

Plate 1 Letter-heading from the time of Ames, Bush & Co. (1850)

George Watkins collection, NMR Swindon



Plate 2 General view from the Feeder Canal in 1965

Angus Buchanan

The Great Western Cotton Factory

Angus Buchanan and George Watkins

This article is the result of a collaborative project between the authors, pursued spasmodically in the 1960s and 1970s. It was not brought to fruition then for several reasons. We were both preoccupied by more pressing commitments, and then in the 1980s George's phenomenal ability to recall structural and mechanical details began to weaken, and we were not able to finish the work. It was put on one side and then, with George's death in 1989, it was overlooked. The recent rediscovery of the notes we prepared, however, makes it possible now to complete the exercise, and I am glad to do so as a tribute to my co-author. George lived his whole life within a few miles of the Great Western Cotton Factory, and he was always sorry to have missed the opportunity of examining its steam engines. But he was assiduous in collecting information about the mill, and entered into long correspondence with retired workmen, like the boilerman Mr. B. Harwood, who filled in many useful details for him. We are thus able to present some hitherto unpublished material about the site, the factory, and the steam power units. A.B.

The demolition of the Great Western Cotton Factory in 1968 was a serious loss to the stock of significant industrial monuments in Bristol. The site was largely redeveloped, and apart from a 'footprint' in the road pattern, some street names, and a few fragments of wall, nothing remains to be seen. Yet for over a hundred years the factory was a unique industrial building in the Bristol region. Large fireproof textile mills were common enough in Yorkshire and Lancashire, and in other parts of the country where the textile industries flourished in the nineteenth century, but in the Bristol region it was the only one of this type. It was also one of the largest employers of labour in Bristol in the nineteenth century, and it made a profound impact on Barton Hill, the industrial suburb that grew on the eastern edge of Bristol in this period. Its story deserves to be told.¹

The factory was built as the result of the formation of the firm styled initially 'Clarke, Acramans, Maze & Co.' J.B. Clarke, a cotton manufacturer in Manchester, negotiated a partnership with about a dozen Bristol entrepreneurs to undertake large-scale cotton manufacture in the city. There had been a number of small-scale operations producing cotton goods in and around Bristol before, but the city had a long

attachment to the woollen cloth trade - even though production had moved out into the hinterland of Somerset and Wiltshire - and there had been little interest in developing a cotton industry. The spectacular success of this industry in Lancashire and elsewhere, however, encouraged a number of industrialists and property-owners to believe that Bristol possessed all the advantages of these districts, and should thus be able to sustain a substantial cotton factory. W.E. and A.J. Acraman, owners of a large engineering business; Peter Maze, who had given his backing to the Great Western Railway, which I.K. Brunel was then building; and men of property like G.H. Ames, C. Pinney, H. Bush and R. Bright; had all been recruited into the partnership, and the foundation stone was laid on 18 April 1837. Within a year the first buildings were complete, and in January 1839 a presentation was made of the first piece of manufactured cloth to the mayor of Bristol.²

The site chosen for the new factory consisted of two acres, subsequently expanded to about seven acres, alongside the Feeder Canal in the parish of St Philip, then just beyond the built-up part of the city. The canal had been constructed as part of the 1804-09 port improvements to bring a supply of fresh water into the Floating Harbour and to provide a throughway for the Avon Navigation from Bristol to Bath and the Kennet & Avon Canal. Running almost due east from the city for over a mile to Netham weir, the Feeder provided along its banks excellent opportunities for industrial development, and these were grasped by the cotton company. It was intended that raw material and local coal would be brought to the site by barges on the Feeder, and that the whole business of preparing the cotton, spinning the yarn, and weaving and bleaching the fabric, would be integrated on the premises.

As the new Great Western Railway passed one corner of the site where it crossed the Feeder on its approach to Temple Meads Station, and as the SS *Great Western* is reputed to have returned from its maiden voyage to New York on 26 May 1838, bringing bales of cotton for the mill, the appellation 'Great Western' was no mere coincidence.³ It represented, indeed, part of a determined effort to reassert the commercial and industrial leadership of Bristol after decades in which Liverpool and other cities had displaced her from the proud position as second city in the realm. Other enterprises, in soap, sugar and paper manufacture, as well as in coal-tar, tobacco and chocolate, all flourished at this time, so

that the people to whom I.K. Brunel referred as ‘the spirited merchants of Bristol’ managed briefly to restore to Bristol in the 1830s and 1840s something of the commercial vigour for which it had been famous in the eighteenth century.⁴ The revival did not last long, and the wave of innovative enterprises was already diminishing in Bristol by the 1850s. But the Great Western Cotton Factory struggled on into the twentieth century, even though it rarely made attractive returns for its investors.

The fortunes of the Cotton Factory were reflected in its frequent changes of nomenclature. The original title was altered in 1838, when the Acramans got into financial difficulties and pulled out of the partnership, which became ‘Clark, Maze & Co., Great Western Cotton Works’. Clarke himself withdrew in 1845, when the title became ‘Maze, Ames, Bush & Co.’ and five years later, in 1850, the style changed again to ‘Ames, Bush & Co., Great Western Cotton Works’. This name remained until 1864, when the enterprise underwent substantial changes after the American Civil War, which had drastically curtailed the supply of raw cotton and, as in Lancashire at the same time, caused widespread hardship. The firm was thoroughly reorganised under the terms of the 1862 Companies Act establishing limited liability, under the style of ‘Great Western Cotton Works Bristol Limited’.⁵ There was a further reorganisation in 1885, when a new prospectus was issued and the style changed to ‘Great

Western Cotton Company’, as which it remained until cotton production ceased in 1925.

Despite all these changes of title, the organisation of production at the Cotton Factory remained fundamentally unchanged from that set up in 1837. The relative isolation of the factory from other cotton enterprises made it necessary to plan the firm as an integrated unit from the outset. In contrast with the mills of Lancashire, in which a high degree of specialisation had become the general practice because of the ease with which the product could be passed between spinning, weaving, and finishing mills, all the processes in Bristol were performed on the same site. The five-storey spinning mill was the first building to be erected, and was named the ‘Phoenix Mill’.⁶ This was soon joined by a weaving shed capable of holding over a thousand looms, together with a bleaching shed and a small foundry, so that most of the mill-work could be carried out on the premises. These units were modified or expanded over the active years of the Cotton Factory, but there was little change in the basic pattern.

The conception of the Bristol firm was, in fact, very neat. It was intended that bales of raw cotton and local coal would be brought to the site by barges on the Feeder Canal and that, after preparing the cotton, spinning the yarn, weaving and bleaching the cloth, the fabric could be packed and despatched by sea,

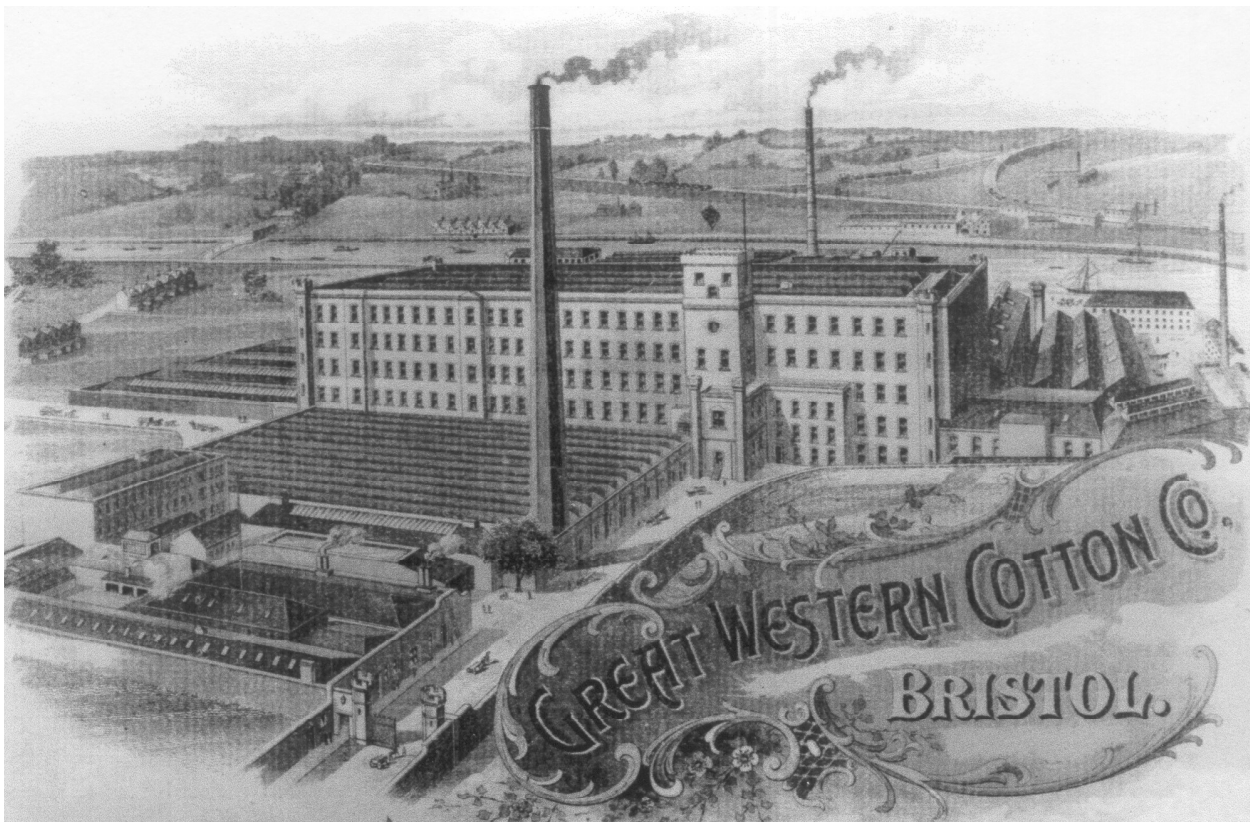


Plate 3 Letter heading from Great Western Cotton Co. (1888)

George Watkins collection, NMR Swindon

railway, or road, all of which were conveniently available. In practice, it did not work so smoothly. Operating problems in the port of Bristol soon made it cheaper to import cotton through Liverpool, and to bring it to the site by canal or rail. Local coal from the Kingswood coalfield was found to be inferior to Welsh coal, which was shipped in large quantities, although in later years the coal mine at Hanham, a few miles from the Cotton Factory, was found to be serviceable.⁷ Even the local water supply was problematic, being relatively hard compared with that collected off Pennine grit, and attempts were made to collect rain water in a reservoir in the cellar.⁸

In his opening address at the Cotton Factory, J.B. Clarke had made a point of the comparative cheapness of labour in Bristol being one of the advantages of the operation, but it seems unlikely that this was ever a substantial factor in its favour. From the outset, it was a large enterprise by nineteenth century standards, with 923 employees by 1840. After the down-turn in the 1860s with the American war, this figure grew to 1,600 in 1883, and probably reached 2,000 by the early twentieth century.⁹

The principal product of the Cotton Factory was a range of coarser calicos intended mainly for the export market. The first consignment of cotton fabric was to Italy, reported in June 1840, and thereafter it was sent to markets in the Mediterranean, the Near East and the Far East.¹⁰

The mill appears to have shared in the general prosperity of the British cotton industry at the end of the nineteenth and beginning of the twentieth century. It also shared in the difficulties of the industry everywhere during the First World War, and the euphoric feelings of reviving prosperity after the War. One of the strangest events in the history of the Cotton Factory was the refusal of the proprietors to accept a 'highly advantageous' offer from Lancashire to purchase the whole concern in 1919.¹¹ The optimism about the prospects of the cotton industry was short-lived, and the Bristol mill closed down in 1925. The premises were acquired by the Western Viscose Silk Company, which re-equipped them and used them for the production of *Wescosyl*, an early artificial fibre, from 1925 to 1929. The circumstances of serious international trade depression and rapid decline



Plae 4 Yates engine and engine house team in 1925

George Watkins collection, NMR Swindon



Plate 5 Letter heading of Western Viscose Silk Mills Ltd (1930)

George Watkins collection, NMR Swindon

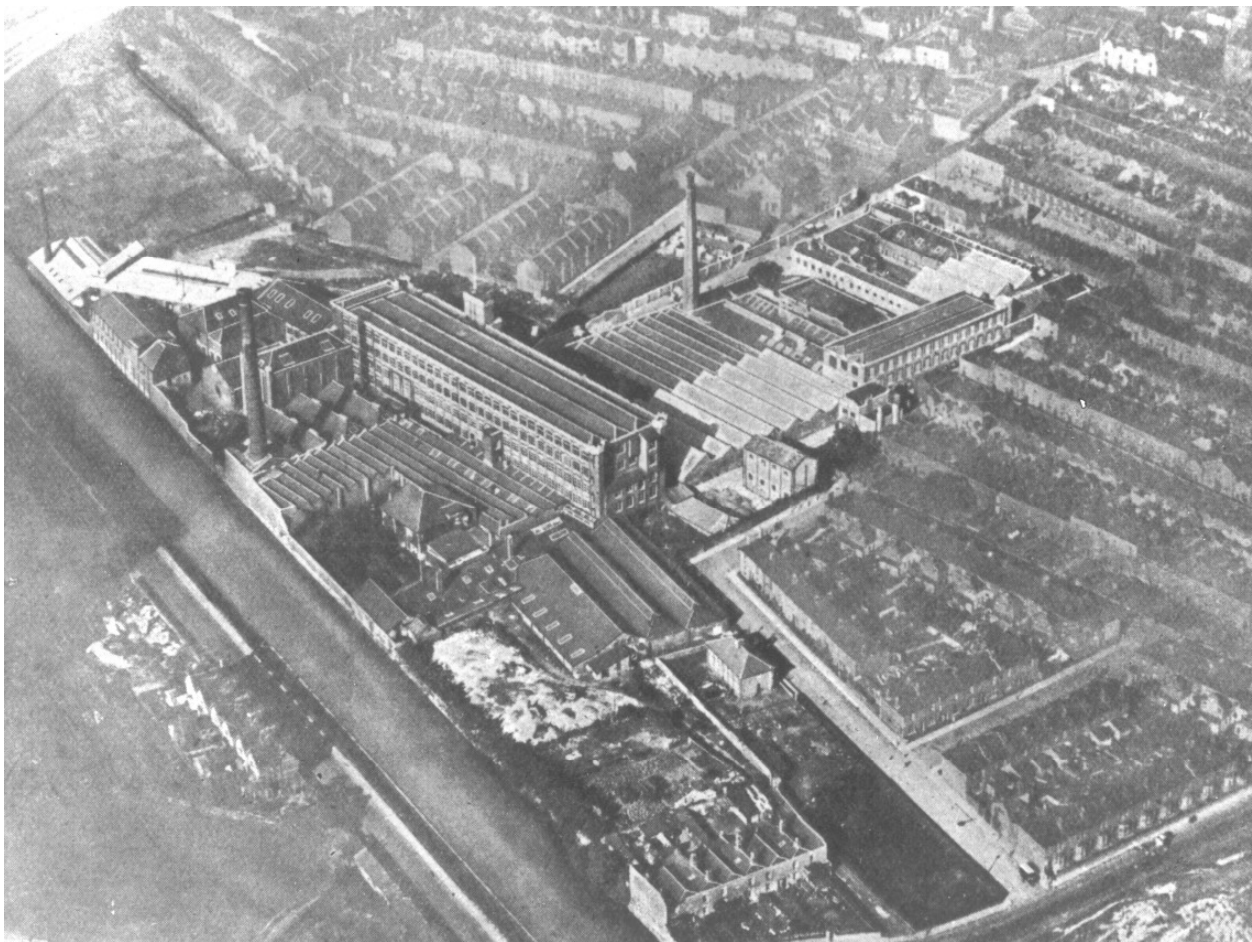


Plate 6 Aerial view of the Great Western Cotton Factory, c.1930. Is this a publicity photo taken in an attempt to sell the mill complete?
George Watkins collection, NMR Swindon

in British cotton manufacturing were, however, unfavourable for the development of new textile industries, and the company went into liquidation in 1929. From then until their demolition in 1968, the buildings were either re-used as warehouses, sublet as small industrial units, or left derelict. They were damaged by bombing in the Second World War, and

became very dilapidated, being finally demolished for new industrial development before interest could be aroused in listing them, or even in securing their proper recording.¹²

Throughout the eighty-seven years of its operation, the Great Western Cotton Factory enjoyed fairly har-

monious labour relations. The management appears to have been generally competent, with a touch of paternalism and even philanthropy, although there were clearly some exceptional occasions. For example, the local press reported a disturbance in the mill in 1852, after which the Chief Manager Ashworth was fined £5 for assaulting Emma Williams, who had led a protest against the machines running overtime.¹³ A report on the mill commissioned by the proprietors in 1873 from James Potter of Oldham commented favourably on the enterprise: *'In conclusion I can only say that you have more than an average cotton mill'*.¹⁴ But early the following year a committee appointed to examine *'the losses of the past year'* and to see *'what prospects there are of the company being able to work the Mill profitably for the future'*, accused the then Manager Thomas Lang of misappropriating *'considerable quantities of flour belonging to the Mill, for the keep of his pigs etc., the value of which we estimated at £500'* - although the final phrase was crossed out with the marginal note: *'would it be prudent to read this?'*¹⁵

There were some industrial disputes in the later years of the Cotton Mill, according to Mr. Clayton, the last manager of the cotton enterprise. These were in 1908 and *'after 1910'*: *'The worst I can recollect was a strike of the winders due to bad cotton which caused so much breakage as to sadly reduce their piece work wages. I believe that lasted a couple of weeks or so'*.¹⁶ In 1924, however, the *Textile Mercury* reported that the mill had run for fifty years without stopping a single loom for a day except for repair or renewals, and that the total bad debts for the half century was a mere £50.¹⁷

The main spinning mill was a fully fire-proof structure, with cast-iron columns supporting brick vaulting and floors of stone slabs, encased in a shell of bricks and local pennant sandstone and iron window-frames, and with wood only used in the roof. It was 300 ft long, divided into 32 bays, with two rows of cast-iron columns arranged at 9 ft 6 in intervals down the length of the mill. It had a projecting turret, entrance and staircase block on the northern side, and was originally equipped with castellated corner towers, although these were subsequently removed. Also on the northern side was the square weaving shed, a single-storey structure with 'saw-teeth' roofing and north-facing glazing. Still further north was the smaller 'Hope Mill', a

three-storey building with thirteen bays. This was probably occupied partially by the engineering department, which was able to deal with repairs and maintenance on all the engines and machines in the factory. Beyond this and various ancillary buildings were the castellated entrance gates. Additions were made at both ends of the main block to accommodate preparatory and bleaching processes, and to provide for storage and packaging. Between the main block and the canal, the space was taken up with boiler-rooms and coal storage for the steam engines.

Steam was always the source of power for all the operations in the Great Western Cotton Factory. The original engine was a double beam engine installed in the engine house, which was created out of two bays taking up two floors (the second and third) running the width of the main spinning block. This was a traditional Boulton & Watt machine of 2 x 80 hp cylinders, with a cast-iron fly-wheel and cranks placed at 90 degrees to each other, driving vertical shafts through bevel gearing which then drove secondary shafting along each floor of the mill.¹⁸



Plate 7 The original engine house

Bristol Regional Buildings Record

There was also a single 80 hp beam engine adjacent to the entrance tower on the north side of the mill, which provided power to the weaving shed, and there was an arrangement for coupling the main unit to this when additional power was required for weaving. Then there was a smaller engine of 20 hp providing power for the engineers' department, at the top of the mill yard, and a further engine of 24 hp had been added for the bleaching department by 1844. Steam was initially provided at fairly low pressure, probably about 15 psi, from a set of boilers of unknown type: they could have been Cornish single-flue boilers, internally fired, or egg-ended boilers with furnaces below. They were provided with coal from a short stretch of raised railway, bringing it from the barges on the canals to the main coal store. The principal chimney stack was placed alongside. There was a subsidiary chimney stack at the north-west corner of the weaving shed, but it would appear that this served the engineers' department as no additional large boilers are mentioned. It was distinguished by being octagonal. A third stack served the bleaching shed engine and boiler.¹⁹

The first major reform of this power plant probably came with the re-floating of the company after the American Civil War. By then the boilers were twenty-eight years old and needed replacing, and the practice of 'McNaught compounding' beam engines was giving Northern mills greater economy and thus a decisive competitive edge over the low pressure machines in Bristol. It seems likely that new boilers working at 65 psi were installed at this time, and that the beam engines were McNaughted by the addition of a high pressure cylinder. The prospectus at the re-start stated that new spinning mules would replace the old ones, and so in 1865 there were 43,000 mule spindles and 24,000 throstles, together with 1100 looms.²⁰ By 1884, it was recorded that there were twelve boilers working at 65 psi²¹ and the fifty-year-old engines were all heavily loaded. Ring spinning was being introduced for the medium and coarse calicos manufactured in Bristol. This required fewer skilled spinners and increased productivity, but it also required additional power, so that drastic measures became necessary in order to maintain the enterprise.

With the reorganisation of 1884 it was decided to deal with this problem by installing a completely new engine in an engine house built on to the south-west corner of the spinning mill and working through rope drives in a rope-race to all the floors of the mill. A fine twin tandem horizontal slide valve engine by W.&J. Yates of Blackburn was acquired and gave excellent service. It provided about 1600 hp and

required a set of seven boilers working at 120 psi.²² One consequence of providing rope drives along the length of the mill was that the horizontal shafts had to be strengthened, because they were substantially longer than the original shafts taking power from the engine when it was inside the main mill building. The old engines and boilers were removed. In 1897, a new horizontal engine by George Saxon of Openshaw, working at 120 psi, was installed in the old engine house to provide power for the weaving shed.²³ This arrangement served until the end of cotton manufacture, and the subsequent experiment with viscose silk. It is probable that all the machinery was scrapped soon after closure in 1929.

There are several reports of breakdowns of the power equipment. The most serious was in 1889 when a sudden reduction in the load on the weaving shed engine caused it to over-run, shattering the flywheel and engine bed.²⁴ It seems that a decision was made not to replace it, but to run the weaving shed from the new Yates engine. This did not prove satisfactory, however, so that the Saxon engine was installed in 1897 to supplement the main power unit through a secondary rope drive from the old engine house.²⁵ There were also a number of fires in the history of the mill, although the fact that they were all minor outbreaks demonstrated the basic soundness of the mill design.²⁶

Barton Hill had consisted mainly of open fields when the Great Western Cotton Factory was built in the 1830s, but it quickly attracted workers and their families to the neighbourhood of the mill so that it became convenient to make provision for housing them. This was done in an orderly fashion, the adjacent area being laid out in a grid pattern with each street named after a proprietor or a feature of the mill and built up with terraces of solid artisan houses. A strong sense of community developed in Barton Hill, with the proprietors of the Cotton Factory subscribing towards the £2,700 raised for the construction of the new church designed mainly for workers at the mill. This was consecrated as St. Luke's Barton Hill on 20 September 1843. There was other evidence of philanthropic concern for the neighbourhood on the part of the mill owners, reflected in the fact that workers in the mill were habitually of long service.²⁷ Despite disuse, war damage and decay, the main buildings of the Great Western Cotton Factory remained intact until the summer of 1968, an austere reminder of the industrial past amongst the tower-blocks of the Barton Hill redevelopment scheme. But the spinning mill was then demolished, revealing briefly the distinctive cellular structure of the tradi-

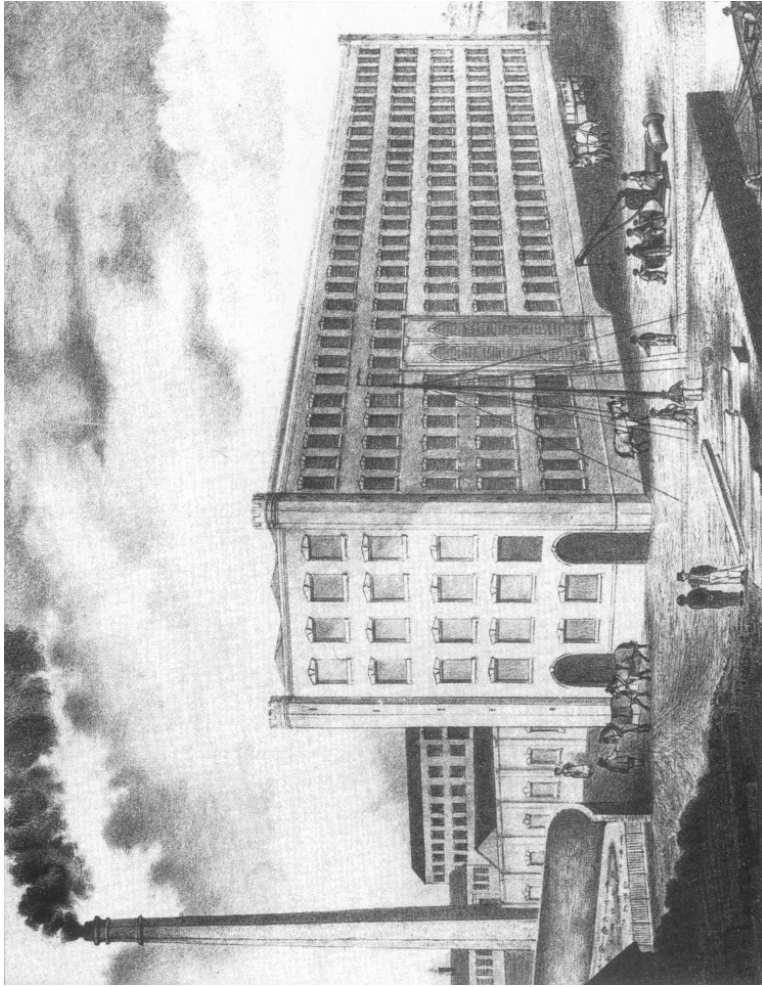


Plate 8 The Great Western Cotton Factory in 1838

Bristol Industrial Museum

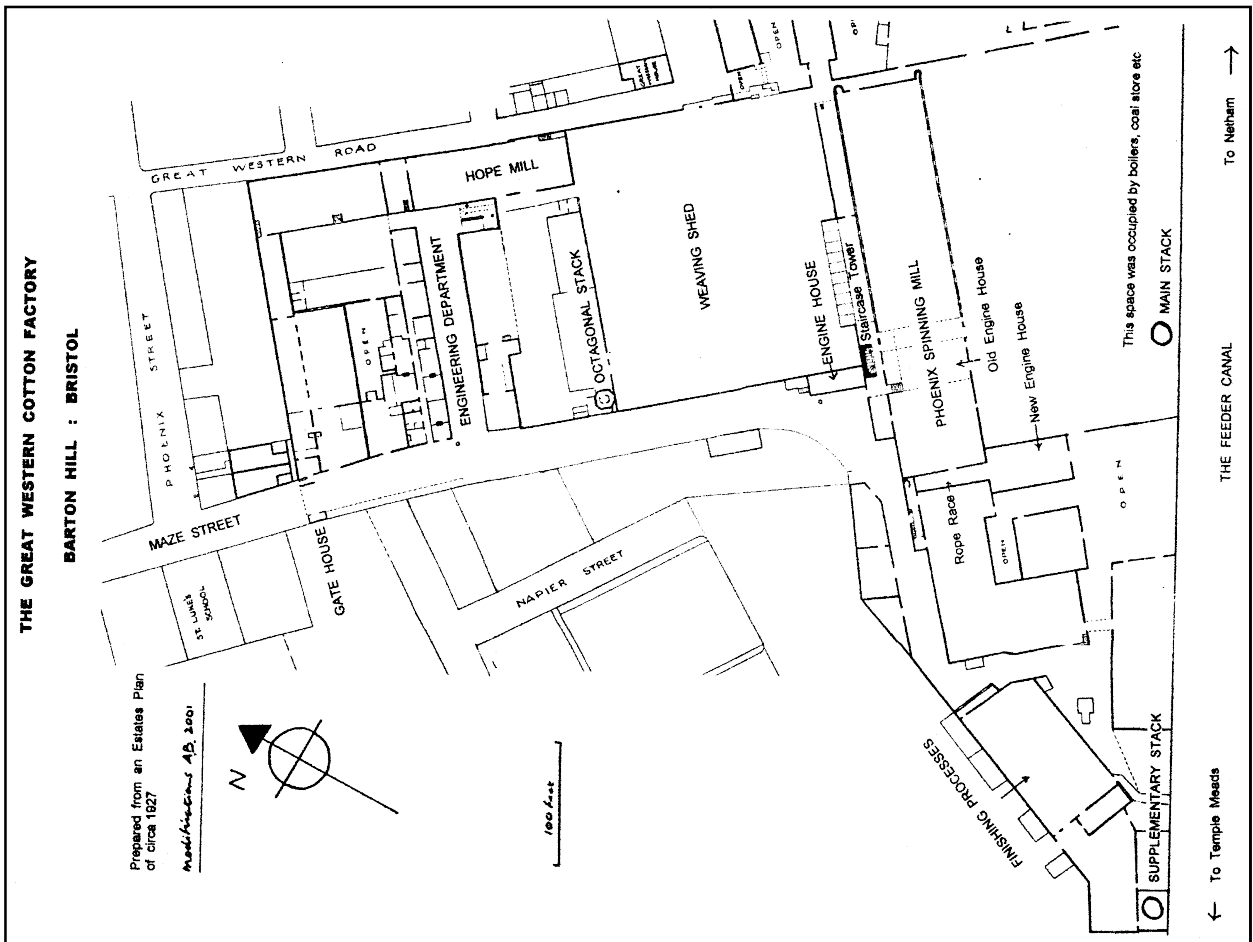


Fig. 1 Diagram of the site (based on Estate Map of c1927)

tional fire-proof textile mill. Only a few fragments of this once important industrial enterprise now remain, but it made a significant contribution to the industrial history and industrial heritage of the Bristol region, and this fact alone makes it worth while reviewing the history of its development, its prosperity, and its decline.

Notes and References

- We do not know of any published works devoted to a full account of the Great Western Cotton Factory, but there are several useful contributions and summaries such as: Latimer, J., *The Annals of Bristol in the Nineteenth Century* (Bristol, 1887); Buchanan, R.A. and Cossons, N., *The Industrial Archaeology of the Bristol Region* (Newton Abbot, 1969); Sanigar, W.T., *Leaves from a Barton Hill Notebook* (Bristol, 1954); Jones S.J., 'The Cotton Industry in Bristol', *Transactions of the British Institute of Geographers*, 13, 1947; Anon., *Work in Bristol* (Bristol, 1883); Arrowsmith, *Dictionary of Bristol* (Bristol, 1884). There is a file on the Factory in Bristol Record Office (BRO), at 13423; and there are frequent references in the Bristol press. Over many years GW compiled a file of notes about the Factory, referred to here as 'GW Notes', which will eventually be deposited with the George Watkins Collection in the National Monuments Record Archives at Swindon.
- Latimer, *op.cit.*, p.237
- Felix Farley's Bristol Journal*, 26 May 1838, reported the cargo of the SS *Great Western*
- The quotation by I.K. Brunel came in a letter to John Yates on 16 November 1854 in which he complained that newspaper articles on the SS *Great Eastern* project then being canvassed had 'failed to do justice to the spirited merchants of Bristol' by ignoring their contribution to transatlantic steam navigation. The arguments for decline or revival in the economic fortunes of Bristol in the nineteenth century are rehearsed in Alford, B.W.E., 'The economic development of Bristol in the nineteenth century: an enigma?', and Buchanan, R.A., 'Brunel in Bristol'; both in *Essays in Bristol and Gloucestershire History*, ed. McGrath, P. and Cannon, J. (Bristol, 1976)
- Jones, *op. cit.*, pp.76-77
- The name 'Phoenix' suggested that it had been burnt and raised from the ashes, but we have no reason to think that any such event occurred. The appearance of a basement on the canal frontage makes it look like a six storey mill.
- There are details of coal used and prices in GW Notes
- Jones, *op. cit.*, quoting Clayton, the last manager of the Factory, on the reservoir
- Employment figures are derived from BRO 13423 and from GW Notes
- Felix Farley's Bristol Journal*, 1 June 1840, reports on the first consignment
- Sanigar, *op. cit.*, p.23
- A photographic survey of the mill was made by the Bristol Regional Buildings Record in 1965, and is now housed in the University of Bath. In the same summer, 1965, a party from Hartcliffe School under the direction of Mr. H.M. Stedman made a valuable preliminary survey of the main building, a copy of which is filed in GW Notes.
- BRO 13423-30-81; See also *Bristol Mirror*, 2 March 1852
- BRO 13423-26
- BRO 13423-24, report dated 10 January 1874. The flour was used in sizing the cloth, and the loss reported only accounted for a fraction of the total loss of £6,000 which was being investigated. Lang issued a businesslike report himself, suggesting that 'the weavers may have carried out a little' material from the mill (BRO 13423-25) and no action seems to have been taken against him.
- BRO 13423-32
- BRO 13423-34; See also *Textile Mercury*, 28 June 1924
- When GW first compiled his notes on these engines he did not know who the makers were, but I believe that he was alerted by Jennifer Tann to the fact that drawings of the first installations survived in the Boulton & Watt archive in Birmingham City Library. He was thus able to obtain copies of some of these drawings, and to confirm the attribution of the engines to the Birmingham firm.
- There is a problem about these stacks because the 'main' chimney does not appear on the earliest representations of the factory, whereas the octagonal one does, so it seems possible that the former was only installed at the time of the construction of the Yates engine and engine house, with its need for increased boiler capacity.
- The figures cited from the 1865 prospectus are in GW Notes
- The figures cited from the 1884 report are in GW Notes
- The specifications for the Yates engine are discussed in GW Notes: 'No dimensions are known, but the cylinders would be about 24 ins. high pressure and 48 ins. low pressure and 5 ft. stroke to run at about 60 revolutions per minute. It was a typical Yates slide valve set, with single slipper guides, and condensers below. The flywheel was some 27-28 ft. diameter, grooved for thirty ropes. There were the usual Yates cross cut-off valves on the high pressure cylinders. Two interesting features were that the high pressure and low pressure cylinders were close together: Yates usually had more space to get at the piston rod glands; also there were five governors in all. Each side could thus run independently having its own cut-off and speed governor, while there was another one on the centre, possibly an extra safety precaution'.
- GW Notes, describing the Saxon engine as a Corliss compound with the engine number 235, although full details appear to have eluded him.
- BRO 13423-30-181; See also *Western Daily Press*, 23 September 1889
- B. Harwood gives a graphic account of seeing these engines at work when he was a boy working in the mill. One of his duties was to report changes in the expected loads on the engines to the engine drivers, and he took the opportunity to observe closely what went on. On one occasion he got into trouble with Mr Turner, the Manager (and, incidentally, father of Eva Turner the opera singer), and his Chief Engineer 'Black Jack' Calvert, both of whom came from Lancashire and warned him: 'Thee look ater thysel, next time I 'ear of thee doing summat tha shouldn't tha's finished...' see letter no.7, n.d but probably May or June 1962, in the sequence of 23 letters preserved in GW Notes
- There is a list of fires in GW Notes
- Sanigar, *op.cit.*, stresses the impact of the Factory on the local community: 'So closely bound up was the Factory with the family life of the parish that some of its trade terms were commonly used outside the walls as well as within' (p.23)