. Wallace indicates that the boilers were used to power the blast when water was lacking and then replaced the water power entirely when the high-speed blower was installed.

Later pictures show two boiler houses. It is still not clear why two were present. At least for a time one set of boilers was fired with gas from the furnace. Perhaps that was the reason for two sets.

The only piping shown in old photographs is the exhaust stack which connects each boiler house to the main smokestack. No trace of wither the water supply or steam pipes has yet been found.

Both boiler houses and their contents were removed when the B&R East Canaan properties were liquidated in the 1920's.