

Samuel Slater & The Bootts: American Pioneers

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Much information contained in sections 1-3 sourced from the 1836 book "Memoir of Samuel Slater, the Father of American Manufactures", written by George S. White of Philadelphia, who describes himself in the book as having been a "personal acquaintance" of Samuel Slater.

Section 1 Slater in England

Samuel Slater (1768-1835) "Father of the American Industrial Revolution", born Blackbrook, Belper, Derby

Samuel Slater was born Blackbrook, Belper, Derbyshire, England on June 9, 1768, at the family's property, Holly House of Holly Farm. Samuel was the fifth son of eight children. His father William Slater is described in most texts solely as a "yeoman" farmer (being the owner, rather than tenant, of farming land), his considerable estate inherited from his own father. Yet William Slater was, according to White, also a wealthy businessman operating as a timber merchant, buying up additional land in and around Belper.

William lived just a couple of miles from Jedediah Strutt, resident at nearby Makeney, and it was through William's business contacts that a business relationship with Jedediah was forged. In fact, according to the Belper Research website that includes "People: The Strutts – Biography" at http://www.belper-research.com/strutts_mills/strutt_history.html, it was part of William Slater's land in Belper that Jedediah Strutt acquired for the construction of his mills. Moreover, William Slater's timber business would have interested Strutt when planning the construction of a future cotton spinning mill. Indeed, according to George White, "Being a neighbour of Jedediah Strutt,he (William Slater) once made a considerable purchase for him (Strutt) containing a water-privilege on which there is now a very extensive establishment."

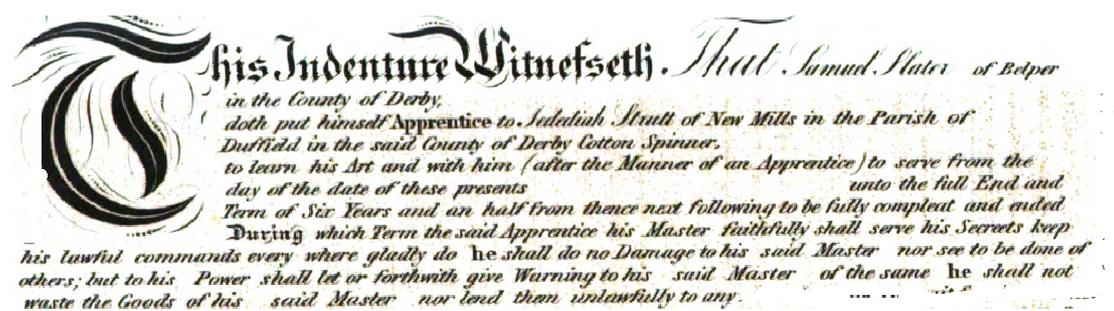
A "water privilege" was a licence to harness river water power to drive machinery. White then goes on to say, "He (William Slater) was otherwise engaged with Mr. Strutt in making purchases of consequence, who had a high opinion of his abilities and integrity as a man of business." No further details are given but one wonders whether these "purchases" would have included Slater's timber to be used in part construction of Strutt's first mills.

Meanwhile Samuel had received a basic education at a school in Belper and at the age of ten (1778) had begun work as a clerk at the cotton mill opened that year by Jedediah Strutt using the water frame pioneered by Richard Arkwright at nearby Cromford Mill.

Sadly however, William Slater, the father, died in 1782 following a farming accident, with Samuel now being fourteen years of age. But shortly before William's death, an agreement was reached between Jedediah Strutt and the Slaters for Samuel to become articled and indentured as an apprentice at Strutt's new mill at Milford, "in the Art of Cotton Spinning" according to the indenture certificate, Jedediah then being a partner with Sir Richard Arkwright.

According to White, during the six and a half year period of apprenticeship through to 1889 Slater lived with the Strutt family at Makeney.

Part of the contract as it appears in White's book and signed by Strutt and Slater dated 8th January, 1783 is below. The six and a half year period of apprenticeship meant that Slater was free to set up as a fully qualified Cotton Spinner from 6th July 1789:



This Indenture Witnesseth. That Samuel Slater of Belper in the County of Derby, doth put himself Apprentice to Jedediah Strutt of New Mills in the Parish of Duffield in the said County of Derby Cotton Spinner, to learn his Art and with him (after the Manner of an Apprentice) to serve from the day of the date of these presents unto the full End and Term of Six Years and an half from thence next following to be fully compleat and ended During which Term the said Apprentice his Master faithfully shall serve his Secrets keep his lawful commands every where gladly do he shall do no Damage to his said Master nor see to be done of others; but to his Power shall let or forthwith give Warning to his said Master of the same he shall not waste the Goods of his said Master nor lend them unlawfully to any.

White only mentions in passing that following his father's death, his mother married again twice, "The mother of Mr. Slater was a fine looking woman, and lived a short time since with her third husband, whom she survived, and often observed, she had been favoured with 'three good husbands'".

White also mentions that Samuel didn't return to Holly House during the first six months of his apprenticeship and puts this down to Slater's complete devotion to his work including carrying out "experiments" at weekends.

Whilst White does make clear Slater's continued fondness for his mother, one wonders whether her subsequent two marriages left Samuel feeling isolated from the family home having previously enjoyed a close and happy relationship with his now deceased father. If so, this state of mind could have been a significant factor in explaining both Samuel's complete devotion to his work and later move to America.

White confirms that Slater was well-trained by Strutt, having been at the Milford mill almost from the start when he was aged 10 (initially on trial as a clerk) and that, by the age of 21, he would have gained a thorough knowledge of the organisation and practice of cotton spinning. Also important, Slater, apart from being blessed with a good memory, evidently also had the mind of a true engineer, understanding the principles and workings of Strutt's machinery above and beyond the requirements of a straightforward machine operator.

White gives one particular example in his biography:

"Mr. Strutt endeavoured to improve the heart-motion, that would enlarge or raise the yarn in the middle, so as to contain more on the bobbin. Jedediah Strutt was unsuccessful in his experiments, and Samuel saw what was wanting, and went to work the next Sunday, the only time he had to himself, and formed such a motion, to the satisfaction of his master, who presented him with a guinea."

This informs us that in that one area alone, Slater was able to improve on Strutt's machinery, evidently in advance of Jedediah's own knowledge, and it may well be that Slater saw various other possibilities to improve the workings of the mill, albeit his position to effect such improvements constrained by the master-servant relationship. In which case, one can see Slater becoming quietly and increasingly frustrated with his employment.

By 1783, on the other side of the Atlantic, the American Revolution had come to an end and new trade deals were being set up between America and Great Britain that satisfied the interests of both countries. America was already very much reliant on imports for many of its goods hence British merchants were particularly welcome in America. One of these merchants was Kirk Boott of Derby, a friend of the Strutts, who emigrated to Boston that same year of 1783 following the cessation of hostilities and subsequent peace between the two countries. The ensuing success stories of Kirk Boott and his son of the same name are detailed later in this article.

Coincidentally, 1783 was also the very same year Samuel Slater began his apprenticeship receiving an indenture certificate of contract signed by "Jed Strutt" (White's biography includes

a copy of that certificate). There is then the likelihood Slater came to know through Strutt of Boott's success in America in the subsequent years of his apprenticeship.

Either way, White gives various clues in his book as to how Slater's mind was working at that time:

According to White, even before Slater entered Strutt's business he asked Strutt if the business was considered to be a permanent one to which Strutt replied that such permanency was not probable. White comments, "Indeed the whole cotton business of England was, at that time, confined to a small district in Derbyshire, and its whole amount not greater than that which is done at the present day in a single village in New England".

Also, according to White, Slater had at some time considered creating his own business and "enquired of Arkwright and others if they thought the business would be overdone in England", no mention of course being made by Slater of a possible move to America. One might surmise that as far as a reply was concerned Slater received little meaningful reply from Arkwright given the latter was already planning to move his mills into north-west England against the agreement of Jedediah Strutt. If correct, the irony is that one man later became accepted worldwide as the father of the factory-based industrial revolution, the other man off-quoted as the father of the American industrial revolution with a town, Slatersville, in Rhode Island, founded in 1803, named after him.

In reality, according to White, Slater had been contemplating the move to America for some time and then, after completing his apprenticeship, secretly decided to make the move with the aim "to introduce the manufacture of cotton, on the Arkwright improvement, and that he remained after the time of his indenture with that special object in view."

According to White, "the first occasion of his (Slater's) thinking of leaving Mr. Strutt, and what finally determined him, was his observing in a Philadelphia paper, a reward offered by a society for a machine to make cotton rollers, &c. This convinced him that America must be very bare of every thing of the kind, and he prepared himself accordingly."

William, his wealthy father, had previously bequeathed Samuel two houses and a nail store in Belper as Samuel's portion of the estate. Samuel decided to keep these on in case later events in America were to prove adverse requiring a retreat to England. In the event, Samuel never returned to England and the properties were eventually sold "for nearly two thousand dollars" (presumably with the aid of Samuel's brothers including John who later joined Samuel in America).

Statement by the

Historical Society of Rhode Island (1834)

"On the 1st day of September 1789, he took his departure from Derbyshire for London, and on the 13th he sailed for New York, where he arrived in November, after a passage of sixty-six days. He left New York in January 1790, for Providence, and there made an arrangement with Messrs. Almy and Brown, to commence preparation for spinning cotton at Pawtucket

Providence, R. I. Dec. 13th, 1834."

Slater was also fully aware there were strict penalties laid down by the government to be imposed on anyone found taking industrial design plans over to America.

"The government restrictions were very severe, and very unjust ; the officers were very scrupulous in searching every passenger to America".

Also, according to White, Slater took no patterns, writings or memoranda with him and "he had nothing about him but his indenture, which he kept concealed, and this was his only introduction and recommendation in the new world".

And it was only shortly before boarding his New York-bound ship that Samuel posted a letter to his mother, who was aware he was in London but not that he intended to emigrate to America, informing her of his destination.

Slater never saw his mother again although the two evidently corresponded regularly. White puts Slater's non-return to England down to a complete focus on his work. But another explanation, not mentioned by White, was that, following his subsequent success in America, Slater was concerned that, rightly or wrongly, he would be prosecuted should he set foot again in England where he'd become tagged "Slater the Traitor". Slater, after all, had moved to America in secrecy, clearly aware of the potential consequences of being found out. Additionally White writes that Slater "had the confidence of his master (Jedediah Strutt) and became his right-hand man, and he might have attained the highest eminence by a continuance in England."

Possibly White overstates Slater's position at Milford for the following reasons:

William Strutt (1756-1830 - elected FRS 1817) son of Jedediah, joined his father's business at the age of fourteen (1770) and, according to White, was a boyhood work companion of Slater. Given that In 1779 William was made a freeman of Derby and Burgess of the Borough,

allowing him to vote in Parliament and later became a noted civil engineer and inventor, it seems inevitable that William was Jedediah's true right-hand man. Indeed, William later took over the business after Jedediah died and his technical ability became so respected that among two of his five 1817 FRS proposers were Marc Isambard Brunel and James Watt. Moreover, when one compares the ages of Slater and William Strutt, William, at the time of being made a freeman, was 23 years of age, 12 years older than Samuel who would have been working for just one year in the Strutts business. More likely, by the time Slater decided to leave for America in 1789, William Strutt had taken over much of the business from his father Jedediah, now in his 60's, possibly with William in charge of the recently built and more advanced Belper North and West Mills (built around 1786) with Jedediah remaining in charge of the Milford Mill and Slater working as Jedediah's second-in-command.

In these circumstances, a frustrated Samuel may well have concluded that, were he to have stayed at Milford, this subordinate position would likely have continued under William even after Jedediah's retirement and/or subsequent death.

Slater was yet to be fully aware of the potential of steam power, still in its infancy, and the effect it would have on the cotton spinning business, removing all geographical constraints to the industry and laying the foundations for the industrial revolution. Yet Slater was subsequently to become one of the first American mill entrepreneurs to use steam to drive mill machinery.

What Slater did know with some certainty was that water-powered factory cotton spinning had not yet started in America and there was an urgent need there for the industry to be developed. Slater's apprenticeship was duly completed on 6th July 1789.

America beckoned and Slater left Derbyshire for London and America on the 1st September 1789, as a qualified Cotton Spinner, short of two months after completion of his apprenticeship.

Section 2:

Slater in America

From the moment of his arrival, Slater evidently kept good records, including contract documents, retaining much correspondence, some of which appears in Whites' biography. In Chapter 2 of the Slater memoirs, White gives numerous detailed examples of how America had fallen well behind Britain in terms of textile machinery including its continued use of pre-

Arkwright jennies. White also highlights the concerns the American administration had, post-revolution, in terms of America's then backward industrial technology.

Indeed, at the start of Chapter 3 White writes, "The preceding chapter is designed to show, that every attempt to spin cotton warp or twist, or any other yarn, by water power, till 1790, had totally failed and every effort to import the patent machinery of England had proved abortive. Much interest had been excited in Philadelphia, New York, Beverly, Massachusetts, and in Providence, Rhode Island; but they found it impossible to compete with the superior machinery of Derbyshire."

After his arrival in New York in November 1789 (according to White, Slater's passage to New York took sixty-six days) Slater first took employment with the New York Manufacturing Company, but soon became disillusioned first with the inferior machinery (just two spinning jennies) and then, according to White "with the water privileges which were shown him in this section of the country, to commence any new works". This statement is interpreted as meaning, from a practical point of view, Slater considered there to be little potential for water-power to be sufficient to drive the Arkwright-type machinery that Slater wished to develop.

However, 3 weeks into his work in New York, Slater was advised to contact one Moses Brown, a wealthy industrialist, in Providence, Rhode Island. Brown had already set up a company, Almy and Brown, in Pawtucket, close to the Blackstone River, with the company attempting to produce a water -powered spinning factory based on Arkwright principles and to be the first in America . However, the company's first attempt had failed badly.

Slater was duly taken on to take charge of rebuilding the factory, virtually from scratch with Slater moving to Pawtucket from New York in January 1790, having been in America only a few weeks.

(One potential element of confusion here: the mill was sited close to the Pawtucket Falls on the Blackstone River close Providence, Rhode Island. Just over thirty years later Kirk Boott Jnr. was to be superintendent of the so-called Boott Mills close to the like-named but quite separate Pawtucket Falls on the Merrimac River in Massachusetts).

On arrival at Pawtucket early 1790 Slater boarded at the home of one Oziel Wilkinson, a business partner of Moses Brown who'd recommended the accommodation to Samuel.

Wilkinson was himself a successful businessman and the accommodation was evidently a great success because in 1791, Slater married one of Oziel's daughters, Hannah Wilkinson (they were to go on and have ten children, although, sadly, four died at childbirth).

The Slater/Almy Brown contract, subsequently settled between the parties, was much on Slater's initial terms with Slater promised 50 % of the profits if the venture were to be successful and with Slater being half-owner of the enterprise and having day-to-day control of its development.

However, there appears to have been one significant downside to the contract.

According to the agreement, Slater was "accountable for one half of the expense that hath arisen". Those expenses all paid for and advanced by Almy/Brown. So one might assume had the project failed, Slater would then have been legally bound to pay back one half of all the outstanding costs to Almy/Brown, a situation which, in those circumstances, would no doubt have been financially disastrous for Slater.

But given these circumstances, White provides knowledge of Slater's engineering expertise: Details of components of the Slater Mill given in White's book, such as carding machines drawing and roping frames in preparation for spinning, described in highly technical terms, highlight the ultimate capability of Slater as an engineer.

A particularly significant item in White's memoir is the letter he received at his own request from one Mr. Smith Wilkinson of Pomfret, Connecticut and dated May 30th 1835, written a month after Samuel died.

Smith Wilkinson informs White that he had come to work for Slater at the age of ten years and started out working on the cotton breaker. Smith Wilkinson goes on to say that Slater began producing a water frame containing 24 spindles, and two carding machines and drawing and roping frames in preparation for the spinning. Later Slater added a frame with 48 spindles. "The first frame of 24 spindles, was much longer erecting than anticipated, because cards and other things, even tools to work with, could not be obtained; all these were made by Mr. Slater's own hands, or by his directions".

On the question of whether Slater brought into America any patterns or blueprints, Smith Wilkinson continues, "The assertions which have been made in public, representing that Mr. Slater brought with him from England, models and patterns, drawings of machinery, &c, we know, from the best possible authority, to be incorrect; he told me that he had not a single pattern or memorandum to assist him in his calculations in constructing his first machinery; but

he was favoured with an excellent memory, which never failed him in a single particular, until he accomplished his purpose. This was corroborated by the testimony of Moses Brown and William Almy".

Smtih Wilkinson adds that any expert in the theory and practice of cotton spinning would recognise the need "to adjust and adapt machines to suit the various kinds of cotton, and the different qualities of yarn; and how to perform the various calculations connected with the different departments of cotton spinning, and would be satisfied that Mr. Slater's first work, in Pawtucket, was a proof of his knowledge and experience, as well as of his mathematical and mechanical genius".

Nevertheless, rumours continued in America that Slater must have brought in designs, drawings or blueprints from England and it would have been difficult if not impossible for Slater to have proven a negative.

In any event, the Slater mill, complete with accompanying dam, waterway and waterwheel, became fully operational in 1793. From that point on, Samuel Slater's future took off in a series of developments that gave rise to what became known as the Rhode Island System.

In 1798, Samuel Slater formed a new company, S. Slater & Company in partnership with his father-in-law Oziel Wilkinson. A new spinning mill on the east side of the Blackstone River in Rehoboth, Massachusetts was built. Throughout the next decade, other mills also sprang up alongside the Blackstone River with many of the workers being ex-employees of Slater, some poached away by other entrepreneurs. Others stayed with Slater, one of whom was Bela Tiffany who became an overseer for Slater (the Tiffanys were to play an important part in Slater's later development in what became the town of Webster - see later).

In 1803, Samuel Slater was joined by his younger brother John Slater (1776-1843) from England. White does not give details of John's previous occupation other than he "probably" brought with him details of latest advancements in cotton spinning in England. Other separate articles give John as a millwright/wheelwright who had been apprenticed in the Derbyshire mills but these statements are given without concrete evidence. .

In any event, for the next 2 years John worked for Samuel on the mills at Pawtucket gaining the necessary local experience.

Meanwhile, Brown and Almy purchased land north of Providence in an area called Smithfield close to the Branch River. In a partnership between Almy and Brown and the two Slaters, a new mill and housing for workers was built at this site with John, having then moving to the Smithfield area, becoming the overall superintendent and with Samuel remaining in Pawtucket in charge of the two mills either side of the Blackstone River.

The Smithfield project, under John, became highly successful and by 1807 a village had grown up around the mill. That area then became known as Slatersville.

In 1812, Samuel's wife died in childbirth. Oddly, Hannah's death was to coincide with the start of a Slater development that was to firmly establish his success in America.

The aforementioned Bela Tiffany, an overseer at the original Slater mill was the son of a textile merchant and industrialist James Tiffany, with whom Slater evidently lost no time in making an acquaintance.

The Tiffanys came from Southbridge in the Oxford area of Massachusetts. Slater and the Tiffanys had evidently sourced that area for a suitable further industrial development and happened on an area located near Oxford South Gore close to the French River and a large lake improbably named Lake Chargoggagoggmanchauggagoggchaubunagungamaug, but now commonly referred to as Slater Lake, an expanse of water that could provide a powerful water supply.

In 1812, with Almy and Brown financing purchase of the land, the Tiffanys now became partners with Samuel Slater to form the Slater and Tiffany Co. A new mill, at Oxford South Gore was started and a village grew up around it which became known as the East Village. Further mill developments took place creating the South and North Villages, the South Village on the East bank of the French River close to the Connecticut border and the North Village a mile further north, also on the French River. The overall effect was to create a major industrial centre in Massachusetts with these mills operating well into the twentieth century

In 1832, Slater was instrumental in having this industrial area formally renamed Webster in recognition of Massachusetts senator Daniel Webster whom one assumes had been of considerable help to Slater, politically, in the overall Oxford South Gore development.

(https://en.wikipedia.org/wiki/Daniel_Webster)

A millionaire, Slater died April 21, 1835, Webster, Massachusetts owning over a dozen mills with ownership then passing to the younger Slaters.

A true pioneer in every sense, Samuel Slater had not only brought Arkwright principles and new management techniques to America and improved on them. Slater was also behind new turnpikes being created connecting Massachusetts, Rhode Island, Connecticut and New Hampshire. As a reformer, Slater had also introduced a Sunday School system for his workers, many of whom were children. Such a system, previously unknown in America, involved Slater's pupil workers being taught reading and writing skills and fundamentals in the operation of machinery.

Samuel Slater is buried in the East Village.

Footnote:

Whilst Slater's mills were a huge success, from an industrial development point of view, there remained weaknesses that could be exploited. Slater's mills were relatively dispersed and their ownership remained solely in the hands of the Slater family. A much larger more centralised plant that could not only spin but weave into cloth all under one roof required considerable investment. A new type of company, a stockholding company involving shared ownership, was the brainchild and ultimate success of one Francis Cabot Lowell, a wealthy merchant of Boston.

Section 3:

Samuel Slater, the Bootts (Kirk Snr. and Jnr.), and the Strutts

A copy of the following letter is amongst other letters that George White catalogues in his Samuel Slater memoir. White makes no comment on the contents of the letter but in the context of industrial textile development at the time and the relationship between Slater and the Bootts it may be of some significance. The letter is from Samuel Slater to George Benson Strutt, brother of William Strutt (F.R.S. and civil engineer) and dated June 4th 1821. George Benson Strutt was in charge of management of the Strutt business and was based in Belper nr. Derby.

"George Benson Strutt, Esq.

North Providence, June 4th, 1821.

Dear Sir, At the special request of G. Sullivan Esq. counsellor, and many of my friends in this section of the country, I now take the liberty to address you principally in their behalf. The object is merely this: A

certain cotton manufacturing company in this country, who have been in the cotton business a few years only, still, they have pretended to be the inventors of almost every thing, and have taken out patents accordingly; but as it is so well known, that, before they commenced business, one of their brightest partners was in England, for some time (cloaked as a merchant.) obtaining information and workmen, which induces the public here to believe, that they claim that which belongs to the public, &c. The greatest question is concerning the double speeder, now much used in this country, which is said to be on a much improved plan to any thing in Great Britain. Mr..Sullivan will forward this letter to one of his friends in England, who will wait on you in order to ask you some questions, but not with a view of obtaining any information, as respects any new improvements with you. If the questions asked appear pertinent you will have the goodness to answer them accordingly. We have a very recent new plan of machinery, just set in operation, only yet nicknamed the treble speeder, for roving and winding, which, from all appearance, far exceeds the double speeder ; as it will not cost more than one third per spindle, will be abundantly more durable, and perform double the work. The front roller must make at least 400 revolutions per minute, or the machine will not perform the work to best advantage. I contemplate having some of the kind in operation shortly, and should the plan far exceed the double speeder, on a full experiment, I will send you a draught of it with pleasure. I am told the inventor, a country boy about twenty years of age, is now spinning on the same principle, as fine as one hundred skeins to the pound, and running the front roller about as fast as for roving.

I am, dear sir, your most obedient servant,

Samuel Slater.”

To add some meaning to the contents of this letter, the following is noted: (1) Slater refers to U.S. patents and the “double-speeder” and that “a certain cotton manufacturing company.....have pretended to be the inventors of almost every thing, and have taken out patents accordingly”; (2)

In his book, “The Life and Times of Francis Cabot Lowell, 1775–1817”, Chaim M. Rosenberg writes, “Between 1861 and 1821 Paul Moody was awarded 10 U.S. patents for his cotton spinning frame, double-speeder, winding spool, cloth-dressing machine and other inventions”.

Hence, Slater’s letter demonstrates his doubt regarding the authenticity of the patents and writes that he is already in the process of developing a “treble-speeder” for “roving and winding”.

There is no doubt that the “certain cotton manufacturing company” mentioned refers to The Boston Manufacturing Company. “ And the statement “one of their brightest partners was in England for some time (cloaked as a merchant) obtaining information and workmen” refers to Kirk Boott Jnr. and/or his father Kirk Boott Snr. who had died 1817. Moreover, Kirk Snr. left a will made out in 1813 showing his ownership of a property in King Street, Derby where his sister, Elizabeth, was living at the time.

Possibly no coincidence that this property was very close to the large property at St. Helen’s House, in the same King Street, where the eminent civil engineer William Strutt lived -

<http://www.tunaleyfamily.com/KirkBoott-EdwardBrooks.pdf>.

In any event, the timing of the letter in 1821 is remarkable given it is dated shortly before the Merrimack Manufacturing Company was set up. Perhaps Slater, in his evident ire but determination not to name names, was alluding to the two Bootts collectively. But with Boott Snr, having died in 1817, the matter clearly focused on Boott Jnr.

In fact, if there is any doubt about Boott Jnr.'s visits to England, an immigration document shows that Boott Jnr, was continuing to travel to England as late as 1827, on this occasion involving one William Duesbury (see later).

Overall, Slater appears to be making two points: (1) that in the case of at least one of the patents, namely the "double-speeder", he has serious doubts regarding the attribution (2) that at least some of the information relating to these inventions had come from the Strutts in Derby and Belper.

Meanwhile, according to the book, "Legendary Locals of Lowell" by Richard P. Howe and Chaim M. Rosenberg, Kirk Junior "returned to Boston in 1817, befriended Patrick T. Jackson (both Jackson and Boott had suffered a serious family loss the same year) and was appointed agent to the Boston Manufacturing Company. ". As such, it would have been under Jackson (First Agent of the B.M.C.) that Boott Jnr. would have travelled to England after 1817, perhaps not for the first time, seeking information from the Strutts.

And the Boston Associates along with Boott himself would have been fully aware of William Strutt's capabilities, particularly through a knowledge of Samuel Slater's background as an apprentice to the Strutts, thirty years previously.

Samuel Slater's letter is also of some irony as it was Slater himself who, in 1789, had secretly walked out on Jedediah Strutt, William's father, and taken Strutt's and Arkwright's technical knowhow to America.

A look now at the events of the previous few years:

Francis Cabot Lowell (1775-1817), an import merchant, had spent some time in Scotland and Manchester, England (1810-1812) studying the Arkwright power loom. On his return to America and along with other influential people, most notably Patrick T. Jackson (brother-in-law of F.C. Lowell) and Nathan Appleton (a wealthy merchant and businessman), Lowell set up a new type of company, a stockholding company, the first of its kind in America with a view to building a mill at the side of the Charles River at Waltham nr. Boston. This mill would both spin cotton and produce cloth, mainly calico cotton, all under one roof. The size of this centralised mill to be much larger than Slater's mills that were relatively dispersed and produced spun cotton but not the finished cloth.

By setting up this stockholding company, incorporated in 1813, Lowell and his investors, who later became known as the Boston Associates, were in a financial position to achieve the building of this complex and by 1815, with the help of the brilliant engineer, Paul Moody, the first Waltham mill was complete. Under the continuing guidance of Lowell, Appleton, Jackson, and Moody, further mills at Waltham were built that all ran efficiently and successfully. The entire system, based financially on a

stockholding corporation, became known as the Waltham System - a new model for the burgeoning industrialisation of America that, at the larger scale, superseded partnerships such as the Slater, Almy and Brown companies..

Yet the scope for industrial expansion in textiles was so great in America that the Slater empire, run by Samuel and John Slater's offspring after the two died, continued well into the twentieth century.

Indeed, as late as 1927, the Slaters moved business into South Carolina and started a Slater mill with a village built around it. The ensuing village was later named Slater-Marietta after the Slater family.

Section 4:

The Bootts

Kirk Boott Snr. (1755-1817) was one of the original investors in the Boston Manufacturing Company who like F.C. Lowell was a wholesale and import merchant, Boott having emigrated from Derby in 1883. Boott's emigration had in itself been a risky move as relations between Britain and America were only starting to improve following the War of Independence that didn't officially end until the same year of Boott's emigration.

Having said that, Boott's import business soon profited considerably because at that stage America, not yet industrialised, relied heavily on British imports. Cheap imports from Britain were also deliberately designed to keep America reliant on British goods and to stall the setting up of local manufacturing industry. That position started to change with the beginning of America's industrialisation and America's 1812 War with Britain following which import tariffs (the 1816 Tariff and the 1824 Tariff) were introduced by America particularly on cotton and wool textiles and iron products in order to deter cheaper British imports.

Around 1814 and as an early investor in the Boston Manufacturing Company, Boott was already on business terms with F.C. Lowell. But from 1814 onwards, events determined that a closeness between the Bootts and Lowells extended to their families. Firstly, in 1814, Francis Boott (1792 – 1863) – son of Kirk Boott Snr, who, in 1810, had graduated from Harvard with honours and was later to become an eminent London physician - returned from a stay in Derby, England where he'd developed an interest in botany. Francis became friendly with John Lowell, dubbed "The Norfolk Farmer" because of John Lowell's great interest in horticulture and botany. John was the brother of F.C. Lowell.

Secondly, in 1815, Boott Snr, took on John Amory Lowell, son of John Lowell and both son-in-law and nephew of F.C. Lowell, as an apprentice at his mercantile business. This event took place after the young Lowell had completed his studies at Harvard

Meanwhile Kirk Boott Jnr (1790-1837) had studied at Harvard but without graduation and in 1811 left America to assume the position of lieutenant officer in the British Army. Boott served in that capacity in the (Spanish/Portuguese) Peninsular War but in 1813, after Napoleon had been exiled to Elba, Boott's

unit was ordered to move to New Orleans to help fight in Britain's 1812 War with America. But Boott, as an American, was excused that duty and, according to various reports, moved either to the Royal Military Academy at Woolwich or the Royal Military College at Sandhurst, to study engineering...

However, no evidence for this has yet been found and in an excellent detailed account, "Waterpower in Lowell: Engineering and Industry in Nineteenth-Century America " by Patrick Malone, the author claims with some certainty that this was not the case and that Boott returned to Boston to work in his father's business

In fact Samuel Slater's letter to George Benson Strutt, lends support to several other documents claiming that Boott, after leaving the British Army, did indeed spend considerable time in England with the Strutts and in particular William Strutt , FRS and civil engineer, studying the mill machinery at Belper, Derby. Also that he later returned to Boston with various plans and designs relating to the future Lowell development.

N.B. George Benson Strutt, the recipient of Slater's 1821 letter rather than William Strutt, was then manager of the Belper mill complex.

As previously mentioned, an immigration record shows Boott Jnr. still travelling to England and returning to Boston from Derby as late as 1827 now in the company of William Duesbury, grandson of the founder of Royal Crown Derby. The two travelled to Boston/Charlestown aboard the ship "Emerald of Boston" with Boott given as age 34 and Duesbury age 36. Duesbury was an expert in dyeing and may well have provided Boott with specialist advice. However, records show that, following arrival in America, he went on to operate a boarding house at 113 Merrimack Street, presumably for the benefit of workers at the Merrimack Manufacturing Company including the "Mill Girls". He was also owner and proprietor of an apothecary on the corner of Merrimack and Lewis Streets. No evidence has been found that he worked directly for the Merrimack company.

Returning to an earlier time, from around 1815 onwards and for reasons relating to import tariffs the Boott import business started to founder even though Boott Snr. remained a wealthy man.

And in 1817 a double tragedy took place. F.C. Lowell unexpectedly died (August 10th 1817) at the early age of 42 with Kirk Boott Snr. dying suddenly the same year although there is some doubt over the actual date of Kirk's death within that year. According to certain records, Lowell's death was quickly followed by the death of Kirk Boott. But another record gives Kirk's death as 9th January 1817, seven months prior to Lowell's death.

Problems over Kirk Boott's Snr's estate now surfaced and that matter is covered at:

<http://phtunaley.hypermart.net/KirkBoott-EdwardBrooks.pdf>

Around the same time and according to the book "Legendary Locals of Lowell" by Richard P. Howe and Chaim M. Rosenberg), Kirk Jnr was now appointed agent to the Boston Manufacturing Company working under Patrick T. Jackson, First Agent of the B.M.C. and brother-in-law of the now late F.C.

Lowell. Meanwhile, the Waltham mills were reaching their full capacity in terms of power that could be generated from the Charles River.

To offset this, an ambitious plan was covertly developed to create a much larger mill complex at a site close to the Pawtucket Falls on the Merrimack River at what was then East Chelmsford about 23 miles northwest of Boston.

It is stated in the same book, "Legendary Locals of Lowell" that, in November 1821, four people were gathered viewing the site at East Chelmsford after the land and water rights had been bought out from a company called The Proprietors of Locks and Canals. The four people were Nathan Appleton, Patrick T. Jackson (First Agent of the Waltham mills), Kirk Boott Jr, and his elder brother John Wright Boott. That meeting in November 1821 came five months after Samuel Slater's letter dated 4th June 1821 to George Benson Strutt in Derby, England.

The overall plan was stunning in its simplicity – to turn an existing but disused Pawtucket Canal that bypassed the Pawtucket Falls, into a power canal.

By buying out the company known as the Proprietors of Locks and Canals, the Boston Associates would have full control over the canal itself, a large area of land (around 400 acres) between the canal and the Merrimack River and rights to carry out development work on that section of the Merrimack River at the Falls including a dam to regulate flow of water through the canal. And with a 32 foot head of water, the potential was there to sell off power to other entrepreneurs who might wish to set up in that area.

And crucially, the Middlesex Canal, was close by, offering a direct and easy route for transport to Boston for the projected industry

About the Pawtucket and Middlesex Canals

The Pawtucket Canal, then owned by the company known as The Proprietors of Locks and Canals, had been built in 1796 to bypass the falls on the Merrimack. River, much to be used by boats carrying timber along the river from New Hampshire to Newburyport where there was a ship building industry. However, almost as soon as the canal was completed, work started on a new 27- mile canal direct from the Merrimack to Charlestown, Boston, and incorporating 20 locks. This new canal, named the Middlesex Canal and built by the Middlesex Canal Corporation, opened around 1800 and took virtually all the traffic from the Pawtucket Canal. This meant that much of the Newburyport industry moved to Boston with the Pawtucket Canal then falling into disuse.

As a result of the buy-out of the company, mainly by buying up stock, Kirk Boott was appointed Agent and Treasurer

And, according to "Legendary Locals of Lowell", Boott had already been offered the position of Agent of the Merrimack Manufacturing Company even before the company was fully organised or registered.

Perhaps supporting the view that Kirk Boott Jnr, rather than Appleton and Jackson was the main driving force behind the project.

According to the book "The Life and Times of Francis Cabot Lowell, 1775–1817" by Chaim M. Rosenberg, the original subscribers, Appleton and Jackson each took 180 shares, the two Bootts, Kirk Boott and John Wright Boott each took 90 and Paul Moody 60. Following these events, Wright Boott took no active part in the Chelmsford development..

But as regards Kirk Boott, he needed to be planner, draughtsman and architect with an overall knowledge of mill mechanics, the latter skills some of which he'd possibly learned from the Strutts. And aside from the more technical engineering aspect, canals had to be widened and branches excavated, boarding houses had to be built, as well as the mills. A sizeable labour force was required to do the job so the agent had to be responsible for recruitment and then be able to exercise good control over the workers. By all later accounts Kirk Boott, had a somewhat dictatorial manner and was not always well-liked by the workers but he was respected by his peers. And, from his days as a lieutenant officer, he was used to giving orders when a job needed to be done. These appear to have been some of his qualities when he embarked on the position of First Agent for both the M.M.C and P.L.C. companies. And finally on this theme, Boott was aware that an arrangement could be made with the Boston Manufacturing Company for their brilliant chief engineer, Paul Moody, at Waltham, to assist on the practical engineering side of the construction at East Chelmsford.

The Merrimack Manufacturing Company was formally incorporated in early 1822, shares having been bought and transferred with the main shareholders being the principal Boston Associates and the Boston Manufacturing Company.

Kirk Boott, already Agent and Treasurer of the Merrimack Manufacturing Company was now appointed Agent, Treasurer and Clerk of the Proprietors of Locks and Canals meaning he was now only answerable to the shareholders many of whom were also directors of the B.M.C.

And John Amory Lowell, now one of the biggest shareholders in the Boston Manufacturing Company and close friend of John Wright Boott was appointed a director of the Suffolk Bank, a clearinghouse bank set up by the Boston Associates in 1818.

In the same year, however, and in what appears to have been a foolhardy venture given Amory Lowell's other pressing commitments, John Wright Boott started up a wholesale business in partnership with Lowell. Unsurprisingly and particularly as Wright Boott no longer had his brothers to fall back on, this business going by the name of Boott and Lowell, was dissolved in 1824 with its closure evidently a forerunner to the Mill Dam foundry disaster that followed: <http://phtunaley.hypermart.net/KirkBoott-EdwardBrooks.pdf> .

Probably as a result, Wright Boott took no further part in the East Chelmsford project

Section 5

Construction

Work on the canal, much of it carried out by Irish immigrants, began in 1822 but it was not until the second half of 1823 that it was up and running.

The original Pawtucket canal was one and a half miles long with four locks (this became three locks after the original construction) starting at the head of the falls and joining the Concord River at a point just before this river enters the Merrimack. The Pawtucket had to be widened and deepened, new locks installed, a dam created at the head of the falls to regulate flow of water into the canal and a new power canal dug out. This power canal, the Merrimack Canal, to link the Pawtucket Canal, to a site, close to the Merrimack River, where the new Merrimack Manufacturing Company textile mills were to be sited. Using a system of locks and gates, the waters of the Merrimack Canal were then able to deliver power, via a head race to a 30 foot water wheel, from the full 32 ft. drop in the Merrimack River at that site.

These waters then directed back to the Merrimack River.

Machinery for the mills was at that stage furnished in the machine shop at Waltham where Paul Moody was the chief engineer and it was Moody who'd designed the 30ft water wheel.

However, given the scope of development now taking place at East Chelmsford plans were already afoot for a new Machine Shop to be built on the new site. In 1824, Moody was duly transferred from Waltham as was the machinery from the Waltham machine shop. The machine shop at the new site was itself powered by water from the Merrimack Canal using a thirteen-foot drop to the Lower Pawtucket.

By 1824, Moody had also moved away from the British method of using gears and shafts to drive the system and instead introduced pulleys and leather belts to provide the a more direct transmission, a method that proved significantly more efficient in terms of both running and maintenance.

Work was also started by Boott on recruiting the so-called "mill girls", many of whom came from outlying farms. Boarding houses were now being built to house these female workers who were to live under the watchful eyes of matrons in what became a paternalistic system.

At around the same time, Boott was also the driving force behind the building of a stone church close to the Merrimack Manufacturing Company. The building was finally approved by the M.M.C's board of directors and consecrated as the Episcopal Church (American Anglican) of St. Anne's in early 1825. Today, this church is still very much active (see:

<https://www.episcopalchurch.org/parish/st-annes-episcopal-church-lowell-ma>)

and stands on Kirk Street, Lowell, the street named after Boott and situated at right angles to what later became the Boott mills.

In 1825, the Proprietors of Locks and Canals company separated from the Merrimack Manufacturing Company and became officially, at least, a separate entity. It's main purpose to sell land and lease waterpower to new textile manufacturing companies

Kirk Boott now became First Agent and Treasurer of two separate companies - a position that, in all likelihood, would not be allowed today. Additionally, Paul Moody was now appointed chief engineer for the P.L.C. with Patrick Tracy Jackson moving from Waltham to Lowell and taking overall charge of the Machine Shop.

By 1826, the population of East Chelmsford, formerly a farming community, had risen to around 2500 (by 1836 it was around 16000) and, in March 1826, the area was officially renamed Lowell in memory of F.C. Lowell.

The next decade saw the P.L.C. digging out more branch canals with supposedly independent and competing textile manufacturing companies being set up at the side of these branches. In fact all the canal and building work was carried out by the P.L.C. with the machinery created and provided by the P.L.C.'s own continually expanding Lowell Machine Shop. Indeed, the Machine Shop was now starting to produce machine tools not only for the Lowell textile mills but for emerging industries elsewhere. Meanwhile many of the directors of these new companies also had considerable financial interests in both the B.M.C. and the M.M.C. – these people, the so-called “Boston Associates”, often being family related to each other, sometimes directly and sometimes by marriage.

The sequence of new mills, canals and years were as follows:

Hamilton Manufacturing Company 1826 fed from the Hamilton branch canal

Appleton Manufacturing Company 1828 fed from the Hamilton branch canal

Lowell Manufacturing Company 1829 fed from the Lowell Canal that branched from the Merrimack Canal.

The Middlesex Company 1831 fed from the Eastern branch canal.

Suffolk and Tremont fed from the Eastern branch canal 1832

The Lawrence Manufacturing Company 1833 fed from the Western-Lawrence branch canals

The Boott Mills 1836 sited between the Merrimack River and the Eastern Canal - fed from the Eastern branch canal

The Massachusetts Mills 1840 fed from the Eastern branch canal.

Amazingly, up to 1837 Kirk Boott had been in charge of all this work from the very start, working as a planner, draughtsman, site manager and construction supervisor, including oversight of all work on the canals, locks and dams, the buildings, the machinery, the boarding houses and the roads.

With the ageing of the mills and the machinery, the effects of the First World War and the Great Depression plus the fact that many owners (including the Slaters) had begun to move their companies further south, the Lowell mills began to close from the 1920s onwards.

But of all the manufacturing companies, the Boott Mills completed in 1835, consisting of six centralised linked mills and occupying 800,000 square feet, were the most imposing and enduring and its doors didn't close until 1955.

Kirk Boott died in 1837, following the overturning of his carriage at the corner of Merrimack and Dutton Street.

Today, thanks to the U.S. Park Service, the Boott Mills have been renovated and form part of the Lowell National Historic Park that includes the Boott Cotton Mills Museum.

Footnote:

One great development that Boott was not in charge of during his time was the building of the Boston Lowell Railroad, completed 1835. Much of this was down to Patrick Tracy Jackson and the civil engineer George Washington Whistler (1800-1849), then the chief engineer at the Lowell machine shop (Paul Moody had died 1831 following a short illness). Jackson had the parts of a George Stephenson locomotive imported from Newcastle, England and brought up to Lowell from Boston along the Middlesex Canal. Whistler was able to replicate and improve on the components and create a fully working steam locomotive. The first journey by steam locomotive from Lowell to Boston took place in June 1835.

Whistler was the father of the famous artist James McNeil Whistler (1834-1903) and his younger short-lived brother Kirk Boott Whistler (1838-1841), named, of course, after Kirk Boott,

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