

## WILLIAM STRUTT OF DERBY (1756-1830).

By C. L. HACKER.

THE name of Strutt, in connexion with early cotton mills, popularly implies Jedediah Strutt, inventor of the Derby rib machine and partner of Richard Arkwright. Few people have heard of Jedediah's more brilliant son, William. William's reputation during his life, and for one or possibly two generations after his death, was nearly as high and as widespread as it deserved to be, yet during the course of a hundred and fifty years he has been almost completely forgotten.

It was Professor Bannister who rediscovered him, when making an architectural study<sup>1</sup> of early iron-framed buildings, and this led Professor Skempton and H. R. Johnson<sup>2</sup> to a detailed investigation of the Derbyshire mills. They found not only that William was an able engineer but that, owing to the particular fire-proof form in which he constructed his mills, he was largely responsible for the erection of the first iron-framed buildings. Dr. R. S. Fitton and A. P. Wadsworth subsequently gave a clear description of the work of the various members of the Strutt family in their book on the Strutts and the Arkwrights,<sup>3</sup> and William began to emerge as a person.

Yet, in spite of this research, he is still relatively unknown; and in February 1960 Professor Skempton, accompanied by myself, found a torn and long-forgotten portrait of him in the attics of the Derby Infirmary (Plate IX). William had contributed in so many ways to the original Infirmary that a subscription was raised in Derby for this painting to be made and, on its completion, it

<sup>1</sup> T. Bannister, "The first iron-framed buildings", *Architectural Review*, vol. 107, 1950, 231-46.

<sup>2</sup> H. R. Johnson and A. W. Skempton, "William Strutt's cotton mills 1793-1812", *Trans. Newcomen Soc.*, vol. 30, 1956, 179-205.

<sup>3</sup> R. S. Fitton and A. P. Wadsworth, *The Strutts and the Arkwrights 1758-1830*, Manchester Univ. Press, 1958.

was hung in the Board Room. Its symbolic relegation to the attics clearly indicates that it is time that both William Strutt and his portrait were dusted and once again set before the public.

He was born at Blackwell, near Alfreton, in Derbyshire on 20 July 1756<sup>4</sup> and was the eldest of five children. At the time of William's birth, Jedediah was poor, a young wheelwright who had recently been left the stock of a small farm. But it was also at about this time that Jedediah patented his machine for making ribbed hose. He ceased to be a wheelwright and did not become a farmer. Instead, he entered into partnership with his brother-in-law, William Woollatt, and Samuel Need of Nottingham to manufacture hosiery. Owing to the rib machine and owing to Need's capital the venture was successful. About 1770 they took Richard Arkwright into partnership and he brought with him his roller-spinning machine. Cotton-spinning then became their principal concern and remained so after Arkwright left in 1781. Strutt's firm, which had been centred on Derby, soon spread to Milford and Belper, and by the early years of the 19th century it was the largest business of its kind in the country.

Alongside this growing industry, William grew to manhood. In 1757 his mother had written:

"Tell my Dear Billy thay talk much of him at London & if he is a good Boy ye Dr says he shall be a parson & do Honour to their Cloth."<sup>5</sup>

But it must soon have been evident that his future would be in the cotton-spinning trade. Nothing more is heard of his becoming a parson; and, having attended the schools of Mr. Gregory of Findern, Mr. Lowe of Norton and Mr. Wilkinson of Nottingham, he entered his father's firm when he was about fourteen. At the age of eighteen he appears successfully to have supervised the working of the mills at home while his parents were in London,

<sup>4</sup> The general information on William Strutt's life has been taken from a typescript in the Derby Public Library, entitled *William Strutt*, and from Fitton & Wadsworth. The typescript is anonymous, but internal evidence indicates that the author was the Hon. Frederick Strutt, William's grandson.

<sup>5</sup> Letter from Elizabeth Strutt to her husband, 10 May 1757; Fitton and Wadsworth, 31.

and in the following year, 1775, he was himself visiting the firm's London warehouse. But he and his brothers would have been steeped in the affairs of the mills long before they officially started work there, for they were living among the industry. The running of the machines, the advisability of building another mill, the behaviour or production of the mill-hands: such topics must have been a regular part of the conversation. And, as Jedediah's prosperity was due initially to mechanical inventions, their importance would not have been lost on his children.

They were given a careful and obedient upbringing, mixing from necessity only with the local industrial families such as the Arkwrights, the Evans and the Needs; and the correspondence between the parents and children when the former were in London in 1774 gives a picture of a quiet, domestic existence. The emphasis is largely upon economy and duty, whether one of the boys really requires a new coat or whether his old one could be turned, the hanging of bacon, and so on. A formal and very dutiful letter from William to his mother, thanking her for a present of some buckles, is one of many which show how earnest the children were in their efforts to follow the precepts set for them:

"It is the deepest sense of Gratitude that obliges me to write to thank you & my Father for all the favours I have received from you but especially for what you have now sent, tho' I want Words to express my sense of the Obligation you have conferr'd upon me, let my Actions & Conduct witness the sincerity of my resolutions to please you & to conform to every thing that is Virtuous & Praiseworthy. The Buckles are very neat and exactly what I could have wished . . ."<sup>6</sup>

Besides instructing the girls in careful household duties and the boys in the business, Jedediah was continually encouraging his children to acquire knowledge and manners which would make them fit for a higher form of society than that to which he had been born.

"I need not tell you," he wrote to William in 1774, "that you are not to be a Nobleman nor prime minister, but you may possibly be a Tradesman of some emminence . . . & you may

<sup>6</sup> Letter from William Strutt to his mother, 8 May 1774; Fitton and Wadsworth, 127.

be assured if you add to the little learning & improvement you have hitherto had, the Manners, the Air, the genteel address, & polite behaviour of a gentleman, you will abundantly find your acct in it in all & every transaction of your future life — when you come to do business in the World.”<sup>7</sup>

The young Strutts were told to perfect their French, to mix only with people from whom they could benefit in the form of manners or learning, and Jedediah also encouraged William to learn to dance well, either by going to school or by “entering company & assembly where you can improve yourself”.<sup>8</sup> Accompanying the letter quoted above, he sent William a copy of Lord Chesterfield’s Letters to his son.

When Jedediah died in 1797 his business was carried on by his three sons<sup>9</sup> under the title of W. G. & J. Strutt. William, it seems, was mainly concerned with the technical side, Joseph with the commercial aspects and George, who lived at Belper, was chiefly in charge of the mills there and at Milford.

Under the brothers the business grew. New mills had to be built for the increased trade, and cottages were necessary in the surrounding neighbourhood to lodge the factory workers.

It was due to the expansion of the firm, which had of course begun during Jedediah’s lifetime, that William was able to demonstrate his skill as an engineer. The construction of his mills has been dealt with very thoroughly in the paper by Johnson and Skempton,<sup>10</sup> and it will therefore only be necessary to mention the buildings in outline.

The most important of William Strutt’s achievements was that he was the first person who successfully attempted the construction of fire-proof buildings on a large scale in England. At the turn of the century it was urgently important to industrialists that some means should be found of preventing fires from spreading, for they started so easily from overheated machinery, naked lights, and

<sup>7</sup> Letter from Jedediah Strutt to his son William, 17 August 1774; Fitton and Wadsworth, 145.

<sup>8</sup> Fitton and Wadsworth, 145.

<sup>9</sup> Until his death in 1800, Jedediah’s brother William was also in the business.

<sup>10</sup> *Trans. Newcomen Soc.*, 1956.

so on. In the *Derby Mercury* alone, there are numerous instances of fires which consumed mills with all their stock, and Strutt and Arkwright lost their Nottingham mill in this manner in 1781;<sup>11</sup> but the final impetus towards an improved construction was probably the burning of the famous Albion Mills in London in 1791<sup>12</sup> where £150,000 worth of damage was caused.

William began his first fire-proof mill at Derby in the following year (Fig. 12). It was completed in 1793. It was six storeys high, with cast-iron cruciform columns and massive timber beams which were protected by plaster on their undersides and supported brick arch floors. The topographers Britton and Brayley<sup>13</sup> wrote in 1802 that it was

“remarkable for its floors being constructed on brick arches, and paved with brick, by which means it is rendered absolutely indestructible by fire. This building is six stories high, 115 feet long and 30 feet wide; it was erected in the year 1793, and was the first *fire-proof* mill that was ever built.”

The 4-storey warehouse at Milford, built simultaneously with the Derby structure, and the West Mill at Belper, 1793-95, were of similar construction. Strutt used hollow pots in some parts of these buildings, a device which had recently been introduced in the Palais Royal in Paris, and he had taken the trouble to learn as many details as possible.

These mills were obviously of immense importance to contemporary mill-owners and engineers, but they are even more important in the history of structural engineering. For Strutt had prepared the ground. Only cast-iron beams had to be substituted in place of the timber beams, and one had iron-framing. It was Charles Bage<sup>14</sup> who took this step, not Strutt, but he was obviously inspired by Strutt's mills and we know<sup>15</sup> that the two men were in correspondence at the time. Many of the features of Strutt's fire-proof mills, such as the brick-arch floors and

<sup>11</sup> *Derby Mercury*, 15 November 1781.

<sup>12</sup> *Derby Mercury*, 10 March 1791.

<sup>13</sup> J. Britton and E. W. Brayley, *The Beauties of England and Wales*, vol. 3, 364, 1802.

<sup>14</sup> A. W. Skempton, “The origin of iron beams”, *Actes du VIII<sup>e</sup> Congrès International d'Histoire des Sciences*, 1029-1039, 1956.

<sup>15</sup> Bage-Strutt correspondence, Shrewsbury Public Library.

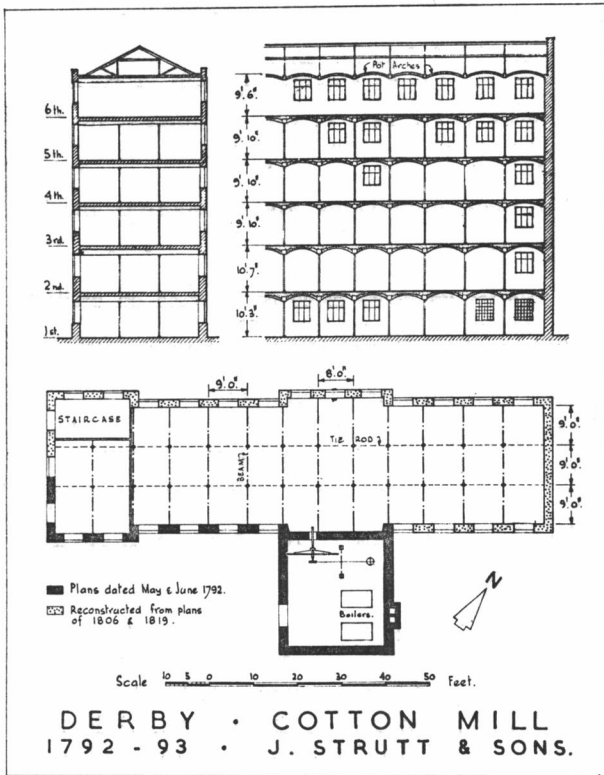


FIG. 12. Drawing by H. R. Johnson showing the form of construction used in the Derby Mill (Johnson and Skempton 1956).

the cruciform cast-iron columns, were used in Bage's design. His mill, which was a flax mill in Castle Foregate, Shrewsbury, was erected in 1796-7 for Thomas and Benjamin Benyon and John Marshall; it was the first multi-storey building with iron-framing.

Here it must be emphasized that the Shrewsbury mill was not iron-framed in the modern sense of the word, for the brick walls took much of the load in supporting the building. Load-bearing iron-framing in the external walls in multi-storey buildings was not achieved in England for another sixty years. But the Shrewsbury flax mill is of the utmost significance since, following as a logical step from Strutt's fire-resisting mills, it is one of the early links in the chain of engineering experience which ultimately produced the skyscraper.

William Strutt's next mill, the North Mill at Belper (1803-04), naturally had iron beams as well as iron columns and so did the East Wing added to the Milford Warehouse in 1805-06, the Reeling Mill and the South Mill at Belper (1807-08 and 1811-12 respectively). In these buildings the design of the beam was improved, and from Bage's hefty bars of iron Strutt produced a lighter, more serviceable iron beam, which is not so very different from those used today.

Yet the building for which William Strutt was chiefly celebrated by his contemporaries was not one of the mills, but the Infirmary at Derby (Plate X).

The idea of building the Infirmary was first broached in November 1802 by the Rev. Thomas Gisborne.<sup>16</sup> He was one of the trustees for Isaac Hawkins, who had left £5,000 to be used for charitable purposes. A meeting of the leading inhabitants of the county and town of Derby was called in April 1803<sup>17</sup> and the money was accepted for the proposed infirmary. From then on, meetings were called frequently, and subscriptions mounted by the thousand. Anyone who had donated more than £50 was on the Subscriber's Committee<sup>18</sup> and, as William Strutt had, like his brothers, given £300, he would have been on this committee. In 1804<sup>19</sup> plans were submitted for

<sup>16</sup> J. H. H. Grant, *A Brief History of the Derbyshire Infirmary*, 1924.

<sup>17</sup> *Derby Mercury*, 7 April 1803.

<sup>18</sup> *Derby Mercury*, 6 October 1803.

<sup>19</sup> *Derby Mercury*, 9 August 1804.

the proposed infirmary, in answer to an advertisement, but were considered inadequate and a design proposed by the sub-committee was adopted. Working drawings were then made from this design by Mr. Samuel Brown, a drawing master, and executed by the engineer Charles Sylvester. A "person willing to Contract for the execution of Brickwork and Masonry . . . including the getting out foundations, making drains &c." was advertised for in the *Derby Mercury* for 28 March 1805, and the Infirmary was finally opened on 4 June 1810.

In all this William Strutt's name does not figure largely. However, it was he who produced the sub-committee's design and it was he who was the moving spirit in the building of the hospital. A few contemporary tributes will illustrate this.

Samuel Glover<sup>20</sup> wrote of the Infirmary:

"The design of the building was arranged by William Strutt, esq., F.R.S., according to which working plans were drawn by Mr. Browne", and again

"William Strutt, esq., F.R.S., was the principal director in the arrangement and construction of the Derby Infirmary . . . He was much esteemed by his townsmen who have subscribed for his portrait, and placed it in the Infirmary as a token of their respect for his valuable services to the Institution."<sup>21</sup>

Maria Edgeworth<sup>22</sup> went even further.

"He built it," she wrote, "a noble building; hot air from below conveyed by a *cockle* all over the house. The whole institution a most noble and touching sight; such a GREAT thing, planned and carried into successful execution in so few years by one man!"

But Charles Sylvester is the most authentic authority, since he was actively concerned in the construction, and his tribute to Strutt in the dedicatory letter to his book on the Infirmary is worth quoting:<sup>23</sup>

"There is no one to whom my work could with so much propriety be inscribed as to yourself. Among the numerous and munificent patrons of the Derbyshire General Infirmary, you stand distinguished, for the benevolent attention which you have unremittingly bestowed upon its interests, no less than for the

<sup>20</sup> S. Glover, *The History of the County of Derby*, vol. 2, 506, 1829.

<sup>21</sup> Glover, 574.

<sup>22</sup> Letter from Maria Edgeworth to Miss Honora Edgeworth, 25 April 1813; A. J. C. Hare, *The Life and Letters of Maria Edgeworth*, vol. 1, 196, 1894.

<sup>23</sup> C. Sylvester, *The Philosophy of Domestic Economy*, Nottingham, 1819.





PLATE IX. Portrait of William Strutt.



PLATE X. View of the Derbyshire General Infirmary engraved by J. Pye,  
drawn by E. Goodwin (C. Sylvester 1819).

eminent ability displayed by you in the original plan, and all the subsequent arrangements, which have rendered this institution the just object of general admiration. To the exertion of your powerful mind and well directed intellect, the inventions and improvements detailed in the work now submitted to the public are entirely due; and it is with the most lively gratitude that I recollect the hours we have passed together, in discussing the philosophical principles on which they are founded."

The Infirmary was one of William Strutt's great contributions to public life. In this building he introduced such improvements as day rooms for convalescents, a separate fever house which was part of the hospital yet had no internal connection with the other wards, and smaller wards of two or three beds (Fig. 13). Generally, at that time, the ill, the very ill and the dying, and both medical and surgical cases were crowded together in one large room. In the Derby Infirmary it was possible to segregate the patients.

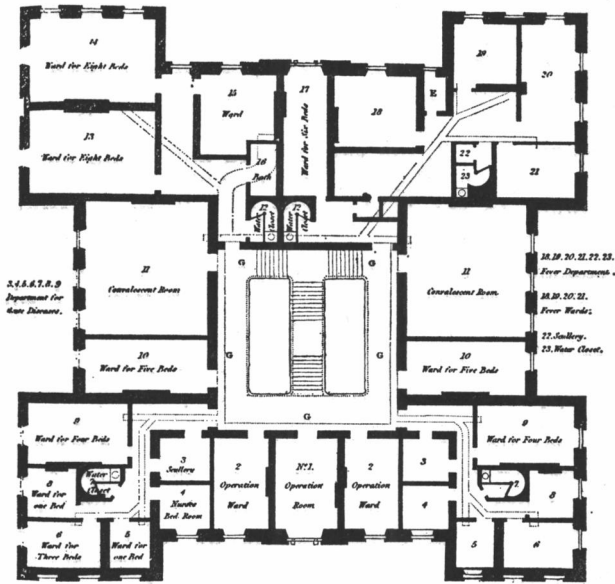
A considerable number of technical innovations were incorporated in the design, the most famous of which was the system of warming the hospital. A stove in the basement heated air, which was conveyed round the building in flues opening into the rooms on the upper floor which were appropriated for patients. An opening of identical dimensions provided a passage for the escape of foul air. An ingenious system of weather vanes ensured that the mouth of the foul air flue in the roof always faced away from the wind, while the mouth of the flue some distance from the hospital which brought in cold air to be heated always faced the wind.<sup>24</sup> This hot air system, invented by Strutt, had been used in his mills as early as 1792.

Other new ideas developed in this hospital were: the laundry, where air was blown through the linen in order to give it the effect of being dried out of doors; a washing machine; a new form of steaming table; a roaster for roasting meat or baking; a watch clock; and special doors for the water-closets that were

"so contrived that the person who enters them, by the action of the door, and without any attention on his part, expels all

<sup>24</sup> Sylvester, 3.4, and F. Oppert, *Hospitals, Infirmaries and Dispensaries*, 104. London 1867.

DERBY INFIRMARY.  
UPPER STOREY



Published June 1, 1819 by Longman, Hurst, Bosc & Co.

Large scale.

FIG. 13. Plan of the upper storey of Derby Infirmary (C. Sylvester 1819).

the foul air; which is at the same time replaced by the warm fresh air of the house: and, in returning, leaves this fresh air in its place; whilst by the same action of the door the basin is washed in the usual manner."<sup>25</sup>

The Infirmary was supported entirely by voluntary contributions and more than £31,000 (including interest) was amassed by 1809. As the cost of the land and building amounted to only £17,870. 3s. 4d., the charity had more than £13,000 to set it going. The 5th Duke of Devonshire was chosen to be President of the Institution when it was opened in 1810<sup>26</sup> and William Strutt, a governor by virtue of donation, was elected one of the two auditors for the coming year. He was continually re-elected auditor until his death.<sup>27</sup>

The Derbyshire Infirmary, and particularly its hot air stove, served as a model for a number of similar institutions, notably the Lunatic Asylum at Wakefield.<sup>28</sup> In 1818 one of the Governors of the Bristol Infirmary travelled to Derby to consult Strutt about improvements to the Bristol hospital<sup>29</sup> and, according to Strutt's obituary memoir, the fame of his Infirmary even spread to the continent. In spite of Florence Nightingale's revolution in nursing and hygiene, it was not rebuilt until 1891.

This building was Strutt's major contribution to his town, but it was far from being the only one. His obituary memoir<sup>30</sup> states:

"It would be no easy task to give a full account of the public works in which he took part, as it would be little less, than to describe the various improvements that have taken place in the town of Derby, for the last fifty years."

His entry into the public life of the neighbourhood can be dated to 1779 when, at the age of twenty-three, he was sworn a burgess of the borough of Derby, which entitled him to vote for its Members of Parliament. In 1788, when

<sup>25</sup> Sylvester, vi.

<sup>26</sup> *Derby Mercury*, 7 June 1810.

<sup>27</sup> Annual Reports of the Derbyshire General Infirmary, 1809-1830.

<sup>28</sup> Watson, C. and Pritchett, J.P., *Plans, elevations, sections and description of the Pauper Lunatic Asylum lately erected at Wakefield*, 32. York, 1819.

<sup>29</sup> Letter to William Strutt from his old friend the Rev. W. Burslem, 20 April 1818. Derby Public Library.

<sup>30</sup> "Memoir of William Strutt, Esq., F.R.S.", *Derby Mercury*, 12 January 1831. According to Baines, writing in 1835, this article was by Strutt's son, Edward.

only thirty-two, he was principally responsible for obtaining an Act of Parliament for the building of St. Mary's bridge over the Derwent, and he collaborated with the architect, Harrison, in the design.<sup>31</sup>

In 1792 he was at the head of a committee which obtained an Act for the paving and lighting of Derby. This was to be paid for by a small levy and by the enclosure of a part of the town known as Nun's Green, which had previously been common land. The latter move was unpopular and brought forward strong opposition. Among Llewellyn Jewitt's collection<sup>32</sup> are several ballads, which were distributed on broadsheets, and which illustrate the outcry against the enclosure. One verse of the Paving and Lighting Song goes:

"Next one from beggar's blood that sprung,  
To opulence grown is he;  
And *struts* along with iron rod,  
And swears you shan't be free."

Strutt, convinced that he was in the right, rode the storm and was also chairman of a second committee, which sat thirty-three years later, to extend the paving and lighting. This second bill was received with approval in Derby, testifying to the success of the earlier Act. The popular ballads are the only records of any criticism or dislike of Strutt. He is normally mentioned in terms of glowing praise, which speak boldly from the heart and are obviously not mere flattery of a rich and influential citizen.

William Strutt, with his brother Joseph, was also responsible for the founding of the first elementary school in Derby. It was run under the Lancastrian system. Joseph Lancaster had visited Derby in 1812 to address a public meeting and the school was begun shortly afterwards. Lancastrian schools had also been founded by the Strutts at Belper and Milford. This was a continuation of the policy of their father who, in 1785<sup>33</sup> had

"entirely at his own Expense, instituted a SUNDAY SCHOOL for the Benefit of ALL the Youth of both Sexes employed in his Cotton Mill . . ."

<sup>31</sup> *Derby Mercury*, 12 January 1831.

<sup>32</sup> Llewellyn Jewitt, *The Ballads and Songs of Derbyshire*. London 1867.

<sup>33</sup> *Derby Mercury*, 25 August 1785.

The Strutts were good employers. It is true that the ages of their mill-hands were often shockingly young, but with the establishment of the Lancastrian schools no children were taken into the mills until they could read. The minimum age of entry into the works seems to have been about ten years and, by the standards of the day, this was not scandalous. It must be remembered that William Strutt himself, the eldest son of a mill-owner, began his working career at fourteen.

A poem written when Edward Strutt, William's only son, was elevated to the peerage, gives a cheerful picture of life in the mills:<sup>34</sup>

"I wandered on a grassy bank by Derwent's silvery side,  
While busy hands in the town above the loom and shuttle plied;  
And ever and anon the ring of laughter's merry peal  
Resounded, and the workman's song above the whizzing wheel.  
Then here, said I, blithe industry can work and sing the while,  
Not thus is wont a grief-worn man his labour to beguile."

This is no doubt a very rose-tinted view, but certainly the conditions of the mill-hands were thoughtfully considered. The buildings, many of which are still standing, are light and airy, and the carefully conceived system of heating would have been a great benefit in the icy Derbyshire winters. Milk, meat, vegetables, potatoes and coal were supplied by the Strutts and could be bought at the mills for reasonable prices. Discipline was maintained by a system of fines which were deducted from the Quarterly Gift Money, and to keep order by such a humane method was a considerable achievement at this time.

Chapels and churches were also built, Friendly Societies formed, and a savings bank started. One feels a strong and just moral influence spreading over the local inhabitants. Joseph Strutt, the most artistically minded of the brothers, gave an Arboretum to Derby, a garden where rare trees could be seen and enjoyed, and he also opened his house for all who wished to inspect his pictures and other art treasures. However, it must not be forgotten that while William and his brothers were providing food,

<sup>34</sup> Lettice Digby, *My Ancestors, being the History of the Digby and Strutt Families*, 130, 1928.

religion and a little education for their dependent population, they were also extracting a twelve-hour day's work from these same people, and making a considerable fortune in the process.

But what was William Strutt like as a person? What sort of man was this public-spirited industrialist who showed such ability as an engineer?

A more intimate view of the man can be obtained by considering his circle of friends and acquaintances, which in his middle and later years was by no means restricted to the neighbouring mill owners. Of course, by the nature of his business, he was closely connected with the other industrialists; and his sister, Elizabeth, was married first to William and then to Walter Evans, the owners of the Darley mill, and William Strutt himself married Barbara, the sister of Walter Evans. He also remained in touch with the Arkwrights and was one of Sir Richard Arkwright's executors.

But Strutt was also in contact with some of the liveliest minds of his period. His interest in mechanics probably contributed to the friendship which grew between him and Dr. Erasmus Darwin when the latter moved to Derby in 1781. Erasmus, who was the grandfather of Charles Darwin, has been described by Coleridge as "the everything except the Christian".<sup>35</sup>

"Dr. Darwin," wrote Coleridge, "possesses, perhaps, a greater range of knowledge than any other man in Europe, and is the most inventive of philosophical men. He thinks in a *new* train on all subjects except religion."

With William Strutt he formed the Derby Philosophical Society which met weekly for scientific discussions. Erasmus Darwin was originally President, but on his death in 1802, Strutt was elected President and remained so for the rest of his life. The Society included such men as James Watt and Matthew Boulton (who provided the steam-engine for Strutt's mill at Derby) and Josiah Wedgwood.

Charles Sylvester, the engineer, Samuel Bentham and his brother Jeremy, Robert Owen and Charles Bage were

<sup>35</sup> *Collected Letters of Samuel Taylor Coleridge*, ed. E. L. Griggs, vol. 1, 177; letter to Josiah Wade, 27 January 1796.



also friends of William Strutt and lively technical discussions run through their letters. For instance, Samuel Bentham wrote to Strutt in 1805<sup>36</sup> enquiring about the drying of wood artificially; Charles Bage<sup>37</sup> corresponded on a diversity of scientific subjects, one of which was his experiments on the strength of iron beams; and a letter from Darwin to Strutt in 1801 reads:<sup>38</sup>

"Dear Sir,

1. I wish on Sunday morn to see the grand effects of your electrical apparatus.
2. To learn if positive electricity exists *in* glass or on it."

This is typical, terse and to the point.

It is easy to understand that Strutt should take trouble to be up-to-date with new buildings, but these letters indicate that his interests were far wider than they need have been. Consequently it is not very surprising to find him writing to Samuel Oldknow<sup>39</sup> in 1789 about Tom Paine's iron bridge, although this was the year before the design for the bridge was publicly known through its exhibition in London.

But perhaps the clearest idea of Strutt's scientific activity can be gained from an extract from his obituary memoir:<sup>40</sup>

"Amongst his other inventions and improvements, we may mention a self-acting mule for the spinning of cotton, (invented more than 40 years ago), but we believe that the inferior workmanship of that day, prevented the success of an invention, which all the skill and improvement in the construction of machinery of the present day, has barely accomplished.

"In conjunction with Dr. Darwin, he availed himself of a rude but original contrivance, called a Watchman's Tell-tale, and so improved upon it, as to form the present complete Watch-clock. This machine, though in use above 40 years, is only now beginning to be generally known, and applied to the services of the public.

"He was the first person who attempted the construction of fire-proof buildings on a large scale in this country, and with the most perfect success. The great improvements made of late

<sup>36</sup> Fitton and Wadsworth, 181.

<sup>37</sup> Strutt-Bage correspondence, Shrewsbury Public Library.

<sup>38</sup> *William Strutt*, 16. Letter from Dr. Darwin to William Strutt, 6 August 1801.

<sup>39</sup> G. Unwin, *Samuel Oldknow and the Arkwrights*, 222, 1924.

<sup>40</sup> "Memoir of William Strutt, Esq., F.R.S.", *Derby Mercury*, 12 January 1831.

years in the formation of Castings in iron, have given great facilities to this mode of construction, which is now very extensively in use.

"The connexion of the circumference of a circle with the center by suspension radii, is an invention entirely due to him. This principle combining great strength and lightness, has been most successfully applied to Water Wheels on a large scale, and is now coming rapidly into use in the wheels of carriages.

"The invention of a machine somewhat similar in external appearance to the sun and planet wheels, which were formerly used in steam engines, and its application to clocks and machines, for indicating & registering, the revolutions of rotatory machinery, was one of his latest efforts; and the simplicity, accuracy and complete novelty of this sort of clocks, will afford to the scientific world, sufficient evidence of his powerful genius and comprehensive mind.

"The success which attended his efforts in these and many other mechanical contrivances, as well as in the superintendence of public improvements of every kind, naturally created a general confidence in his judgment, and a deference to his opinion. On the introduction of any new project his sanction was eagerly sought for; and 'what does Mr. Strutt think of it', was a common subject of enquiry."

On 26 June 1817 he was made a Fellow of the Royal Society although, typically, he did not seek for the honour. James Watt, Marc Isambard Brunel, James Lawson, Richard Sharp and P. M. Roget were his proposers. No specific invention is mentioned on the certificate, but by this time the Infirmary had been running for seven years, and William had a very considerable reputation. How great this was may be gathered from Sir John Rennie's Presidential Address<sup>41</sup> to the Institution of Civil Engineers thirty years later, where in tracing the principal engineering developments since the beginning of the 19th century, he mentioned Strutt in no less than four different respects, and one of these was as the originator of fire-proof construction in England.

In 1793 Darwin had introduced William Strutt to Richard Lovell Edgeworth. Edgeworth was trained for the law, although he was never called to the bar, but above all he was fascinated by science. He has been described as an eccentric, and certainly he must have been a refreshing influence when he made one of his rare

<sup>41</sup> J. Rennie, *Min. Proc. Inst. Civ. Eng.*, vol. 5, 1846.

visits to Derby. He was interested in everything and anything scientific. He wrote<sup>42</sup> that he practised telegraphic communication as early as the year 1767, and he made several novel designs for carriages. A machine for cutting turnips, a tunnel under the Severn, a very large umbrella for covering haystacks — his lively, excited mind flitted through such subjects, experimenting and creating. In June 1811 he wrote to Strutt:<sup>43</sup>

“I am constructing a spire for our little church, of iron ribs covered with slates — which I intend to finish & paint within side of the tower & then to draw it up at once & place it where it is to remain.”

and in 1817<sup>44</sup> he wrote that his son

“has succeeded so well in heating the Church of Collon by your instructions, that he receives application on the subject from various quarters.”

Edgeworth, Sylvester, and many of the others were continually publishing accounts of their works, but unfortunately Strutt's pen remained idle. In 1829, only eighteen months before his death, he admitted this to Maria Edgeworth,

“You ask me for any printed copy or any account of my own inventions. Alas! whatever is known of them must have been by other means, for I know not that I ever printed a word about them — I do not defend this, but only as it is easier for me to make two inventions than to write about one, I have indulged my predilections.”<sup>45</sup>

R. L. Edgeworth, in a friendly, charming letter, had upbraided Strutt for this, many years earlier:

“This reference to Nicholsons journal recalls to my mind your culpable indolence in not publishing an account of Derby Infirmary with the many admirable improvements that you have made in its economy — I seriously think it *culpable* indolence which you palliate to yourself under the name of diffidence or amiable modesty — ‘Let your works so shine &c.’”<sup>46</sup>

<sup>42</sup> *Memoirs of Richard Lovell Edgeworth, Esq., begun by himself and concluded by his daughter Maria Edgeworth*, 92, 1844.

<sup>43</sup> Letter from R. L. Edgeworth to William Strutt, June 1811. Derby Public Library.

<sup>44</sup> Letter from R. L. Edgeworth to William Strutt, 1 January 1817.

<sup>45</sup> Letter from William Strutt to Maria Edgeworth, 21 June 1829. *William Strutt*. 88.

<sup>46</sup> Letter from R. L. Edgeworth to William Strutt, June 1811. Derby Public Library.

Yet, although it is sad that no personal account of his inventions was published, one can hardly accuse Strutt of indolence when one considers how much time the running and expanding of his business must have occupied, quite apart from the many occasions on which he acted on behalf of the town.

Although the Edgeworths lived in Ireland, a firm friendship grew between them and the Strutt family. R. L. Edgeworth visited the Strutts when he was in England in 1799 and again, with Maria, in 1813. He also presented his sons to Strutt during their journeys to England. And always the Edgeworths were received with lavish hospitality. William Strutt, accompanied by his son, Edward, paid a return visit to Edgeworthstown in Ireland in 1816,<sup>47</sup> and this is significant since it appears to be the only occasion on which William travelled further than England.

Maria used to consult William about technical details in her books. The following<sup>48</sup> is one of her letters to him:

“Edgeworthstown

Sept. 15th, 1823.

My dear Sir, — My dear friend I think I might venture to say —

Will you do me a favour and a service — ‘Yes with all my heart if I can’ is your answer at the moment you have read so far —

Then you can do me this service, and no one in my opinion can do it so well. It is to look over an account of spinning jenies — Arkwrights inventions, &c., in short of the cotton spinning, which I have been writing for the sequel of ‘Harry and Lucy’ — my father’s ‘Harry and Lucy’ which I am endeavouring to finish. And you his friend, and the friend of his family will lend your hand and your mind to assist his daughter to finish it, so as to be worthy of the beginning.

Your sincere friend

Maria Edgeworth.”

The subsequent correspondence shows that Strutt did in fact look over whole chapters of Maria’s book.

Besides Maria Edgeworth and, of course, Dr. Darwin, William Strutt came in contact with two other literary figures, Coleridge and Thomas Moore. Coleridge was a

<sup>47</sup> *William Strutt*, 54.

<sup>48</sup> *William Strutt*, 79.

visitor to the district as a young man, but he must have known the family fairly well for, when he was in Derby, Jedediah gave him an introductory letter<sup>49</sup> to Mr. Fellowes of Nottingham. Thomas Moore, on the other hand, moved to Mayfield Cottage near Ashbourne in Derbyshire in July 1813 and lived there for several years. He was a close friend of Joseph Strutt, William's brother, and inevitably spent much time with William and his family.

Moore's first letter about the Strutts, when he was a newcomer to the district, gives a concise although rather impersonal description:<sup>50</sup>

"We were on a visit to Mr. Joseph Strutt's, who sent his carriage and four *for* us and back again *with* us. There are three brothers of them and they are supposed to have a million of money pretty equally divided between them. They have fine families of daughters, and are fond of literature, music, and all those elegancies which their riches enable them so amply to indulge themselves with."

A year later Moore wrote in a much warmer tone:<sup>51</sup>

"I like the Strutts exceedingly . . . they have quite a nest of young poets in that family; they meet every Sunday night, and each brings a poem upon some subject; and I never was more surprised than in looking over their collection. I do not think I wrote half so well when I was their age."

Moore sang his own songs to the Strutt families, "The Minstrel Boy" perhaps and "the Last Rose of Summer". There is an amusing account in his diary of a dinner he attended in Derby, after which he entertained the Strutts in this manner. After the meal he had

"adjourned (tired as I was, and covered, not only with applauses but with fish-sauce) to a party at William Strutt's, where I found duets on the harp and pianoforte going on; and, in spite of my dozen and one speeches, was obliged to muster up voice enough for the same number of songs."<sup>52</sup>

Thomas Moore was an individual, and a witty, sparkling individual. Nearly all his letters proclaim this, and con-

<sup>49</sup> Griggs, 177-8.

<sup>50</sup> Letter from Thomas Moore to Mr. Power, 23 October 1813. *Memoirs, Journal and Correspondence of Thomas Moore*, ed. Lord John Russell, vol. 1, 365, 1853.

<sup>51</sup> Letter from Thomas Moore to Miss Mary Dalby. Russell, vol. 2, 31.

<sup>52</sup> Diary for 31 January 1828. Russell, vol. 5, 256, 1854.

tact with him must inevitably have broadened as well as lightened the Strutts' outlook.<sup>53</sup>

To complete this view of William Strutt, his letters to his son, Edward, are helpful. Edward was educated at Manchester College, York, and from there he went to Cambridge. In 1830 he became a Member of Parliament for the borough of Derby and in 1856 he was created Lord Belper.

Like Jedediah's letters to himself, William's letters to his son were often instructive, but the tone was warmer; and whereas Jedediah stressed the importance of acquiring the social "virtues", the emphasis in William's letters was largely on the importance of knowledge. For instance, in 1818 he wrote to Edward, congratulating him on passing an examination:

"The pleasure which this must give you, must be worth a good deal, independently of the proper legitimate object; *real knowledge* — You are now I hope so well grounded in most of those requirements which appear dry & crabbed to young people, that you have nothing before you but the pleasure which must result from a successful pursuit of it."<sup>54</sup>

And later the same year he wrote:

"You are now just at that age when it is easy to learn any thing, & you have nothing to do but to learn. When I was the same age I had nothing to do but to Work — the two objects Wealth & knowledge. If you get as much of yours as I got of mine you will be successful enough, & will have laid a good foundation for a happy life; which that you may enjoy is the anxious wish of your affect. Father."<sup>55</sup>

However, writing to Edward in 1819, William showed that, although by then extremely rich, the frugality of his early years had had a lasting effect.

"Oeconomy," he wrote,<sup>56</sup> . . . "under every circumstance of fortune is a virtue, because it leaves more to be applied to better purposes than extravagance."

This, one feels, was one of the tenets on which he based his life. He was exceedingly generous in donating gifts

<sup>53</sup> Letter from Thomas Moore to Joseph Strutt, 1 September 1817. *William Strutt*, 65.

<sup>54</sup> Letter from William Strutt to his son Edward, 18 April 1818. Derby Public Library.

<sup>55</sup> 22 October 1818.

<sup>56</sup> 2 June 1819.

of money for the various projects for the improvement of Derby, yet in his house and family simplicity is often mentioned rather than any display of wealth. William's portrait illustrates this. His is a kindly, austere, almost academic face, which compares very favourably with the bloated features in the well-known picture of Sir Richard Arkwright. And Maria Edgeworth also grasped this facet of his character, when she wrote to her sister:<sup>57</sup>

"We have been now five days at Mr. Strutt's. We have been treated with so much hospitality and kindness by him, and he showed such a high esteem, and I may say affection for my father, that even if he had not the superior understanding he possesses, it would be impossible for me not to like him. From the moment we entered his house he gave up his whole time to us, his servants, his carriage; everything and everybody in his family were devoted to us, and all was done with such simplicity of generosity, that we felt at ease even while we were loaded with favours. This house is indeed, as Sneyd and William described it, a palace; and it is plain that the convenience of the inhabitants has everywhere been consulted: the ostentation of wealth nowhere appears."

So William Strutt, one of the benevolent despots of the Industrial Revolution, was no mere small-minded mercenary with a flare for business. In his life he illustrated all the virtues which Jedediah had encouraged him to pursue:<sup>58</sup> "Benevolence & kindness ... Sobriety, Temperance, Diligence, Frugality, Industry & Oeconomy". His mark is still on Derby, although the citizens may not be aware that it is his mark, and he has ineradicably formed one of the steps leading to modern building.

But for the final word it would be best to turn to his contemporaries. At the time of Strutt's death, Robert Owen wrote of him:<sup>59</sup>

"Society must lose the services of one of the most valuable men that the last century has produced;"

and, on the same lines, Coleridge had written many years earlier;<sup>60</sup>

<sup>57</sup> Hare, 197.

<sup>58</sup> Letter from Jedediah Strutt to his children, May 1774. Fitton and Wadsworth, 133.

<sup>59</sup> Letter from Robert Owen to Edward Strutt, 23 December 1830. *William Strutt*, 92.

<sup>60</sup> Griggs., vol. 1, 175. Letter from S. T. Coleridge to John Thelwall, 6 February 1797.

“William Strutt is a man of stern aspect but strong, very strong abilities.”

Yet perhaps Maria Edgeworth produced the most comprehensive epitaph. She referred<sup>61</sup> to him as “the ingenious, indefatigable and benevolent Mr. William Strutt of Derby”.

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<sup>61</sup> *Memoirs of Richard Lovell Edgeworth*, 334.