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BOAR'S HEAD MILLS
Old Lane
Darley Abbey
City of Derby

A SURVEY AND INVESTIGATION OF THE COTTON MILLS AND ANCILLARY BUILDINGS

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Note: numbers in brackets refer to the key plan (Drawing 1, following text of report)

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The principal holding of primary documentary sources is the collection of Evans family and company records, some formerly held by Derby City Library, but all now deposited at the Derbyshire Record Office in Matlock. Thanks are offered to the County Archivist, Dr Margaret O'Sullivan, and her staff for every assistance with the sources in their care, and for permission to reproduce extracts from the Liberty Map (Figs 4 and 23). Other documents of importance were consulted at Derby Local Studies Library, by whose permission Figs 8, 10, 67 and 71 are reproduced, and at Cambridge University Library. At both the assistance of staff is gratefully acknowledged. Fig 7 is reproduced by permission of Derby City Council. Figures 12, 13, 15, 21, 38, 39 and 45 are © Crown copyright. NMR. All other figures are © English Heritage.

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SUMMARY

The Boar's Head Mills, also known as Darley Abbey Mills, form a large complex of cotton spinning mills and other buildings beside the River Derwent just north of Derby. They were founded by Thomas and Edmund Evans and were operated under the Evans name from the 1780s until the 1960s. They formed, with the Arkwright mills at Cromford and elsewhere, and the Strutt mills at Belper, Milford and Derby, one of the three most significant late 18th- and 19th-century textile enterprises of the Derwent Valley. The Evans family had well-established financial and industrial interests before they embarked upon cotton spinning, and were related to the Strutts by marriage, as well as acting as bankers to Richard Arkwright and a number of other mill-owners.

The earliest building, Long Mill (1), was erected in 1782-3 on the eastern bank of the Derwent, which was penned by a large weir. It may have been operational from 1783, though it is possible that effective working was delayed for a number of years. The earliest unequivocal references to its operation date from 1787. When the mill was struck by fire in 1788 the complex was described as including workshops and warehouses in addition to the mill itself; it may also have included a picking room, for the processing of raw cotton – a facility first mentioned in 1791.

The extent to which the original mill survives in the present building is unclear. Two interpretations of the evidence are debated below: first, that the brick and stone carcass of the mill survived the fire, and was raised from four storeys to five plus an attic in the rebuilding; second, that little more than the wheel and wheel-pit were retained from the fire-damaged building. As it survives today, Long Mill consists of five storeys and an attic, and is seventeen bays from north to south. It has brick walls on a gritstone ground floor, conventional timber floors and a queen-post roof. The original timber stair (later replaced), ground-floor office and upper-floor stores were grouped at the north end, while privies projected from the south end, leaving the remaining spaces, which were heated by stove vents, clear. A number of original windows survive: they are of timber, but incorporate small iron casements. The attic, which was converted *c*1792 to provide a schoolroom, was lit by lunettes in either gable.

An eastwards extension, later known as Middle Mill (2), is of uncertain date, but was probably added between 1804 and 1805, following the building of a new leat between 1798 and 1800, and certainly existed by 1811. It consists of five storeys and six bays, and incorporated the original wheel position. Like Long Mill, it was of conventional timber-floored construction, and the east gable was similarly adorned with a lunette. It was severely damaged by fire in 1947, after which it was re-floored and re-roofed.

Two other buildings are roughly contemporary with Middle Mill; both occupy sites rendered more attractive for building by the diversion of the original leat. On the northern perimeter of the site there is a long range (4) which is of great technological significance. It incorporates one of only two known *in situ* survivals of a proto-fireproof constructional technique pioneered by the Strutts, cotton-spinners, in the 1790s, in which brick jack-arches or vaults spring from timber skewbacks attached to timber beams, all the timbers being protected against fire by a thick coat of plaster. The beams are supported at mid-span by cast-iron columns of rounded cruciform cross-section. Two distinct phases of building, both making use of the technique, can be dated by

documentary evidence to the period 1797-1801. They incorporated ground-floor cart openings, were sufficiently well-lit on the first floor to function as workshops, and formed part of the mill's wood-yard. The other building of about this date is a three-storey, three-bay house (3) with a slightly concave front and convex rear, probably intended for a manager or other mill official. A third building is possibly earlier but was not available for inspection. Now forming part of the Darley Abbey Pottery (6), it was present by 1811 and is conceivably the Picking Room mentioned in a letter of 1791.

The construction of East Mill (7) began in 1818. Forming a broader eastwards continuation of Middle Mill, from which it derived power, it is six bays in length and five storeys high. Unlike its precursors it is built in fireproof construction, with brick vaults supported by cast-iron beams, and is notable particularly for the form of its cast-iron roof. This is quite different in conception from those of West Mill, commenced just two years later, and North Mill, and indeed is difficult to parallel anywhere. West Mill was added in two phases, beginning in 1821, and appears to incorporate fabric from an earlier wheel-house, present by 1811. It is of four fireproof storeys built on an L-plan, and has an elaborate roof of cast- and wrought-iron construction. This exhibits slight variations between the two phases, which correspond to the two arms of the 'L'. It is likely that Long Mill was 'fireproofed' with sheet metal and the timber stair replaced in brick and stone at about the same time to safeguard the heavy investment in contiguous structures.

North Mill (9) was probably built *circa* 1835. Three storeys high and thirteen bays long, it resembles West Mill in its use of fireproof construction and in some of the details of its roof, but is more massively built, suggesting that it was intended for different machinery or processes (possibly mule-spinning). A contemporary return range at the western end was demolished before the end of the 19th century. The mill entailed a further diversion of the leat serving Middle Mill, from which power was derived initially.

The major mill extensions and additions – East, West and North Mills – were either accompanied, or followed quickly, by other building works. Among the earliest were a single-storey office range (11), the taller part of the stone-built range (12) on the southern perimeter of the site and a number of small houses on Old Lane). The diversion of the leat *c*1835 released land for the stables (18) towards the north-east. The present Dining Room (17) was also added next to the bridge. Other buildings, such as the one known as the Fire Station (20) and the ranges to its east, would appear from their roofs of combined cast- and wrought-iron construction to belong to the period from *c*1830 to the 1850s. Several buildings of this period served the manufacture of bobbins and other turned wood products. They include the Bobbin Shop (21), which has another iron roof, and a number of coppice barns (22, 23) in which timber was stored and dried. At the eastern end of North Mill a steam engine-house and boiler-house were added in the mid-19th century, either to replace or to supplement the existing water power.

Later 19th-century buildings included the polishing shed (25), but the most significant change in this period was the arrival of a 250hp steam engine in 1897 (removed in the 1970s). The engine-house (26) and chimney (27) remain, and were associated with the installation of rope-races throughout the mill buildings.

In 1943 the mills were sold to J. & P. Coats of the Coats Viyella Group. Textile manufacturing, latterly confined to finishing processes, ceased in 1970. Since then two engineering firms, Ellison Metal Products Ltd and Patterns [Derby] Ltd, have been the principal occupants, but much of the site is let to smaller firms.

INTRODUCTION

The Boar's Head Mills (the name is derived from the Evans family crest: see Fig 1)[1] are situated about two kilometres north of central Derby at an altitude of roughly 48m above sea level. They stand on the eastern bank of the River Derwent and occupy a level site defined to the north and west by the inside of a broad bend in the river (Fig 2). This side of the river is sometimes referred to in documents as the Chester side, the settlement of Little Chester lying about one kilometre to the south. The buildings lie north and south of a private road known as Old Lane, which links the complex, via a bridge, to the village of Darley Abbey on the western bank. In the opposite direction the road continues to the present site boundary, beyond which it forms a residential street called Haslam's Lane, leading to the old Derby–Alfreton road.

Fig 1. The Boar's Head crest, as used on countless labels for reels of sewing cotton.

Fig 2. A mid-20th-century aerial view of the Boar's Head Mills from the south-west. Inter-war houses (bottom left) have appeared in the grounds of the Evans mansion, Darley House, and have also sprung up on the opposite side of the river. At this date the mill leats powered a series of turbines. (BB001872; courtesy of John Nelson)

The Boar's Head Mills complex is of enormous historical significance, but this has been slow to emerge from previous historical accounts of cotton-spinning in the Derwent Valley, which have been hampered by the patchy survival of primary documentation. The principal exceptions to this neglect have been Jean Lindsay's 1960 article on the early history of the Evans' cotton enterprise, capitalising on the period for which documentation is fullest, and a popular account of the development of Darley Abbey.[2]

The industrial archaeology of the site was first examined by Stuart Smith and Arnold Pacey in 1968. Their access to the buildings appears to have been restricted, but they succeeded in identifying the existence of an important early iron roof in West Mill.[3] Limited photography was carried out by the Royal Commission on the Historical Monuments of England (RCHME) in 1975,[4] and was followed by a brief inspection of Long and West Mills in 1988,[5] but no more substantial investigation occurred before the present one. In the absence of more comprehensive information it has until recently been impossible to judge the true significance of the surviving buildings, and they make only a fugitive appearance in an overview of the Derwent Valley textile mills published in 1993.[6] The present report reveals just how extensive is the survival of early (late 18th- and early 19th-century) buildings, and draws attention to the rare survival of proto-fireproof construction in one building and an impressive sequence of mill buildings and others incorporating structural cast iron.

The investigation and survey on which this report is principally based were undertaken for a number of reasons. The recording of significant textile sites in the Derwent Valley has been ongoing since the late 1980s, initially by the Royal Commission on the Historical Monuments of England (RCHME), and since 1999 by English Heritage, as threats to particular sites have dictated. More recently the most historically significant part of the Derwent Valley was recognised as a potential contender for UNESCO World Heritage Site status. Three main strands of enquiry have been followed in support of this objective. The investigation and survey were undertaken to evaluate, and provide an adequate record of, the many surviving buildings of the mill site. At the same time documentary research into the evolution of the industrial community at Darley Abbey was co-ordinated by the Arkwright Society and research into Evans housing was undertaken by Dennis Rodwell, lately of Derby City Council.[7] These were utilised on the one hand to support the nomination process, including the preparation of a substantial nomination document,[8] and on the other to inform a review of the listed status of the site. The Derwent Valley was inscribed as a World Heritage Site in December 2001 and the listings were subsequently revised. The main mill complex, comprising Long, Middle, East and West Mills, is now listed Grade I, while a number of other buildings are listed Grade II* and II. The whole of the Boar's Head Mills site lies within the Darley Abbey Conservation Area, as does the historic core of the settlement.

Fieldwork for the present report was undertaken principally over two weeks in May 2000 and during a number of shorter visits between then and March 2001.[9] Documentary research, which should not be considered exhaustive, concentrated initially on the important holdings of the Derbyshire Record Office, which provide detailed, though incomplete, information for the period 1787–1810, and much scantier information (at least so far as the buildings are concerned) thereafter. Of prime importance are the Correspondence Book, containing transcripts of letters sent between 1787 and 1809, and two ledgers detailing transactions during the period 1795–1810.[10] To these may be added the firm's brief and business-like responses to the Factories Inquiry Commission in 1834, mainly concerned with child welfare and safety but embracing a range of more general issues.[11]

A number of other sources have proved to be especially valuable. The 1811 map of the Liberty of Darley Abbey (referred to henceforth as the Liberty Map) gives a relatively detailed picture of the mill complex prior to the major expansion in the years around 1820 (see Fig 4).[12] The Chapelry District map of 1846 (see Fig 7) is similarly detailed,

but is known only from a copy made in 1970.[13] A short article published in the *Illustrated Times* in 1862 presents a number of wood engravings, including a series of interiors and a bird's-eye view of the whole mill site (see Fig 8).[14] The latter is particularly useful, though it needs to be treated with caution: West Mill, for example, is shown with a west elevation of eight bays, whereas it actually has seven, and considerable liberties are taken with perspective. Ordnance Survey map coverage at 1:2500 commences in 1881 (see Fig 9), with revisions in 1899 (Fig 75), 1913, 1938 and subsequently.[15] An interesting series of photographs, many of them depicting mill interiors, dates from about 1930.[16] An important and hitherto unregarded source identified in the course of the work is a set of measured plans, dating from July 1944, showing each storey of Long, Middle, East and West Mills with the exception of the Long Mill attic.[17] Architectural detail is simplified and squared off, but the plans are particularly valuable for their depiction of contemporary room uses, power transmission and machinery layouts, including details of the make and date of machines. They have the additional merit of showing features of Middle Mill destroyed in the fire of 1947.

Note. On the following pages, numbers in brackets refer to the key plan (Drawing 1). Buildings are discussed broadly in the order in which they were built, but in a few cases developments which relate to the evolution of other parts of the complex will be found elsewhere. The buildings are of brick construction, with gabled roofs of Welsh slate, unless stated otherwise.

HISTORICAL BACKGROUND

Darley Abbey before the 1780s

Darley Abbey (which 19th-century and earlier sources usually refer to simply as Darley) is an outlying settlement within the medieval parish of St Alkmund, Derby, occupying a site on the western bank of the River Derwent roughly 2km north of central Derby (Fig 3). A house of Augustinian canons, initially located closer to Derby, was established at Darley *circa* 1146 and was dissolved in 1538. The conventual buildings are thought to have lain on flat land close to the Derwent, but despite the survival of one substantial 15th-century building (now the Grade II listed Abbey public house) their precise disposition remains uncertain.[18]

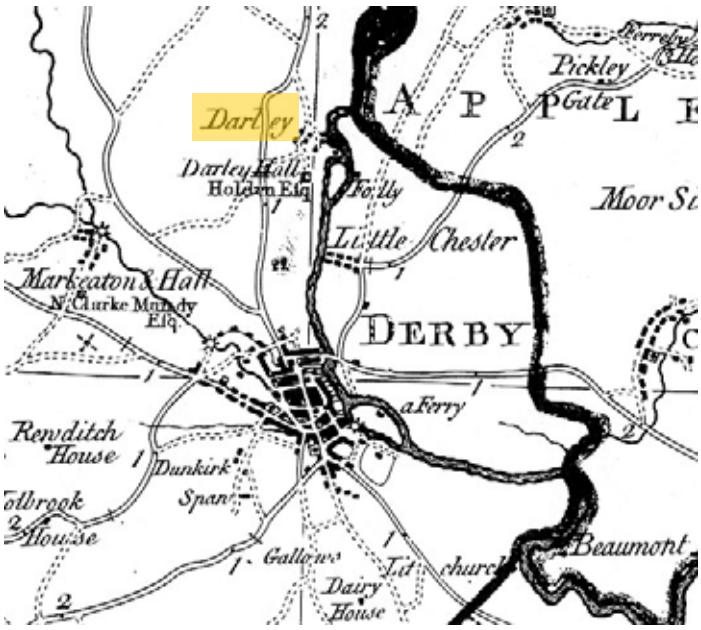


Fig 3. Darley (highlighted) as depicted in relation to Derby on the 1791 revision of Burdett's Map of Derbyshire.

The Derwent was exploited from an early date to power a series of mills at Darley and the origin of the present leat on the western side of the Derwent may well have been a monastic corn mill. In the mid-17th century two corn mills and two (later three) fulling mills, and possibly a forge were at work in Darley.[19] A map dated 1708 gives a simple pictorial representation of 'houses and Milnes', apparently just to the north of the surviving monastic building,[20] and it is stated that these included a paper mill by 1713, when one was offered for sale.[21] An estate map of 1757 notes the presence of 'Darley Mills' just beyond the area of detailed depiction.[22] By this date the mills also included the flint mill of William Duesbury (1725-86), which supplied his Derby Porcelain Factory. Twenty years later another flint mill and a leather mill were in operation.[23] The regular operation of these mills would have required the penning of the Derwent. The present weir, immediately downstream of the river bridge, impounded water for the mills on the west bank as well as the east, and may also incorporate fabric dating from before the establishment of the cotton mill.

The Evans family

When they embarked on textile manufacture in 1782-3 the Evans family already had long experience in the management of industrial enterprises.[24] The origin of these lay in the late 17th century when Anthony Evans (b. 1650), described as a yeoman of Winster (an upland parish west of Matlock), inherited through his wife a house and lands at Bonsall, near Cromford.[25] The estate was rich in lead and calamine (a zinc ore used in the manufacture of brass) and also possessed some copper. It was still contributing to

the family fortunes as late as the first decade of the 19th century, when a lead-smelting cupola and slag mill were being operated by Evans & Co. at Bonsal Dale.[26] Anthony Evans prospered sufficiently from a mixture of agriculture and mining that he was able to pay for a Cambridge education for his son, Edmund (1690-1746). His grandson Thomas Evans (1723-1814) also graduated from Cambridge. Thomas is said to have established a works beside the Derwent at the Holmes, in Morledge, Derby, consisting of slitting, rolling and flattening mills. They are shown as separate Copper Mills and Iron Mills on a map of 1762-7. The former produced copper for use by the Navy to sheath hulls, while the latter is thought to have manufactured rod-iron for the nailing industry, as well as hoops, presumably for barrels used by brewers, as documented in a letter of 1793.[27] The date given by all sources for the foundation of the works is 1734, which must indicate some confusion if Thomas's date of birth is correctly given. They were perhaps established by Thomas's father, Edmund.

Thomas Evans married Sarah, daughter of Alderman William Evans (no relation), in 1751. The latter had owned a fulling mill and dye house at Darley since at least 1746. At some point Thomas Evans left Bonsall for a house at 3 St Mary's Gate, Derby, close to the majority of his growing business interests. Here, in partnership with Samuel Crompton, he established the Crompton and Evans Bank in 1771; shortly afterwards, on Crompton's withdrawal from the partnership, it became Thomas Evans & Son. In the 1770s Alderman Evans' fulling mill became the nucleus for a series of land acquisitions. In 1773 the Revd Edmund Evans (1721-91), Thomas's elder brother, acquired a corn mill, a paper mill and a flint and china mill from Abraham Hirst of Derby, and over the two ensuing years Thomas Evans made further purchases, consolidating the family's hold on this long-established water-power site. By this time their interests at Darley included the Paper Mill, a red lead mill, a corn mill, a tin mill and a 'Rope House' or rope walk (demolished in 1798).[28]

One of the main markets for paper was the textile industry, which required it for packaging. The Paper Mill was 'intirely burnt down' in November 1791,[29] but was rebuilt in the following year[30] and was still operating in 1913.[31] Most of the buildings at this date formed a large group between the river and the leat, immediately south of the surviving weir. By 1938 most of the buildings had been demolished, and the leat either filled in or culverted.[32] However, a building (now used as a furniture showroom) on the eastern side of Darley Street, formerly on the western side of the leat, is of industrial appearance and is probably of late 18th or early 19th-century date. It is possibly a remnant of one or other of the Evanses' industrial enterprises.

The cotton business

Origins

A series of family and business connections brought the Evans family into close contact with a pioneering group of cotton manufacturers. In the mid-18th century Thomas Evans' younger brother, George (1726-1808), married Anne, daughter of Peter Nightingale, who in 1784 established a cotton-spinning mill at Lea, near Cromford. Thomas Evans' banking clients included Richard Arkwright, whose patented water frame and carding engine had revolutionised the production of cotton yarn following the opening of his Cromford Mill in 1771. Clients of the Evans bank included (from 1786) Samuel Oldknow (1756-1828), another cotton mill owner with mills at Stockport and Mellor in Cheshire. From at least 1794 Jedediah Strutt (1726-97), a wealthy hosier and

erstwhile partner of Richard Arkwright's, was also a customer.[33] Arkwright and Strutt must quickly have brought to Evans' notice the very great potential for profits in the cotton-spinning industry. Thomas Evans' eldest son, William (1755-96), married Elizabeth (1758-1836), daughter of Jedediah Strutt, in 1785. Following William's death, she was married again to his half-brother, Walter Evans (1764-1839), in 1798.[34] The marriages and business connections cemented an association that as early as 1777 embraced social functions, such as balls at the nearby fashionable spa of Matlock Bath. In 1793 Barbara, sister of Walter Evans, married Jedediah Strutt's talented son, William (1756-1830). Both William Strutt and his sister Elizabeth subsequently became partners in the Evans bank.[35]

Thomas and Edmund Evans acquired the future site of their cotton mill in 1778 out of the bankruptcy of another banker, John Heath, owner, with his brother Christopher, of Darley Hall and its estate.[36] The first cotton mill, now known as Long Mill, was begun in 1782 and may have been completed in 1783, the date which the firm of Walter Evans & Co. later adopted for the firm's foundation. Thomas Evans is said to have been persuaded to build it by Richard Arkwright. Indeed, Arkwright seems to have entered into some kind of loose partnership with Thomas and Edmund Evans, taking out a joint insurance policy with them 'for their water cotton mill' with the Sun Insurance Company in 1782. The mill, described as 'stone and tiled', was valued at £800, a figure which at this date is probably too low to indicate a fully tooled-up working mill on the scale of Long Mill.[37] The Derby-based sculptor, Joseph Barlow Robinson (1821-83), writing in 1866, related the following anecdote, which contains sufficient detail to warrant being taken seriously:

Fig 4. The cotton mill complex and its immediate neighbourhood as shown on the 1811 Liberty Map. The large T-plan building (numbered 5) roughly west of the cotton mills is the Evans mansion, Darley House, built 1785. Early workers' housing, including The Square (numbered 12), can be seen close to the Evans paper mill. The future Evans residence, Darley Hall (bottom), is marked 'Darley Abbey'. (Derbyshire Record Office)

> We believe the origin of the cotton manufactory at Darley, was through Mr. Arkwright recommending its erection to the late Mr. Thomas Evans and his Son, saying they would do well with it. The Messrs. Evans accepted his advice, and wished him to take a share in

> the undertaking, which Mr. Arkwright willingly agreed to do. On their getting the mill to work, in the year 1783, and finding it to answer their expectations, Mr. Arkwright was asked what share he proposed to take; he very generously replied, that he did not wish to take any share, but as it was a good thing, they might make him a compliment of one hundred pounds, and he would give them a full release; which was immediately done, and the money very gladly paid.[38]

Arkwright subsequently considered renewing his connection with the mill. On 2 November 1786 he instructed his attorney to draw up a 'Lease of Mr Evans's Mills at Darley Abbey', but the outcome of the instruction is not known.[39] Perhaps the intention was abandoned after the fire of 1788. It has been suggested that the move towards a lease may indicate that the mill was only now capable of being operated,[40] but the interval since 1782 seems unduly long. The fact that Walter Evans & Co dated the firm's establishment to 1783 is also a far from negligible consideration.[41] It is true that in January 1787 the Evanses advertised for 'Families, particularly Women and Children' to work at the mill, with the offer of 'comfortable Houses, and every necessary Conveniency either at Darley or Allestrey; particularly a Milking Cow to each Family';[42] but this may be a response to natural wastage in the workforce, rather than an inaugural campaign of recruitment. The surviving company records commence only in October 1787, but even so, if no prior mill-working is contemplated, those recruited earlier in the year would by then have been idle for some considerable time.

Arkwright's support would have been invaluable at a time when his patents were still, in theory at least, enforceable at law (they were overturned in 1785). Both he and the Strutts could also offer a wealth of technical and commercial experience, from which the Evanses undoubtedly benefited. In December 1787, for example, an ironfounder called Bacon was asked to send a man to Belper Mill 'to take dementions of a Stove to make for us'; in 1791 workers' housing in Darley Abbey was proposed, 'same as Messrs. Strutts in the Bag Lane'; and in 1796 an order was placed with Joseph Frith, brass founder, of Ashbourne, 'for six dozen of roving box tops by Mr Strutts pattern'.[43]

The original mill lay on the east bank of the Derwent (Fig 4), isolated from the other Evans properties, and was powered by a wheel on its east side. By October 1787 it was trading as W. Evans & Co., suggesting that Thomas Evans had settled the business on his son, William (1755-96). Entries in the Correspondence Book show that the mill was producing twist, while an order for 'picking baskets' is an indication that raw cotton was being prepared, though not necessarily in the mill itself.[44] There was also a 'Cotton Mill Warehouse', for which 'a few beams & joice [joists]' were ordered in October 1788.[45]

The fire, and reconstruction

In the early hours of Saturday 29 November 1788 the mill suffered a serious fire.[46] In a column dated 3 December, only the first paragraph of which has previously been published, the *Derby Mercury* reported:

> Between Two and Three o'Clock on Saturday Morning last the Cotton Mill at Darley, near this Town, was discovered to be on fire; all possible Assistance was immediately procured in order to extinguish it, but in vain; it had proceeded too far, – and in 'spite of every Exertion, in about three Hours, that handsome Building was entirely destroyed.
>
> – The Flames ranged with uncommon Violence, and diffused a vivid Light many Miles round; which, together with the Darkness of the Night, and the frequent Crash of falling Walls and Timber, exhibited this prodigious Conflagration an object truly awful and sublime! – The large Water Wheels, the neighbouring Buildings, Work Shops, and Warehouses, in which every Kind of Stock was deposited, were, however, fortunately preserved. – – We are happy to learn that the whole was insured for a considerable Sum,

> and peculiarly so, that Employment will be provided for all the distressed Work People until the Building can be restored to its former Situation; which, from the exertion now making, it is hoped will speedily be effected.[47]

Evidence of the rapid response to the disaster is found in an advertisement on the same page of the *Mercury*:

> DARLEY COTTON MILL
> Wanted Immediately
> A number of Stone Masons, Sawyers, Carpenters, Joiners, and Clock-makers. – The Stone Masons and Sawyers to work under Cover.
> Spindles, Roving-Cans with appurtenances, Spinning, Roving, and Drawing Heads, &c.
> Also a Quantity of dry Oak, Ash, Elm, or Alder Plank.
> Enquire on the premises.[48]

On the same day that the column was written a letter was sent to Messrs Whitfield & Co. of Barrow (probably Barrow upon Soar, Leicestershire), perhaps the Evanses' most important customer for twist at this time:

> You have no doubt heard 'ere this of our mill being burnt down a shocking misfortune indeed. Mr. Evans is so closely employed on the spot in expedititing [*sic*] the rebuilding it, that he has not had time to think much about things but probably we may get a few of the wanted N^{os} spun to take [the place? care?] of the others – this I only suppose may be the case.[49]

The mere possibility that spinning might continue, albeit at a reduced capacity, suggests that the destruction was less than total, though the evidence of the mill fabric itself (discussed in detail below) is inconclusive in its present state. It remains possible, too, that limited production may have been maintained, perhaps by means other than water power, in other buildings. However, by the end of the month the firm was apologising to its customers for the restricted numbers of yarn in stock, 'not being able at present to replace them'.[50]

Rebuilding probably occupied the whole of 1789, and Long Mill may have been the Derby cotton mill described in that year as 'at present not employed'.[51] By late March 1790, however, the mill was being tooled up for spinning. It was certainly in production again by 6 July, when a letter complained 'that our Cotton Mill has lost upwards of three quarters of an hour this forenoon on account of the flood'.[52] In August 1791 an order was despatched to Messrs Smith & Co. of Chesterfield for a 'Cast Iron Cock of a peculiar form' – presumably a cockle stove such as the Strutts used in their mills.[53] In December the firm wrote a letter to William Edwards, a Derby maltster and agent for the Sun Fire Office.[54] The building was already insured with the Phoenix Fire Office, but cover was now required for the contents, including the millwright's work and machinery. This letter contains the most detailed early description of the cotton mill, and is worth quoting in full:

> Sir
> We want to compleat the insurance of our Cotton Mill, some time ago the Phoenix office insured us £1000 on the Building of the Mill, and also the same sum on the inside works including every other species of property, on terms which you refused. We desire to know whether you assure us in two terms like the Phoenex [sic], viz Building for one, and Water Wheels Geering, Machinery, Utensils and Stock for the other or how. Do you include those Fixtures & Timbers, which are put into the Mill on account of the Water Wheels Geering & Machinery as part of the Building, or the other. our Moating or Picking is at least [blank space] yards from the Mill, therefore suppose you will assure more then £1000 if required. We have a room in the Roof of the Mill, about twelve feet wide, which we wish to use as a Sunday School Room, but are at a loss how to warm it. we thought of fixing a

Brick Chimney upon the Principals, having a large flat stone under the Chimney to guard the timber, and of making a foundation on the floor to turn a Brick Arch, or support a large Hearth Stone two or three feet from the floor, and upon that to fix a small Stove with a short pipe into the Chimney. if any better mode can be shewn we will be glad to adopt it, and as you are near had better be done under your inspection. there are windows in the ends which prevent the tunnil [?] from being there

Plan Omited [*i.e.* the plan sent with the original letter was not copied into the Correspondence Book]

We have constantly a night watchman, and we have also a machine which we call a watchmans Clock, in the roof or uppermost room, by which means we know if ever ^he misses going up stairs at the times appointed and he must necessarily pass all the other rooms, we believe that this adds much to our safety.

Drying House.

We have a Building of Brick (except the Shutters) & Tile used as Drying House Finishing room sizing Room and ware Rooms for a paper Mill part of the ground floor is also occupied as a ware room for Cotton Wool what will be the terms of insurance upon it?

Picking Room.

We have also a Picking or Moating Room in the Attick over a Methodist meeting House the meeting House belongs to other people can we insure both in the same Policy & on what terms. We shall be obliged to you to procure us an early answer to our questions, and wish to know what words will be inserted in the policy to shew the distinct property.

We remain

Your most obedt. servt.

Wm. Evans & Co

When the insurance was made on the Corn Mill, how it was understood the Wheels and Machinery where [*sic*] included. can the policy be altered by lessening the amount on the Building & charging it to the Machinery.[55]

Edwards was slow to reply, and on 5 May 1792 a chasing letter was despatched:

We are rather concerned that you did not communicate to us your Letter from Mr. Barclay [of the Sun Office, Royal Exchange, London] the 22 of March both because we had applied for an insurance, and also because we have since insured 1000 more in the Exchange Insurance Office. Mr Jas. Hall has taken a particular plan of the whole of our Mill, from which the Office will ~~have~~ know the situation of ~~the~~ Fires much better than we can describe them. They will also learn from it that our Mill is in the first class of Cotton rates. He also took a plan of the Roof Room in which we want to have a fire as mentioned in our Letter of 22 decr last, & to which they consent.

We desire to insure £1000 on the Building & Mill-wrights work (including Water Wheels, Shafts, Iron wheels Timbers &c) and £1000 on the Machinery Utensils & Stock of Goods – they will be pleased to insert what is needful respecting a Fire in the Roof Room.

The Cotton Mill is Brick & Stone covered with Slate situate at Darley in the Parish of St. Alkmonds Derby and to be insured in the name of Thos. Wm. & Mr Evans.[56]

Although both letters clearly indicate that the mill was a going concern, some aspects of the business before the fire had not been restored. A request for 'three thread Yarn' from Peels, Ainsworth & Co., dimity and muslin manufacturers of Bolton,[57] met with the following reply:

We have not put any Machinery for doubling & Twisting since rebuilding our Mill. and it will not suit us to put it up now except we have a regular order. Believe we could under take to send you twelve to thirty Bundles weekley. but you must take such Numbers as they happen to run because we have no other customer for three thread Yarn. and it would be inconvenient to make a many numbers for so small a quantity.

We shall expect to receive a Weekley order for a consitherable time, to charge it at the general price for Hosiers Yarn. and to make the reels so much shorter as the twist makes it run up – If you think proper to give us such an order we will set about the Machinery and shall expect to be two or three Weeks in putting up the machinery…[58]

Similarly, it was reported to a customer in Newcastle-under-Lyne: 'We do not spin any weft, but have sent you the price of our Twist'.[59]

Both carding and the picking of raw cotton were put out, in part at least. This would have allowed production to increase when demand was high, but could be dispensed with when it fell. For example, in August 1797 a letter to John Towle, ropemaker, of Draycott (on the lower Derwent), asked him 'not to make any more Card Rope till further Orders', though the supply had resumed by November.[60] The standard of picking, however, sometimes fell short of what was desired. In October 1803 James Rose 'brought in his picked Cotton' and was given one month's notice. On the same day,

> James Huthwaite also came to Darley, and I gave him notice that it was uncertain how long his hands could be employed to pick for Walter Evans & Co. and that he must give the worst of his hands a month's notice on his return Home, and that they are permitted to leave before that time if they can get employment elsewhere.[61]

Putting picking out was prudent on other grounds, too. The care with which the Evanses specified to their insurers how distant their own picking room was from the mill is a reminder of the particular fire risk posed by raw cotton, as perhaps is their use of the attic over a Methodist chapel for the same purpose. These factors raise the possibility that one of the early buildings surviving on the mill site – now part of Darley Mill Pottery – may have been a picking room.[62]

Early expansion, 1795-1811

William Evans died in 1796 and was succeeded in the business by his half-brother Walter.[63] Though the events outlined below suggest that William may have set in motion a substantial programme of expansion, its execution was left almost entirely to Walter. The documentary evidence for a series of building and engineering projects carried out in the late 1790s and the first decade of the 19th century is contained chiefly in the two Evans & Co. ledgers. By comparison with that surviving for other periods, this evidence is relatively abundant, though frequently hard to disentangle from other strands of the Evans family's industrial enterprises. Two distinct campaigns of work can be identified, the first concentrated in the period 1796-1801, and a second between 1804 and 1806. In the earlier of the two periods the works include a new flood wheel and wheel-house on the east side of Long Mill, promptly followed by a realignment of the original leat, a 'New House in Weir Close', 'Buildings in Wood Yard' (also referred to, less specifically, as 'New Shops') and 'Shed in Wood yard', an 'Engine-house' (almost certainly for a fire engine) and two bridges, one in timber and one in stone. The second campaign included a 'New Stable at Cotton Mill', a 'New Water Wheel' (also apparently replacing an existing one) and another 'New Wheel House', a boat house and a saw-pit. Other additions cannot be dated precisely, but are known to have been built by the time the Liberty Map was compiled in 1811.

Of the buildings mentioned by name above, a number can be identified with varying degrees of confidence. The house in Weir Close is likely to be the three-bay, concave-fronted house (3) facing the approach across the River Derwent, which was probably built to house a mill manager or similar official. The various buildings in the Wood Yard appear to comprise the proto-fireproof range (4) and the attached shed (5), and it is likely that the saw-pit was situated nearby. The Stable and [Fire-] Engine-house must be precursors of the present buildings associated with those functions (15, 10), while the Boat House appears also to have been replaced by a later structure, now demolished.

The most intractable interpretative problem concerns the two wheel-houses and their relationship to Middle Mill and to the precursor of West Mill. Since it is often uncertain to which building the documents refer a brief account is given here rather than in the individual building summaries.

The earliest sign of impending work on a substantial scale is the construction of a brick kiln at Darley. This was operational from the summer of 1795. However, its output was divided between a number of building projects, including the paper mill and houses in Mile Ash Lane, so its existence need not imply that major works were planned for the cotton mill specifically.[64] New houses were built in the brickyard, probably to house the workers there, in or before 1797.[65]

Fig 5. Flooding was a recurrent hazard of water-powered sites, with the potential to interrupt production and sometimes worse. Here the leat upstream of Middle Mill is seen spilling over onto Old Lane. (BB001871; courtesy of John Nelson)

The first indication of work connected directly with the cotton mill is a series of accounts for a 'Flood Water Wheel & House at East side of the Mill'. A flood wheel is one set at a higher level than normal, allowing it to be used when the river is in spate (see Fig 5). The evidence of Long Mill (discussed in detail below) indicates that the original wheel was located on the east side, so it would appear that the flood water-wheel was added alongside. The wheel-house referred to may therefore have been an extension of an existing one in order to accommodate a second wheel, though it is possible that the original wheel was not housed. The accounts, extending from August 1796 to September 1798 with the last wages paid in July 1797, tend to confirm this, as they appear to relate to a refashioning of existing installations. For example, they include reference to an 'Old R[egulator]. House'.[66] A reference to the 'East wheel' in October 1798[67] might suggest that there was already a wheel on the west side of Long Mill, where a second leat and wheelhouse are known to have been in existence by 1811, but since there were two wheels on the east side by late 1798 it may simply be another way of distinguishing the flood wheel. Although the work was carried out on the site of Middle Mill the total bill, at £791 2s 6½d, seems well below the likely cost of a five-storey, six-bay extension, the more so when it is considered that barely more than a quarter of that sum was assigned to building materials and wages in respect of the wheel-house, the remainder being taken up by the 'Wheel Forbay, Gates Shutters &c'.

Before the flood wheel and wheel-house were complete work had begun on the 'New Stone Bridge for Cotton mill meadow', minor payments for which are dated May to

September 1798.[68] This work appears to have been a prelude to the eastwards realignment of the mill leat upstream of the mill. The costs are assigned to the 'New Cut acc[oun]t.', which can be identified with the 'New Cut in Shrogs', for which wages were paid between August 1798 and October 1800.[69] The total cost was £401 8s 11½d. The Cotton Mill Meadow appears to have been the large enclosure shown on the Liberty Map (Fig 4) to the east of Long Mill, in which the only early building is the nucleus of the present Pottery. The stone bridge is probably the one which survives along the course of Old Lane. The leat to either side has been culverted since the 1970s, but the stone parapets remain above ground and there are remains of sluice gear on the upstream side. An important consequence – perhaps the prime motive – of the realigned leat was that it made more accessible an area of land lying between the old leat and the river to the north. In this area both the 'New House in Weir Close' and the Wood Yard buildings were built at much the same time. The detailed evidence for these buildings is discussed later in the report.

The 'New Wood Bridge at Cotton Mill', for which accounts extend from September 1797 to May 1800, was probably the much longer bridge across the Derwent. The accounts were originally headed 'Repairs of Bridge', but were later amended to read 'New wood Bridge', and include an allowance for 'Old bridge materials'.[70] Two iron gates secured the bridge.

Work was also proceeding at the paper mill in the late 1790s and it is not always possible to determine which documentary references relate to which project. Middle Mill (not known by that name, of course, until the addition of East Mill) is particularly difficult to identify in the Ledger entries. As already observed, the cost of the wheel-house of 1796-8 seems insufficient for an extension on the scale of Middle Mill. The only building project of sufficient scale is that identified as 'New House in Weir Close', against which the substantial sum of £2,432 3s 5½d was set in May 1798.[71] Despite its magnitude, this too seems an improbable candidate for Middle Mill. Weir Close is unlikely to refer to the area east of Long Mill, and 'New House', even allowing for considerable latitude in the naming of buildings, seems too imprecise for a major mill extension. It is possible that work on water closets at the cotton mill, between December 1796 and March 1797, by John Chatterton, a plumber and glazier, and a carpenter called Thomas Raworth, both of Derby, relate to the fitting out of a new building, but confirmation is lacking.[72] It is perhaps more likely to indicate the conversion of the existing Long Mill privies from earth or ash closets to water closets. This is not the only project needing consideration. Between August 1797 and January 1800 £214 19s 2¼d was expended on a 'Stove House at East side Mill'.[73] This is perhaps less likely to relate to Long Mill, which was built with stove heating from the outset. Given that the leat ran along the east wall of Long Mill for much of its length, the siting of a stove would have been limited to the north end of the east elevation, where the new leat swung clear of the building. If on the other hand the stove formed part of the construction of Middle Mill it is likely to have been swept away when East Mill was added, but it is odd that accounts for the construction of the main bulk of Middle Mill cannot readily be identified. It is therefore possible, but by no means clear, that Middle Mill existed in its present form prior to 1800.

Diverse other items (totalling just £323 5s 10¾d between August 1798 and October 1801) are brought together under the 'Cotton Mill Building Account'.[74] These refer, amongst other things, to putting 'pillars' (obtained from foundries, and therefore identifiable as cast-iron columns) in the cotton mill in July 1799. Further pillars and stoves followed. The accounts also refer to both a reeling room and a 'Cross room' (or 'x

room') in 1798-9.[75] The latter name suggests a structure at right-angles to another; though this is suggestive of Middle Mill, the term is used in such a way as to suggest a single-storeyed structure, in contrast to floors within the cotton mill, which are distinguished by the form '2nd room' (for first floor), etc.

In 1804-5 there was a further spate of building work, including a 'New Stable at Cotton Mill', a 'New Water Wheel' (apparently replacing an existing one) and 'New Wheel House', a 'Boat-House in Meadow' and a saw-pit. This work should perhaps be related to wider changes in the operation of the mill. Between 1804 and 1807 a considerable investment in new machinery is apparent, including the equipment of a new card room,[76] with carding engines supplied by Thomas C. Hewes & Co. of Manchester.[77] By May 1807 Walter Evans & Co. were describing themselves as 'Cotton Spinners and manufacturers of Sewing and Knitting Cottons'.[78] A number of letters of this period refer to 'new connections', and suggest a significant realignment of production to serve new markets. John Farey, touring Derbyshire between 1807 and 1809, remarked on a similar phenomenon. After listing five mills where thread spinning, including linen thread, was spun, he noted: 'At Draycot, Belper, and many others of the Cotton Mills [in a foregoing list] …, Sewing-cotton thread is spun, and wound into neat Balls'.[79] In the same period the Correspondence Book contains numerous references to the production of candlewick, including mention of 'Winding Candlewick by hand'.[80]

The new water wheel, for which all but one of the payments totalling £795 15s 1½d were made between June 1804 and June 1805, appears to have replaced an existing wheel as there is mention of 'new cants upon pit wheel' and 'no charge made to millwrights works, as it only replaced the old work'.[81] There are also accounts for the accompanying 'New Wheel House', spanning much the same period, and including income from the sale of surplus materials. The last payment of wages was on 10 October 1805 and the final bills were settled in the first half of 1806.[82] The final cost of £1,425 15s 3d, charged to the Cotton Mill Building Account, is roughly seven times that incurred for the wheel-house of 1796-7. In 1804 large quantities of glass were purchased from Richard Titley of Manchester,[83] while another entry in the accounts, dated 22 August 1804, refers to '16 Dozen sash pulleys'.[84] Assuming four pulleys per double-hung sash, this gives 48 windows – enough for a large building rather than one serving merely as a wheel-house. Middle Mill required 48 sashes for the upper floors of the main elevations (the ground floor, being essentially a wheelhouse, is unlikely to have been sashed), though there is some evidence that windows in the east gable wall may have increased the total. It is possible that the accounts relate to the rebuilding of the earlier wheel-house on the east side of the mill, raising it to its present height. Some support for this interpretation can be found in the variations in brick bond and window size between the ground floor and the upper floors of the present structure, though structural and functional explanations could also be found for these. Another possibility is that the accounts refer to a substantial precursor to West Mill, spanning a second leat along the west side of Long Mill, both of which the Liberty Map (Fig 4) shows to have been in existence by 1811 and for which no other obvious sources can be found. There is, however, no indication of the height of this structure, and even if it were as tall as the present east-west arm of West Mill it is unlikely to have need as many as 48 windows.

The Boat House, first mentioned in 1803,[85] may have housed Evans & Co.'s own barge, to which scattered references occur, but is more likely to have been for a lighter used to dredge the leats and their approaches. Expenditure on the 'Boat House in Meadow', totalling £382 15s 11¼d between October 1804 and August 1805, is substantial enough

to suggest an entirely new building.[86] It should therefore appear on the 1811 Liberty Map, but does not. Between May 1805 and May 1806 payments were also made in respect of a 'Saw Pit at Cotton Mill'.[87] This is likely to have been in the vicinity of the Wood Yard, where buildings were erected between 1797 and 1801. A later boat house, although not shown on Ordnance Survey maps up to 1938, appears in a mid-20th-century aerial photograph on the south bank of the east leat, close to the inlet from the river.

The accounts for the 'New Stable at Cotton Mill' commence in June 1804 and the last tradesmen's bills were settled by March 1806, though payments of wages ceased in April 1805.[88] The entries are unrevealing. The building is unlikely to be the surviving stable (18), which does not appear on the 1811 Liberty Map (Fig 4), and its location is uncertain.

Other buildings were either present by, or added during, the 1790s and 1800s. The existence of a picking room some distance from the mill was noted in 1791, and there was a payment in July 1799 for putting in new windows.[89] Amounts are set against an Engine-house in January and February 1801 – probably at this early date a fire-engine-house is indicated.[90] Mention of 'an Extinguishing fire Engine complete with Leather Hose & Buckets &c' occurs on 31 October 1804. The engine, delivered by Thomas Rowntree of London, was not the first at Darley (there is a possible earlier reference dating from 1789, when an unnamed correspondent was requested to supply an 'engine').[91] In the event Rowntree's engine proved unsatisfactory; part of the payment was withheld pending improvements, but five years later the problem was still not resolved. In the end the Ledger records a 'loss on an engine being worse than the former'.[92] A Soup House was in existence by December 1799, when a copper was bought for it, followed by sheet lead and a boiler in January 1800.[93] It was supplemented or replaced by the Dinner House – probably a place where employees could eat food they had brought themselves, rather than a canteen where hot food was prepared and served – for which building accounts extend from September 1808 to April 1809.[94]

One recurring theme in the late 18th and early 19th-century operation of textile mills was a concern for security. The river and leats provided some protection and it is known that the bridge across the Derwent was closed by two iron gates. In addition the Evanses employed watchmen to patrol the site at night, and this may have led to the construction of the small watch house now used as a toll house. The watchman was obliged at intervals to adjust 'a watchmans Clock, in the roof or uppermost room, by which means we know if ever he misses going up stairs at the times appointed and he must necessarily pass all the other rooms'.[95] In 1803 clocks for the watchman were purchased from the noted Derby clockmaker, John Whitehurst.[96] The potential for more serious threats to life and property, perhaps during the Luddite disturbances of 1811-16, is recognised in the survival of a musket cupboard. This was formerly kept in the first-floor office of Long Mill, but is currently stored on the second floor. It is a tall deal cupboard with two doors, each with three cyma recta moulded sunk panels to the exterior. Inside, the base of the cupboard has shallow sockets, angled backwards, to receive musket butts, while on the back of the cupboard there are a mixture of leather and wooden spacers, on two levels, to receive gun barrels. On the reverse of the left-hand door is written:

> 5 Doz Ball e^{t} [i.e. etc] for Guns

1½ Do shot Do Do
4 Do Ball e[t] for Pistols

The value of the complex can be gauged from the amount of insurance cover purchased in 1807 and 1809. At the earlier date the cover totalled £5,000, made up of £1,500 for the mill building, £1,000 for millwrights' work, £2,300 for clocksmith's work, carding engines and 'moveable utensils' and £200 for stock in trade. By 1809 this had been augmented by £330 on a warehouse and £1,200 for the stock kept in it.[97]

Continuing expansion, 1812-62

The fifty years that elapsed between the making of the Liberty Map (Fig 4) and the publication of the *Illustrated Times* article were characterised by continuing expansion. A very considerable programme of works is apparent in the years between 1818 and *c*1835, during which East, West and North Mills were added, and this impetus continued through to the middle of the century with the construction of a large number of ancillary buildings. Documentary information for this period is scanty, but some of the most significant additions are summarised in a series of entries in a contemporary Stock Book maintained by the firm.[98] The first was East Mill, commenced in 1818, and completed at a cost of £3,017 16s 7½d. It was followed, from 1821, by West Mill, the cost of which totalled £4,676 5s 9½d. On a much smaller scale, an addition to the Dinner House was built in 1820 for £190 15s 0d.[99] The latest entry in the Stock Book is dated 1826 and North Mill is nowhere mentioned, nor was it referred to in 1833, when the Evanses were consulted by the Factories Inquiry Commissioners; instead they described West Mill as their 'third and last' addition to the original mill.[100] It is also absent, together with the accompanying further diversion of the leat, from George Sanderson's *Map of the country twenty miles round Mansfield*, surveyed 1830-34 (see Figs 6 & 7), though on stylistic grounds it cannot be many years later.[101] Although the new channel passed close alongside North Mill it did not supply power to it directly. Instead power seems to have been derived initially from the existing wheels.

Fig 6. Sanderson's 1835 map shows a leat aligned roughly north-south. North Mill is absent.

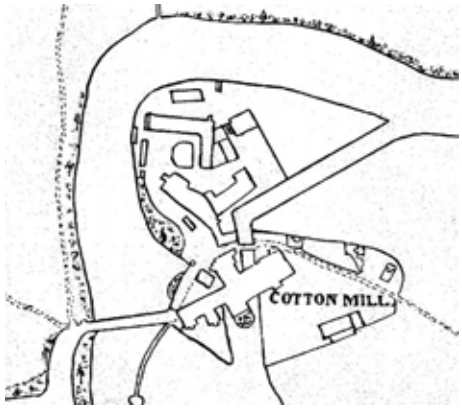


Fig 7. By the time the 1846 Chapelry District map (here redrawn) was prepared the leat had been realigned and North Mill had been built. (Derby City Council)

East, West and North Mills more than doubled the combined floor area of Long and Middle Mills, entailing a huge increase in productive capacity that was reflected throughout the site infrastructure. The workforce grew accordingly. It was estimated at between 500 and 600 in 1829,[102] and given as 750 in 1846.[103] That the mill extensions were built in fireproof construction, and that a number of the single-storeyed ancillary buildings dating from *c*1830 to the 1850s incorporate iron roofs, is an indication of the considerable confidence that the Evans family placed in the business: many

manufacturers were unwilling to incur the higher capital costs of fireproof buildings. Iron roofs are found on two buildings in the vicinity of the Wood Yard (10, 11), and on the Bobbin Shop (21) which was built to the south of East Mill. Timber for the manufacture of bobbins and other turned products was stored in well-ventilated coppice barns (19, 20). Other buildings dating from the second quarter of the 19th century or shortly afterwards include a substantial stable (18) and a dining room (17), both replacing or supplementing earlier buildings, a separate office building (11), a gassing shed (24) and some small houses.

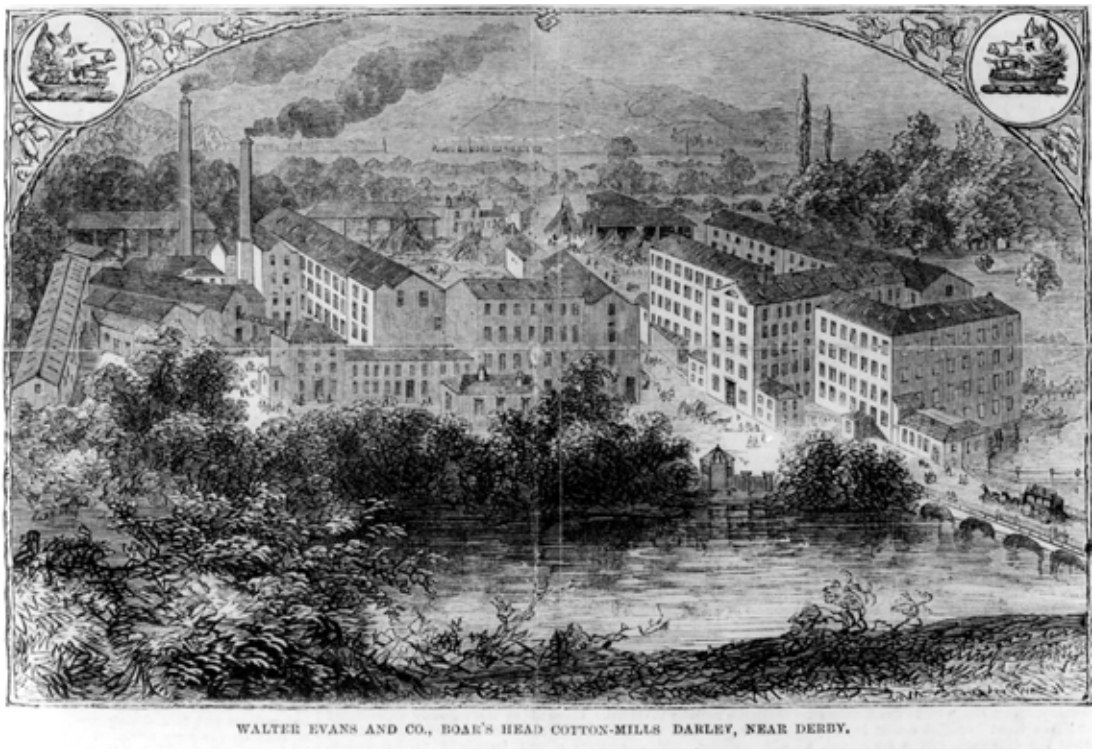


Fig 8. This bird's-eye view published in the Illustrated Times *in 1862 gives a good impression of the scale and complexity of the mill complex at its peak. It depicts many important details though some are misleading and the perspective cannot be trusted. (Derby Local Studies Library)*

Most of the surviving buildings were in existence by 1862, when the *Illustrated Times* article was published (see Fig 8).[104] This details many of the functions then carried on at the site. Baled cotton was kept in stores prior to mixing (to gain the desired combination of different qualities), blowing and scutching (the opening and cleaning of the raw cotton). Then followed carding, drawing, slubbing and twisting, reeling into hanks, dyeing or bleaching, winding onto reels or cards, or into balls or skeins, followed by warehousing prior to despatch. The winding of crochet cotton was still performed by hand, as outwork. Some dyeing was carried out on site, but some, together with all the bleaching, was contracted out. Timber (mostly birch) was stored and seasoned in a wood yard, and fashioned into a variety of turned products, including bobbins and reels. Financial and stock control was exercised from a counting house, and packaging and marketing were aided by a lithographic and letterpress department.

The late nineteenth century

In the second half of the 19th century the firm of Walter Evans & Co. excelled in the production of sewing cotton, winning medals at industrial exhibitions in London (1861

and 1862), Dublin (1865), Paris (1867) and Vienna (1873), and subsequently at the Paris International Exhibition of 1879.[105] At the beginning of the 20th century the products of the 'Boar's Head Cotton Manufactory' included sewing, crochet, embroidery, machine and knitting cottons, patent glacé and Maltese thread.[106]

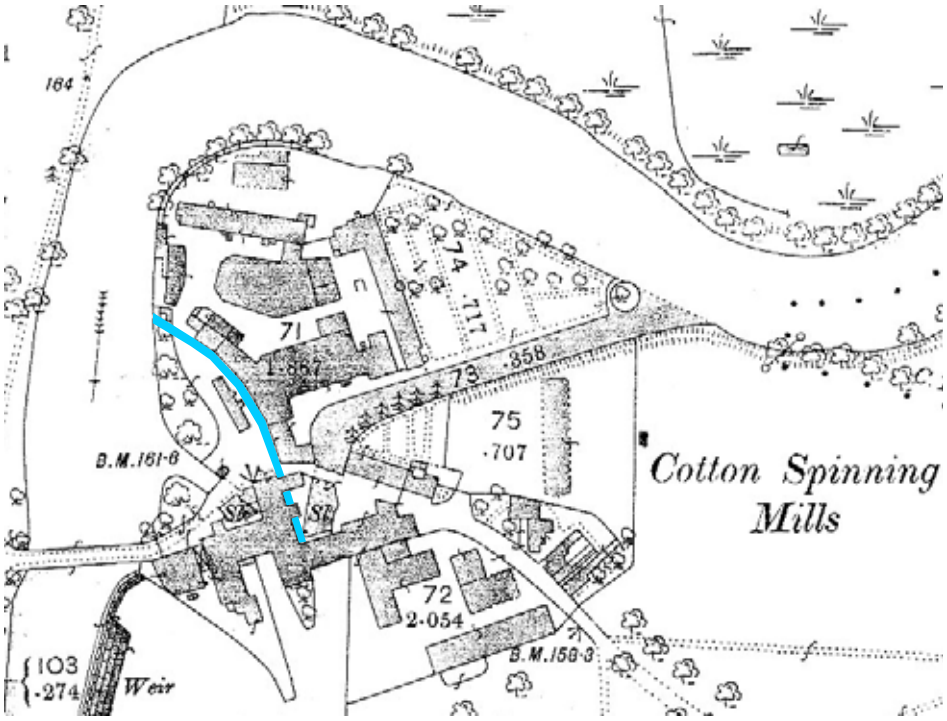


Fig 9. The earliest Ordnance Survey 1:2500 map, surveyed in 1881. The blue line indicates the possible course of the original mill leat, as suggested by building alignments (see p 26).

Little has been written about this period of the firm's history and most of the primary documentation that might have illuminated the built legacy appears to be lost. The surviving buildings, together with others known only from 19th-century maps and illustrations, demonstrate the firm's continuing investment in the mill site, though the scale of new building is somewhat less than it had been earlier in the century. The buildings of this period revert to more conventional – and economical – structural forms and lack the presence of many of their earlier neighbours. The greatest single change occurred in 1897 with the introduction of steam power on a much larger scale than hitherto and the installation of rope races within the main mill complex. The principal other addition was the north-lit Polishing Shed (25), which replaced earlier ranges attached to the concave-fronted house and North Mill.

The twentieth century

In 1903 Walter Evans, a great-grandson of Thomas, died, and two years later the business was sold to the manager of some years' standing, John Peacock (d. 1930), who had come from the Scottish textile-manufacturing town of Paisley.[107] With his three sons, Capt. H. M., J. and A. D. Peacock, he converted the business into a limited company 'and made extensive alterations to accommodate the latest machinery'.[108] No significant additions to the building stock accompanied these changes, and for the final seventy years of cotton manufacture changes were largely confined to repairs.

Five turbines and dynamos, for electricity generation, replaced the water-wheels in the early 20th century – two in Middle Mill and three in West Mill, as indicated on one of the

1944 plans. A Battery House, later demolished, was added against the east wall of the north-south arm of West Mill.

In 1934 the bridge across the Derwent was demolished and in the following year the present steel and concrete bridge was completed.[109] At the eastern end of the bridge there are two cast-iron gate piers, octagonal in section with moulded caps and necking rings. The shafts are cast with the name of 'HILL & SMITH L^{TD} | BRIERLEY HILL'.[110] In May 1938 there was a gas explosion which damaged the range extending southwards from the Stables.[111] Much of what we know of this range derives from photographs taken in the aftermath of the explosion (see Fig 64).

During the Second World War an Air-Raid Precaution (ARP) post was established in part of the ground floor of Long Mill, protected by an inserted wall (now removed). It is likely that the rolled steel joists supporting the ceiling in this area of the ground floor replaced the original beams at the same time.[112] The cupola was removed from the roof and a fire-watching post mounted in its place, but no significant incidents were recorded. The 1944 plans show the ARP post, and also detail a series of room uses in the main mill complex.

Negotiations for the sale of the mill began in 1941, and in the following year a controlling interest in the company was acquired by Kerr & Co. Ltd of Glasgow. However, it was not until 1943 that the sale of the mills to J. and P. Coats Ltd of Paisley, later part of the Coats Viyella Group, was concluded, the operating name of Walter Evans & Co. Ltd being retained. At this date the bobbin shop was still in production, and there was a research department and dyeing rooms.[113]

After the war, in April 1947, Middle Mill was badly damaged by fire. Workmen who helped to fight the blaze were rewarded by the firm, John Nelson receiving a 10-shilling gratuity with a letter of thanks dated 21 April.[114] After the fire Middle Mill was re-floored throughout, using rolled steel beams manufactured in Frodingham, near Scunthorpe, and reinforced concrete. A series of circular tie spreaders on the north and south elevations are contemporary. Substantial quantities of brickwork needed rebuilding, notably the eastern two bays of the south elevation at third- and fourth-floor level, and the parapets on both elevations. The south wall of the stair compartment was also rebuilt above the third floor and the west wall above the fourth. The eastern wall of Long Mill may have been rebuilt at fourth-floor level, at the point where it forms the end wall of Middle Mill, at the same time.

Doubling continued (probably in East and Middle Mills) until at least 1952, when a newspaper article noted that many machines at the mills were idle owing to a recession in the cotton trade.[115] In 1968 or 1969 a flood-prevention scheme led to the decommissioning of the five turbines in favour of a conventional AC supply. Acceptance of such a move was probably also an indication of declining production, now confined to finishing processes. In the following year East and Middle Mills were sold to Patterns [Derby] Ltd, and in 1970 finishing processes were relocated to Lancashire and merchandising to Leicestershire, bringing to a close almost 190 years of continuous textile production.[116]

The industrial community

The Evans family was a powerful and beneficent presence in Darley Abbey until 1929, when Ada Evans died and her residence, Darley Hall, was made over into a school. In common with many early mill-owners the Evanses were persuaded that the smooth running of their industrial enterprises required a workforce that was both disciplined and contented. To this end they built a substantial house for themselves overlooking the mills, and provided workers' housing on a substantial scale, together with a number of social amenities – notably schools and a church.

Darley House and Darley Hall

Fig 10. The factory in its social setting: West Mill (right) and the dining room are overlooked by Darley House, home to Walter Evans from 1785, which shares the higher ground with St Matthew's Church, built 1818-19. (Derby Local Studies Library)

The first Evans residence at Darley was Darley House (Fig 10), which was built for Walter Evans in 1785. It occupied generous grounds set back from what is now known as Church Lane, and overlooked the Boar's Head Mills to the east. Thomas Gardner of Uttoxeter (*c*1737-1804) has been proposed as a possible architect (though proof is lacking), and the house is also thought to have incorporated a system of stove-heating devised by Evans's inventive son-in-law, William Strutt.[117] It was of brick with stone dressings, and stood three storeys high beneath a hipped roof. When Samuel Evans adopted the older Darley Hall (see below) as his residence in 1844, Darley House became home to two of his sisters. By the beginning of the 20th century it was leased to a banker, Colonel James Cavendish. After the First World War it was used as a school and in 1934 it was demolished, the site now being occupied by houses.

Darley Hall, to which Ordnance Survey maps of 1881 to 1938 give the alternative name of 'Darley Abbey', stood just to south of the settlement of Darley, with grounds extending along the west bank of the Derwent. It belonged, from 1709, to William Woolley (d.1716), the early historian of Derbyshire. His son, also called William, rebuilt it in 1727 to a design by Francis Smith of Warwick, with wrought-iron balustrading by Robert Bakewell of Derby.[118] A surviving drawing shows the east elevation as it was in 1758, with three storeys and seven bays, the end bays projecting and the whole articulated by a series of giant pilasters.[119] The younger William died in 1732, and after his widow's death the house was sold in 1754 to Christopher Heath, member of a Derby banking

family. In the 1770s Darley Hall was leased to Robert Holden of Aston Hall, Aston upon Trent, who employed the Derby architect, Joseph Pickford (1734-82), to extend and remodel it between 1775 and 1778. The bankruptcy of the Heaths in 1780, from which the Evanses profited by acquiring the future site of their cotton mill, inflicted a heavy blow to the Holdens, the lease of Darley Hall having been fraudulently assigned to a London bank as security for a loan. At considerable cost, however, they renewed the lease, and by the 1790s they were engaged on landscape improvements.

Darley Hall was sold to Samuel Evans in or shortly after 1814, and in 1844 he made it his principal seat, adding a loggia and domed conservatory. It remained in the Evans family until 1929, when Ada, widow of Walter Evans, died. The County Borough of Derby acquired the house and grounds, the latter forming a park, the former eventually becoming the Derby Central School. Following the relocation of the school in 1958 the house was demolished in 1962, with the exception of part of the north wing and the stable block. At the Duffield Road entrance to the grounds Pickford's gate piers and a 19th-century lodge, added by Samuel Evans, survive.

Housing and education

In both the established settlement of Darley, on the west bank of the Derwent, and also further afield in Allestree, the Evanses built up a substantial estate composed principally of workers' housing.[120] In Darley some existing properties were acquired (including the site of the Folly Houses, on the Chester side of the river), but from about 1790 many two- and three-storeyed houses were newly built. They included The Square and houses in Darley Street (*c*1790), the Four Houses, built in 1792 on the 'cluster' principle later adopted by the Strutts for some of their Belper housing, further houses in Mile Ash Lane (1795-6) and Lavender Row. Others were built in Hill Square, Poplar Row and Upper and Lower New Road.

Nos. 3-16 Brick Row, also built by the Evanses, form a single three-storey terrace built in two phases (of five and eight houses respectively) in 1797-8 and 1798-1800 (Fig 11). Each block incorporated a schoolroom on the second floor, later converted to provide additional bedrooms. These schoolrooms either replaced or supplemented the attic room in Long Mill, used as a school from 1792 or shortly afterwards (see pp 31-2). In 1826 a more substantial school was built in Brick Row to a design by the Nottingham architect, Henry Moses Wood (1789-1867). The new school had classrooms on two floors, flanked by houses for the schoolmaster and schoolmistress. The 1862 article maintains that no less than five schools were

Fig 11. Brick Row from the south. The schoolroom occupied the top floor in the middle of the row. To the left is the more elaborate school of 1826.

'maintained by a fund left for that purpose' by the Evans family, which may indicate that the attic and Brick Row schools were still in use.[121]

Within the mill site itself a much smaller number of houses were provided for more specialised purposes. These are likely to have been for key employees such as a mill manager and perhaps the night-watchman. They are described in more detail in the main body of the report.

Worship

The Evanses belonged to the Church of England, but Darley, an outlying part of the Parish of St Alkmund's, Derby, was not served by its own church. In 1818-19, doubtless for his own convenience as well as for the benefit of the local inhabitants, Walter Evans built and endowed St Matthew's Church, Church Lane, to a design by Henry Moses Wood.[122] A new pulpit, pews and organ were added by another Walter Evans in 1886, as part of a wider scheme (1885-91) that included the addition of a chancel. In 1891 the east window, commemorating Mrs Susan Evans (d. 1891) and her only son, Arthur (d.1870), was inserted.[123]

THE EVOLUTION OF THE COTTON MILLS, 1782-1811

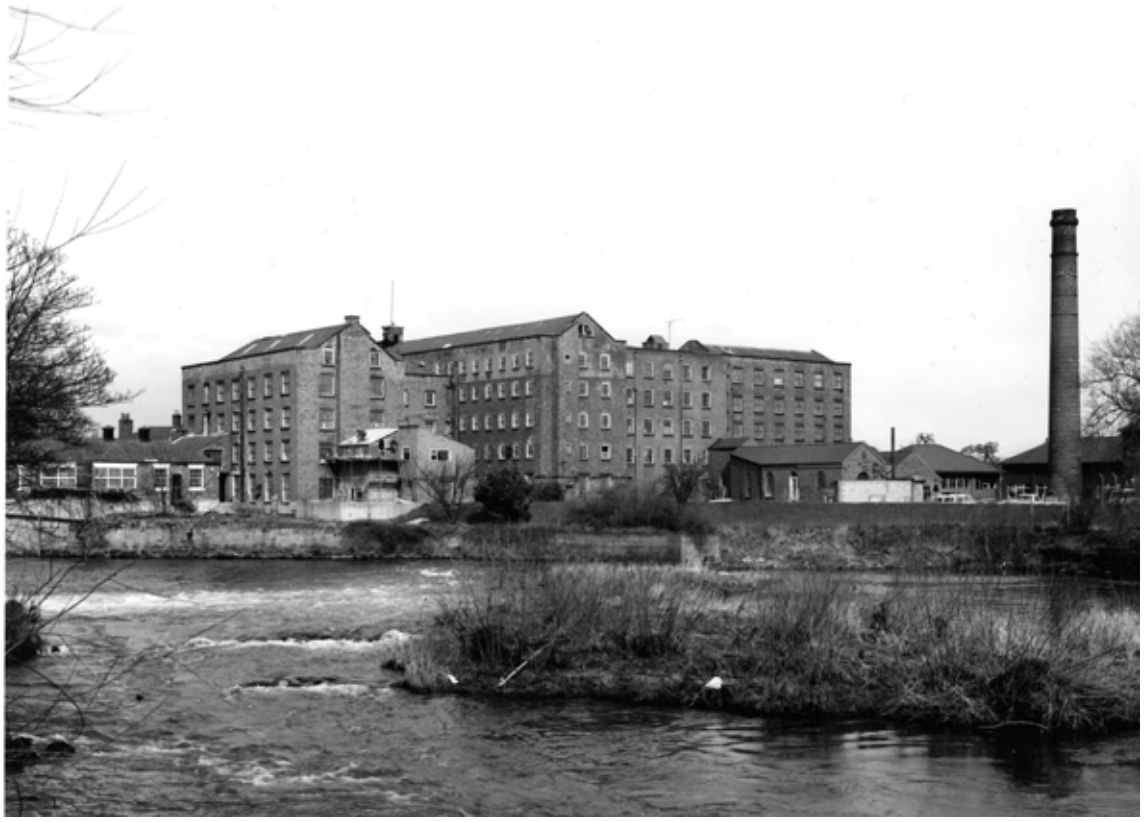


Fig 12. General view of the main mill complex from the south-west in 1975, showing (from left to right) West Mill, Long Mill, Middle Mill and East Mill. (BB82/6261)

The core of the cotton mill complex at Darley Abbey is a single group of conjoined structures ranging in date from 1782/8 to the 1820s (Fig 12; Drawing 2). To these, various ancillary buildings of similar and later date have been added. The existence of the 1811 Liberty Map (Fig 4) provides a convenient, if arbitrary, cut-off point, and is used here to distinguish the early evolution of the mills from the developments that followed.

Long Mill (1), 1782/8

No early depictions of the first mill, either topographic or cartographic, have come to light, and the extent to which it may have survived the fire of November 1788 remains uncertain. It is possible that the brick carcass of the original mill, and possibly some other features, were retained when the mill was rebuilt. The main grounds for believing this lie in the form of the fourth floor, which documentary sources confirm was in existence no later than December 1791, when the conversion of the attic above it was proposed in order to form a schoolroom. On the exterior the top storey is set back slightly from the flank walls of the lower storeys, and the brickwork is of a slightly different colour (Figs 13 & 14). The difference in colour may explain why it has been rendered at some stage. The windows are also smaller than on the lower floors (on the west elevation, north of West Mill, they have had their sills lowered subsequently).

Internal evidence – for example of timbers exhibiting signs of fire damage – may be concealed by later metal sheeting.

Fig 13. Long Mill from the north-west in 1975, with West Mill to the right. The brickwork of the fourth floor and attic retains traces of render. The structure on the ridge is the Second World War ARP post. (BB82/6265)

The newspaper account of the fire presents a rather different picture, however. The mill is described as 'entirely destroyed', and while this might be dismissed as journalistic hyperbole the observation that the water-wheels survived the fire seems to be a credible detail. This prompts an alternative explanation of the present form of the mill, centring on the position of the original wheel or wheels. The mill is seventeen bays in length and no evidence has been identified in the existing walls to suggest a smaller original plan footprint, nor to indicate that the earliest surviving timber beams have been inserted into existing brick walls. The water-wheel position, on the east wall between the fourth and fifth bays from the south, is surprising. Typically wheels were placed at or near the middle of one flank wall (as at Arkwright's contemporary 21-bay Masson Mill, Cromford, 1783-4), or sometimes, on smaller mills, against a gable wall. Between the eighth and the ninth bays, where the wheel on a seventeen-bay mill might be expected, there is a pier which is slightly wider than normal, but this is sufficiently explained by the presence within it of a hot-air flue. Even once the two northernmost bays – taken up by the stair office and stores – have been discounted, the markedly asymmetric water-wheel position might suggest instead that the original mill corresponded to the southern eight bays or so of the present structure.[124] Water-wheels and their associated pits and leats represented a considerable capital investment, and it is possible, given that the wheels survived the fire, that they were retained to power a mill rebuilt on an enlarged plan. To the south the Derwent left little scope for enlarging the footprint of the building, while to

the north there was slightly more room for expansion, albeit possibly at the expense of introducing a kink in the alignment of Old Lane.

The mill (Drawings 2-4) is built on a roughly north-south axis some 30-40m east of the natural course of the Derwent. The original mill leat appears to have left the river a mere 60m to the north-west of the present north gable. This is suggested by the alignment of a series of buildings which stood until the 1880s, but of which the concave-fronted house (3) is now the only substantial survival. Though in fact they are contemporary with the realignment of the leat at the end of the 18th century, these appear to have respected a gently curving watercourse reaching the mill next to its north-eastern corner and passing along its eastern flank.[125] It is possible to see corroboration for this alignment in the small-scale, and clearly schematic, depiction of the mill and its watercourse on a plan made by Benjamin Outram in 1792 for a proposed extension of the Derby Canal.[126] This agrees in showing the leat in the form of an arc (though with no pretence of accuracy) and passing along the east side of Long Mill. Burdett's small-scale map of Derbyshire, a revision of which was issued in 1791, appears to show much the same.[127]

Fig 14. The east elevation of Long Mill, with Middle Mill at right-angles to the left. The leat passed directly alongside the stone ground floor. The stone ground floor and rendered brick fourth floor are clearly differentiated.

The earliest large-scale map is the 'Liberty Map' (Fig 4) of 1811, which shows the leat as modified between 1796 and 1798, possibly in connection with the addition of Middle Mill. On the Liberty Map the leat departs from the river almost due north of the mill; it follows a straighter course for much of its length, but at the northern end incorporates a slight curve in the opposite direction to that suggested by Outram. The differences between the two maps are signal enough to suggest that Outram's plan, despite the inevitable deficiencies resulting from its small scale, does indeed show a different arrangement.

The water-wheel powering the mill machinery was positioned on the eastern wall of Long Mill opposite the fourth and fifth bays from the south. It may have been open to the elements originally, as appears to have been the case at Masson Mill. The main upright shaft carrying power to the upper floors must have been located in the same area. This arrangement appears to be confirmed by the positioning of the transverse ceiling beams of the ground to third floors. Since these remain concealed by metal sheeting it is

impossible to ascertain whether any of them survive from before the fire. The pattern consists in all the beams north of the water-wheel bays being offset towards the northern side of the piers on which they bear, while the much smaller number of beams to the south are offset southwards. The precise reason for this is unclear (it is perhaps associated with the use of lesser upright shafts of the kind known to have been used at North Mill, Belper, as rebuilt by the Strutts in 1803, and at some other early cotton mills), but it confirms the two water-wheel bays as original design features. By the same token it suggests that the wheel position against the west wall, now within West Mill, results from a later modification.

Standing on a plinth of large gritstone blocks, the mill has a ground floor of herringbone-tooled coursed gritstone rubble, rising to a lintel-band, the stones of which have diagonal tooling between dressed margins. Above this band the walls are of orange-brown brick, some of them over-fired, laid in an irregular bond. The flank walls rise to a stone-capped parapet concealing gutters at the feet of the roof slopes. The parapets return at either end, where they run into the stone-capped gables. Many of the windows, including most of those on the ground floor, have been altered, but they were originally quite small. On the ground floor these windows have square heads formed by the lintel band externally, but on the upper levels they have segmental brick arches. Inside, many on the ground floor retain segmental brick rear-arches, while on the upper floors they all have timber lintels of which all but those in the stair well are sheeted in metal. Except on the ground floor, where most of the windows retain shelving internal sills, the windows have internal splays running continuously between storeys, without sills in the plane of the wall. Some of the ground-floor windows are protected by iron bars.

Fig 15. The south gable wall of Long Mill in 1975. (BB82/6264)

The mill entrance is in the centre of the north wall, and has a neatly quoined ashlar surround (see Fig 55). The lintel is unusually massive, resulting in the projecting lintel band being raised in the same manner as over the altered ground-floor windows. Since there is no indication that the lintel and quoins are not contemporary with each other, this may suggest that the opening has been inserted. An alternative original entrance position might be posited in the second bay from the north on the western side. The doorway in this position, now internal, has no historic features visible, but it faces the original approach from the opposite bank of the Derwent and would allow for a stair rising on its north side.[128]

The mill was formerly divided at all levels except the attic by a brick wall placed two bays from the north end. This division survives on the ground floor, but on the upper levels

only the western one-third remains, where it corresponds to the present stair well. The brickwork is generally well bonded at the side walls, and appears to be contemporary with them. The stair compartment, occupying the western one-third of the two northernmost bays, is enclosed to the east by another brick partition. Although this is roughly block-bonded into the north wall, the three-bay fenestration of the gable walls suggests the likelihood of an original division in a similar position. There is also a consistent pattern of alteration whereby doorways towards the southern end of this partition have been shifted further southwards at some point – perhaps in connection with the present stair, which is a replacement. The original stair is likely to have been of timber construction, probably rising via half-landings. A series of transverse beams spanning the storey-level landings may be re-used from the original stair or floor construction in this area. The beams have a series of redundant joist seatings in either the northern or the southern face only, consistent with their use as trimmers previously. Another indication of the original form of the stair comes from the payment of £4 14*s* 6*d* in April 1799 for a crane mounted in the '6th room' (i.e. fifth floor, or attic).[129] This presumably utilised the loading doorway in the partition dividing the attic from the stairwell. If so, it probably required trap-doors in the stair landings to function.

Fig 16. The interior of the third floor from the south-west. (BB001906)

The eastern two-thirds of the same two bays formed a separate room, distinct from both the stair compartment and the main working rooms to the south. Doorways opened off the stair on each level. Only the ground-floor room was heated by a fireplace, suggesting that it served a different function from the others. It was probably a counting house or office. The fireplace on the eastern wall has been blocked, but the chimney breast survives, and was served initially by a flue rising in the pier between the first and second windows from the north. Subsequently a flying flue was arched across to a new stack set into the north-eastern corner of the building. The room was lit from the north, where the window, judging by the external masonry, appears to have been widened. A moulded plaster cornice respects both the widened form of this opening, and a cupboard position on the south wall. On each of the upper floors the corresponding room probably served as a store and control point for materials, etc, but the divisions between these rooms and the main working rooms have been removed.

The working rooms (Figs 16 & 17) were fifteen bays in length, giving internal dimensions of roughly 31.22m by 8.11m (104ft x 27ft) on the ground floor. The ground-floor room was appreciably taller than the others, with 2.87m (9ft 6in) to the underside of the joists, as compared with 2.56m (8ft 6in) on the three floors above. The ceilings are conventionally formed from transverse beams and axial joists, all now concealed by metal sheeting, but on the fourth floor a different arrangement is found. Here there is instead a grid of timber beams. The transverse beams form eight bays of two windows each, plus a short bay at the southern end. Each bay is divided into five compartments by axial beams of the same scantling. The variation in ceiling form is primarily a response to the intervals between the tie-beams, as determined by the mechanical requirements of the roof, but may also reflect lighter anticipated floor loadings at attic level.[130]

Fig 17. Interior of the fourth floor, from the south. (BB001909)

Each room was entered from the stair and controlled or serviced from the room alongside the stair. The rooms were regularly fenestrated with the exception of the wider than normal piers between the eighth and the ninth bays from the south. These contained flues (the pier to the east has three flues) which appear to have served a stove. Like the pier containing the flue serving the counting house fireplace, these piers have brick corbels to carry the timber lintels on either side. This has the effect of removing the timbers from possible contact with sparks rising in the flues. What appears to be another arrangement of flues occurs on the south gable. Here the flues rise on either side of the central tier of windows, diverging at attic level so as not to encroach on the lunette.

Various different kinds of cast-iron column are found in the mill.[131] Only those dating from the late 19th century and later appear to be *in situ*. The remainder were re-set no earlier than when the timbers were sheethed in metal, though it is possible that some were simply reinstated in earlier positions. Probably the earliest form, found on the second and third floors, is a solid cruciform-section column with separate base and cap. Five columns of this sort survive on the second floor, and six on the third floor, all north of the junction with West Mill. There are also a small number of solid cylindrical columns with necking rings; these are probably no earlier than the early 19th century.

The small number of early timber fixtures and fittings surviving elsewhere in Long Mill include a series of windows. These consist of two lights, each light two panes wide and four deep, the panes being slightly taller than they are broad, the bottom four panes of one light forming a pintle-hung iron casement (Fig 18). Most of those that survive

(Drawing 4) are on the east side but a number survive in other positions.[132] They appear to be the same as the windows which George Bassett, ironfounder, of Mayfield near Ashbourne, was asked ('as soon as you can') to provide in February 1799, though there is no reason to suppose that this particular order related to Long Mill.[133] That similar windows still formed the majority of those in Long Mill in 1833 is confirmed by the Evans & Co. responses to the Factories Inquiry.[134] Fewer early doors survive, but on the second floor the doorway linking the stair with the main room retains one consisting of four moulded sunk panels set within a simple cyma reversa architrave.

Fig 18. One of the early timber and iron-casement windows on the east elevation of Long Mill.

Fig 19. The attic and queen-post roof of Long Mill, from the north. One of the flues inserted in the 1790s to serve the school-room stoves, remains on top of the right-hand end of the collar. (BB001912) See also the cross-section, Drawing 3.

The nine-bay roof, incorporating the attic storey, is carried by a series of softwood trusses of queen-post form, the main joints of which are of pegged mortice-and-tenon construction (Fig 19; Drawing 3). The principal rafters rise only to the queen-posts, which are linked by a cranked collar. The queen-posts have expanded bases and heads, and taper towards the latter on the outer edge only. Raked struts rise from the expanded bases. This form of truss construction creates a clear central nave 2.77m wide and between 1.74 and 1.90m high. There are two sets of purlins. The lower rank is formed by large butt purlins, set square against the principals. The upper rank is clasped at the collar, diamond-set in the normal manner, and is of much lighter scantling except in the northernmost bay (see below). The fact that the lower purlins are square-set tends to suggest that the stud, lath and plaster sides of the attic room represent an original intention, even though the floor boards on which they rest extend all the way across the building.[135] This is confirmed by the absence of any paint or wash on the timbers inside the ashlaring, whereas these are present on the room side, largely concealed by later metal plates. The roof covering, probably renewed, is of Welsh slate, secured with copper nails.

The more substantial purlins (roughly 26cm by 24cm) of the northernmost bay are designed to support the additional load of a bell cupola, which was mounted on the

ridge.[136] This was dismantled during the Second World War and a fire-watching post erected in its place, but some evidence for its form remains (see Fig 20). It rested on two heavy timber bearers slung across, and bolted to, the upper purlins at the southern end of the bay. Into each of these bearers two upright timbers were tenoned, forming the corners of the cupola. The mortices were pegged and wedges were driven in to tighten them. Fragments of the tenons and wedges, and the truncated base of the north-west upright, remain *in situ*. The position of the south-east upright is now occupied by a mast for a television aerial. The cupola appears to be contemporary with the lath-and-plaster underside of the roof slope, which butts neatly against the former positions of the uprights. The bell was cast in 1793 and re-cast in 1936.[137] It was rung by means of a bell-pull which was guided between the base of the cupola and the stair well by a series of timber pulley wheels mounted on iron spindles. In the south-east corner of the stair well it descended through a pipe, passing through circular openings in the stone-flagged landings. When the mills closed in 1970 the bell was briefly transferred to Eagley Mills, Bolton, another Coats Viyella site, but in 1973 it was returned to Walter Evans School in Darley Abbey.[138]

The attic was lit by large semicircular windows in each gable. The tripartite north window retains its original chamfered mullions and moulded glazing bars. The south window has been renewed, and consists of two casements, hinged at a central mullion. The timbers have large angle-beads and the glazing bars are of a plain splayed form. A series of skylights in the roof slopes are probably original features. They would have been necessary for the attic to be used for processing or to function as a schoolroom, and they appear on a bird's-eye view of the mills published in 1862 (Fig 8).[139] Hatches on either side of the roof gave access to the parapet gutters. The east doorway was renewed in the 20th century, but the west retains its original form. The brick gables were limewashed, as were the truss timbers.

The attic appears to have been used for a powered process of some kind. There is a consistent pattern of evidence suggesting line-shaft bearers mounted on top of the collars. It consists of a pair of bolt holes passing vertically through the eastern end of each collar. On the same alignment there is a semicircular cut in the top of each cupola bearer. The ends of the line-shafting are indicated by a bearer in the southernmost bay, which is bird's-mouthed against the upper purlins and bolted, and evidence for a similar arrangement formerly in the northernmost bay, 2.26 – 2.43m south of the north gable. The latter bearer was respected by the later sheeting of the timbers.

The attic school room, *c*1792

Schoolrooms are known to have operated in the attics of mill buildings in a number of places.[140] The best known is the Strutts' at North Mill, Belper: built *c*1803 and documented in Farey's drawing of 1809, it was probably intended as a school from the outset.[141] The schoolroom in Long Mill, while demonstrably the result of alterations, is the earliest known example of its kind.

A letter of 22 December 1791, quoted more fully above (pp 10-11), details the intention, presumably an after-thought to the initial post-fire intentions, to create a Sunday School in the mill attic:

> We have a room in the Roof of the Mill, about twelve feet wide, which we wish to use as a Sunday School Room, but are at a loss how to warm it. we thought of fixing a Brick Chimney upon the Principals, having a large flat stone under the Chimney to guard the

> timber, and of making a foundation on the floor to turn a Brick Arch, or support a large Hearth Stone two or three feet from the floor, and upon that to fix a small Stove with a short pipe into the Chimney. if any better mode can be shewn we will be glad to adopt it, and as you are near had better be done under your inspection. there are windows in the ends which prevent the tunnil [?] from being there.[142]

By 5 May 1792 it would appear that heating had still not been provided,[143] but the proposal was evidently carried into effect shortly afterwards and much as described. Among the features that survive are three short brick stacks, resting on gritstone bases which are in turn seated on the western ends of three collars, widened by the planting of additional timbers on either side (Drawing 3). The stacks, on the first, fourth and sixth trusses from the south, formerly pierced the roof, but aerial photographs show that they were truncated before the mid-20th century.[144] Each has a blocked aperture in one face for a former stove-pipe. The aperture is on the south side of the northern flue, and on the north side of the other two. The stoves appear to have been freestanding on the attic floor, perhaps as outlined in the letter, but floorboard evidence is concealed by overlying boards of later date.

The 'fireproofing' of Long Mill

The use of metal plates to protect structural timbers from fire was patented by David Hartley in 1773,[145] and was adopted by the Navy Board in 1782.[146] Benjamin Gott contemplated nailing iron plates to joists at his Armley Mills, Leeds, in 1804, and did indeed use them on roof timbers there in 1807, as well as covering floors at Bean Ing Mills, Leeds, at some time before 1826.[147] The plating of roof timbers has also been noted at Lowerhouse Mill, Bollington, and Quarry Bank Mill, Styal, both in Cheshire.[148] The use of metal plates at the Boar's Head Mills has been known for some years, but there has been considerable uncertainty as to its date.

Fig 20. The attic of Long Mill, seen from the north. The metal plates sheathing the truss timbers and other exposed timbers are clearly seen. The two bearers suspended above the purlins in the foreground supported the former cupola housing the mill clock and bell. Traces of line-shafting are also visible. (BB001911)

Metal plates are employed extensively in Long Mill, where practically all timber surfaces are concealed, as well as in the third-floor ceiling and roof-space of West Mill and the

second-floor ceiling and roof-space of North Mill. At least some of the plates must therefore date from no earlier than the 1820s. There are some variations in the size of sheets employed, which may indicate that they are of various dates, though plates may simply have been cut to different sizes to suit particular situations. There is good evidence in the attic of Long Mill to suggest that the plating here is not an original feature: the plates on the ashlared side walls are nailed onto horizontal boards, which in turn are laid over the original lath-and-plaster finish of the ashlaring. On the roof timbers the plates overlie traces of limewash.

The metal plates in the attic (Fig 20) are relatively small, typically 34.5cm by 25cm and lapped approximately 12cm. In the northernmost bay larger sheets extend onto the lower part of the eastern ceiling slope, but on the opposite side of the same bay the partition dividing it from the stair is not plated. Otherwise the plating is uniformly confined to the ashlaring and the truss timbers. The latter are fully plated within the room, except for the top surfaces of the collars, which remain exposed. Apart from the attic, sheet metal was employed consistently throughout the mill to cover ceiling beams, to underdraw joists and to conceal timber lintels. The only exception was the stair well, where the lintels were left exposed. This may be because the stair was already, or was at the same time, altered to its present form, essentially of brick and stone.

If the attic plates can be ruled out as original features dating to the rebuilt mill of 1788, they may nevertheless have early origins. It is significant that no mention was made of sheeting in the 1791 letter to the Phoenix Insurance Company, who might have been expected to regard the feature favourably when coming to terms (see above, pp 10-11). It is noteworthy that in 1797-8 the insurance of the cotton mill was underwritten by the Royal Exchange Office of London for £14, whereas from 1799 to 1803 the annual premium fell to £9 2s 0d. Since the mill complex did not contract in this period it may be that some safety measure induced the reduction.[149] Alternatively the sheeting may date from the early 1820s when, with the mill complex much extended and partly fireproof, it was thought desirable to reduce the vulnerability of the original mill. The absence of sheeting from the stair well would seem to favour the latter conclusion, since the replacement of the presumed timber stair with one in fireproof materials is unlikely to have occurred before the construction of the first fireproof building – East Mill – in 1818.

Later attic features

Two partitions within the attic are of different dates, both subsequent to the sheeting of the timbers, and probably relate to continuing use of the attic as a school. The earlier partition, dividing the fourth and fifth bays from the south, is roughly boarded and incorporates a re-used late 18th-century door of four moulded sunk panels, hung on spoon-head hinges. This divided the school-room roughly in half. The second partition lies between the third and the fourth bay, turning the latter into a small room between two larger rooms. It is of studwork, lath and plaster, and has a re-used late 18th- or early 19th-century door of six moulded sunk panels. Within the room thus created, to the west of the doors, there are rails at dado-height and above, and on the ceiling slope. The rails to the north and west have a series of iron pegs or large nails, suggesting use as a cloakroom. One of the timbers has been re-used, and incorporates a series of diamond-set and square mortices.

A wrought-iron tie-rod has been secured to the eastern end of the northernmost collar. The rod carries some of the load of the corresponding ceiling beam on the fourth floor, to which the other end is attached. Its attachment to the collar required splitting and

peeling back one of the metal plates, which it therefore post-dates. It may be connected with the removal of the wall lower down the mill building.

Middle Mill (2), 1804-5 (?)

Middle Mill (Fig 21; Drawing 2) forms a five-storeyed eastwards extension of Long Mill, which it abuts with straight joints. At 15.90m long and 8.43m wide internally (53ft x 28ft), the ground floor is fractionally wider than that of Long Mill, but only because it has thinner walls. It consists of five regular bays, with a longer sixth bay, partly occupied by a stair, at the eastern end. It was built astride the original leat, which was widened to accommodate a flood wheel in 1796-8. As discussed above (pp 13-15), the date of Middle Mill is uncertain. It cannot reasonably be earlier than the flood wheel and may be contemporary with it. However, it is more likely to be the 'New Wheel House' constructed in 1804-5 at a cost of £1,425 15s 3d (see above, p 15). A range conforming to Middle Mill is depicted on the 1811 Liberty Map (Fig 4) and the building certainly pre-dates East Mill (commenced in 1818) since the latter covers a lunette in its east gable and wraps around part of the easternmost bay. The name Middle Mill can have been adopted only once East Mill had been built.

Fig 21. The south elevation of Middle Mill in 1975, with the gabled Long Mill to the left and East Mill (with the small-pane sashes) to the right. (BB82/6263)

Owing to extensive fire damage in 1947 (see Fig 22), little of the original structure of Middle Mill survives except for the walls, and on the south elevation the eastern two bays have been entirely rebuilt at third- and fourth-floor level. The original walls are more lightly built than those of Long Mill, probably to lessen the weight carried by the wide segmental arches that span the two wheel-pits. The walls are of brick throughout, but the bond varies. On the ground floor English bond is used, on the floor above it is monk bond (a variation of Flemish bond in which headers alternate with two stretchers) and irregular English garden-wall bond above. Stone is reserved for window sills, the voussoirs of the two keyed arches and the copings, which have been re-set (with some modern replacements on the south side) on the rebuilt parapets.

The original windows have segmental brick heads and stone sills. The ground-floor windows are the same width as those on Long Mill, while on the upper floors they are slightly wider. On the north side the ground-floor windows do not respect the bay rhythm of those above. A number of ground-floor windows on both elevations have been blocked since 1944, probably after the 1947 fire; their positions are roughly indicated by patches of carefully matched 20th-century brick. On the north elevation the first-, second- and third-floor windows of the easternmost bay retain what are probably the original small-pane hornless sashes, five panes wide and six deep.[150] Of the remaining windows, three ground-floor windows on the south side have early or mid-19th-century

cast-iron frames, which are six panes wide and six deep, with a central four-pane opening section. One of these is set askew within a canted opening, apparently to facilitate observation towards the south-east, but perhaps to avoid some internal obstruction. There is another 20th-century ground-floor window on this side, with a cement-faced lintel; the remaining windows have 20th-century hornless sashes which post-date the fire. A number of windows can be identified in the east gable, now covered by East Mill. On the second floor two blocked windows are visible south of the stair compartment. In the apex of the gable the blocked lunette is visible inside the roof-space of East Mill.

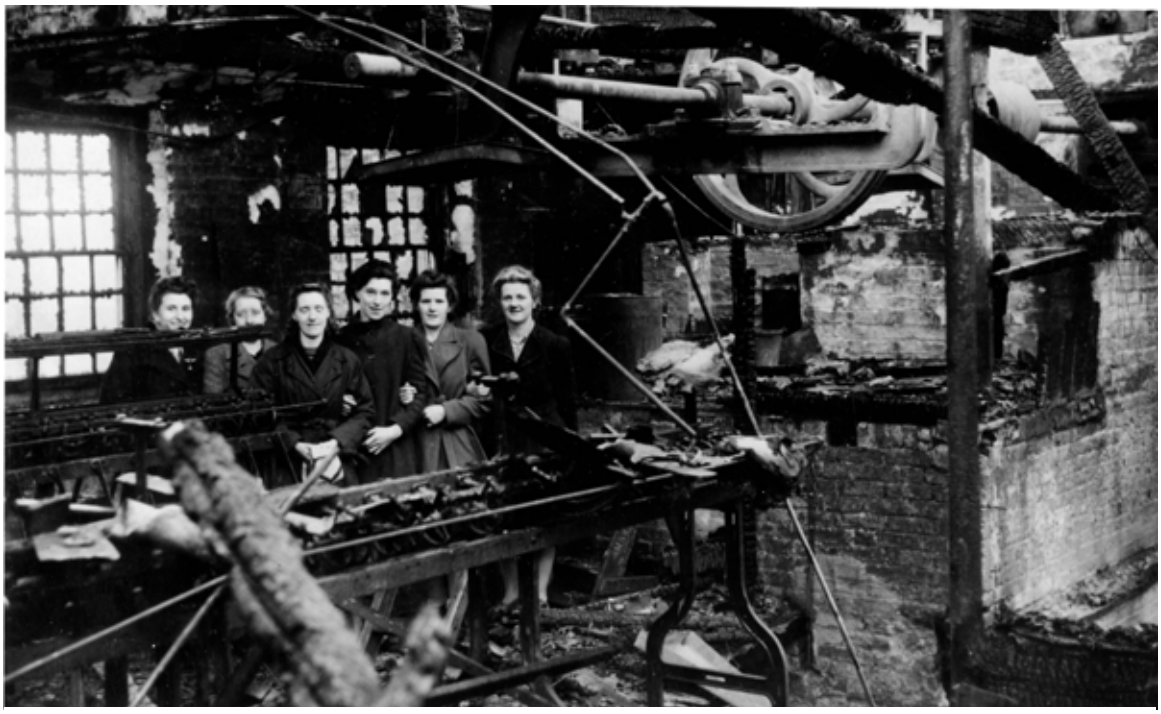


Fig 22. Middle Mill following the fire of 1947. (Photograph courtesy of John Nelson)

The entrance on the north side of the easternmost bay has brick closers in the lower part of the jambs, but its position respects the present stair which also serves East Mill. The over-light and cement-covered lintel are secondary. On the south elevation there is a blocked doorway, or full-length window, in the third bay from the west, associated with a corbelled panel of brickwork. This appears to relate to the pier dividing the twin leats passing under the mill, but whether it implies access to the pier for some purpose is unclear.

Few internal features of significance survived the 1947 fire. The plans drawn in 1944 show only a small number of irregularly disposed columns, suggesting clear timber spans originally, as in Long Mill, and this is consistent with the limited information that can be derived from a 1947 photograph showing internal fire damage.[151] The principal survival is the stair, but for reasons which are given below it is likely that this dates from the addition of East Mill. The storey heights must have been reinstated after the fire, and resemble those in East Mill. The ground floor is taller than the floors above it. On the ground floor the large gritstone arch mentioned in the account of Long Mill is exposed, the crown of the arch rising a little above first-floor level. There is a variation in the internal form of the windows between the ground and first floors, the latter having walk-in

windows, while the former have sills in the plane of the wall. The third floor was not accessible beyond the stair compartment at the time of survey.

The precursor of West Mill

Before 1811 work began on a westwards extension of Long Mill, incorporating at least one further water wheel, served by a new leat drawing water from the Derwent only a few metres north-west of Long Mil. The Liberty Map of that date (Fig 23) shows a structure consisting of two elements: a wider section, adjoining the mill and forming roughly two-thirds of the length of the extension and, at the western end, a shorter and narrower section which steps back on the north side. As with Middle Mill, this building is hard to identify with certainty in the Evans & Co. ledgers.

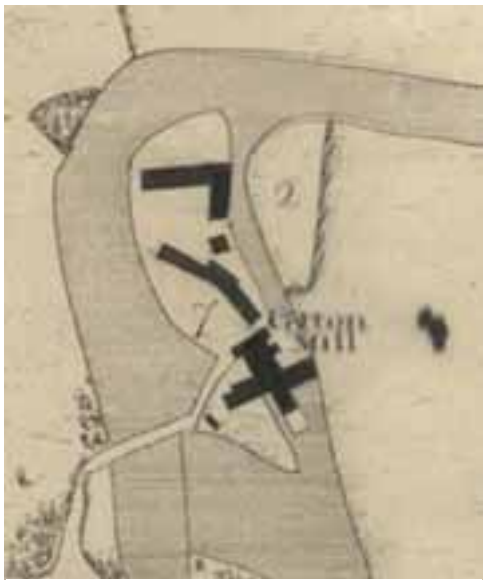


Fig 23. Detail of the Liberty Map of 1811. The forerunner of West Mill is clearly shown straddling the leat on the west side of Long Mill. (Derbyshire Record Office)

That parts of this early building may survive in West Mill is suggested by one or more variations and anomalies in the present structure. The ground floor of the east-west arm is of stone on both elevations, but the masonry differs on the westernmost three bays of the north elevation. Here it is of finely tooled ashlar, in marked contrast to the rough diagonal tooling of the rubble stone used elsewhere, which is much closer in character to the masonry of Long Mill and its two-storeyed additions. The windows in the rubble masonry also differ in having plain stone lintels and reveals, whereas elsewhere in the building they have a quarter-round moulding.

Comparison of the north and south elevations of the east-west arm reveals further variations not only in the size of the windows, but also in the bay rhythm. The window openings in the three upper storeys of the four-bay south elevation are smaller, and thus plausibly of earlier date, than their counterparts to the north, though at four panes wide and four high they are larger than those of Long and Middle Mills. They also differ from those of the earlier mills in having gritstone lintels with a quarter-round moulding – a detail which occurs throughout West Mill except on the ground floor of the east-west arm. It is possible, therefore, that the variation in size and rhythm has another cause, and it will be argued below that the rear wall dates from 1821.

Other pre-1811 additions to Long Mill

In addition to Middle Mill and the precursor of West Mill, three further additions (see Drawing 2) are clearly marked on the 1811 Liberty Map. None of these appears on Outram's 1792 map, though this is at such a small scale that absolute reliance cannot be placed on it. Nevertheless, for other reasons it is likely that the additions date from after 1798. Two of the additions form roughly matching two-storeyed wings projecting east and west of the northern end of the mill. The third, which incorporates a water tower, projects from the eastern side of the mill, between Middle Mill and the east wing. Both the east wing and the water tower stand where the original leat is thought to have run,

and are therefore unlikely to have been built before the leat was re-routed between 1798 and 1800.

The east and west wings

The two wings may have been built, in part at least, to provide additional office space, though the absence of fireplaces or stacks may suggest other functions. Both wings are broadly matched to the materials of Long Mill, to which they are block-bonded. The west wing is two bays from east to west, with a two-window west elevation. The east wing is three bays long, was originally blind to the east, and has a canted north-east corner that eases the passage of the road eastwards to the bridge over the former leat. Both wings are of brick construction – predominantly of Flemish bond, though the bond of the west wing is partly irregular – on a base of coursed gritstone rubble rising to the ground-floor sill band. At eaves level there is a coved stone cornice. Doubtless for reasons of security, the wings were originally entered only from inside Long Mill, the present south entrance to the west wing being an insertion dating from after 1944. The windows, segmental-headed on the ground floor, square-headed beneath the cornice on the first, were similar to the early type identified in Long Mill, but without the opening section (though one has a single opening pane). A number survive. The hipped roofs are covered with Welsh slate.

The west wing has an added projection on the western wall, probably dating from the mid-19th century. This has a gritstone base and a chamfered blue brick coping, and is capped by a slate off-set a little below first-floor height. It abuts the wall at a straight joint and is bound by iron straps. The 1944 drawing indicates that it housed a wall-safe and that the room was then the Manager's Office.

The east wing has been reinforced by wrought-iron ties attached to the beams supporting the first floor; they are marked externally by spreaders. The two south-facing first-floor windows have been blocked and replaced by two windows inserted in the formerly blind east wall. The north-facing windows on this level have been renewed.

Both wings have been extensively modernised internally. The west wing, which in 1944 provided a Manager's Office beneath a Staff Dining Room, is currently an unmanned reception area or waiting room on the ground floor and a manager's office above. Further offices occupy the greater part of the east wing, which in 1944 was used partly for testing thread, and partly for storage, on the ground floor, and for storage on the first floor, where it was integrated with the adjoining store in Long Mill. The eastern bay of the ground floor (the former store) has been used as a transformer house for some years. A large entrance has been inserted in the eastern wall since 1944 and the south-facing window has been louvred.

The water tower

Abutting the eastern side of Long Mill, covering the sixth bay from the north, is a turret, slightly elongated east-west, rising the full height of the mill, which it abuts with straight joints (see Fig 14). Given the conjectures above about the original course of the mill leat, it is likely that it is either contemporary with, or post-dates, the diversion of the leat between 1798 and 1800. At the base of the south wall the crown of a segmental brick arch is visible, suggesting the presence of a culvert beneath the turret.

The original entrance to the turret was a wide, segmental-headed doorway, now blocked, in the east wall. This has gritstone anchor blocks for double-leaf doors. Smaller internal doorways were inserted at an unknown date to communicate with the mill working rooms on each level. The turret was lit on each storey except the ground and fourth floors by a small segmental-headed window in the east wall. At ground-floor level a window was inserted in the south wall; it was subsequently narrowed on one side and its sill was raised; a new entrance was inserted in the north wall before 1944, perhaps when the original doorway was blocked.

The 1944 plans show that a water tank occupied the fourth floor of the turret, as now. It is possible, especially since this level is unfenestrated, that this was the turret's original purpose. If so, it would have required a pumping engine for which no clear evidence has emerged. It may have been built to serve the water closets that were installed in 1796-7, perhaps replacing an earlier, unsatisfactory, water supply or a different form of sanitation. Its position is relatively remote from the known sanitary provision in the mill complex; however, it is likely that the lower floors served another purpose or purposes, and therefore its siting may reflect other considerations. Other possible functions include a hoist tower, but the plan area is very large for such a purpose, and the doors communicating with Long Mill are not specially large. The minimal fenestration might suit this explanation, but the position of the windows in the centre of the east wall – i.e. beyond any hoist – suggests otherwise. The unlit fourth floor might be explained as housing the hoist mechanism, but this would prevent the hoist from serving this level. The floors, where seen, appear to be later insertions, but there is no indication, despite its generous size, that the turret ever contained a stair.

OTHER PRE-1811 BUILDINGS

The existence of the Liberty Map, surveyed in 1811, allows developments up to that date to be summarised. In addition to the buildings and extensions described above, the map shows two substantial ranges and a small freestanding building to the north of the main mill complex. Adjoining the eastern end of the bridge over the Derwent there is a very small structure, possibly a gatekeeper's or night-watchman's lodge, now overlain by the Dining Room (17). A little to the east of the mill leat there is a larger building of irregular plan which can probably be identified with the building now occupied by Darley Mill Pottery.

The manager's house (3), *c*1797

This is the largest house on the Boar's Head Mills site. It is a plain but substantial three-bay house, its subtly concave front elevation overlooking the approach across the River Derwent (Figs 24 & 25; Drawing 5). Its size and position suggest that it was intended for a mill manager or as a counting house, both paralleled at Arkwright's Cromford Mill. Outram's 1792 map shows a building, distinct from Long Mill, that might be interpreted as corresponding to the present house, but the depiction is too crude for any confidence to be placed in it. The house may instead be the 'New House in Weir Close', which was charged to the Cotton Mill building account in the lost Inventory Book on 24 May 1798.[152] The implied proximity to a weir is consistent with what is known of the mill's early water-management system, while the stylistic appearance of the house would tend to corroborate a date in the 1790s. However, the substantial sum expended (£2,432 3s 5½d), which amounts to roughly two-thirds of the stated cost of East Mill some twenty years later, suggests that more than just the house was involved. It may therefore be the same 'New Hs.' for which, in January 1797, George Coulston was paid £31 0s 7d for slating, including 107¼ft of ridge – a length greatly in excess of what was required for the house alone.[153] Since the house used to form part of a longer range extending southwards (of which only a fragment survives) it is possible that the high total cost includes this as well. The curved alignment of the house and range may reflect the line of the original mill leat, the diversion of which was in progress between 1798 and 1800. The upper floors of the house are currently disused; the north-west part of the ground floor operates as the Riverside Café.

Fig 24. The concave-fronted house viewed from the south. (BB001894)

The house consists of three storeys beneath a hipped roof, and has a south-west facing curving front of three wide bays. The plan is one-and-a-half rooms deep with a central

entrance and stair hall, and originally had stacks on each end wall. Both the external appearance and internal arrangements of the house have been extensively altered, but most elements of its original form can be ascertained. The brickwork is in English garden-wall bond, and stands on a brick plinth. The entrance and wide flanking ground-floor windows of the front elevation retain their original segmental-arched heads. The windows on the upper floors were narrower. The first-floor windows have all been altered, but were originally in line beneath those on the second floor. They probably had segmental heads like those below. The central window lit the stair. On the second floor the left and central windows retain their original form. They have two-light timber casements and square heads formed by the wall-plate.

The convex rear elevation had just two windows per floor. On the ground floor one remains in the form of a doorway (above which the original window arch has been retained as a relieving arch) while the other has been blocked. On the first floor the left-hand window retains its original segmental head of brick headers, but the other has been altered. The second-floor windows resemble those on the front elevation.

Fig 25. The house seen from the NW.

The interior, which is considerably altered, particularly in the south-east bay, consists of a series of irregular-shaped rooms resulting from the skewed alignment of the end and cross-walls in relation to the curved front and rear. Such an arrangement suggests a pre-existing site constraint, but its nature is not apparent. The central entrance opened onto an entrance and stair hall, off which large heated rooms opened to left and right. Smaller service rooms occupied the rear, and may have been unheated. The north-west room is spanned by an axial beam with a moulded plaster cornice. Part of the former rear room is now incorporated with it. The south-east room was originally similar, but the chimney breast has been removed from the end wall, and the whole of the rear room has been incorporated.

Of the stair the moulded and beaded strings, moulded handrail and, from the first floor upwards, square-section balusters (mostly timber, but iron at the corners) survive, together with the treads above first-floor level. The stair rose via landings lit from the front. Here some of the original joinery survives. Four doors of six moulded sunk panels open off the first-floor landing, and are set in moulded architraves consisting of a cavetto, quirked ogee and fascia. The rooms to the north-west were both spanned by a plastered axial beam and were heated by fireplaces (now blocked) on the end wall. The architraves facing into the rooms have a large cavetto, astragal and fascia, and there are moulded skirtings. The boarded floors are probably original. The rooms to the south-east were similar, but have been more extensively altered.

On the second floor there is again a complete sequence of four doorways opening off the landing. The doors are as below, except that the sunk panels of the room faces are not moulded. The architraves are simpler, consisting of an ovolo, fascia and bead on the landing face, and a simple bead inside the rooms. The floors are of lime-ash on laths. The front north-west room retains an original fireplace surround, the moulding of which matches those of the architraves on this floor, but the mantel shelf and hob grate are later.

The hipped roof is carried by two king-post trusses. These appear to rely entirely on carpentered joints without use of structural ironwork. The king-posts are of substantial scantling, pegged at the tie-beam, with the principal rafters pegged at the expanded head and unpegged raked struts rising from the expanded foot. The single set of butt purlins returns across the hipped ends without the need for half-trusses. The south-east end incorporates a trimmer indicating the former position of the stack on this wall. The common rafters are pegged at the apex without a ridge-piece.

The curving front of the house was echoed (probably in a more rudimentary fashion) in the range attached to its south-east end. The brickwork of the rear elevation continues for a short distance beyond the end of the house, suggesting that the attached range was contemporary; it was certainly built by the time the 1811 Liberty Map was surveyed. The majority of the range was demolished to make way for the present north-lit shed, but it appears in the 1862 view (Fig 8) as a two-storeyed structure of ten bays, with an entrance in the sixth bay from the north. There is a roof scar on the south-east wall of the house. A rebuilt fragment of the rear elevation remains attached to the south-east end of the house, forming a triangular space between the two buildings. The remaining length of wall is largely obscured at ground-floor level, but incorporates a large first-floor window with a two-light timber casement. There is a straight joint where the brickwork continuous with that of the house stops. The function of this range is unknown.

Nineteenth-century alterations

A small two-storeyed extension was built onto the north-west end of the house, set back towards the rear, between 1811 and 1862. It was demolished between *c*1950 and 1972, leaving a roof scar, blocked-up joist pockets and traces of limewash on the house wall. An aerial photograph shows that the north-west end of the roof was hipped. The upper floor did not communicate with the rest of the house, suggesting a service or ancillary function. A series of single-storeyed additions to the rear of both the house and the range adjoining to the south-east were built by 1881; some or all of them may have been present by 1862 (they are shielded from view in the 1862 illustration (Fig 8)). The earliest is a gabled addition projecting from the centre of the house.

During the 19th century the south-east bay of the house was adapted for industrial purposes, probably related to the now largely demolished attached range. Doorways linking this bay with the stair area on all three floors were blocked and a new front entrance (not shown on the 1862 view) was inserted alongside the original one. The stack on the south-east wall of the house was removed; in its place there is an area of 19th-century brickwork beneath a substantial timber bressumer and a brick relieving arch. The ends of the beams spanning the former front rooms on the ground and first floors, which were originally lodged in the chimney breast, were supported on iron cantilevers. A wrought-iron tie-rod restraining the front and rear walls at this end is probably contemporary. It passes through the cantilevered beam in the first-floor ceiling,

but beneath two other axial beams. The latter are associated with the renewing of the second floor in this bay as a conventional boarded floor.

At the same time the partitions dividing the original front and rear rooms were removed and a new three-flue stack, narrower and deeper than the original one, was built backing onto the stair bay. The ground-floor fireplace has been blocked. A new boxed-in stair was inserted in the corner to the rear of the new stack. This survives above the first floor, but has been replaced below it by another rising against the south-east end wall. The first-floor room has lost its fire surround, but on the second floor there is an elaborate mid-19th-century cast-iron chimneypiece, with a round-arched fire opening, and a surround incorporating pilasters, consoles, an entablature and mantel shelf. The front second-floor window may have been enlarged at the same time to receive the present three-light timber casement.

A number of alterations to the remainder of the house are roughly contemporary. Both the entrance and the landing window above it have joinery dating from the second half of the 19th century. On the second floor the fireplace in the rear room has been reduced in size for a basket-arched cast-iron surround.

The proto-fireproof building (4), 1797-1801

Two ranges, one running roughly east-west, the other roughly north-south, are positioned on the northern edge of the site. The east-west range (4), which is two-storeyed and partly of proto-fireproof construction, is the earlier of the two, and is itself the product of at least two main phases, commencing in 1797 and complete by 1801 (Drawings 7 & 8). It is probably the subject of a series of building accounts in the Evans & Co. Ledger, which variously refer to 'Buildings in Wood Yard' and 'New Shops'. The other range (5) is single-storeyed and appears to be the 'Shed in wood yard' for which accounts survive for 1799 and 1800. The alignment of this range, and of the eastern gable of the other range, was determined by the mill leat as re-routed between 1798 and 1800 (see pp 12-15). By 1811 a small, roughly square building stood between the north-south range and the range containing the manager's house (3), but it appears to have been swept away during the 19th century. At some time between 1811 and 1846 an open-fronted building of elongated plan was added to the north of the east-west range. This was demolished in the 20th century.

The east-west range (see Figs 26 & 27) is of exceptional importance as one of only two known surviving instances of a type of proto-fireproof construction pioneered by the Strutts in the 1790s, and the only known example in which the technique is applied to part of the building rather than the whole. The purpose of the innovation was to minimise the quantity of timber employed in the construction of upper floors, and to reduce the vulnerability to fire of the remaining timbers. Portions of the upper floor consist of brick jack-arches springing from timber skewbacks attached to the lower edge of transverse timber beams, the whole covered with lath and plaster on the underside so that no wooden surfaces remain exposed. The axial thrust exerted by the vaults is restrained by the use of wrought-iron tie-rods (two in each bay). The surface of the floor above is of brick laid on sand.[154]

Buildings erected on the same principle by the Strutts in Derby, Milford and Belper have all been demolished, though important records of their form exist.[155] The form of construction was extremely short-lived. The earliest example was the Derby cotton mill

of 1793; when in 1803 the Strutts rebuilt North Mill, Belper, following a fire, they adopted the more fully fireproof system, using cast-iron beams, which Charles Bage (a friend of William Strutt) had pioneered at Ditherington Mill, Shrewsbury, in 1797. There is currently no evidence for the technique having been used after 1803. Until 2000 all the documented examples were buildings erected by the Strutts themselves, but the building at Darley Abbey demonstrates that they were prepared to share technological innovations with the Evans family, who were their relatives by marriage.[156] In 2003 a second extant example was identified at the former Bump Mill of Hewitt & Bunting, part of the Walton Works of Robinsons Ltd on Chatsworth Road, Chesterfield.[157] Here the connection with the Strutts, if any, remains to be established.

That the 'Buildings in Wood Yard' correspond to the 'New Shops' can be demonstrated by comparing George Coulson's (or Coulston's) bills for slating, which appear with identical amounts under both headings in January 1798.[158] One of the payments was for 95¼ft (29.03m) of slate ridge. This compares closely with the 29.60m between the outer faces of the gables, the discrepancy probably resulting from the presence of chimney stacks.[159] A first phase of work appears to have begun in July 1797 and to have been completed by May 1798. Towards the end of 1797, a number of orders for cast-iron 'pillars', caps and bases are recorded, 'to be charged to the Cotton Mill'.[160] Some were being ordered as late as January 1800.[161] A payment (in July 1799) for 'putting pillars in cotton mill' indicates the destination of some of these,[162] but it is likely that others were intended for the 'New Shops' which were under construction at the same time and which still have columns of early form.[163] Mark Swinnerton, a Derby stonemason, was paid 10s 1½d for '12 steps to New Sh[op]s' in January 1798, a feature which can perhaps be identified with one of the two existing external stone stairs. The total cost of the 'New Shops' was £635 6s 8d.[164] The 'Shed in Wood yard' followed, most payments occurring between May 1799 and February 1800, with the last payment of wages in June.[165] Then between October 1800 and May 1801 a long series of bills was settled indicating a further phase of construction. Although preparation for the original building had included the driving of piles in the low-lying ground, no new piles were driven for the addition, suggesting that some preparation may already have occurred. Among the items noted are '5 pillars and 10 caps [perhaps caps and bases]', 2,000 paving bricks (for the first floor?) and '10 stone steps'.[166] In all, the cost of the addition was £319 0s 7d.

The original function of the range is not fully clear: the ground floor has a series of cart openings, while the upper floor was well fenestrated in a manner that suggests that it formed a workshop. It may have incorporated the 'Turner's shop', presumably for the manufacture of bobbins, etc, mentioned in a Ledger entry of 1801.[167] At the time of survey the first floor and attic, and the western two bays of the ground floor, were vacant. The next four ground-floor bays to the east were used as a carpenter's shop and the remainder was used for storage. In the eastern bays of the attic there were numerous labels for cotton reels, printed with the boar's head crest (one is reproduced as Fig 1). This may suggest that part of the building formed the 'lithographic and letterpress printing department' which in 1862 'produced all the labels, the ornamental wrappers, the bill heads, and the letter headings used at the mills'.[168]

The original building, 1797-8

The earliest part of the east-west range is the western two-thirds (Drawing 7). This is apparent from the position of straight joints on the front and rear walls, which identify the eastern five bays as an addition. A straight joint which occurs only at first-floor level on

the front wall, appearing to distinguish the two westernmost bays from the next five, does not correspond to a transverse wall and must originate in a modified opening rather than a phase break. Thus defined, the original building corresponds to the western seven bays as represented by the roof trusses and hence by the ceiling divisions of the first floor. Although the roof structure is secondary, it is likely that it reproduces the bay pattern of the original roof. The central three bays of the seven, however, correspond to five bays of proto-fireproof ceiling on the ground floor. These can be broken down further, consisting of three narrow bays to the centre, divided by brick partitions from wider flanking bays. Beyond the fireproof area, the paired bays at each end are of

Fig 26. The western portion of the proto-fireproof range from the south. (BB001900)

conventional construction, and observe the same bay structure on all levels.

The external brickwork is in English garden-wall bond and rises to a stepped and dentilled eaves, through which the original (and some later) first-floor windows rise to the wall-plate. To the front and rear of the wide end bays of the fireproof section there are original full-width double-doored openings with semi-elliptical arches. All but one of these have been infilled.[169] Otherwise the ground-floor openings have segmental arches – the height of a stretcher on the south front, but consisting only of a row of headers on the rear. The windows had either timber sills, as now, or plain brick. Many of the windows on the rear have been blocked, and of those that remain the majority have had one dimension or the other altered. None retains an original window frame, but some have 19th-century frames of timber or iron.

The proto-fireproof bays formed three distinct compartments, as brick partitions divided the two wide outer bays from the three narrower bays in between. No evidence was found for original communication between these three units. On both sides there is a doorway at the south end of the partition, but these shows signs of insertion, and the west example probably relates to the creation of an axial passage across the wider bay once the cart entrances had gone out of use. The three narrow bays were lit from the rear, but the eastern one appears to have had a doorway originally, later converted into

a window with an arch at a higher level. A window on the south front cannot be ruled out, as a large inserted opening may have obliterated evidence in the western bay, but the middle bay has always been blind on this side, and the window in the eastern bay is an insertion. At the south end of the wall dividing the wider western bay from the conventionally built bays beyond there is a blocked doorway with a heavy beaded frame, which may be original and may have been mirrored at the other end of the building.

Fig 27. View from the SW, showing the full extent of the range, and the attached shed at the eastern end.

The conventionally built bays at either end appear to have mirrored each other in general terms. Each had a front entrance close against the large cart openings; these are distinguished from the contemporary windows by their lower heads. That to the east survives in an altered form, but that to the west has been replaced by an entrance slightly further east, and only the western springing of the arch survives. Beyond these doorways there was a pair of windows. To the east these have been replaced by a single large doorway, and only the arched heads remain; to the west the inner window survives (with a raised sill and a modern bowed frame), while the outer one has been converted into a doorway. To the rear each pair of bays has three ground-floor windows. The two outer windows in each case are opposite the front windows and appear to be original, whereas both inner windows are insertions (that to the east has the deeper form of window head).

These similarities are striking, but it is difficult to be certain whether the internal arrangements were the same in both ends. The two western bays have been re-floored with steel beams, while the eastern pair lost their gable wall at an early stage when the building was extended eastwards, and these alterations have eliminated key points of comparison. On the inside of the surviving west gable there are scars resulting from the removal of a substantial stack. This interpretation is confirmed in the roof space, where struck back bricks and traces of parging and sooting indicate a stack rising immediately north of the ridge. The width of the stack where the evidence is clearest (on the first floor) is about 1.73m, and suggests that it served fireplaces on both floors. The eastern two bays provide complementary evidence in the form of the surviving framing of the upper floor, which incorporates a trimmer for a stack of similar width backing onto the lost gable.

The floor frame is notable for one other feature. The transverse beam marking the bay division is of an unusual trussed form. It consists of a cambered beam over which two spandrel pieces are butted together, the whole assembly being bound together by a central iron stirrup and a series of six angled bolts. Each bay is further compartmented by two axial beams of substantial scantling. The division between these bays and the fireproof bays to the west must have been formed originally by a brick partition rising through both floors, as is still the case at the other end. Without this

compartmentalisation the effectiveness of the fireproofing would be very greatly diminished. Apart from a stub at the northern end, there is currently a lightweight modern partition on the ground floor, and the beam over it is supported by a fluted cast-iron column of the same type as is used to support the beam on the line of the removed east gable. At first-floor level there is no division apart from short stub walls – little more than piers – which are secondary. The fact that there is a step up at this level from the boarded floor of the two end bays to the brick-paved floor over the fireproof vaults is a further indication that a wall has probably been removed. A similar step up from the other end may have been eliminated when the floor there was replaced.

Access to the first floor may have been via an external stair on the south front. The present first-floor entrance appears to be original, and is well placed, being roughly central to the building as first built. The stair, on the other hand, respects in its present form a large inserted ground-floor doorway immediately to its west. The stair is of brick with a stone landing (partly supported on a timber cantilever) and repaired stone treads, and incorporates what may be a kennel. The iron balustrade is modern. It is unlikely that the stair respects an earlier opening in the same position since the present opening does not observe the limits of the fireproof bays. The present position of the stair may result from its having been relocated to accommodate the inserted entrance. This explanation might also account for the raised sill of an inserted ground-floor window, which the lower part of the stair comes close to cutting across.[170] The stair position in the second bay from the west can be discounted, as it post-dates a ground-floor doorway in the transverse wall adjoining to the east.

On the first floor each bay of the original building had a single 4ft-wide window facing south. To the rear the evidence is more complex, but appears to indicate a pair of 2ft-wide windows in some (or perhaps all) bays. The area above the fireproof vaults formed a single space, separated from the western pair of end bays by a brick partition. A doorway, now blocked, at the southern end of this partition appears to be an original opening, whereas two other doorways are later insertions. A similar arrangement may have existed at the opposite end. In the west gable there is a small original window, now blocked, just south of the former stack. This may be the window that the 1862 view (Fig 8) shows erroneously in the centre of the gable.

The roof and the associated first-floor ceiling may date from the middle of the 19th century or even later. The roof timbers are machine-sawn softwood, though some of the ceiling timbers are more crudely worked and may be re-used. The remaining cross-wall rises to purlin level, obviating the need for a truss. The roof trusses are generally of king-post form with slender and widely raked struts, which are notched but not pegged. The king-posts have expanded feet and heads, and are tenoned with pegged and wedged fixings at the tie-beam. Where the east gable and the other cross-wall have been removed a reduced form of truss is employed. This simply consists of raked struts rising from the tie-beam to truncated principal rafters. These struts have pegged mortice-and-tenon joints. There is a single set of purlins, supported on cleats, and a plank ridge. Two of the common rafters in the westernmost bay stop short of the ridge to respect the former gable stack, though the timbers of the first-floor ceiling indicate that the stack may already have been dismantled below the roof space by the date of the roof. The roof-space has a lime-ash floor on a bed of reeds, except in the two bays at the west end, where there is a boarded floor. It is lit by a series of roof-lights, as shown on the 1862 view.

While the precise function of the building is unclear, the peculiar characteristics of the building call for some comment. The presence of stacks, and of conventional timber floors, at either end might suggest domestic use, but there is no evidence that the end bays were divided into smaller rooms and there is, on the other hand, some evidence that they were integrated with the fireproof bays on both floors. The variation in structural techniques clearly indicates that the building housed more than one function, and that the functions were of differing vulnerability to fire. The fact that the building was located in the mill's Wood Yard suggests a range of uses, including the carpenters', turners', framesmiths' and pattern-makers' shops needed to keep an early cotton mill functioning.

The eastern extension, 1800-1801

The eastern extension, which abuts the original building with straight joints, was added between October 1800 and May 1801, and similarly makes use of proto-fireproof construction (Drawings 7 & 8). At the same time a number of features are reminiscent of Long Mill as rebuilt in the late 1780s. These features – the roof and first-floor ceiling construction and the attic-level lunette in the east gable – may have been matched in the original building, but if so the evidence is now lost.

Fig 28. The proto-fireproof ground-floor ceiling of the eastern extension, showing brick vaults springing from timber beams supported on cast-iron columns. (AA051582)

The extension occupies an awkward site, constrained by the diverted mill leat, which was completed in the same month that work commenced on the building. This results in a canted east gable, which necessitated a radiating pattern of transverse beams and must have complicated considerably the process of constructing the five fireproof vaults. As in the fireproof portion of the original building, five fireproof bays equate to three bays on the floor above and in the roof. The walls have brickwork of irregular bond, and repeat the plain detailing of the original building, including the eaves treatment. No separate entrance was provided, so that access appears to have been gained from within the original building. As before, the lighting of the fireproof bays from windows on the front was avoided. Each bay had a window in the rear wall, and there were three further ground-floor windows in the east gable. The fireproof ceiling differed in incorporating solid cast-iron columns under the mid-point of the beams (Fig 28). These columns are of the quasi-cruciform, quasi-quatrefoil cross-sectional form used by the Strutts in a number of their buildings, including the rebuilding of North Mill, Belper, in 1803-4.[171] They have pronounced entasis to the shafts, and simple caps. A further difference is that the

beams rest for the most part on round-cornered piers projecting on the internal faces of the front and rear walls. There are, however, no piers at the south end of the first and second beams from the east. The brickwork here appears to be contemporary with the rest of the addition, but the anomaly may be connected with the adjoining 'Shed in wood yard' (5), which was completed slightly earlier in February 1800. Possibly it reflects the same preparatory works hinted at by the absence of new piles (see above), and suggests that both ranges were foreseen from the outset.

The first floor (Fig 29) was similar to that of the original building. An external stair on the front rose to an entrance in the central bay of three.[172] On the front there was just one window apiece in the west and central bays, but two windows in the east bay, and there were two windows per bay in the rear wall. All these windows were of a standard size which, with a width of 85cm, was markedly smaller than those on the front of the first phase. The floor is mostly covered with paving bricks, into which a series of seven timber-edged hatches have been inserted. At the west end, however, there is a strip of floor laid with 9-inch quarry tiles. The ceiling, like that of the fourth floor of Long Mill, is a grid of beams: the axial beams, which are staggered from bay to bay, are morticed and pegged at the transverse beams, and there is an original trimmer, similarly jointed, for a stair rising to the attic in the south-east corner of the eastern bay. The exposed joists are waney, and between them the ceiling is plastered.

Fig 29. The first floor of the east extension from the west, showing the brick-paved floor and grid of ceiling beams. The makeshift ladder stair at the far end occupies an original stair position.

Fig 30. The attic and original roof structure of the east extension, from the east.

The attic (Fig 30) has a lime-ash floor, is lit by a lunette (now reduced) in the east gable and has roof trusses designed to allow relatively free movement in the central nave, as perhaps were those of the original building before it was re-roofed. To either side of the nave the effect of the trusses is to create a series of bays or compartments suitable for storage. The hardwood trusses (Drawing 8) are of queen-post form, and are similar to those in Long Mill, with tapering queen-posts; the collars, however, are differently treated, forming regular segmental arches by contrast with their cranked counterparts in the earlier mill. The principal joints are of pegged mortice-and-tenon form, but the queen-posts are, in addition, stirruped at both the feet and the heads. The raked struts are not pegged. There is a single set of butt purlins; these are of square cross-section in contrast to those of the later roof to the west. On either side of the passage formed by the queen-posts the bays were used for storage. They now contain a number of bobbins, and labels for bobbins.

Shed attached to proto-fireproof building (5), 1799-1800

Attached to the eastern extension just described, and projecting southwards, there is a single-storeyed six-bay range (Fig 31) which is now largely enfolded by later buildings to east and west (Drawing 6). A range is depicted in this position on the 1811 Liberty Map, and for reasons given above it is probably the 'Shed in wood yard' of 1799-1800. There is, however, a gable scar on the south wall of the east extension, indicating a slightly lower roof line. The present building appears to represent a raising of the original structure rather than a comprehensive rebuilding.

Fig 31. The open-fronted shed, as depicted in a photograph dating from c*1930, by which time a north-lit roof linked it with the adjoining building to the west. (BB001860; courtesy of John Elliott)*

The range was originally just four bays long. This is indicated by the existence of an internal gable and an accompanying straight joint on the rear wall, and is confirmed by the 1811 map (Fig 4), which shows the single-storeyed range as less than half as long as the extended east-west range to which it is attached. It was formerly fully open-fronted (and remains so in part) on the west side; here the roof oversails, and the openings are formed by timber lintels carried on square brick piers. Elsewhere the walls are in Flemish stretcher bond (having courses in which headers and stretchers alternate, separated by three courses of stretchers only), with a cogged eaves course on the rear wall. All the openings on the rear wall, which originally backed onto the mill leat, are insertions, which were blocked up during the 20th century. The four-bay interior originally formed a single space, but a brick partition has been inserted (on the evidence of straight joints) between the second and third bays from the north. The roof trusses are of king-post form, with raked struts, and have been reinforced by timbers bolted onto either face. They carry a single set of purlins. The roof probably had a hipped southern end. This is suggested by the fact that the southern bay is longer than the others and although the end wall remains *in situ* it rises only to tie-beam level.

The two added bays date from between 1811 and 1846. They are generally similar, but the roof differs in having through-bolted king-posts without reinforcement. The whole building is now a car-repair garage.

Demolished range to north

A building some nine metres north of the proto-fireproof building is shown on maps from 1846 to 1938 but lies beyond the edge of the 1862 view (Fig 8). It was roughly 19m from east to west by 8m from north to south, and was open-fronted on the south side. It may have functioned as a cart shed or store. To the rear, a narrow addition, possibly of lean-to form, appears on the 1881 Ordnance Survey map (Fig 9).

Building east of Middle Mill (now Darley Mill Pottery) (6)

The 'Liberty Map' (Fig 4) shows a building of relatively complex plan, suggestive of phased development, in a position corresponding to the present Darley Mill Pottery. The evidence presented here is based on observation from the road, without the benefit of internal or close-hand inspection, which was declined by the owners.

Fig 32. The present house attached to Darley Abbey Pottery. (BB001887)

The earliest part of the building (the outline of which is depicted on Drawing 1) is a two-storeyed structure, roughly square on plan, distinguished by a blocked cart opening in its southern elevation (Fig 32). It would appear to be an industrial building, which has been extended and adapted to provide domestic accommodation. The brickwork is in English garden-wall bond, rising to a dentilled eaves course, and incorporates windows placed irregularly, one on each floor, in the west elevation. These have segmental arches of brick headers. To the east of the ground-floor window there is a run of brick closers suggesting a blocked window or doorway. The cart opening has a pronounced segmental arch which has been infilled to create a window; a first-floor window is offset to the east. Given the oddly isolated position of this building it is possible that it was

used (on the upper floor only?) as a picking room, where raw cotton was prepared. As discussed above, the raw cotton was a recognised fire risk that mill-owner's sought to minimise by locating it some distance from their mills.

Additions to both the east and the north are both distinguished by straight joints, and have more regular fenestration indicative of domestic origins.

THE EVOLUTION OF THE COTTON MILLS, 1818-35

In the space of less than twenty years, commencing in 1818 and concluding probably about 1835, the mill complex was greatly enlarged by the addition of two substantial extensions – East and West Mills – and the detached North Mill. All three were built in fireproof construction.

East Mill (7), 1818-

East Mill (Fig 33; Drawings 2, 10 & 11) forms an eastwards extension of Middle Mill, the gable of which it covers, and consists of six bays and five storeys. The Stock Book notes only that it was commenced in 1818 and cost £3,017 16s 7½d.[173] It is appreciably wider (17.43 x 9.82m internally on the ground floor, excluding the privies) than the earlier Long and Middle Mills. Thus while the south wall forms a continuation of the south wall of Middle Mill, the north wall is advanced and indeed overlaps the earlier structure to the extent of about half a bay's length. The overlap accommodated privies (later converted to house a hoist). The walls are of red brick, laid in English garden-wall bond. Rounded gritstone quoins are confined to the ground floor of the north-west corner, where they ease access to the entrance to Middle Mill. The original windows are confined to the north and south walls (with the exception of the small west-facing windows serving the privies) and have flat arches of gauged brick, stone sills and original small-pane sashes (seven panes wide and three over three panes deep).[174] Two windows in the eastern gable – one on the third floor and a lunette on the fourth – are later insertions characterised by the use of larger brown bricks. The present fire-escape doorways are also insertions.

Fig 33. East Mill from the NW. East Mill is wider than Middle Mill (right), which it overlaps to the extent of its privy tower.

East Mill is built in fireproof construction throughout (Fig 34). Segmental brick vaults ('jack-arches') spring from transverse cast-iron beams, which are supported at mid-span

by hollow, circular-section cast-iron columns. The columns have simple moulded bases, caps and necking rings. The beams have parallel-sided bottom flanges but the web and overall sectional form are concealed. The storeys diminish in height significantly on the upper floors, in line with those in Middle Mill. The floors are laid with blue bricks, presumably on a bed of sand.

The cast-iron roof trusses are of a particularly unusual form (Fig 35; Drawings 10 & 11). The principal rafters rise from iron shoes resting on brick corbels, and are linked by a low collar with spandrel braces. Both the collar and the principals are of a simple inverted-T section, but the collar is in two parts, thickened and halved together. The junction is made fast by keyed tie-rods. The same method may be employed to secure the beams, but if so it is concealed within the floor structure on the lower levels. The collars are supported in mid-span by slender columns lacking the necking ring of those on the lower floors. A cruciform-section king-post rises from the centre of the collar. There are two ranks of fish-bellied cast-iron purlins, the web stiffened by short flanges of different lengths, giving a flattened C-section. They rest against lugs cast into the web of the principals, which are reinforced by a stiffener on the soffit at this point. The common rafters, battens and ridge-board are of timber, the rafters located between cleats cast into the upper flange of the purlins. The fourth-floor ceiling also incorporates timber. It is joisted conventionally, the joist ends resting on the flange of the collar and being underdrawn in lath and plaster, giving some slight protection against fire.

Fig 34 (top). Fireproof brick vaults on the second floor of East Mill, showing cut-outs for a central axial overhead line-shaft.

Fig 35 (bottom). The easternmost cast-iron roof truss, showing fish-bellied purlins and timber common rafters. One of the flues is visible in the gable to the right of the king-post.

East Mill utilised the same power source as Middle Mill, and circulation depended on the same stair (Fig 37). The latter was positioned in the north-east corner of Middle Mill, where it served both mills equally well. A large segmental-arched doorway (now reduced in size) was inserted in the gable wall of Middle Mill to link the two mills at this point. This fact, coupled with the fireproof construction of the stair, suggests that the

latter dates from the addition of East Mill and not before. It is also conveniently placed for the privies, which occupy the overlapping portion of Middle Mill. The gritstone treads rise around a substantial brick pier standing on a gritstone base. There are half-landings against the north wall on each storey and two quarter-landings composed of large gritstone flags between storeys. The half-landings have groin-vaulted brick ceilings and doorways opening onto both mills. Those leading to East Mill are broken through the original gable wall of Middle Mill. They have iron doors and door surrounds, the latter incorporating fish-bellied lintels, as also found (inserted) in Long Mill.

Fig 36 (above). The single-storey structure adjoining the north side of East Mill, and the remaining gate pier for a short-lived eastern perimeter to the mill site.

Fig 37 (right). The East Mill stair from the west. (BB001922)

Early internal features are not numerous in East Mill, though some may be concealed by the present use of the building for a mixture of manufacturing and retailing. The privies were entered from East Mill. On the first floor the original narrow doorway, now blocked, has a segmental arch of brick headers. In the roof space there are the remains of what may have been a lantern or louvre. It is formed from two transverse beams linked together by tie-rods, and is plastered internally.[175]

There is some evidence for a central axial line-shaft on the first floor, where two of the columns have scrape marks on their south faces. This may perhaps indicate the original transmission arrangement on all floors. Another line-shaft, perhaps later, is indicated by bolt-holes for removed hangers and a scrape-mark against one beam. On the second floor former line-shafting hangers on the north side of the columns are indicated by paired bolt-holes in the beam flanges and slots cut through the base of the web, together with some cut-outs in the vaults (Fig 34). A series of paired bolt-holes and scrapes form another alignment roughly 60cm south of the columns. On the third floor there are two sets of bolt-holes, slots and scrapes on the south side of the columns

In the angle formed by the north wall and the gate pier at the eastern perimeter of the site there is a single-storeyed structure, currently with a felted flat roof (Fig 36). It has an irregular plan, largely determined by the road passing along its north-east side, and is clearly recognisable on both the 1846 map and the 1862 bird's-eye view (Figs 7 & 8). It has brick walls incorporating a rounded corner to the north, and a large entrance, probably an enlargement of an original feature but now blocked, taking up most of the

west wall.[176] Two windows have been inserted in the north wall; they have bull-nosed brick sills and concrete lintels. The absence of evidence for original windows raises a question as to the original function of this structure. It is possible that it was built as a stove to heat the mill. Some support for this interpretation can be found in the nearby east gable of the mill. This carries up three flues, two to the north and one to the south of centre, which discharge into the roof-space (see cross-section). Since this arrangement precludes smoke flues it is likely that they were for hot air.

The east addition

A tall slate-roofed lean-to was added against the east gable of the mill between 1846 and 1881. The east front has a dentilled eaves course. There is a blocked doorway at the eastern end of the south wall. The windows – one in each of the three walls – have segmental arches of brick headers and cast-iron frames. The window in the east wall is offset to the south, and it is likely that a large doorway, which has been inserted at the northern end of the same wall, replaces a further window. Opposite this doorway a similar opening has been pierced through the east wall of East Mill. The function of the addition is unknown. In 1944 it was labelled 'Reception' (presumably of goods rather than visitors), but the position of the original doorway, facing a yard to the south, points to other origins.

West Mill (8), 1821-

West Mill (Figs 38-41; Drawings 2 & 9) projects west-wards from Long Mill, bridging a former leat, then returns southwards, giving an L-shaped plan overall. Construction began in 1821 and a cost of £4,676 5s 9½d is recorded.[177] West Mill replaced an earlier wheel-house, similar in footprint to the present east-west arm, dating from before 1811. It is possible that some masonry or other elements survive from this earlier building, including perhaps the two wheel-pits, which were not seen. However, some of the anomalies in the present structure are more convincingly explained as the outcome of two distinct campaigns commencing in 1821. The interval between the two may have been relatively brief, though it is perhaps significant that Sanderson's (admittedly small-scale) map, surveyed 1830-34, appears to show the east-west arm only. On the other hand the cost given I the Stock Book, which is 50% higher than that of East Mill, must refer to both arms, and on internal

Fig 38. West Mill from the south-east in 1975, showing the L-shaped plan. The leat passed beneath the right-hand range. (BB82/6264)

evidence it does not appear that the Stock Book was updated after the mid-1820s. It is in any case likely that the final form was envisaged from the outset.

The mill consists of four storeys, with floor levels that match those of Long Mill except on the ground floor, which has a modern concrete surface (lower than the ground floor of Long Mill) overlying the original wheel-pits. The walls are of brick, laid in English garden-wall bond and rising to stone-coped parapets. The exception is the ground floor of the east-west arm, which is of coursed gritstone.

Fig 39 (left). The north elevation of West Mill in 1975. The rainwater fall pipe roughly marks the junction between the two phases of construction. (BB82/6265)

Fig 40 (above). The stone ground floor of the four eastern bays, showing (at ground level) the twin arches to the former wheel pits.

The first phase corresponds to the eastern four bays (Fig 39). The second extended the north elevation westward by three windows, then returned southwards to give a seven-bay west elevation, of which the northern three bays correspond to the width of the east-west arm. As already noted, the ground floor of the east-west arm, which incorporates two low segmental arches spanning the lead (Fig 40), is of stone on both elevations, but the masonry differs on the westernmost three bays of the north elevation. This distinction may be the result of the two-phase evolution, but given the marked contrast between the two styles of masonry – finely tooled ashlar to the west, and rough, diagonally tooled rubble (closer in character to the masonry of Long Mill and its two-storeyed additions) elsewhere – it is possible that the latter style of masonry survives from the pre-1811 building. Stone, which was preferred to brick in proximity to watercourses, was not employed elsewhere on the north-south arm, suggesting that its presence at the western end of the north elevation was primarily to achieve a harmonious appearance. There are two further indications that the 1821 phase was confined to the east-west arm. On the south wall a stub return corresponds to a partition in the roof-space separating roofs of slightly different characteristics (see below). The iron beams of the fireproof vaults are supported along the same line by cast-iron columns, so it is possible for the vaults to have ended here initially.

The fireproof vaults, which are overlaid by blue clay tiles, have the same span as those in East Mill and the beams are supported by hollow circular-section cast-iron columns of

the same pattern (Fig 42).[178] The cross-section of one beam is exposed in the stair compartment. It is of inverted-T form, with a slight taper to both the web and the flanges. The trend of the fireproof vaults throughout West Mill is from east to west, making them transverse (the normal arrangement) in the north-south arm, but axial in the east-west arm. The likely reason for this is that three axial vaults are better adapted to bridging the two wheel-pits than four transverse vaults, given the positions in which the iron beams would require intermediate support by a row of cast-iron columns. The transverse beams are supported at mid-span, whereas the axial beams are supported every two bays – sufficient to bridge the wheel-pits. The southern axial beam is supported at one end by a cast-iron corbel set into the wall of Long Mill.

The east-west arm of 1821 may not have terminated conventionally in a brick gable wall. Apart from the stub return, which may have functioned as a buttress, no evidence was found for the removal of an end wall. Given the short interval that is likely to have elapsed between the two phases it is likely that the second phase was anticipated from the outset, and that a temporary gable wall, perhaps of timber, was erected.

The entrance to West Mill was at the west end of the north elevation, where the stair was situated. It has a semicircular arch; the fanlight is probably original but the door has been renewed. Adjoining it to the east there was a wide cart opening with a semi-elliptical arch, now infilled.

Fig 41. The west elevation of West Mill, showing the blind windows (and parts of windows) corresponding to the stair compartment at the north end. The single-storey building in the foreground is the former mill dining room, now a restaurant. (BB001880)

The principal windows of West Mill are characterised externally by gritstone lintels and sills and internally by brick arches. The external lintels, and the brick jambs both inside and out, have a quarter-round moulding. The windows are mostly the same size as those of East Mill and are fitted with sashes which are similarly seven small panes wide and three-over-three panes high (as on East Mill). On the ground floor two further rows of fixed panes are placed over the sashes. Many of the sashes are original, but a number have been renewed. The windows to the northernmost bay of the west elevation are blind, with painted fenestration, and the same is true of the northern two

panes of the next windows to the south.[179] This treatment corresponds to the position of the stair compartment, which is lit from the north only. On the south elevation of the east-west arm the windows are smaller, though they have similar quarter-round moulded lintels and jambs, and the windows of the westernmost bay are displaced eastwards relative to the corresponding windows of the north elevation. This displacement would seem to respect the return wall of the north-south arm, and is therefore unlikely to result from the retention of earlier fabric.

Fig 42. Interior of the east-west arm of West Mill from the south-west, with the stair compartment showing to the left. The columns, the beams they support and the brick vaults are original features, but the transverse tensioning beneath the vaults is later. (BB001919)

The concern for fireproofing extended to a range of internal features. West Mill covered four-and-a-half window bays of the non-fireproof Long Mill. The northernmost tier of windows was adapted to provide doorways on all floors, but the doorways were designed to act as fire barriers. The openings here have fish-bellied cast-iron lintels which are cast with dimples to receive large rivets on the faces of the doors. Two doors are provided in each opening: a single skin to Long Mill and a double skin to West Mill. The stair compartment in the north-west angle of the building was similarly a potential fire risk. It is partitioned off in brick and contains stone steps rising around a brick pier. In addition to the external doorway, internal doorways to the stair are placed close to or against the north wall on each floor; they have fish-bellied iron lintels (without dimples) and self-closing iron doors operated by a weight rising and falling in a box and acting via a pulley. On the ground floor the internal doorway to the stair has been blocked; another alongside gives access to the understairs area.

Privies occupied a compartment in the south-east corner of the north-south arm, where on each floor they are signalled externally by a small window with a plain stone lintel. This variation in the fenestration demonstrates that the privies are original, even though the compartment walls meet the external walls at straight joints. The original doorways faced west and had stone lintels. The north-facing doorways are later insertions, dating from the addition of a small, secondary, lobby on each floor except the ground floor, enclosed by timber partitions. These lobbies were lit by small inserted windows which have timber lintels. On the south wall of the privies there is a blocked vertical slot which may have accommodated pipes.

Heating was provided by a stove projecting centrally on the south gable. This is identified on one of the 1944 plans, where it is labelled ‘hot air furnace (disused)’. Elements of the structure, but not the fittings of the stove, survive. Hot air was carried,

probably to each floor, through flues in a stack projecting on the gable wall. On the second floor an elaborate register plate of radial 'hit-and-miss' type survives to indicate how the level of heating was controlled.

With the exception of the stair compartment and privies each floor could provide, at the conclusion of work, a single L-plan room, though it is likely that on the ground floor the wheelhouse was partitioned off from the remainder. The generous size of the windows and the proximity to a water-power source suggest that manufacturing processes would have predominated, but there is little surviving evidence for power transmission.

Fig 43. The roof of the east-west arm. (BB001914)

Fig 44. The roof of the north-south arm. (BB001916)

Access to the roof-space was originally via a narrow link from the fourth floor of Long Mill. This has walls which are half a brick thick and incorporate a small window to north and south. The south window, a cast-iron frame containing six panes, is original. At the Long Mill end there is a harr-hung iron door, while at the opposite end there is a ledged door of tongued-and-grooved boards. The pitched roof of the link is underdrawn.

The roof of West Mill is hipped short of the junction with Long Mill, in order to cause as little obstruction as possible to the fourth-floor windows of the latter, hence the need for the link described above. The roof is also hipped around the north-western corner, but at the southern end there is a gable incorporating the stove-vent flue. The copings to the ridges, hips, parapets and gable are of sandstone. The roof-space is divided where the east-west and north-south arms meet by a light studwork partition, which is plated on its western face. The plates were painted white and have traces of later limewash, but neither finish occurs on the timbers, except at the edges of the plating. On the opposite face the timbers have been limewashed but have never been plated.

On either side of this partition the roofs have a number of features in common, but also incorporate significant differences. All the roof elements are cast iron and of inverted-T cross-section unless stated otherwise. The trusses of the east-west range rest on stone pads and have cranked tie-beams composed of two members bolted at mid-span (Fig 43 & Drawing 9). Two pairs of cruciform-section raked struts rise from the tie-beam to the principal rafters, which meet at vertical bolting faces and support a slender cast-iron ridge. The tie-beams are suspended at mid-span by an axial pair of wrought-iron square-section king-rods. The upper ends of the rods are formed into eyes, which are

held in place by lugs projecting from the bolting faces. At the eastern end two half-trusses form the hips, and the common rafters are of slightly lighter scantling (the flange approximately 50 x 15mm, as opposed to 65 x 17mm). The purlin differs in the hipped end in being supported only by the bolts attaching it to the principals; elsewhere additional support is provided by a seating cast into the face of the principal. Wrought-iron battens for the slates rest in raised (or cleated) notches cast into the backs of the rafters. The undersides of the slates are torched with lime mortar. The only timber components are the joists of the third-floor ceiling, which form a grid. The ends of the axial joists rest on the tie-beam flange, giving the ceiling the same cranked cross-section. The joists are protected against fire by metal plates nailed over and under them; the same treatment extends into the narrow link to the fourth floor of Long Mill.

The roof over the north-south arm (Fig 44) has a truss set diagonally between the internal and external corners formed by the two ranges, and a further four bays to the south. The differences, when compared with the roof of the east-west arm, principally concern the form of the purlins and the substitution of timber for a number of features. The ridge, common rafters and battens are of timber. There are two sets of purlins. Where the east-west arm has cast-iron common rafters and purlins of inverted-T section with a parallel-sided flange, the north-south arm has timber common rafters and two pairs of T-section purlins with a fish-bellied web. The diagonally-set truss is associated with half tie-beams extending north and west from its mid-point. These are strutted in the normal way, but the west tie has had the longer, inner strut removed to ease access to an inserted chute.[180]

The roof-space is lit by two small windows placed on either side of the south gable stack, and by a series of roof-lights. The windows have plain stone lintels externally, but iron lintels internally. The nature of the floor means that it cannot have been used for much more than storage, but the space was fully accessible from Long Mill. The stair also rises to the roof-space, but on the landing below mortices for a removed balustrade suggest that the stair originally stopped at the third floor. A small room, formerly with a shelved interior, was created in the south-west corner of the roof-space with plastered studwork partitions in or before 1890.[181]

Later extensions

A narrow two-storeyed lean-to covering the three northern bays of the west elevation was probably added between 1811 and 1846. It fills the space between West Mill and the Dining Room. The original north-facing window has a wedge-shaped gritstone lintel comparable to those found on North Mill. Its depiction on the 1862 view (Fig 8) is cramped and unsatisfactory, omitting the window and only hinting at a ground-level entrance. By 1881 (on map evidence), and possibly from the outset, it was open at both ends on the ground floor, suggesting that it may have been used as a loading bay, the use indicated in 1944. A first-floor doorway communicated with West Mill.

Between 1846 and 1862 a small single-storeyed addition, square on plan, was added against the fifth bay from the east on the north elevation. Built of gritstone ashlar, with a flat (now felted) roof, it partially blocks the wide arched opening in the north elevation, which was infilled with stone at the same time. The masonry infilling incorporates a smaller doorway. According to the 1944 plans the addition did not originally communicate with West Mill, which it overlooked via a borrowed light. The entrance was in the west wall, where it was well placed to control access to both the newly created entrance alongside, and the original entrance at the foot of the stair. This suggests that

the addition may originally have functioned as a time-office (in 1944 it was the Engineer's Office).

Clasping the south-east corner of the north-south arm, and occupying the re-entrant formed by the former stove, there is a tall single-storeyed range with a three-bay east front and a mono-pitch roof. Map evidence indicates that it was added after 1846 and before 1881. Its original purpose is unclear, but in 1944 it formed part of the Mechanics' Shop, which also occupied the greater part of the north-south arm.

North Mill (9), *c*1835

Fig 45. North Mill in 1975, viewed from the south-east (BB82/6272).

North Mill (Fig 45; Drawings 12 & 13) lies to the north-east of Long Mill on land made available for building when the original leat, realigned between 1798 and 1800, was again diverted. The new watercourse approached from the east and passed close to the south elevation before turning sharply southwards a little short of its western end. The mill was formerly attached at its south-west corner to a contemporary return range, now demolished, further details of which are given below. The name North Mill has been adopted for convenience. It has been used in the past, though whether as a proper name or merely as a descriptive label is unclear.[182] Some previous accounts (including the recently superseded Statutory List) refer to the building as the Dye House. The 1862 article about the Boar's Head Mills indicates the presence of a dye house by this date,[183] and there is some evidence at the east end of the building to suggest that dyeing may have been undertaken here. It is unlikely, however, that North Mill was designed primarily for this use. Purpose-built dye-houses were generally single-storeyed, because of the weight of water handled, and usually incorporated a high roof to allow adequate ventilation.

The date of North Mill is not known precisely. The absence of any mention in the Stock Book, where the costs of East Mill, West Mill and some lesser additions are detailed, implies that it is later – probably after 1823, the latest dated entry.[184] George Sanderson's map, surveyed 1830-34, which is an imperfect source for smaller buildings owing to its small scale, clearly shows the leat *before* it was re-diverted to make way for North Mill.[185] Like East and West Mill, North Mill is of fireproof construction, and it has a cast-iron roof which represents a simplified, and in some respects developed, form of the West Mill roof, arguing for a date not very long after that of West Mill. However, it is significant that North Mill, which has just three storeys, has thicker walls, and more closely spaced fireproof vaults, than either East Mill or West Mill, suggesting that it was intended to carry substantially heavier floor loads than the other two buildings. This in turn would seem to suggest that it was intended for a different form of machinery or other plant.

The building consists of thirteen bays from east to west, and has walls faced in brick similar in appearance to that of West Mill, laid in English garden-wall bond. Beneath the ground-floor window sills the walls are of coursed gritstone, mostly concealed by render. The walls rise to stone-coped parapets. The openings have wedge-shaped gritstone lintels with pronounced vertical tooling, and are generally constructed with the closers set at the angles of the jambs, rather than inset in the normal fashion. Internally the windows have rounded jambs and sills. The original windows are uniformly small-pane hornless sashes, six panes wide and four-over-four panes deep. The two upper windows on the south side of the second bay from the east have been converted into fire-escape doorways.

Fig 46. The rear elevation of North Mill, from the north-west. (BB001896)

Three full-height projections from the main range appear to be original elements of the design. On the front a privy tower projects from the second bay from the west. This has a window of the standard type facing south and lighting a passage on each floor, and small windows with timber lintels, serving privies placed on either side of the passage, facing east and west. Its absence from the 1846 plan (Fig 7) may perhaps be explained by its small size. To the rear there are short, wide projections at either end (Fig 46). These are vaulted and roofed parallel to the main range but the resulting asymmetrical M-profile roof is disguised by flat-topped gables extending the whole length of the end elevations and, on the east elevation only, by what was originally a uniform

array of six window bays, two of which correspond to the projection. The fenestration of the west elevation is sparser. The east projection is continued by a later and lower one-and-a-half-storeyed block, which is gabled to the north.

Both projections appear on the 1846 map (Fig 7). Nevertheless it is possible that the west projection is an addition. Although the brickwork of the west elevation is continuous, the east return of the projection abuts the main range at a straight joint. The projection forms a tall covered loading bay, with a fireproof ceiling at second-floor level, above which there is a room accessible from the main range. The 1862 view depicts it with a conventionally fenestrated north elevation, in place of the present tall, segmental-arched opening, but there is no sign that the latter results from a later alteration. The presence of windows on two floors in the wall dividing the loading bay from the main range also suggests that the projection was built with a large entrance, since in its absence the windows would be largely ineffective as borrowed lights.

Fig 47. The more easterly of the two ranges projecting on the north elevation of North Mill, from the north-east (BB001897).

The fireproof structure of the main range (Fig 48) consists of thirteen closely set brick vaults carried on cast-iron beams, supported at mid-span by circular-section cast-iron columns of the same form as occurs in West Mill. The hog-backed profile of the beams can be seen above an exposed section of the ground-floor ceiling in the stair compartment on the north side. The beams have a broad bottom flange and a narrow top flange; the latter represents a departure from the form adopted in West Mill.

Fig 48. The ground-floor interior of North Mill, from the west. (BB001926)

The main roof, also of thirteen bays, has trusses composed of inverted-T section cast-iron elements, including principal rafters and a single set of struts, and a square-section wrought-iron king-rod (Fig 49 & Drawing 13). The single set of fish-bellied purlins, the ridge and the common rafters are also of inverted-T section cast iron. The purlins incorporate cast-in seatings for the rafters, and the backs of the rafters are cast with

small cleats for wrought-iron battens, against which the slates are torched.[186] The truss form has a strong family resemblance to that of West Mill, but there are notable differences of detail. All the cast elements are of inverted-T section, whereas on West Mill the struts were cruciform; the tie-beam sections are jointed differently and are set level instead of being cranked; the king-rod is hung differently at the apex; there are differences in the way in which the struts are attached to the tie-beam and principals and the second set of struts is dispensed with. Within the roof space the floor is of timber which, as in West Mill, is plated top and bottom. The parapet gutters to north and south are lined with bolted lengths of cast-iron, and a cast-iron gutter in the fourth bay from the east carries rainwater through the roof-space from north to south.

Fig 49. The main roof of North Mill, viewed from the west. (BB001931).

One original entrance to the main range, located in the east elevation where it is now enclosed by the added engine-house, is distinguished by its lower lintel and the presence of an internal rebate and hinge pintles. Since this faces away from the approach to the site it is unlikely to have been the principal entrance. The present main entrance, which occupies the fifth bay from the west on the south elevation, and another doorway in the opposite end of the bay, are not distinguished in the same way, and may be adaptations of window openings. That to the south may have been relatively inaccessible initially, owing to the proximity of both the diverted leat and other buildings. The principal entrance may indeed have been on the north side, but might be expected closer to one of the two stairs.

The bulk of the main range formed a single open space on each floor, with internal dimensions of 32.16m x 9.79m (105ft 6in x 32ft) on the ground floor. The westernmost bay, however, was partitioned off to provide (from south to north) a stair rising to attic

level, a compartment possibly housing an upright shaft, and a lobby communicating with the loading bay. In addition a second stair compartment, rising only to the second floor, was placed against the north wall in the second and third bays from the east. That this is an original feature is indicated by the second iron beam from the east, which is a shorter than normal casting designed to bear on the brick wall of the compartment. Few early internal features have survived. The stair at the west end has stone treads rising, via a series of half-landings, around a brick pier with rounded ends. What are probably original doors open off the stair at second-floor and attic level; these are of nine and six plain sunk panels respectively. Evidence for original power transmission is sparse, which may indicate that later arrangements, including a central line shaft against the south side of the columns, perpetuated elements of the original system.

The north projection at the west end of the building has a double-height ground floor, with a tall full-width entrance to the north, an original wide doorway leading to the westernmost bay on the south, and a window (now blocked) to the west. The second floor is now largely featureless internally. It was lit by two north-facing windows, one of which has been converted into a taking-in doorway. The iron roof consists of two bays, though the principal rafters of the single truss are the same as the common rafters (fish-bellied and of inverted-T section). The slates are hung on iron battens.

Fig 50. The westernmost bay of the ground floor, from the north. (BB001928)

The projection at the east end of North Mill has vaulted fireproof bays at either end, but may never have had them in between, since there is no evidence for removed vaults or beams. The unvaulted area was perhaps open through two storeys originally. The west end of the projection was open-fronted on the ground floor (though not shown as such on the 1862 view (Fig 8)), with two wide openings (now blocked) separated by a brick pier with rounded corners. This arrangement allowed for a borrowed light in the north wall of North Mill, four bays from the east. The vaulted bay at the opposite end, which is wider than its western pair, was lit by two windows, now blocked. Projecting on the external face of the north wall, with which it is bonded, is a substantial brick stack, probably associated with a stove or furnace. Now capped, it would appear to have been substantially reduced in height, judging by the 1862 view. In its north face (now inside the north extension) there is a blocked opening at chest height, which has a gritstone lintel and sill. In the east face there is what appears to be an access hatch. On the first floor a pair of openings in the south face, divided by a rounded pier, reveal the flue to be un-sooted.

On the first floor the ceiling consists of four bays of fireproof vaulting. The entrance from the main range is not original, but may have obliterated evidence for an earlier opening. In the stack there are paired openings, three brick courses high, divided by a rounded pier. Both the first and the second-floor rooms have two windows in each of the east and west walls. The roof is underdrawn without any provision for access, but it is likely that it resembles that in the projection at the opposite end of the building.

The north extension

The one-and-a-half-storeyed north extension represents a mid-19th-century addition, probably dating from the period 1846-62, and abuts the earlier range at straight joints. To the north it presents a broad low gable, the brickwork set on a low gritstone base. The only opening in the gable wall which appears to be original is a small iron-framed window on the upper floor. This incorporates a central opening section. The slate roof covering has been replaced on the west pitch with felt. As with the adjoining range, the west side is open-fronted on the ground floor, consisting of a timber lintel supported by cruciform cast-iron columns. Behind the lintel there is a low space (Fig 51) beneath a floor composed of closely spaced fish-bellied cast-iron beams, laid north-south and supporting a timber-joisted floor of reeds (presumably with a screed of lime-ash above), which are plastered on the underside. The purpose of this space is unclear; a doorway and two small windows in the north wall are all later insertions. A contemporary gritstone stair compartment, the long wall of which is overlain by an iron wall-plate with cast-in seatings for the beams, occupies the south side of this low space. The structure is cut into the pre-existing wall to the south, through which a doorway was inserted, giving access to the stair from the western fireproof bay of the adjoining range.

Fig 51. The space beneath the raised ground floor of the north extension. (BB001927)

A second room, east of the stack, was entered via a doorway inserted in the pre-existing wall of the adjoining range. A separate external entrance in the north gable is a later insertion. This room has a taller ceiling than that just described, consisting of three fish-bellied beams spanning east-west. It is also better lit, having two windows (now blocked) in the east wall.

The attic room is open to the boarded underside of the roof and has a galleried appearance, owing to the different ceiling heights below. It consists of a single bay, roofed by a single set of cast-iron fish-bellied purlins and cast-iron rafters, all of inverted-T section. In addition to the small window already mentioned and a roof-light, two north-facing sash windows with concrete lintels and sills have been inserted, at heights reflecting the varying floor level. An opening has been breached in the west face of the stack.

An association with dyeing may be suggested by the presence, by the early 20th century and possibly somewhat earlier, of a large iron water tank. This was supported above the east roof slope of the extension on a framework of iron or steel stanchions and beams, of which the only remains are the sawn-off ends of two I-section beams visible in the north wall of the original projection. It is possible that the tank was associated with the provision of steam power at this end of North Mill at some date prior to 1881 (see below).

Former four-storey (?) building attached to SW corner

At the south-west corner of North Mill a full-height stub of brick wall projects southwards, continuing the alignment of the west gable wall. The ragged end of the stub has been made good in cement. This is all that remains of an L-plan building shown in the 1862 view (Fig 8), the stub representing the northern tip of the east wall of one range. An entrance is shown in the west gable wall of the cross-range. The building is depicted as consisting of four storeys, though it matched North Mill in height, and incorporated roof-lights. It appears to have had no communication with North Mill and may have served as a warehouse. The building was demolished between 1881 and 1899 to make way for the Polishing Shed (25).

The added engine and boiler-house

Fig 52. The interior of the engine house (left) and boiler house (right). (BB001925)

In contrast with some other 19th-century textile-producing regions – notably Lancashire – Derbyshire maintained a heavy dependence on water power almost everywhere except in Derby itself, where industrial expansion rapidly out-stripped the available water-power sites. At the Boar's Head Mills the earliest use of steam power for which evidence has survived was at North Mill. Here an engine-house and boiler-house were added between 1846 and 1881. They are absent from the 1846 map of Darley (Fig 7), and obscured on the 1862 bird's-eye view (Fig 8), but the first edition of the Ordnance Survey 1:2,500 map, surveyed in 1881 (Fig 9), shows both buildings.[187] It is possible that the engine was used to pump water into the elevated water tank which was formerly attached to the rear of the north extension, but latterly the engine-house contained a 1917 100hp twin gas engine which was connected by line-shafting to an upright shaft at the west end of North Mill.[188]

The engine-house and boiler-house were added at the east end of North Mill, the junction being marked by straight joints. Their twin gables (see Fig 45) projected the same distance forwards (south) of North Mill, but the four-bay boiler-house projected further to the rear than the three-bay engine-house. The brickwork is in English garden-wall bond; the original roof covering has been replaced with felt, resulting in the removal of at least one louvre (visible in aerial photographs) from the boiler-house. The front gables each had two windows apiece, with wedge-shaped stone lintels; those to the engine-house have been restored, while those to the boiler-house have been replaced by a large mid-20th-century doorway, leaving just the lintels *in situ*. To the rear the engine-house had a single tall window, while the boiler-house had a pair of semicircular-arched windows.

The engine-house (Fig 52) partially obstructed the entrance in the east gable of North Mill, which may have been blocked at this stage. The addition also probably blocked two

windows, the positions of which have been obliterated by a large inserted doorway. A large stone in the remaining portion of this wall may have functioned as a bearing block. The engine-house has timber king-post trusses with raked struts; the timbers, including the single set of purlins, are chamfered and stopped, and the main joints are secured by iron bolts. The boiler-house has similar trusses, but without the stop-chamfering. Two openings – a doorway to the engine-house and an east window in the north bay – are insertions which have subsequently been blocked. There was probably a communicating doorway towards the front of the building, but the wall dividing the engine and boiler-houses has been removed from the two southern bays.

A feature which might be interpreted as a chimney is depicted on the 1881 map (Fig 9) in the re-entrant formed by the rear of the engine and boiler-houses, but it is absent from later editions of the map. A more substantial tapering octagonal-section chimney, prominent in the 1862 view (Fig 8), and shown on all subsequent maps up to 1938, is a likelier candidate. It is further distant from the boiler-house, being enfolded by the long range extending southwards from the stables (18), but since it appears functionally unrelated to this range it is possible that it served North Mill. This range was badly damaged in an explosion in 1938 and was later demolished. George Watkins noted that in 1969 the engine-house contained a 1917 100hp twin gas engine.[189]

Later features

The position of the upright shaft is indicated by a complex arrangement of cast-iron columns and beams, associated with a large bearing in the west wall and a series of brackets for bearings on the intermediate landings of the stair (Fig 53). Since there is no evidence for either water or steam power at this end of the building, it would appear that motive power was supplied from the main mill complex, probably in the form of a culverted line-shaft. The position of the upright shaft is indicated by a large casting projecting from the external face of the west gable. Internally, on the ground floor, this is associated with a framework of D-section columns, paired and linked at the capitals, and supporting axial iron beams, at least some of which are of broadly the same sectional form as the main floor beams. A bearing box in the west gable is placed immediately south of the centre-line in the building, and appears to relate to another on the opposite gable, indicating line-shafting close against the central rank of columns.

Fig 53. One of the bearing boxes indicating an upright shaft position in the stair well at the western end of North Mill. (BB001930)

Early nineteenth-century alterations to Long Mill

By the 1820s the considerable investment in mill extensions, which from 1818 onwards were of fireproof construction, must have given rise to concerns that the heart of the mill complex – Long Mill – remained vulnerable to fire. It is probably to the period of West Mill's construction, or to the years immediately ensuing, that a series of modifications to Long Mill can most plausibly be dated. They included the sheathing of nearly all exposed timber with sheet metal (discussed above, pp 32-3) and the replacement of the original stair with one built almost entirely of brick and stone, together with alterations to

the entrance and office arrangements at the north end of the ground floor. They may have included the use of heavy timber planks, jointed with iron tongues, in the vicinity of the new transmission at the junction with West Mill. Certain changes to the ground-floor fenestration can perhaps also be assigned to the same period.

The replacement stair rises in a brick compartment placed in the north-west corner of the mill (Fig 54). The windows within this compartment, unlike those elsewhere in Long Mill, are not plated, indicating that it is either contemporary with, or earlier than, the plating. The stair climbs anti-clockwise as far as the fourth floor around a solid brick pier in a series of straight flights returning at half-landings and at larger storey-level landings. The treads are of gritstone (some with a later covering of concrete) and the landings are formed by large gritstone flags (two flags which cracked at a relatively early date are supported by heavy cast-iron beams). The large span of the storey-level landings necessitates the use of a single beam on each floor. These timbers, which are not plated, have joist seatings on one face only and are probably re-used trimmers from the earlier timber stair. However, since the seatings face in different directions (north on the ground and first floors, south on the second and third floors) some or all of them are likely to be *ex situ*. The storey-level landings are lit by the west-facing windows in the second bay from the north, the windows of the northernmost bay being blocked. The half-landings are lit at floor level by the westernmost tier of north-facing windows. The wall forming the east side of the stair compartment is only roughly bonded into the splays of the north-facing windows, which like their counterparts elsewhere in the mill are continuous throughout the full height of the wall.

Fig 54. The stair in the north-west corner of Long Mill. An exposed timber beam is visible top left, and timbers used to form the windows were left similarly un-plated, but the stair is considerably less vulnerable to fire than the timber stairs commonly found in early cotton mills. (BB001904)

On each floor a door opens southwards from the landing into the main mill room and a second door opens eastwards into the small room occupying the remainder of the two northernmost bays. On the second floor the door to the south retains its original form, consisting of four cyma reversa sunk-moulded panels and hung on strap hinges within a cyma reversa moulded architrave. The east-facing doorways have consistently been altered by moving them slightly further south than their original positions.

The wall forming the east side of the stair compartment divides it on the ground floor from the mill office, occupying two-thirds of the mill's width in the two northernmost bays, and is pierced at its southern end by a wide doorway (subsequently narrowed) with a heavy cast-iron lintel. The office, or counting house, is essentially a creation of the early 19th century, though it may replace a similar component in the original design of the mill. A new entrance was created in the centre of the north wall, probably replacing a window and opening directly into the counting house through which it is likely that mill hands were obliged to pass on their way through the wide opening to the stair compartment and so into the appropriate mill room (the doorway now linking the counting house directly with the ground-floor mill room is a later insertion). The entrance has a massive square-cut lintel and quoins, all with neat vertical tooling between horizontally tooled margins, and the top of the lintel rises into the original lintel band, with a more slender band set directly above it (Fig 55). The windows to either side, one lighting a cupboard under the stairs, the other lighting the counting house, date from the 1780s but the counting house window was widened towards the east at this time, requiring an additional length of sill to be inserted. The office was heated by an inserted fireplace on the east wall, linked by a flying flue to a chimney rising in the north-east corner of the mill. It is spanned north-south by a beaded timber beam. A moulded plaster cornice returns along both sides of the beam and into the window splays as widened; it respects the chimney breast and flue and also defines the position of a large cupboard or other full-height fixture formerly projecting into the western half of the room from the south wall.

Fig 55. The inserted north entrance to Long Mill. The window to the left, widened leftwards probably at the same time, lights the counting house.

The manner in which the new north entrance breaks the lintel band is repeated in a series of windows in Long Mill, where probably around the same time a series of ground-floor casements were replaced by sashes more in keeping with those adopted on East and West Mill. On the western side all four windows north of West Mill, and on the eastern side the two windows immediately south of the water tower, were altered in this way. The heads were raised to lintels set immediately above the original lintel band, and the surrounds were roughly chamfered. The openings were fitted with cast-iron frames which were four panes wide and tall, the central four panes top-hung and opening outwards.

THE WIDER COMPLEX, 1811-62

Not surprisingly, the considerable enlargement of the main mill buildings between 1818 and about 1835 precipitated further investment in ancillary buildings. A number of the buildings detailed below may be as early as the main mill extensions, but some have characteristics (notably the form of their iron roofs) suggesting dates within the second quarter of the 19th century. The 1846 map already referred to provides a potential *terminus ante quem* for many, though there are problems associated with this map in its redrawn state (Fig 7). Most of the buildings can be identified in the bird's-eye view published in 1862 (Fig 8). This takes liberties with perspective and spatial relationships, but where details are capable of being verified they have some semblance of accuracy. Thereafter relatively few additions were made until the mills were converted to steam power in 1897.

Watch house (10)

The small octagonal watch house (Fig 56 & Drawing 18) appears to be absent from the Liberty Map but appears on the redrawn 1846 map and is also clearly depicted in the 1862 view (Figs 7 & 8). Whether its omission from the Liberty Map (Fig 4) can be taken as proof that it dates from after 1811 is unclear, in view of its small size and the fact that it has an eaves cornice matching those on the two pre-1811 wings projecting from the north end of Long Mill. A building of similar size is shown on the Liberty Map in a different position, closer to the bridge, and it is just possible that it has been re-sited. Its position close to the river crossing suits its present use as a tollhouse, but since the through route eastwards from the mill is a later 19th-century creation this is unlikely to be its original function. It may more aptly be termed a 'watch house'. This is the name given to a building erected to serve the Paper Mill in 1805-6, and which presumably afforded shelter to a night-watchman.[190] The employment of a night-watchman at the cotton mill is documented in 1791 and 1803.[191]

Fig 56. The watch house from the south. The present entrance is a later insertion. (BB001892)

The building is rendered externally and incorporates a sill band and coved eaves cornice in stone. The original entrance was in the eastern facet, where straight joints are visible in the render beneath the present window, and where there is a lowering of the plinth for a threshold. The south elevation, which incorporates the present doorway, was originally blind, as were the north and the west. The other facets were each occupied by a

window. The interior was heated by a small fireplace on the west wall. The pyramidal roof is underdrawn.

Offices (11)

This building, probably dating from *circa* 1825-30, faces west onto the roadway linking Old Lane with the northern part of the site (Fig 57 & Drawing 12). A building in the same position, and following the same orientation, appears on Sanderson's map of 1830-34. It was originally single-storeyed, but was raised to two storeys after 1969. The upper floor reproduces the stuccoed exterior of the original work on three sides, but its rear wall is of exposed blockwork and the windows have horned sashes.

Fig 57. The Offices, originally single-storeyed, now raised to two storeys. (BB001893)

In its original form the building had, as now, an oversailing shallow-pitched hipped roof. The modest scale and domestic detailing indicate an office function, as now, and point to the increasing complexity of administering a large mill complex. Where offices in Long Mill had once sufficed for both administration and time control, it is likely that by the 1820s the administrative functions required separate accommodation. Although the 1862 view (Fig 8) appears to show a building of just three window bays, the architectural evidence is for a narrow building of four widely spaced window bays. On the west front this relatively sparse fenestration allows for an entrance and two stacks placed against the front wall, the latter serving fireplaces heating the rooms at either end of the building. On the rear elevation the windows are supplemented by three doorways. There was a single window in the north wall and this was probably matched by a corresponding window to the south. The windows have painted wedge-shaped lintels. On the west front they retain hornless sashes; the remainder have been blocked, as have the rear entrances.

The interior probably consisted of four rooms. The two end rooms retain their original form, but the two in the middle, the more southerly of which incorporated the front entrance, have been thrown together, an overhead beam marking the removed partition. It was unclear whether either of these rooms was heated. The rooms retain a series of probably original cornices, and the doorway to the north room has an architrave with a distinctive early-19th-century moulding. Elsewhere most features appear to date from a refurbishment *c*1900. These include further architraves and a cast-iron fireplace in the south room. Another fireplace, in the north room, has been blocked. The moulded sunk-panelled shutters to the windows open to one side into boxes set flat against the wall, rather than in the window splays, suggesting that they too are a later addition.

A small front porch appears on mid-20th-century aerial photographs, though apparently too small to be included on successive Ordnance Survey maps from 1881 to 1972. It has been replaced or enlarged subsequently. The rear windows and entrances have been blocked, probably in connection with the building of the north-lit shed (25) to the rear. The north and south windows have also been blocked.

Sawmill and attached buildings (12)

This two-storeyed range (Fig 58 & Drawing 14), which stands on the southern perimeter of the site, is unique in the Boar's Head Mills complex in having walls constructed wholly of gritstone. It is of four principal phases, built in line, all of which have walls of squared, coursed gritstone with irregular tooling. Given the proximity of the three known coppice barns, two of which (19, 20) survive, and of the Bobbin Shop, it is probable that this range superseded the buildings identified with the old Wood Yard on the northern edge of the site. The building is currently used by two car-repair garages, a trailer manufacturer and two upholsterers.

Fig 58. The western block, with the lower eastern block beyond. (BB001882)

The western block

The earliest phase corresponds to the taller western portion of the present structure, and was erected between 1811 and the early 1830s, appearing on Sanderson's map of 1830-34 (Fig 6), and more clearly on the 1846 map (Fig 7). It is distinguished by straight joints from the adjoining portion to the east, and is thought to have been a sawmill. The principal elevation faces into the site to the north. On the ground floor each bay has a cart entrance. These retain their original form with the exception of the second from the east, which has been widened on the east side. On the floor above there was a window in each bay, the lintels to which have drafted margins. The westernmost window has been replaced by a large taking-in doorway, and another such doorway has been inserted at mezzanine level beneath the next window to the east. On the west elevation there is a semicircular-headed opening on the ground floor, set below a first-floor entrance with a lintel in the same style as those of the windows. An external

Fig 59. One of the tall cast-iron columns in the western block. (BB001884)

stair rises to the entrance, and consists of a short stone flight continued as a (renewed) timber stair to a cantilevered stone landing. The rear elevation was blind.

The ground floor (Fig 59) is unusually tall and has a ceiling divided by transverse beams into six bays. The two easternmost beams are supported at mid-span by tall fluted cast-iron columns, similar to those used in the Dining Room (17). A series of unwrought pine beams are through-bolted to the beam soffits; some have iron lifting rings attached to them and one has a block and tackle. The first floor is of the 'slow-burning' type, with 3-inch boards laid axially between the beams without the use of joists. This type of floor construction enjoyed a particular vogue in the textile industry in and around the 1830s. The king-post roof trusses, which correspond to internal piers on the north and south walls, have raked struts.

The lean-to addition

The first addition, which appears on the 1846 map (Fig 7), took the form of a single-storeyed lean-to built against the eastern end of the original building. Only the south wall survives, rising above the perimeter wall. A diagonal series of coursing anomalies corresponding to the former lean-to roof can be identified where it meets later masonry. A low blocked window appears to be a contemporary feature.

Eastern and central additions

Between 1846 and 1862 there were two further additions, which are represented – recognisably if none too accurately – in the 1862 view (Fig 8). First a two-storeyed, four-bay structure was raised a little to the east of the lean-to, its rear wall built over the perimeter wall, from which it is distinguished by its different stone colour and deeper courses. Subsequently the space between it and the original building was raised to the same height and in a similar fashion (though with slightly shallower courses), forming the present three-bay central section and incorporating the remains of the lean-to. A straight joint in the raised section of rear wall distinguishes these two phases and marks out the eastern one as the earlier of the two. On the front wall the masonry of the two phases is awkwardly coursed together. Further confirmation of the sequence comes from the presence of two original openings (at first-floor and attic or roof-space level) in the formerly external west gable of the eastern structure.

Fig 60. The eastern addition from the north, showing the formerly open-fronted ground floor. (BB001883)

The two additions (Fig 60) broadly replicate the arrangement of the original block, though without the generously proportioned ground floor of the latter. The eastern one was open-fronted on the ground floor of the north elevation, with four cart openings, spanned by timber lintels resting on square stone piers. Two of these openings have been converted into windows. The first floor was reached by the present stone stair

(which is now boxed in but was originally external on the west gable), and via a first-floor entrance (now blocked). The later western addition has two cart openings, while in the eastern bay a similar opening is divided between a ground-floor entrance and another opening directly onto the stair, which now served both additions. Above each cart opening in each phase there is a first-floor window. Those to the eastern addition have lintels with drafted margins, as on the original block. Those in the central section have more slender lintels without drafted margins; two of them retain 19th-century cast-iron window frames. The rear wall of both phases, and the east gable of the eastern block, were originally blind. A first-floor window was later inserted in the rear wall of the central section.

The rear addition

Between 1899 and 1913 (on the evidence of Ordnance Survey maps) a small extension was built against the rear wall of the original block. It was demolished after 1975, but it appears in a photograph of that date and some evidence for its form survives in the form of scars and patches on the original building. It was single-storeyed, gabled to the south, with a lower lean-to section along part of its west elevation. Within the lower portion an opening was cut through the rear wall of the original building. The size and arrangement of the addition suggest a gas-engine house or similar.

Ranges east of the fire station (13, 14)

This single-storeyed block (Fig 61; Drawing 6) extends westwards from the shed (5) attached to the proto-fireproof building, tapering slightly towards the west on plan, with more pronounced canted corners at the western end. It consists of three principal phases, the earliest of which is the wide central portion. Absent from the 1811 Liberty Map, this appears to be marked on Sanderson's survey of 1830-34. It consists of four bays and was originally open-fronted to the east. The western range, with its two canted corners easing movement around the increasingly congested site, was added before 1846 and was fully enclosed. The passage – wide enough for vehicles – which separated the earliest part and the shed was roofed by 1862, but continued to be used as a passage.

Fig 61. The earliest part of this range of buildings is the taller block to the rear. Canted corners on the nearer block assisted vehicular movement around this cramped part of the mill site. (BB001899)

The first phase (13)

The earliest building is a large four-bay shed, gabled north-south and providing an undivided interior which was open to the east. Consisting of a tall single storey, it is perhaps a precursor of the coppice barns (see below), ventilation being augmented by a large diamond 'breather' in each gable. The brickwork is in an irregular bond, and incorporates rounded corners. The plan is irregular, the southern gable being canted in accordance with an alignment established by the southern end of Building 5.

A distinctive feature of the design is the oversailing roof, which is carried at the gables on gritstone cantilevers. Each gable incorporates a large doorway spanned by a timber lintel set beneath a segmental relieving arch. Below and to the left of each breather (when viewed from outside) is a square blocking. On the east side of the building the intervals between the square piers are spanned by timber lintels, with a brick panel above, but all four openings are now infilled below the lintel. On the west side the full-height panels are keyed into the piers and appear to be original. The roof is underdrawn, though the soffit of one tie-beam is visible.

The western addition (14)

The addition on the west side is set back half a brick behind the north and south elevations of the original building, but continues the converging alignments of its gables. It consists of five bays from north to south. Like the Fire Station, which it faces to the west, the end bays of the principal elevation are canted in order to facilitate movement around the site. The brickwork is in English garden-wall bond and rises to a cogged brick eaves cornice, which is raked across the canted bays. The windows have wedge-shaped gritstone lintels, plain brick sills and original cast-iron frames with a central top-hung opening section. They are placed one to a bay in the west elevation except in the centre, where there is a wide doorway (also original) with a segmental arch. A second doorway, now blocked, in the northern canted bay is a 19th-century insertion. The single north-facing window is also an insertion, distinguished by poorly formed jambs, a timber lintel and a side-hung opening section. A blocking in the north gable is of a size consistent with a bearing box, though no power source is apparent.

The roof trusses have similarities with those found in the Fire Station (20), but incorporate significant variations. The main elements are again of cast iron, and either T or inverted-T cross-section, and the purlins have a fish-bellied profile. In other respects they differ. The common rafters and ridge are of cast iron instead of timber. There is also no collar and the principal rafters rise all the way to an iron ridge. In place of the collar there is a pair of raked struts. As in the Fire Station, the tie-beam is composed of two elements, but here they clasp the foot of a wrought-iron king-rod. The relationship of the west addition to the earlier building results in a further variation: at their eastern ends the tie-beams are cranked downwards to accommodate a valley beneath the projecting eaves of the earlier building. The common rafters on this slope rest on a cast-iron flying wall-plate.

The eastern addition/infill

The narrow lane separating the first phase from Building 5 to the east was infilled before 1862, judging by the view of that date (Fig 8). The 1881 Ordnance Survey map (Fig 9) confirms that it was roofed by the later date. A photograph, probably of the 1930s, shows an asymmetrical glazed roof and a studwork partition closing the north end.[192] At this time the buildings to either side were being used as a thread store. Apart from the removal of the partition the infilled portion remains much the same today.

Mill Houses

Three small two-storeyed houses were built to the east of the main mill buildings, on the north side of Old Lane, between 1811 and the early 1830s, and a fourth was added probably in the 1840s (Drawing 1). Together with the building forming the nucleus of the present Darley Abbey Pottery they were known collectively as Mill Houses.

No. 5, Old Lane (15)

This house pre-dates the gassing shed (see below), to which it is attached on the west side, and was built at some date between the compilation of the 1811 and 1846 maps (Figs 4 & 7). It appears to be indicated on Sanderson's survey of 1830-34 (Fig 6). There are few stylistic indicators of date. The building is rendered externally, with the exception of the dentilled eaves, and the hipped roof has a modern covering of concrete tiles. There is a three-bay south front to Old Lane, the central and west bays extending further to the rear than the remaining bay, giving an L-plan overall. This accommodated a parlour to the right of the central entrance, a stair behind the parlour, and a kitchen or living room to the left of the entrance, possibly with a small scullery to the rear originally. In 1846 there were structures to the rear – probably single-storeyed service buildings – but these have been either incorporated in or, more probably, replaced by the present flat-roofed range. The stair has been remodelled to rise from the flat-roofed extension.

Nos. 1- 3, Old Lane (16)

A pair of two-storeyed cottages (Nos. 2 & 3) stands close to the eastern gate. They are probably the '2 new houses in Cotton Mill Meadow' described in a Stock Book entry of 1826,[193] and appear to be indicated on Sanderson's map of 1830-34. The interiors were not seen.

No. 1 Old Lane, another two-storeyed house, is considerably taller than Nos. 2 and 3, the east end of which it abuts. Map evidence places it after 1846 and stylistic details confirm this. No. 1 is built over the eastern gable of No. 2, but the ground floor was originally separated from No. 1 by an outside passage belonging to the latter. This passage was subsequently shared between the two houses, No. 1 acquiring the rear half. The house has a double-depth plan to the main block, the ground floor consisting of a front parlour and a rear kitchen/living room, off which a scullery (now extended into the passage) opens in an original rear range. Beyond the scullery a single-storeyed range of outbuildings extends. The entrance hall and stair are against the west wall, the stair rising to a landing that returns above the former passage. The first floor provided front and rear bedrooms in the main block, together with a WC over the entrance hall, and a third bedroom over the scullery. The interior retains a series of doors of four moulded sunk panels, with splay-cut architraves. The entrance hall and parlour have original moulded plaster cornices. All the original chimneypieces have been replaced or removed.

The Dining Room (17)

Now Darleys Restaurant, this was formerly the mill's Dining Room (Drawing 2). Built before 1846, it replaced an earlier building, location unknown, fulfilling the same function and built between 1808 and 1809 (see above, p 16). By 1862, if not from the outset, the Dining Room offered workers the benefits of hot food.[194]

The surviving building is situated immediately to the west of West Mill, from which it is separated by a pedestrian passage, now covered. It is difficult to tell whether Sanderson's map of 1830-34 depicts it or not, but it appears, none too accurately, on the 1846 map (Fig 7), and more recognisably in the 1862 view (Fig 8). Given the rapid expansion of the mill complex from 1818 onwards it is likely that the new Dining Room was built in the 1820s or shortly afterwards to cater for the enlarged workforce. Cast-iron columns, forming an original feature of the construction, link it chronologically with the earliest phase of Building 12, which was built by the early 1830s.

The building is single-storeyed and built on a broad plan, the irregularly canted western end following the revetted bank of the River Derwent. The walls are in Flemish bond on a stone plinth, and incorporate a stone sill band. The openings have wedge-shaped stone lintels. The roof, which consists of two parallel hipped east-west ranges, meeting at the western end to form a 'C' on plan, is predominantly of Welsh slate with blue clay copings, but incorporates one slope of Cumbrian slate – probably a survival of the original roof covering. The south roof incorporates two tall ridge-mounted louvres; these do not appear on the 1862 view.

Fig 62. The interior of the Dining Room c1930, showing exclusively women millworkers. A tea urn stands to the right. (BB001861, courtesy of John Elliott)

The canted north-west corner is recessed in a manner normally associated with entrances, and the window here has clearly replaced a doorway. This evidence conflicts with the 1862 view which, probably in error, shows an entrance in the broad panel at the west end of the north elevation. The view also shows four north-facing windows, whereas the architectural evidence is for five (one now blocked, leaving the lintel and sill *in situ*, another converted into a doorway and associated with a lean-to canopy on timber brackets). The south elevation has been extensively altered and possibly rebuilt above sill level. It incorporates a wide window to the west (replacing two windows shown in a 19th-century photograph) and an inserted doorway, but retains two original windows. Another wide window occupies one of the two south-west facets of the canted end, the remainder of which retains original window openings. Part of an arch, visible below floor level on the south elevation, probably indicates the presence of a culvert.

Inside the building two fluted cast-iron columns with simple moulded caps support the valley beam (Fig 62). The roof trusses to either side are underdrawn leaving only the tie-beams exposed. Central bolts on the tie-beam soffits indicate that they are of king-post form. A photograph, probably dating from the 1930s, shows the canteen in use, with women millworkers seated on benches at long trestle tables. The roof was then underdrawn a little above tie-beam level, revealing the expanded bases of the king-posts, and raked struts.[195]

The east wall of the building has been removed, integrating it with the two-storeyed lean-to on the western face of West Mill, and with a modern flat-roofed addition to its south. The 1930s photograph shows that the east wall incorporated a window towards its southern end.

The stable (18)

The stable (now a car-repair garage) is located in the north-eastern corner of the site, and replaced an earlier stable for which accounts survive in the Ledger. The present building is absent from the 1811 and 1830-34 maps, but appears on the 1846 map (Fig 7; Drawing 6). Following the diversion of the leat serving Middle Mill a triangle of land between the old leat and the new was made available for building without the necessity of constructing an additional bridge linking the area with existing buildings. Stylistic details, including the evidence for lunettes on the south front, are consistent with a date probably in the earlier part of the period 1830-46.

Fig 63. The stable from the south. (BB001898)

The two-storeyed stable building (Fig 63) has a three-bay south front; to the rear the eastern and central bays project slightly further than the western bay. Horses were stalled in the flanking bays, while the centre provided a lobby and stair. The walls are in Flemish stretcher bond on a base of coursed gritstone, and rise to a cogged and stepped eaves. The north elevation is now obscured by a facing of modern concrete bricks and much of the west elevation is covered by a 20th-century infill block. The semicircular-headed central south entrance is formed of bullnosed bricks and was originally flanked by lunettes. The east lunette has been blocked, while the west survives only as disturbed brickwork on either side of a later opening with a concrete lintel. The three first-floor openings had segmental arches of brick headers; the central one remains in use, while the other two are now blocked. The east elevation may originally have been blind. The three ground-floor windows here are insertions, and have timber lintels and chamfered blue brick sills. The hipped roof has been re-laid with concrete tiles, retaining a tall louvre over the western end of the ridge.

The south entrance opens onto a lobby, off which original doorways give onto the stables to either side. Although there is no fireplace, the lobby may have doubled as a tack room, as there are large wooden pegs remaining on the east wall. To the north, next to the stair, a third doorway, now blocked, gave access to another room, which was smaller than the stables. Two more doorways have been broken through at a later date, linking this room directly with the former stables. Few internal fixtures survive, but the interiors are characterised by tall ceilings, which are underdrawn between chamfered beams with run-out stops.

The stair, which originally had stone treads, has been renewed in concrete, but retains square-section newels and balusters and a moulded handrail. It rises via a straight flight and a quarter-landing. The first-floor rooms have lime-ash floors and were formerly

ceiled at collar level. The eastern bay is subdivided by a partition of studs and boards beneath one of the half-trusses forming the hipped ends. The original roof survives, and indicates that while the western bay benefited from the roof-mounted louvre, there was no similar provision in the eastern bay.

Open-fronted store (19)

This building, consisting of a tall single storey, and three bays gabled north-south, was built south-west of the stables (18) between 1811 and 1846 (Drawing 6). Like the stable, it was probably built following the re-routing of the leat around 1835.[196] It was originally open-fronted to the east, where it overlooked a yard in front of the stables, perhaps suggesting that it was built as a hay barn. The piers, in common with later open-fronted buildings on the site, have rounded corners. The brickwork, in the same bond as Building 5, is set on a gritstone base. The roof structure was not seen; the covering of concrete tiles replaces the original slate and has removed evidence for former small ridge-mounted ventilators, visible on aerial photographs of the mid-20th century.

The north, south and west elevations were originally blind and the interior was originally undivided. The rear wall of the north bay was broken through before 1972 and is spanned by a rolled-steel joist. A 20th-century window has been inserted in the south gable, where there are also blocked pockets for joists or brackets at eaves level. In the north gable there are a series of inserted doors and windows, now blocked. These were associated with a range extending westwards from the stable to Building 5. Although the north wall of this range was in existence by 1846, only the easternmost portion of the present structure was roofed before the mid-20th century. The interior was not seen.

The roughly triangular space dividing Building 19 from Building 5 on the west was infilled before 1881. It may have been built over by 1846, as the map of this date (Fig 7) shows an enclosed space, but in the absence of shading it is unclear whether this represents a roofed structure. Straight joints on the south elevation distinguish the infill from the earlier buildings.

Demolished range to south of stables

The stables were originally on the eastern perimeter of the site, as extended in the early 19th century. In the mid-19th century a long range was built extending southwards from the eastern end of the stables; this has been demolished, leaving evidence of a block-bonded wall at the south-east corner of the stables. Some details of its form can be derived from maps and old photographs (Fig 64). It was single-storeyed and in three distinct units, possibly indicative of phasing, though all three were present by 1881. By the mid-20th century the northern and central sections both had mono-pitch roofs, at different heights, though this may not have been their original form. These sections very roughly correspond to two ranges

Fig 64. The now-demolished range south of the stables, as seen following damage caused by an explosion in 1938. (BB001867; courtesy of John Nelson)

depicted on the 1862 view (Fig 8). This shows the step up in roof heights between the northern and central sections, and shows a tall chimney rising on the rear of the northern section. The southern section is obscured in the view, but in the aerial photograph it has a roof incorporating two ridge-mounted louvres. Map evidence suggests that the open fronts of the southern, central and part of the northern sections were created between 1899 and 1913, but the discrepancy may result from differently interpreted mapping conventions. This range was badly damaged by an explosion in May 1938; it was rebuilt and subsequently demolished after 1970, modern buildings now covering much of the site.

The Fire Station (20)

Fig 65. The Fire Station from the east. (BB001901)

Insurance, both financial and practical, against fire appealed to cotton mill owners from an early date, and the delivery of a fire engine is recorded in 1804, being a replacement for an earlier device (see p 16). However, the building now known as the Fire Station has no original features indicative of such a function, and as the building does not appear on the 1811 map it was not built for the 1804 engine. The form of the original iron roof trusses suggests a date in the second quarter of the 19th century. Its absence from Sanderson's map of 1830-34 may be significant (though the small scale of the map should be borne in mind), but the building is shown as a simple rectangle on the 1846 map (Fig 7). In the 1862 view (Fig 8) the site is shielded by trees. At the time of survey the building was in use by a firm manufacturing wrought-iron products. A horse-drawn fire engine once belonging to Walter Evans & Co. survives as a museum exhibit at Belvoir Castle.[197]

The Fire Station is a single-storeyed building extending four bays from north to south (Fig 65; Drawings 6 & 17). The brick bond consists of a course of alternating headers and stretchers for every five stretcher courses, and rises to a stepped brick eaves. The end bays are both canted on the east elevation, in order to ease passage around the mill

site. Although map evidence for the canted bays is equivocal it seems likely that they are an original feature; that at the south end was certainly canted before a fifth bay was added, as there is a straight joint where the two phases meet.

The building was originally lit only from the east, and appears to have had two openings per bay on this side. In the north canted bay two windows – one narrowed on one side, the other converted into a doorway – each have a segmental arch of brick headers. The south canted bay, where the eaves similarly rakes upwards towards the gable, may have been the same, but is now occupied by a large inserted doorway. In the other two bays of the east elevation the windows rise to square heads at eaves level, while an original entrance in the more southerly of the two bays has a segmental head of brick stretchers. The windows have all been altered by the addition of tile drip-moulds, and one has been narrowed. The gables and rear wall were blind, but a window has been inserted in the north gable.

The three roof trusses are of cast- and wrought-iron construction, but bear on timber wall-plates (Fig 66; Drawing 17). The tie-beam, principal rafters, collar and purlins are cast, and of T- or inverted-T cross-section. The principals rise only as far as the collar, from which the tie-beam is suspended by a wrought tension rod. The tie-beams are each composed of two pieces; where they meet, the bolting faces clasp the foot of the tension rod. The purlins (a single set) have a fish-bellied profile. The common rafters and ridge are of softwood.

Fig 66. Interior of the Fire Station from the south, showing the cast and wrought-iron tie-beam and collar trusses. (AA051584)

At some point both the northernmost bay and the southern one-and-a-half bays were partitioned off in studwork. Both have been removed. The southern partition may have been associated with the large inserted doorway in the southernmost bay. The latter is the only feature rendering the building (or this end of it) capable of being used as a fire station. The opening is bridged by an I-section iron beam, but the doors have been renewed.

The building was extended one bay southwards before 1881. The addition probably functioned as a store, as it has no windows. The segmental-headed entrance is in the east front, which continues the canted alignment and stepped eaves of the adjoining bay. The roof is entirely of timber, and consists of common rafters meeting at a ridge

and supported by a single set of purlins. An inserted doorway communicated with the original building.

The bobbin shop (21) and coppice barns (22 & 23)

Cotton-spinning mills required a constant supply of bobbins, and those specialising in sewing cotton also needed reels in vast quantities. In the period 1787-1810 bobbins were purchased from Charles Bridges and John Brown of Mansfield, Richard Sharlock of Tansley, near Matlock, William Cundy of Ashover and Joseph Wass of Lea Wharf, near Cromford, among others.[198] Such suppliers no doubt supplied short-term needs, for there was also a 'Turner's shop' at Darley, presumably serving similar purposes, as early as 1801.[199] It may possibly have been situated in one of the buildings of the Wood Yard (7, 8), since at this date it might not have been reliant upon motive power. Towards the middle of the 19th century the Evanses increased the mill's capacity in this area. The Bobbin Shop and two coppice barns (of three or more) survive.

The Bobbin Shop

SPOOL OR REEL TURNING MACHINE.

Fig 67 (left). The interior of the bobbin shop, as depicted in the Illustrated Times *article in 1862. (Derby Local Studies Library)*

Fig 68 (right). Conditions (and caps!) were little changed c1930. (BB00 1876, courtesy of John Elliott)

The Bobbin Shop is a single-storeyed range consisting of four bays gabled north-south. It is set at a little distance south of East Mill, from which it is separated by a two-bay range, function unknown, which is gabled at right-angles (Drawings 15 & 16). Given the similarity between the roofs of the two ranges it is likely that they are close in date, and the junction between them on the west side is bonded. The 1846 map (Fig 7) shows a small building roughly corresponding to the position of the two-bay range. This is probably an earlier structure; the two ranges of the Bobbin Shop, which are probably nearly contemporary, are likely to date from shortly after the 1846 map was prepared. The four-bay range was the subject of an interior view in the 1862 article (Fig 67), but is shielded from sight in the bird's-eye view of the same date.

The two-bay range

The two-bay range is square on plan, with a wide entrance, set between piers that project into the room, slightly south of centre on the east wall. The doorway is spanned by an iron lintel. A projection in the corresponding position on the opposite wall was obscured. The range is of interest chiefly for its asymmetrical iron roof (Fig 69). The north pitch descends to the level of the East Mill window sills so as not to impair its lighting, while the south pitch has a wall-plate at a more normal height for a single-storeyed building. The roof consists of a wrought-iron tie-rod suspended by a similar king-rod, together with cast-iron principal rafters and V-struts. The principals are of a type of I-section in which the bottom flange is slightly wider than the top flange, while the struts are of inverted-T section. The foot of the north principal is cranked to provide a bolting face against a single, roughly triangular, iron casting forming a knee; this carries the roof slope down to the level of the East Mill sills. The end of the knee that projects into the room is supported on a length of cast-iron pipe. The purlins are of the same sectional form as the principals, but have a fish-bellied profile.

Fig 69. Interior of the two-bay range, showing the unusual form of the cast and wrought-iron roof truss. (BB001933)

The four-bay range

The Bobbin Shop proper was built as a well-lit turning shop for the manufacture of cotton reels and bobbins. Each bay has a window on either side, and there are also two windows in the south gable. Twin wide entrances, with stone anchor blocks for hinge pintles, were set in the north wall, opening onto the two-bay range. Most of these openings, which have iron lintels, are now blocked.

The trusses (Fig 70; Drawing 16) have cast-iron principal rafters and V-struts, and wrought-iron tie-rods, king-rods and axial ties. Bolted to the lower ends of the principals are

Fig 70. The interior of the four-bay range from the north. (BB001932)

line-shafting hangers, which correspond to bearing boxes on the gables. A further box on the south gable is not matched by any hangers. Belt take-offs, illustrated in the 1862 article, powered individual lathes. These may have been associated with a series of stone machinery bases arranged in ranks in the otherwise Staffordshire clay-tiled floor. The bases conform to the arrangement of bearing boxes, but they are oriented parallel to the gables, whereas the illustration shows the lathes placed parallel to the flank walls. Power appears to have been taken from East Mill along the east side of the two-bay range. A bracket for line-shafting remains *in situ* towards the south end of the east wall.

On the south gable there are scars from a former extension with a shallow-pitched roof. This has been replaced by a modern structure on a different footprint. Neither is shown on the 1972 and preceding Ordnance Survey maps.

The east extension

Above the east entrance inside the two-bay range there is an oil stain which may have been associated with a bevel gear and a further shaft carrying power into an eastwards extension. This was built against the north side of the coppice barn (22), leaving only a passage-like light well between it and East Mill on the north side. It is shielded from sight in the 1862 view, but appears on the 1881 Ordnance Survey map (Fig 9). It was two bays in length, with a simple monopitch roof composed of principal rafters and purlins. The interior is lined and unrevealing. It was extended eastwards between 1938 and 1972.

The coppice barns (22, 23)

Fig 71. Detail of the 1862 engraving in the Illustrated Times *showing coppice barns and stacks of stored timber in the yards. (Derby Local Studies Library)*

Two essentially similar coppice barns were built in the south-west part of the site between 1846 and 1881 (Drawing 15). One (23) was certainly built by the time the bird's-eye view was published in 1862, and it is possible that the other (22) was also present by that date, as the viewpoint does not permit it to be shown. According to the view (Fig 71), two more similar buildings existed towards the eastern perimeter of the site, on the northern side of the road, but of these only the southern example is confirmed by the 1881 Ordnance Survey map (Fig 9). The surviving buildings are characterised by brick piers with rounded corners, the intervals between the piers being open. The deeply oversailing roofs afford shelter for the open sides and have the slates laid so as to permit ventilation between them. They were used to store and season the poles used in the manufacture of turned products.

No. 22

Positioned just to the east of the Bobbin Shop (21), this three-by-two-bay coppice barn may have been intended specifically for the storage of coppice timber used in the manufacture of bobbins and reels (Fig 72). It was built between 1846 and 1881, and may therefore be contemporary with the Bobbin Shop. The trusses are under-drawn at tie-beam level, but there are bolts visible in the centre of the tie-beam soffits, indicating a king-post form (Fig 73). Each hipped end incorporates a half-truss and angle-ties. The interval (about a bay's length) between the building and the Bobbin Shop to the west was infilled by 1881, on the basis of map evidence. Later alterations, probably *c*1969, included infilling the open bays of the coppice barn to incorporate high-level windows.

Fig 72. The coppice barn (22) from the south-east. The roof slates are laid so as to permit ventilation. (BB001885)

Fig 73. The interior of the coppice barn (22). The roof has been underdrawn, but would originally have been exposed. (BB001886)

No. 23

This L-plan shed consists of an east-west range of five-by-two bays, from the western end of which a three-by-two-bay range projects northwards. Variations in the bay intervals probably reflect site constraints (notably proximity to Old Lane) rather than a phased evolution; both ranges were present by 1862. The shed was converted to workshops and offices in 1969 for Patterns [Derby] Ltd. The work involved infilling and glazing the open bays, underdrawing the roof (probably similar in form to that of No. 19) and inserting internal partitions.

The gassing shed (24)

The gassing shed (Drawing 18) is absent from the 1846 map (Fig 7) but was built by the time of the 1862 view (Fig 8), which depicts it somewhat schematically. The suggested function is derived from the present name of the building. Gassing probably refers either to the practice of singeing excess fibres from thread by passing it through a flame, or to chlorine bleaching, though neither process is referred to in the 1862 article. The gassing shed is a wide single-storeyed building of seven bays beneath a hipped roof. The walls are faced in a variety of Flemish stretcher bond, with three courses of stretchers to every course of alternate headers and stretchers, and rise to stepped eaves courses. The north-west corner has been rebuilt.

As originally built the gassing shed (Fig 74) had a central entrance facing Old Lane to the south, flanked by windows in each bay. The north elevation was largely blind: most of the windows are recent insertions, though one (at the east end) incorporates a 19th-century cast-iron frame and another, indicated by an area of blocking immediately west of a large inserted entrance, is possibly original. The windows on the south front (two of them are now blocked) had stone sills and wedge-shaped stone lintels, one of which has been re-used for the window now occupying the former entrance. The roof is carried on a series of king-post trusses. The king-posts, which are through-bolted at the base, have expanded heads and feet; raked struts rise to the single set of purlins.

Fig 74. The gassing shed from the west, with the house, 5 Old Lane, beyond. (BB001888)

THE EXPANSION OF STEAM POWER, 1897

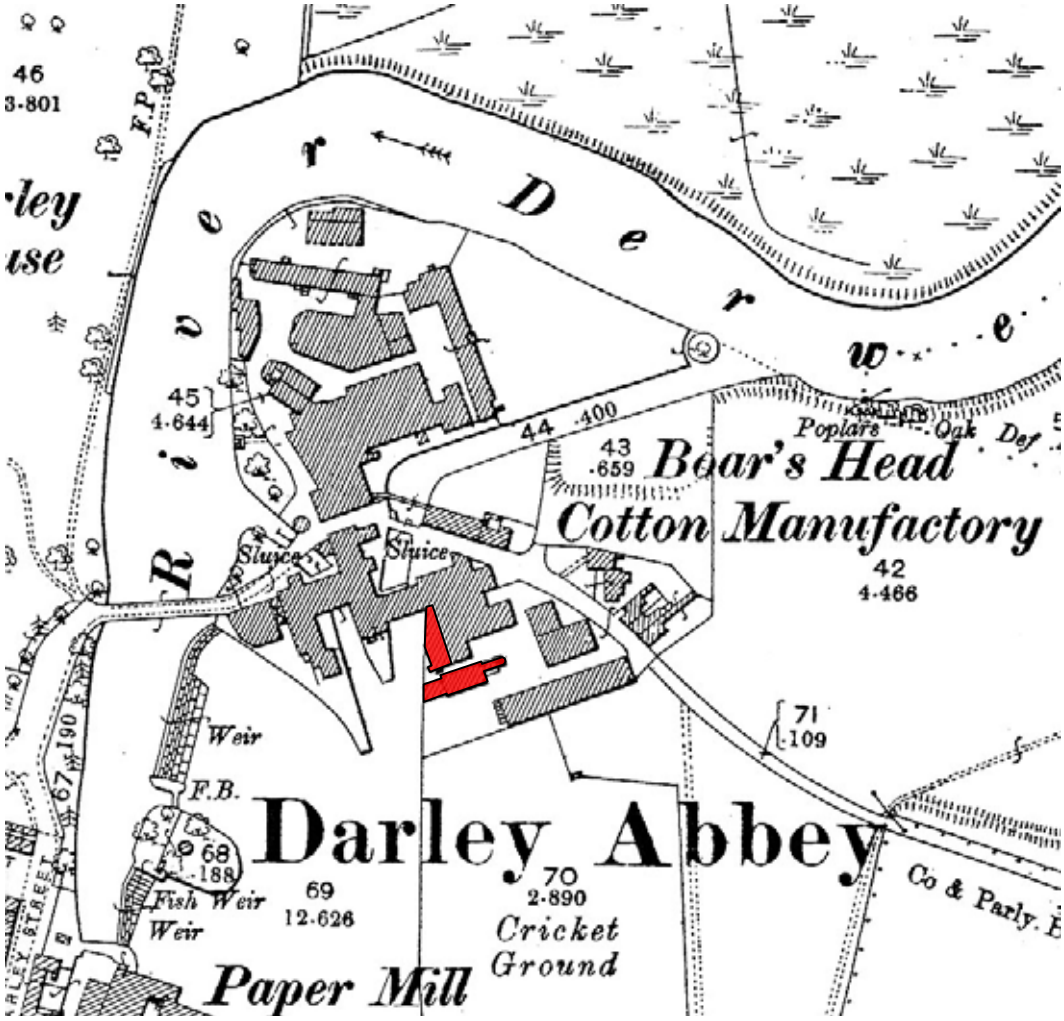


Fig 75. The mill complex as depicted by the Ordnance Survey in 1899. The 1897 engine-house, boiler-house and chimney are highlighted in red.

In the mid-19th century, as discussed above, steam power was introduced to the Boar's Head Mills on a modest scale, but the bulk of the mill complex remained water-powered. In 1897 a 250hp Musgrave Corliss tandem steam engine was acquired, though water power continued to be used as well. The engine was installed in an engine-house (26) extending along the west side of the Bobbin Shop (21) to the south of Middle Mill (Fig 75).[200] Immediately south of the engine-house a boiler-house was placed, exhausting via a tall brick chimney to its east. All three elements are identifiable on the 1899 revision of the Ordnance Survey map (Fig 75). Although the engine was removed *c*1970, the engine-house survives relatively unaltered, as does the chimney, but the less substantially built boiler-house has been demolished. Inside the mill buildings there is abundant evidence for the rope races that were installed at the same time as the steam plant, together with other modifications to the transmission system.

The engine-house (26)

This building covers the western elevation of the Bobbin Shop, where a series of windows were blocked as a result, and slightly oversails the south gable of the earlier building. The engine-house consists of a tall single storey raised over a low basement, and is four bays in length, with an additional bay at the north end forming a narrow link with Middle Mill (Fig 76; Drawing 15). The irregular shape of the west side of the building, the northern bay of which is canted, was determined by the existing tail-race to the west. The exterior is in wire-cut brick and incorporates a blue brick damp-proof course and a plain projecting band at eaves level, the latter returning as a raking band across the verges of the south gable. The entrance on the south gable has a semicircular-arched head framing a fanlight, and is raised at the head of a flight of steps, now buried beneath later concrete staging. Above it there is a small louvred opening. The windows are distributed along the west elevation and have similar heads, stone sills and cast-iron frames. In the link block there is an arched doorway which formerly opened onto timber staging overhanging the leat.

Fig 76 (above). The engine house from the south-west with the Bobbin Shop to the right. The paving immediately to the left of the engine house marks the former edge of the leat passing beneath Middle Mill.

Fig 77. The interior of the engine house (now a fireplace showroom) from the north in 2006.

The interior (Fig 77) is open to the roof and includes a range of features in keeping with the characteristically high level of finish accorded to steam engine-houses throughout the 19th century. An early photograph, a copy of which is displayed at the mill, shows internal details prior to the removal of the engine (Fig 78). The three strutted king-post roof trusses, the king-posts of which are through-bolted at the base, consist of stop-chamfered timbers. The single set of butt purlins is similarly treated and the common rafters are concealed by beaded tongued-and-grooved boarding, laid diagonally. The link bay formed a separate plastered room with a higher floor level, from the south-east

corner of which timber steps descended to a basement level. The roof over this bay is slightly raised above the man roof too, but the brickwork is bonded and contemporary.

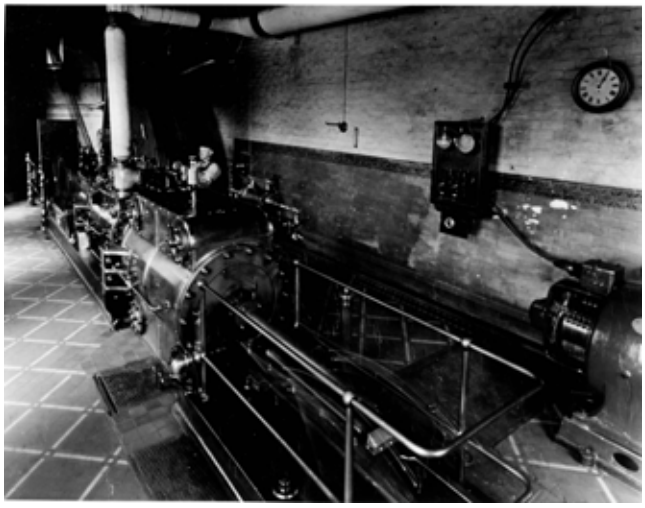


Fig 78. The Musgrave horizontal engine photographed c1930. (BB001864, courtesy of John Elliott)

A small building against the south end of the west wall is structurally distinct but nearly contemporary, appearing on the 1899 OS map. It has an asymmetrical gable to the west and two original openings – a door to the south and a window to the west.

The boiler-house and chimney (27)

The boiler-house has been demolished, but its general form is apparent from aerial photographs of the mid-20th century. It had a segmental roof of corrugated iron on gables and low flank walls of brick. Inside there were two Musgrave boilers.[201] The adjoining brick chimney survives (Drawing 19). It is of tapering circular section with a moulded cap and incorporates an opening at its base through which the exhaust from the boilers was channelled.

The transmission system

Sufficient information survives, in the form of notes by George Watkins and the 1944 plans (Figs 80-84), coupled with the evidence of surviving features, to reconstruct most elements of the 1897 transmission system. In keeping with contemporary practice, this made extensive use of rope races in place of the upright shafts which previously carried power from floor to floor. Rope races were installed in Middle Mill and on both sides of Long Mill, where patches in the floors and traces of inclined boxing are clearly visible (Fig 79). A culverted shaft carried power under Old Lane to the western end of North Mill, where auxiliary power was provided latterly by a gas engine.

Fig 79. Evidence for the removed rope race transmission in Long Mill. (BB001907)

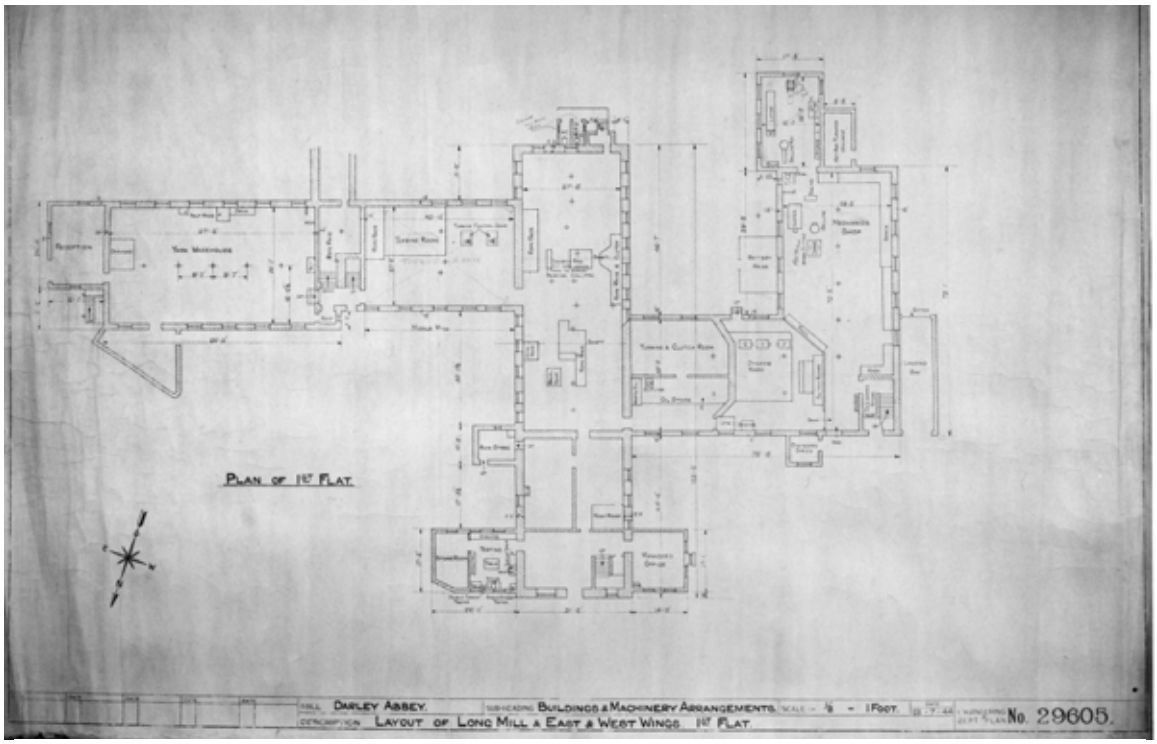
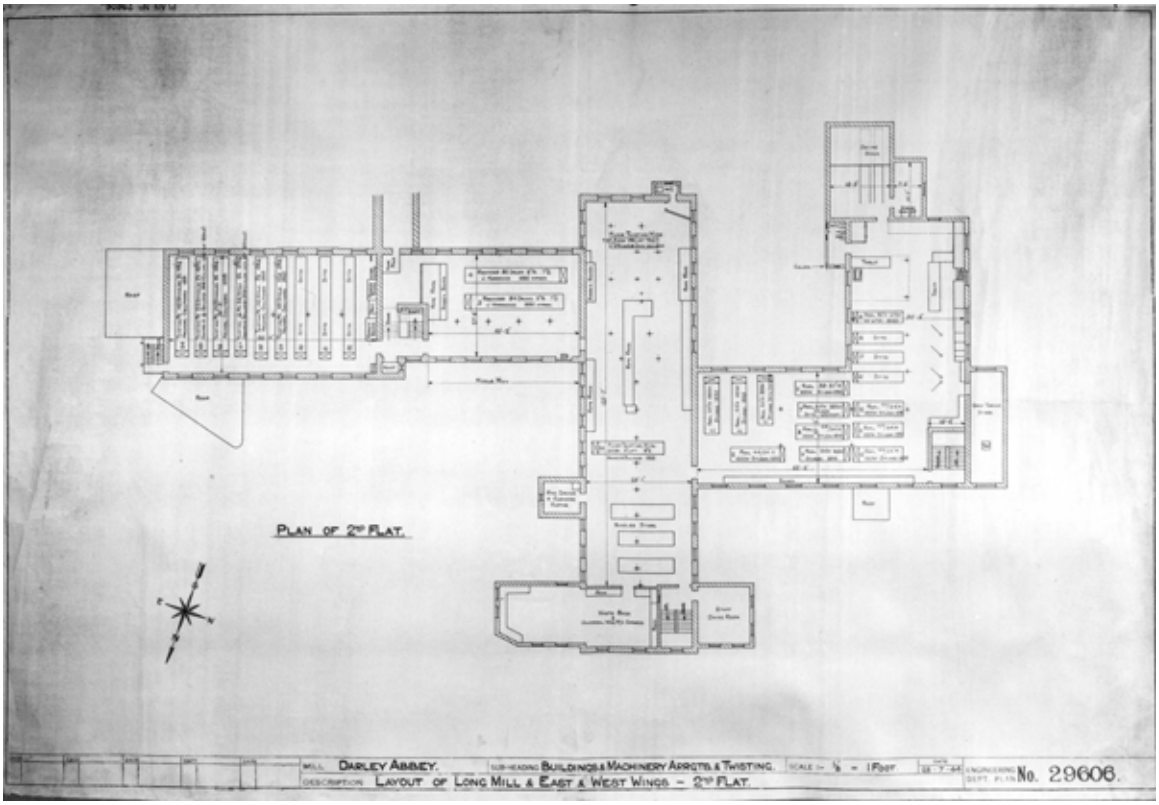


Fig 80 (above). The 1944 ground-floor plan (BB001852; courtesy of Anthony Attwood)

Fig 81 (below). The 1944 first-floor plan (BB001853; courtesy of Anthony Attwood)



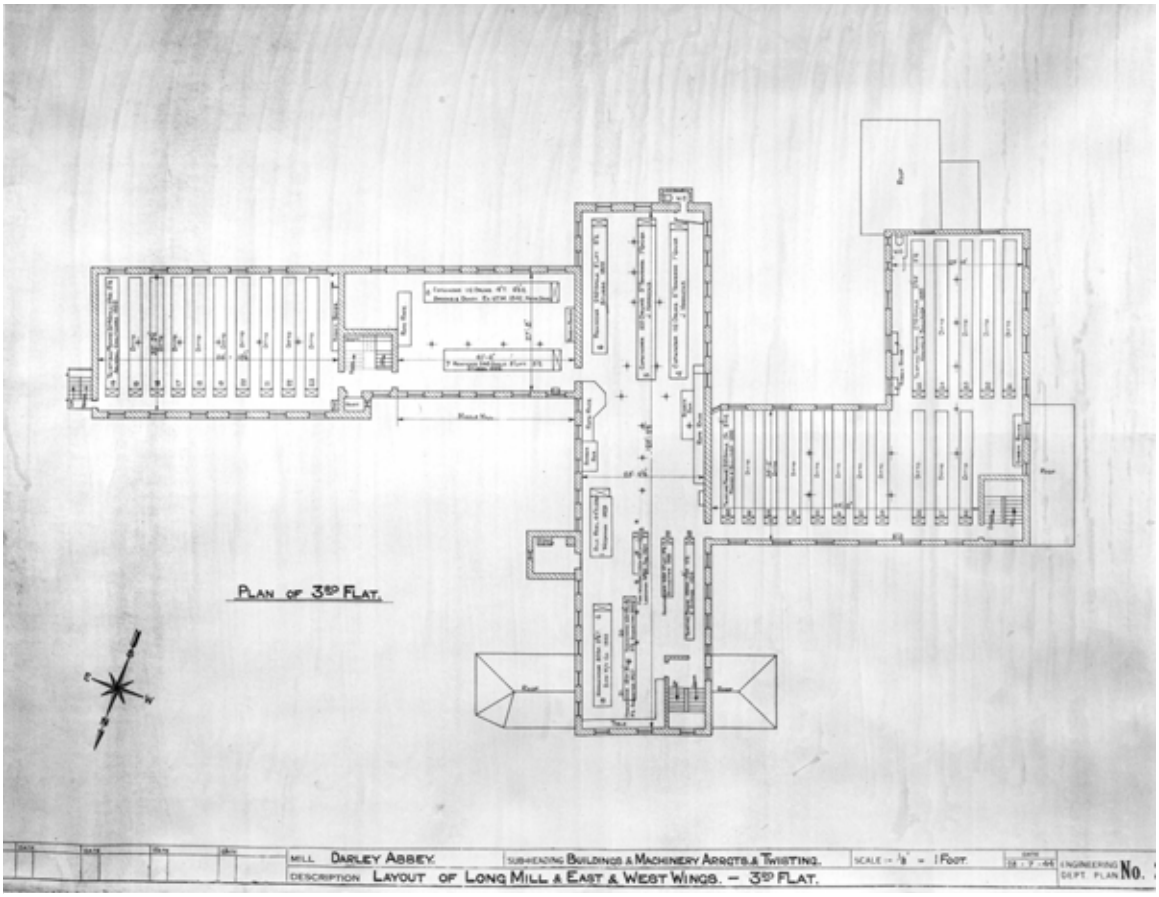
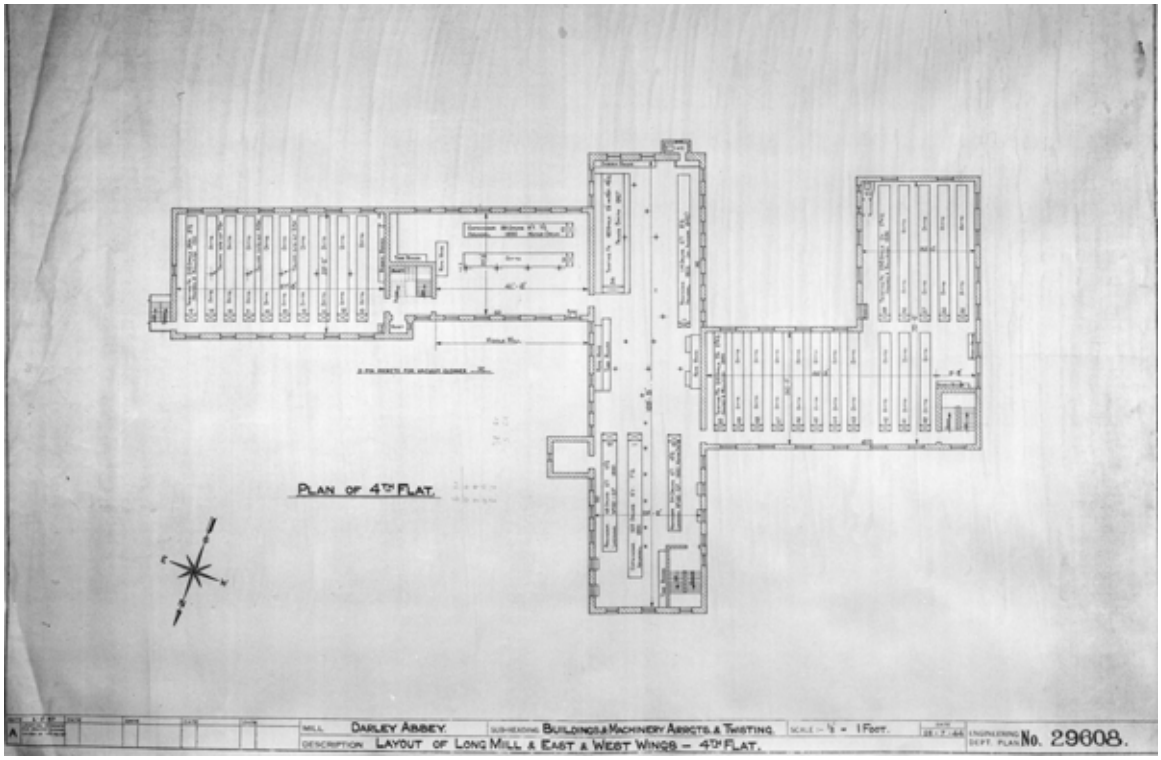


Fig 82 (above). The 1944 second-floor plan (BB001854; courtesy of Anthony Attwood)

Fig 83 (below). The 1944 third-floor plan (BB001855; courtesy of Anthony Attwood)



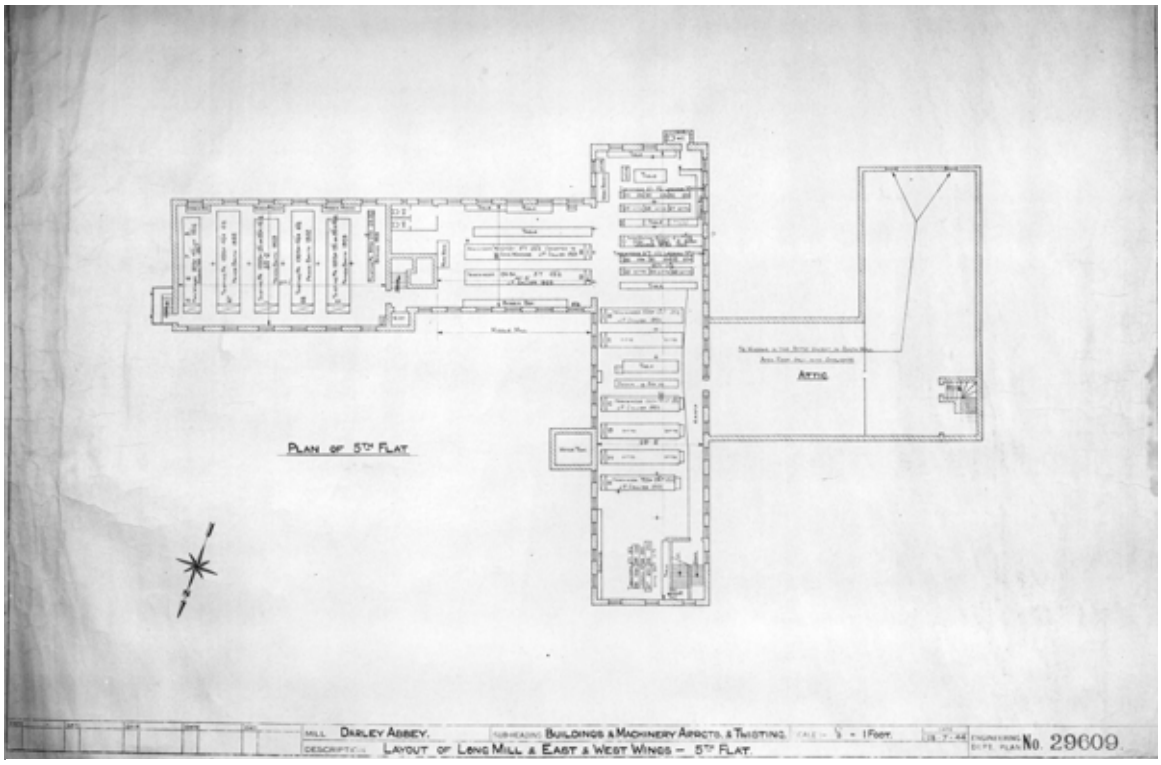


Fig 84. The 1944 fourth-floor plan (BB001856; courtesy of Anthony Attwood)

George Watkins describes the steam engine and a large turbine situated inside Middle Mill both driving a short main shaft, from which ten ropes carried power to a main shaft on the first floor. This was linked to a series of rope races against the west wall of Long Mill, whereby power was distributed not only to Long and West Mills but, via an underground shaft beneath Old Lane, to North Mill as well. Extensive traces of the rope drives in Long Mill remain, characterised by long slots in the upper floors, inclined scars against the east and west walls where protective boxing has been removed, and copious grease stains at the bearing boxes where power was transmitted through the wall into West Mill. The present boxes and evidence for overhead line-shaft bearers in West Mill is contemporary with this system and with the structural reinforcement, using under-slung tension-rods, of the West Mill floor beams.

Water turbines

George Watkins noted that waterwheels continued in use probably until 1923. Thereafter water power was harnessed by five turbines, a number of which were for use only at particular water levels. These were variously rated at 60, 60, 97, 100 and 117hp. Some of the turbines were coupled to the reconfigured transmission system. Most were located in West Mill (Fig 80), but at least one was in Middle Mill. The use of turbines ceased in 1969 as a result of road and sewer works, after which power was derived entirely from the National Grid.

Fig 85. The turbine room in West Mill, c1930. (BB001863, courtesy of John Elliott)

The polishing shed (25)

This single-storeyed building (Fig 81; Drawing 12) replaced the north-south arm of North Mill (9), together with the greater part of the range extending northwards from it towards the Manager's House (3). Map evidence places the date of construction between 1881 and 1899 and it may therefore pre-date the developments in steam power described above, though it is perhaps more likely to be roughly contemporary. It is thought to have been used as a polishing shed, where cotton thread was waxed.

The building has an irregular plan, consisting of seven north-lit ranges of varying length, the constraints being the remaining arm of North Mill to the east and the range of offices (11) to the west, which it enfolds. The maximum length of the ranges is five bays. The walls are faced in Flemish stretcher bond, with five stretcher courses for every course of alternate headers and stretchers. Two windows in the west gables of the two southernmost bays have segmental brick arches, stone sills and cast-iron frames (four panes wide and five deep) incorporating a four-pane opening section. Small two-centred gothic windows with pivoting iron-framed lights occupy the east gables of the three southernmost bays and the west gable of the northernmost, but are omitted from the west gables of the two southernmost. The arches are formed from brick headers but incorporate stone apices. The gothic theme is also taken up by barge-boards incorporating timber fleches. All the other bays are partly or wholly concealed by adjacent buildings. The south elevation (to Old Lane) is blind and the north is largely built against by other structures. The south-west corner of the building is canted to ease traffic movements. While map evidence suggests that this is a modification dating from the period 1899–1913, there is also evidence that minor details are elsewhere recorded inconsistently.

Fig 86. The east elevation of the Polishing Shed, showing the north-lit roof and Gothic-style gable windows. (BB001890)

Fig 87. The interior of the Polishing Shed, from the north-west. (BB001891)

The interior (Fig 82) was intended as a single space within which movement was impeded only by a series of cast-iron columns. These have moulded caps and necking

rings and incorporate gusseted shoes. The latter support a grid composed of tie-beams and valley beams. The asymmetrical trusses have a wrought-iron king-rod and support a single set of purlins, also set in iron shoes. A bearing box in the south wall indicates where a line-shaft, bridging Old Lane, entered the polishing shed against the east side of the central aisle. Bolt-holes in the valley beams identify the positions of former hangers for the line-shaft.

A three-bay lean-to was added against the east elevation between 1899 and 1913; it is now integrated with the main building, which is used as an engineering shop.

NOTES

[1] The boar's head crest was granted in 1815 (Maxwell Craven, *Images of Derby 1860 – 1960* (Derby, 1990), 176).
[2] Jean Lindsay, 'An Early Industrial Community: The Evans' Cotton Mill at Darley Abbey, Derbyshire, 1783 – 1810', *Business History Review*, XXXIV (1960), 277-301; Don Peters, *Darley Abbey: from monastery to industrial community*, Hartington, Derbys., 1974. The latter assembles a great deal of valuable material, but contains some inaccuracies.
[3] National Monuments Record (NMR), Swindon, building file no. 33050.
[4] NMR, negative nos. BB82/6259-72. The NMR also holds two general views, both looking across the river from the north-west, one taken by D M Smith in 1962, the other by Rex Wailes in 1964.
[5] Keith Falconer, 'Supplementary note to NMR file 33050', October 1988, NMR, Swindon. This note identified the presence of two different roof forms in West Mill.
[6] Adam Menuge, 'The textile mills of the Derbyshire Derwent and its tributaries', *Industrial Archaeology Review*, XVI, No. 1 (Autumn 1993), 38-61.
[7] [Dennis Rodwell], 'Darley Abbey, Derby: Historical and Architectural Notes on surviving Evans buildings', Derby City Council report, November 2001.
[8] *Nomination of the Derwent Valley Mills for inscription on the World Heritage List* (henceforth *World Heritage Nomination*), ([Matlock], 2000).
[9] A brief interim statement of the findings presented more fully here appeared in Adam Menuge, 'Boar's Head Mills, Darley Abbey', *Industrial Archaeology News*, 131 (Winter 2004), 7-8.
[10] Derbyshire Record Office (henceforth DRO), D5231/7/1 (henceforth Correspondence Book), D5231/1/1 (henceforth Ledger 1795-1804) and D5231/1/2 (henceforth Ledger 1804-10). Both Ledgers are foliated rather than paginated, and since each 'folio' comprises an open spread rather than the *recto* and *verso* of a single leaf, references in this report adopt the folio number with the addition of 'L' for left and 'R' for right.
[11] *Reports from Commissioners vol. XX: Factories Inquiry: Part II* (henceforth 'Factories Inquiry') (London, 1834), reprinted with the same pagination in *British Parliamentary Papers: Industrial Revolution: Children's Employment*, 5 (Shannon, 1968), Lancashire District [inc. Derbyshire], 92-3.
[12] 'Darley Liberty &c. 1811', no surveyor or other information given, DRO, D769/11 (henceforth Liberty Map). A hand-drawn copy, entitled 'Plan of Darley Abbey Liberty in the County of Derby 1846', has fewer and different parcel numbers, but does not appear to record any changes since 1811 and elides some of the building details of the earlier map.
[13] [Edward Smith], 'Map of the Chapelry District of Darley Abbey. 1846', kept at the Fellowship Room of St Matthew's Church, Darley Abbey. Although this is inscribed 'Copy by T. Cookson Uff 1970' and 'The original (which is at the back of this copy) by Edward Smith 1846', the whereabouts of the original are at present unknown. The Chapelry District map has similarities with the map reproduced, apparently from an original copy, in the *World Heritage Nomination* (2000), 86, and is similar to one presented, redrawn, as the frontispiece to Peters (1974), titled 'Plan of Darley Abbey in 1852 [*sic*] (*Derby City Library*)'. No map answering to this description is currently available at Derby Local Studies Library (I am grateful to Paul Hudson, Local Studies Librarian, for checking the Library's holdings).
[14] 'The Workshops of England. No. XI. Messrs. Walter Evans & Co.'s "Boar's Head" Cotton Mills, near Derby', *Illustrated Times*, 26 July 1862; a photographic copy of the article is held at Derby Local Studies Library and there is an original copy at Cambridge University Library. The article is signed 'A'.
[15] Ordnance Survey, 1:2,500 map, Derbyshire sheet L.5, surveyed 1881, published 1882; first revision, surveyed 1899, published 1900; second revision, surveyed 1913, published 1914; third revision, surveyed 1938, published 1946.
[16] Copies are hung at various places in Long Mill, and have been re-copied (with the kind permission of John Elliott) in the course of this survey. The whereabouts of the original prints and/or negatives is unknown.

[17] The plans, at a scale of 1:96, are of the 1st to 5th 'Flat' (i.e. ground to fourth floors, omitting the attic of Long Mill). They are dated 28 July 1944 and were produced by the Engineer's Dept of Walter Evans & Co. The plan of the '1st Flat' exists in two states, showing significant differences in detail, though both bearing the same date. One (NMR neg no. BB001851) omits numerous openings which appear on the other (BB001852). The plans are now in the possession of Patterns [Derby] Ltd, and we are grateful to Anthony Attwood both for drawing them to our attention and for permission to copy them.
[18] The evidence is reviewed, and two sites tentatively proposed, in David M. Robinson, 'Darley Abbey: Notes on the Lost Buildings of an Augustinian Monastery in Derbyshire', English Heritage Historical Analysis & Research Team Reports & Papers 45, 2001.
[19] *World Heritage Nomination* (2000), 83.
[20] 'A mapp of Darly Abby belonging to Wm Woolley Esq … 1708', reproduced in Robinson (2001), Fig. 4.
[21] Frank Nixon, *Industrial Archaeology of Derbyshire* (Newton Abbot, 1969), 205. The source for the sale notice is not given.
[22] 'A Plan of the Demesne Lands Belonging to Darley Hall from a Survey taken August 14th: 1757', Derby Local Studies Library.
[23] *World Heritage Nomination* (2000), 83.
[24] The dates of birth and death of family members are taken from the family tree in Peters (1974), 88, supplemented and in places corrected by *World Heritage Nomination* (2000), 113-4.
[25] Peters (1974), 24.
[26] John Farey, senior, *General View of the Agriculture and Minerals of Derbyshire; with observations on the means of their improvement. Drawn up for the consideration of the Board of Agriculture and Internal Improvement* (3 vols., London, 1811-15), I, 385. Farey's observations were made between 1807 and 1809.
[27] W. Hutton, *The History of Derby; from the remote ages of Antiquity, to the year MDCCXCI* (London, 1791), 211; Stephen Glover, *The History and Directory of the Borough of Derby, intended as a guide to strangers visiting the town* (Derby, 1843; facsimile reprint, Derby, 1992), 80; Peters (1974), 25-6, including the map of 1762-7 (redrawn).
[28] Ledger 1795-1804, 40L.
[29] Correspondence Book, 26 November 1791. The quotation is from a later letter of 3 January 1792.
[30] It was described as 'nearly finished' on 1 September 1792 (Correspondence Book).
[31] Samuel Evans & Co. are listed as paper manufacturers at Darley Abbey in T. Bulmer & Co., *History, Topography, and Directory of Derbyshire* (Preston, 1895), 737. A large complex labelled 'Paper Mill' appears on the second revision of the Ordnance Survey 1:2500 map, Derbyshire Sheet L.5, 1914 (revised 1913).
[32] Ordnance Survey 1:2500 map, Derbyshire Sheet L.5, 1946 (revised 1938).
[33] For Oldknow, see George Unwin, with Arthur Hulme & George Taylor, *Samuel Oldknow and the Arkwrights: The Industrial Revolution at Stockport and Marple* (Manchester, 1924), 177-8. For Strutt, see R.S. Fitton & A.P. Wadsworth, *The Strutts and the Arkwrights, 1758-1830: a study of the early factory system* (Manchester, 1958), 241-4.
[34] Fitton & Wadsworth (1958), 164-6.
[35] Fitton & Wadsworth (1958), 242; Lindsay (1960), 279-80.
[36] *World Heritage Nomination* (2000), 106; Maxwell Craven & Michael Stanley, *The Derbyshire Country House* (Derby, 1991), 67.
[37] *World Heritage Nomination* (2000), 108.
[38] Joseph Barlow Robinson, *Derbyshire Gatherings: A Fund of Delight for the Antiquary, the Historian, the Topographer, the Biographer, and the General Reader … &c.* (London, 1866), 62.
[39] Peters (1974), 32-3; R.S. Fitton, *The Arkwrights, Spinners of fortune* (Manchester, 1989), 224 & 236.
[40] *World Heritage Nomination* (2000), 108.
[41] This was also the date given in the 1862 article for the building of the first mill (*Illustrated Times*, 26 July 1862, 210, c.1).

[42] *Derby Mercury*, 25 January 1787, 4, c.2. The advertisement added that 'It is a very good neighbourhood for the Men getting work who are not employed in the Manufactory'.
[43] Correspondence Book, 23 December 1787, 4 October 1791 and 22 November 1796.
[44] Correspondence Book, 29 October 1787.
[45] Correspondence Book, 3 October 1788.
[46] Peters (1974), 46, mistakenly gives the date of the newspaper article describing it as the date of the fire itself.
[47] *Derby Mercury*, 4 December 1788, 4, c.4; the first paragraph is quoted in Lindsay (1960), 280, n.14. At the bottom of the same column of the *Mercury* the following announcement was printed: 'Messrs. Evans, deeply impressed with a Sense of the Zeal and Activity manifested by their numerous Friends, in endeavouring to serve them on occasion of the late dreadful Fire at Darley, beg leave to offer their most grateful Acknowledgments for their strenuous, though unsuccessful, Exertions. Derby 2d Dec. 1788.'
[48] *Derby Mercury*, 4 December 1788, 4, c.2.
[49] Correspondence Book, 3 December 1788.
[50] Correspondence Book, 27 December 1788.
[51] James Pilkington, *A View of the Present State of Derbyshire; with an account of its most remarkable antiquities* (2 vols., Derby, 1789), II, 176. The firm's responses to the Factories Inquiry Commission dated the rebuilding of the mill to 1789 (Factories Inquiry (1834), Lancashire District, 92, Answer 3).
[52] Correspondence Book, 6 July 1790.
[53] Correspondence Book, 28 August 1791.
[54] Peter Barfoot & John Wilkes, *The Universal British Directory* (5 vols., London, 1793-98; rpt. Castle Rising, 1993), II, 885.
[55] Correspondence Book, 22 December 1791.
[56] Correspondence Book, 5 May 1792.
[57] Barfoot & Wilkes (1793-8), II, 332.
[58] Correspondence Book, 3 April 1792.
[59] Correspondence Book, 3 September 1803.
[60] Correspondence Book, 14 August and 15 November 1797.
[61] Correspondence Book, 17 October 1803.
[62] See 'Building east of Middle Mill', below.
[63] The Correspondence Book, however, suggests that the company name did not change (to Walter Evans & Co.) until 1799.
[64] Ledger 1795-1804, 16L-17R, 116R and 160L-161L.
[65] Ledger 1795-1804, 110L, 119L-120R, 141L and 143L.
[66] Ledger 1795-1804, 28L-29R, & 121R. There is also a letter in the Correspondence Book, dated 28 October 1796, requesting delivery of a stone for a 'new wheel house on the Chester side'. The 'Chester side', as already mentioned, refers to the eastern bank of the Derwent. The order is for 'a stout perfect stone', 4ft 9in by 5ft 2in and 7 or 8in thick.
[67] Ledger 1795-1804, 188R, entry dated 12 October 1798.
[68] Ledger 1795-1804, 77L & 186L.
[69] Ledger 1795-1804, 185R-186L and 228R-229L. The name 'Shrogs' is also applied to the forge thought to have operated at Darley in the 17th century (*World Heritage Nomination* (2000), 83).
[70] Ledger 1795-1804, 132R, 133L, 163R, 186R-188L, 243L.
[71] Ledger 1795-1804, 62R. See also 163R.
[72] Ledger 1795-1804, 26L. The cost of the work was £167 9s 9d.
[73] Ledger 1795-1804, 131L & R, 207L.
[74] Ledger 1795-1804, 188R-189R, 243R-244L.
[75] Ledger 1795-1804, 188R & 189L.
[76] Correspondence Book, 10 November 1804.
[77] Ledger 1804-10, 134L; Correspondence Book, 26 September 1804.
[78] Correspondence Book, 16 May 1807.
[79] Farey (1811-15), III, 488.
[80] Correspondence Book, e.g. 1 April 1808.

[81] Ledger 1804-10, 2L & R and 159L & R. The quotations are from 159R.
[82] Ledger 1804-10, 6L & R, 85L-86R.
[83] Ledger 1795-1804, 149L.
[84] Ledger 1804-10, 6L.
[85] Ledger 1795-1804, 115L & R, 118L, 132L, 141R and 249R. The Boat House was situated in the 'Meadow'. Mention of 134 sheaves of straw in connection with it may indicate that it was thatched, or perhaps more plausibly that it incorporated a loft or upper floor of gypsum plaster laid on straw. The substantial sum of £382 15s 11¼d, expended on the Boat House between October 1804 and August 1805, suggests enlargement or rebuilding (Ledger 1804-10, 90L & R. See also 78R). The 'C[otton] M[ill] Boat' had earlier been repaired in May 1799 (Ledger 1795-1804, 188R).
[86] Ledger 1804-10, 90L & R.
[87] Ledger 1804-10, 197L.
[88] Ledger 1804-10, 1L & R.
[89] Ledger 1795-1804, 188R.
[90] Ledger 1795-1804, 243R.
[91] Correspondence Book, 10 July 1789.
[92] Ledger 1804-10, 92L.
[93] Ledger 1795-1804, 189L.
[94] Ledger 1804-10, 166L. The accounts indicate that the Dinner House was of brick, with a slate roof. Sash frames were shipped all the way from Manchester.
[95] Correspondence Book, letter to William Edwards, 22 December 1791.
[96] Ledger 1795-1804, 48L. Whitehurst is also credited with making, in 1760, a device for reading, inside Darley House, the wind direction as recorded by a weather vane. This must initially have been installed elsewhere, since Darley Hall was not built until 1785 (Peters (1974), 85).
[97] Ledger 1804-10, 53R.
[98] Stock Book 1815–1826, DRO D5231/5/1 (henceforth Stock Book). This is foliated in the same manner as the two Ledgers, and is referenced in the same manner.
[99] Stock Book, 1L.
[100] The same dates were given in response to the Factories Inquiry Commission as appear in the Stock Book, though without the costs (Factories Inquiry (1834), Lancashire District, 92, Answer 3). See also Lindsay (1960), 280.
[101] George Sanderson, *Map of the Country Twenty Miles Round Mansfield, Comprising parts of the Counties of Nottingham, Derby, York, Lincoln & Leicester … From Actual Survey made in the Years 1830, 1831, 1832, 1833, & 1834*, Mansfield, 1835. The scale of Sanderson's map is two inches to one mile, just sufficient to distinguish individual buildings, though too small to place great reliance upon where smaller buildings are concerned.
[102] Stephen Glover, *The History of the County of Derby* (2 vols. [of a projected longer sequence], Derby, 1829), I, 252.
[103] Samuel Bagshaw, *History Gazetteer and Directory of Derbyshire* (Sheffield, 1846), 99.
[104] *Illustrated Times*, 26 July 1862.
[105] *Derbyshire Advertiser*, 12 March 1943; clipping preserved in Mr Nelson's album.
[106] *Worrall's Textile Directory of the manufacturing districts of Ireland, Scotland & Wales, and the counties of Chester, Derby, Gloucester, Leicester, Nottingham, Worcester … [etc]*, 8th edition (Oldham, 1905), 37. Glacé is thread with a pronounced lustre; Maltese thread was perhaps destined for use in the manufacture of Maltese lace.
[107] J. Peacock is listed as the cotton mill manager in Bulmer & Co. (1895), 738.
[108] *Derbyshire Advertiser*, 12 March 1943.
[109] Dated photographs in Mr Nelson's album.
[110] Brierley Hill is near Dudley, West Midlands.
[111] Dated photographs in Mr Nelson's album.
[112] The steel carries the 'SHELTON' rolling mark of the Shelton Iron, Steel & Coal Company of Stoke-on-Trent. Alongside Hickman's, Patent Shaft and Round Oak, it was one of the four principal Staffordshire steelmaking firms, all of which had origins in the late 19th century. In 1920 it was purchased by John Summers & Sons, sheet makers of Shotton and Ellesmere Port, but the

Shelton rolling mark may have continued in use (information kindly provided by Jonathan Clarke, citing J C Carr & W Taplin, *History of the British Steel Industry* (Cambridge, Ma., 1962)).
[113] *Derbyshire Advertiser*, 12 March 1943 [check].
[114] Mr Nelson's album.
[115] *Derbyshire Advertiser*, 12 March 1943; *Derbyshire Evening Telegraph*, 10 November 1952; unsourced newspaper clipping, dated 2 February 1970, in Mr Nelson's album.
[116] Unsourced newspaper clipping, dated 2 February 1970, in Mr Nelson's album.
[117] Information in this paragraph is derived principally from Craven & Stanley (1991), 68-9. Gardner, whose early career included work with the Derby architect, Joseph Pickford, also worked for Richard Arkwright at Willersley Castle, Cromford, between 1792 and 1795, repairing the damage caused to the newly built house by a fire in 1791 (Howard Colvin, *A Biographical Dictionary of British Architects 1600-1840*, 3rd edn (New Haven & London, 1995), 391-2).
[118] Information in this paragraph is condensed from Craven & Stanley (1991), 65-8, and Colvin (1995), 753.
[119] Reproduced in Craven & Stanley (1991), 67.
[120] For Darley, see Rodwell (2001), *passim*, and *World Heritage Nomination* (2000), 86-90 and map between pages 84 & 85, on which this section is principally based.
[121] *Illustrated Times*, 26 July 1862, 210, c.1.
[122] Nikolaus Pevsner, *The Buildings of England: Derbyshire*, 2nd edn, rev. Elizabeth Williamson, corrected rpt (Harmondsworth, 1986), 193; Colvin (1995), 1072.
[123] Pevsner (1986), 193; T. Bulmer & Co., *History, Topography, and Directory of Derbyshire* (Preston, 1895), 737.
[124] Contemporary mills of four storeys and eight bays can be paralleled at Haarlem Mill, Wirksworth, built by Richard Arkwright *c*1778, and Peel Mill, Burton on Trent, Staffordshire, of *c*1782. However, Haarlem Mill harnesses the water of a much smaller stream, the River Ecclesbourne. Mills of seventeen bays are not unparalleled in the period: Arkwright's Masson Mill, Cromford (1783-4), has 21 bays.
[125] The reluctance to build on a recently backfilled channel is understandable.
[126] Re-drawn in *World Heritage Nomination* (2000), 85.
[127] J B Harley, D V Fowkes and J C Harvey (eds), *Burdett's Map of Derbyshire 1791* (Derby, 1975).
[128] A similar plan was adopted on Arkwright's first Cromford Mill of 1771, though here the motive for placing the entrance in the flank wall, rather than the gable wall facing the road, was to bring it within the secure perimeter of the mill site.
[129] Ledger 1795-1804, 72R.
[130] The variation is not without parallel. The much later South Mill, part of the Bridgett's (later Rykneld Tean) Mill, Derby, was built in the 1820s in fireproof construction, but the sixth floor has a compartmented timber ceiling.
[131] For the evolution of column and beam types, see particularly Ron Fitzgerald, 'The Development of the Cast Iron Frame in Textile Mills to 1850', *Industrial Archaeology Review*, 10, Part 2 (Spring 1988), 127-45.
[132] This form of window survives in the following nine locations. *Ground floor*: eastern side – first and third windows north of Middle Mill and first window north of hoist tower. *First floor*: eastern side – first window north of Middle Mill; south end, central window. *Second floor*: eastern side – third window south of north end; north end – eastern window; western side, second window from north. *Third floor*: eastern side – second window north of Middle Mill.
[133] The request was for 45 casements to a model which the Evanses supplied; 'If you can cast them with holes in for the Hinges to be good, should like it better, but if not thought well, to cast them solid and to have the hole drilled when they come hither' (Correspondence Book, 12 February 1799).
[134] Factories Inquiry (1834), Lancashire District, 92, Answer 5: 'part of the old mill has now sash windows, and most of the other windows have casements which open'.
[135] In the 1791 letter to the insurers, the width of the attic was given as 'about 12ft' (3.66m), a figure which conflicts equally with the 5.20m between the ashlaring and the 2.76m of maximum

headroom between the queen-posts. Perhaps the estimate of 12ft was given off the cuff, without measurement.
[136] The bell was cast in 1793 and re-cast in 1936.
[137] Source?
[138] Information kindly provided by Mr John Nelson.
[139] *Illustrated Times*, 26 July 1862.
[140] Colum Giles & Ian H Goodall, *Yorkshire Textile Mills: The Buildings of the Yorkshire Textile Industry 1770 – 1930* (London, 1992), 175.
[141] Menuge (1993), 43-5 and Plate 4.
[142] Correspondence Book, 22 December 1791.
[143] Letter to William Edwards, Correspondence Book, 5 May 1792. The attic is referred to as the 'Roof Room'.
[144] Their absence from the 1862 bird's-eye view is not decisive, as the illustration clearly takes certain liberties with details.
[145] Sara Wermiel, 'The Development of Fireproof Construction in Great Britain and the United States in the Nineteenth Century', *Construction History*, 9 (1993), 3-26: 4.
[146] J G Coad, 'Two early attempts at fire-proofing in Royal Dockyards', *Post-Medieval Archaeology*, 7, 88-90.
[147] Giles & Goodall (1992), 63.
[148] Anthony Calladine & Jean Fricker, *East Cheshire Textile Mills* (London, 1993), 52.
[149] Ledger 1795-1804, 124R. There are various mentions of 'screw pins' and 'plates' during 1799 and 1800 in the Cotton Mill building account (189L), but the purpose of the plates is nowhere identified and the quantities are small.
[150] Evans & Co. reported in 1833 that 'There are sash windows which open half the full size of the windows, in the whole of the three additions to the mill' – i.e. Middle Mill, East Mill and West Mill (Factories Inquiry (1834), Lancashire District, 92, Answer 5).
[151] Mr Nelson's album.
[152] Ledger 1795-1804, 62R. See also 163R.
[153] Ledger 1795-1804, 109R. If the identification is correct, the length of ridge must include the largely demolished range to the south-east of the house.
[154] The other is the Bump Mill at Robinson's Walton Works, Chesterfield. Here the skewbacks are of timber clad in sheet metal; the two ranks of columns are believed to be replacements of a single original rank (information kindly provided by Dr Patrick Strange).
[155] Johnson, H R and Skempton, A W. 'William Strutt's Cotton Mills, 1793-1812', *Transactions of the Newcomen Society*, XXX (1955-57), 179-205; Keith A. Falconer, 'Fireproof Mills – The widening perspectives', *Industrial Archaeology Review*, XVI, No. 1 (Autumn 1993), 11-26.
[156] They also favoured their erstwhile partners, the Arkwrights: at Masson Mill there is a range employing columns of the Strutt pattern in association with the cast-iron fireproof construction developed by the Strutts in the early years of the 19th century. See Adam Menuge, 'Masson Mills, Cromford, Derbyshire', RCHME Historic Building Report, NBR No. 87315 (1992), 9-10.
[157] Shelley White, 'Walton Works, Chatsworth Road, Chesterfield', Ironbridge Archaeology Series 136, 2003. I am grateful to Dr Patrick Strange for bringing this to my attention, and to Dr Andrew Myers of Derbyshire County Council for making available a copy of the report.
[158] Ledger 1795-1804, 109R (two bills totalling £43 10s 3d bracketed together against 'New Shops') and 136L ('Coulson for slating … 43.10.3').
[159] A 19th-century surveying manual notes that in calculating slaters' and tilers' work '*chimney shafts* are generally deducted, if they be large' (A Nesbit, *A Treatise on Practical Mensuration* (London, 1853), 188).
[160] Correspondence Book, 28 November and 9 December 1797. The supplier was George Bassett of Mayfield, near Ashbourne.
[161] Correspondence Book, 16 January 1800. This order (not the first, as it was described as 'same as before') was to Smith & Co. of the Griffin Foundry, Chesterfield.
[162] Ledger 1795-1804, 188R.
[163] The 'New Shops' are first mentioned on 22 December 1797 (Ledger, 1795-1804, 2R).
[164] Ledger 1795-1804, 220L.

[165] Ledger 1795-1804, 220R.
[166] Ledger 1795-1804, 222L & 287L.
[167] Ledger 1795-1804, 243R.
[168] *Illustrated Times*, 26 July 1862, 210, c.2.
[169] The doorway still in use is the eastern doorway on the south front, though it has evidence for an earlier, lower springing point, suggesting a degree of rebuilding. The other south doorway was infilled in two phases: first it was adapted to form a pedestrian doorway; then this was converted into a window (the two-light frame is similar to a number in the Manager's House (3). Of the two rear doorways, the western one was first narrowed, then infilled to create a window; the other was also adapted to incorporate a window, now blocked. It would appear that the original openings went out of use at a comparatively early date.
[170] The window was subsequently widened to the west, and has a segmental head formed from a single row of headers.
[171] Falconer (1993), 21, Fig 3.
[172] The stair has been modified by the insertion of an iron bearer, probably re-used.
[173] Stock Book, 1815-26, 60R.
[174] The sash windows were mentioned to the Factories Inquiry Commissioners (Factories Inquiry (1834), Lancashire District, 92, Answer 5).
[175] No such feature appears in the 1862 bird's-eye view, nor do the 1944 plans offer any clue to its purpose.
[176] The 1944 plan shows a smaller doorway towards the south end of the west wall.
[177] Stock Book 1815-26, DRO, D5231/5/1, fol.60R. The entry is not dated, but must post-date the accompanying stocktaking account of 28 April 1820 (fol.60L).
[178] The beam lengths are secured at the columns by shrink rings.
[179] Three out of the four examples are just six panes wide.
[180] On the iron door to the chute there is a paper notice reading: 'NOTICE. No Mill Waste […] Washings to be put down the C[hute?] Paper ONLY to be u[s]ed. Any o[ne found gui]lty of breaking the regula[tions will be] fined FIVE SHILLINGS and will be liable [to] instant dismissal'.
[181] The date comes from a pencil graffito inside the room. Another reads 'James Russell Darley Mills'.
[182] For example, it was used by George Watkins in his 1969 notes on the power system (Site 1279, Watkins Collection, National Monuments Record, Swindon).
[183] *Illustrated Times*, 26 July 1862, 210, col. ii.
[184] DRO, D5231/5/1.
[185] Sanderson (1835).
[186] In the westernmost bay the rear roof pitch has been replaced above the purlin by a flat joisted roof, in order to accommodate a later hoist. The hoist, by Wadsworth of Bolton, was belt-driven via a power take-off on the second-floor line-shaft.
[187] Ordnance Survey 1:2500 map, Derbyshire Sheet L.5, 1882 (surveyed 1881).
[188] Watkins Collection.
[189] Watkins Collection.
[190] Ledger 1804-10, 182L.
[191] Correspondence Book, 22 December 1791; Ledger 1795-1804, 48L.
[192] NMR neg. no. BB001860.
[193] DRO, D5231/5/1, 2L (entry dated 25 March 1826).
[194] *Illustrated Times*, 26 July 1862, 210, c.1.
[195] NMR neg. no. BB001861.
[196] It is absent from Sanderson's map of 1830-34, its position being occupied by the word 'Mill'.
[197] Information provided by John Elliott.
[198] Correspondence Book, 28 March & 4 June 1790, 19 February 1797, 25 June 1805 and 19 November 1806; Ledger 1804-10, 212L & 296R.
[199] Ledger 1795-1804, 243R.
[200] Information on the engine is derived principally from manuscript notes in the Watkins Collection, National Monuments Record, Swindon.
[201] Watkins Collection.