THE PROMOTION OF THE
CROMFORD CANAL ACT OF 1789:
A STUDY IN CANAL ENGINEERING

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INTRODUCTION

The Cromford Canal was a typically ingenious design of William Jessop (1745–1814), Civil Engineer of Newark. The waterway linked Cromford with Pinxton and the Erewash Canal at Langley Bridge in the counties of Derby and Nottingham. In common with many other canals of that era it was constructed under a private Act of Parliament in order to satisfy local or, at most, regional needs. The idea of an inter-regional connection to the north was considered at a late stage of planning but this was a transitory fancy and the system stayed a cul-de-sac until closure in 1944, although the building of the Cromford and High Peak Railway in 1825, to join the Peak Forest Canal at Whaley Bridge, enhanced its prospects. The canal remained for many years an important undertaking.

The promoters came from the minor gentry of Derbyshire and the professional classes. The leading member of this self-appointed group was Philip Gell, but other families were represented by William Milne, Charles Hurt, William Fillingham and William Eyre. There were two solicitors, Francis Beresford of Ashbourne and Francis Evans of Nottingham.

Sir Richard Arkwright, nationally famous through his activities in cotton manufacturing, had mills and property in Cromford. Traditionally he has been regarded as the leading figure in the

1Cromford Canal Act, 29 Geo. III, c. 74. RA 31.7.1789. The research for this paper was made possible by a grant from the Leverhulme Trust for the preparation of a biography of Benjamin Outram (1764–1805). I am indebted to Miss Joan Sinar, MA, Archivist, Derbyshire County Records Office, for permission to examine the Gell MSS and for her help and guidance. Mr Simon Stoker of Cromford and Mrs Mary Rea of Belfast are thanked for assistance and advice.

2Cromford & High Peak Railway Act, 6 Geo. IV, c. 30. RA 2.5.1825.

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promotion of the canal, but contemporary correspondence shows that this was untrue. His name was used to win financial and popular support, but he proved unreliable and was much distrusted by his fellow proprietors.

THE ORIGINS OF THE CANAL

The Cromford Canal was described by William Jessop as a canal ‘from Langley Bridge to Cromford with a collateral branch to Pinckston [sic] Mill’. It connected with the Trent Navigation via the Erewash Canal which followed the course of the river of that name for nearly twelve miles before joining the Trent at Sawley (Fig. 1). As though to emphasize its origins as a local venture, the summit level and principal section of the canal linked Cromford and Pinxton, a distance of 14½ miles. A prime purpose was to provide industrial Cromford with coal and corn from the eastern end, but its connection with the Erewash gave access to the national network and ensured a future for exports beyond the Trent Valley.

It is difficult to understand why the plans for the Cromford Canal were not welcomed by the Erewash Company. The Erewash valley was rich in coal, but many seams were nearing exhaustion at the time of the promotion of the Cromford Canal, hence that venture should have been seen as a development to ensure a future for the old waterway. This was not so, indeed the idea for a northwards extension of the Erewash Canal had been proposed by the Reverend D’Ewes Coke of Pinxton to the Proprietors in May 1787, because such a measure would encourage mining developments beyond Heanor. The Committee rejected this proposal and also an approach in July by some businessmen who included ‘Outram and Hodgkinson’. Their attitude seems to have been due to complacency resulting from years of monopoly, a view commonly encountered in canal management in later years.

But there was one good reason for this lukewarm reception. The Erewash Canal had evolved as an adjunct of the Loughborough Navigation with which it shared a management

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1Chandos-Pole-Cell MSS, Derby C.R.O. Matlock.
3Erewash Canal Act, 17 Geo. Ill, c. 69. RA 30.4.1777.
structure; indeed the route was planned for the export of coal into Leicestershire. The Loughborough Company had built up a substantial trade in the Trent valley and beyond, and their future seemed promising, to the extent that they were then engaged in the preparation of a Bill for a Leicester line. The Cromford Canal had access to untapped mineral resources and was seen as a threat to these navigations which carried similar products (and it was said these were of a lesser quality). The opposing proprietors sought to give the Cromford Bill an uncomfortable passage through Parliament but they were eventually appeased, much to the relief of the Cromford group.

JESSOP'S REPORT

The Erewash Company lost the opportunity to dictate developments in their valley, and initiatives passed to a group of Cromford gentlemen. Jessop was invited to investigate the possibilities of a new waterway and commenced fieldwork in September 1787, assisted by Edward Fletcher who surveyed the recommended route. For reasons later explained, Jessop took a further fifteen months to complete his report. The latter was not confined to engineering design and costs, but, in accordance with established practice, included a rudimentary economic review which forecast exports of lime and coal and anticipated other future developments. It was speculative and occasionally inaccurate, but it argued a sound case for canal transport and showed something of the concern that Jessop felt for others, particularly in ‘the lower reaches of people which form the great bulk of society’. Today that report would be dismissed as superficial in many respects, but in 1788 only its sketchy proposals were needed to generate interest. It was obvious that mineral wealth lay untapped in Derbyshire and there was a growing market for large quantities of cheap materials, hence a canal must succeed.

In one respect Jessop’s report was entirely rational and authoritative. The engineering design was practicable, but there would be problems in overcoming natural obstacles of the rugged

1 Leicester Navigation Act, 37 Geo. III, c. 65. RA 13.5.1791.
countryside. Jessop did not trouble his readers with technicalities preferring

... only to mention in general that its length from Langley Bridge, where the present Erewash Canal terminates, to Cromford, is fourteen miles and a half; that from Langley Bridge to the summit level in Codnor Park there is a rise of 82 feet; and that then, including a branch of two miles and a half to Pinkston, there will be a dead level of above fourteen miles in length... passing under Butterley Park it will be subterraneous for one mile, six furlongs and eighty-eight yards in length; so that, though Trent barges may come to the tunnel, it will admit through it and to Cromford boats of seven feet...

Thus the Cromford end was to be built to narrow boat \((70 \times 7\text{ft})\) standards in order to minimize costs of the tunnel, whereas the eastern end would enjoy the benefits of the larger Trent barges \((78 \times 14\text{ft})\).

An artificial canal relies for its operation on a water supply from river or reservoir, but engineers frequently found that prime sources were already used by industry, hence opposition sometimes came from those benefitting by the canal! Jessop believed that his ingenious method of supply was fair and equitable but ‘... it would be a singular case if it met not with opposition ...’. He was certainly correct in that assumption.

Jessop proposed to construct the 14½ mile-long summit pound twelve inches deeper than navigation required, estimating that this volume of water was sufficient for one week's lockage and other losses. The reason for his long delay in publishing the report was linked with this idea. He had waited a year for exceptionally low river flows to occur before measuring the discharge at Cromford, and this happened on Sunday, 16 November 1788, when the rate was 570 tons of water per minute, just sufficient for two locksful each minute. Thus he reasoned that a proportion of the flow of a few hours every Sunday, even during dry weather conditions, could provide enough water for the canal for the remainder of the week. This arrangement could not harm anyone’s interests because the factories were closed on the Sabbath and water ran to waste. Here was a nice solution and yet Jessop claimed that there was no need of even such quantities because most trading would be along the summit level where there were no locks. Furthermore, water for later developments
could be drawn from the effluent of nearby coalmines, also perhaps from the Erewash catchment but, as it transpired, the Erewash Company did not agree to this latter proposal. These assessments were reasonable but erred on the low side, for there was little to spare for emergencies.

Jessop also urged the co-operation of all affected industries and said the Erewash Company should reduce tolls to through traffic, claiming that in the long term this could be of advantage to them, but '... if that policy which sometimes makes men blind even to their own interests should induce them to object'\(^1\) he would survey another route to the Trent!

He also noted

I know of no better situation for establishing considerable ironworks as there appears to be great plenty of iron-stone with the coal and limestone for fluxing, may be brought together by the canal... . . .

Within three years Jessop, Outram and others were to set up such an ironworks. It remains to this day as the Butterley Company of Ripley.

\[\begin{align*}
\text{THE GENTLEMEN INTERESTED IN MAKING A NAVIGABLE CUT}\^{2} \\
\text{The promoters were led by Philip Gell, who held estates at Hopton Hall, Wirksworth, besides quarries and mining rights nearby. His health was uncertain, hence much of the Parliamentary business was conducted through his brother, Captain John Gell of Crick and Wimpole Street, London. Several other local landowning families were involved, including the Eyres and Milnes who were relatives of the Gells, the Hurts and Fillinghams, and the Revd D'Ewes Coke of Pinxton. A famous neighbour, Sir Richard Arkwright, participated in the scheme, mainly, it seems, to lend credibility and to encourage financial support. He was of a different social stratum, however, and his curt, suspicious nature did not encourage friendship with anyone, even the professional group with whom he might have been expected to have interests in common. The latter party included Joseph Outram of Alfreton,}
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\(^2\)ibid. D258/41/32r, Minutes 15.12.1788.
Estate Agent and Commissioner for Enclosures, and his twenty-four-years old assistant and son Benjamin, who was soon to be engaged by the Company as an expert witness and eventually as canal superintendent. Partly as the result of his friendship with Jessop, Benjamin was to become one of the Kingdom's leading canal and railway engineers prior to his early death in 1805.

On receipt of Jessop's report the proprietors began to prepare their Act of Parliament at a meeting in Alfreton on 15 December 1788. Jessop was present, and, although he was to describe himself in Parliament as 'projector',¹ the Gells and their colleagues were in control and Jessop had been given a brief just as would any other engineer 'in pursuance of the directions given'.² A notable absentee that evening was Sir Richard Arkwright, which was unexpected because he had written³ '...I am fearful of the proposed alteration. In taking the water so soon as it leaves the cotton mill will be an inconvenience and a loss to me.'

Although it is commonly believed that he was the promoter of the scheme, the Gell correspondence shows that this was not so. Throughout the campaign he was uncooperative, particularly on issues relating to rights he held in Cromford. Judging by Arkwright's remarks it seemed that negotiations had commenced on the water intake at Cromford. However, the meeting's discussions were on the mode of applying to the Erewash Company for their assent to a reduction of tolls, the quantum of tolls, the subscription and method of conducting this, and a policy statement was completed during the evening. The subscription was a pressing matter and £100 shares were offered based on Jessop's estimate of £42,697. A proprietor was restricted to ten shares before 15 January to give those unable to attend an opportunity to invest. Interest was fixed at 5 per cent until works were complete and a call of 2 per cent was made to defray preliminary administrative expenses.

Beresford was soon reporting to Gell that the lists were nearly full. The leaders of the enterprise were confirmed at this juncture because Philip Gell had subscribed £6,000, his brother John

¹H.O.L.R.O., Evidence on the Cromford Canal Bill, 1.7.1789.
²Gell MSS D258/41/32r, Minutes 15.12.1788.
³Ibid. D258/41/32m, R. Arkwright to Philip Gell, 32.11.1788.
£3,000, Beresford £2,000 and Arkwright only £1,000.\(^1\) Jessop's report had referred to benefits accruing to the poor but this meant, to his wealthy clients, by virtue of the fruit of their labours rather than as subscribers. The original shareholders invested strictly by invitation, but at least one person\(^2\) freely admitted his good fortune because he wrote:

Mr B Outram took my subscription opposite £1,000 for securing a share in the Cromford Canal, undertaken most generously and disinterestedly for the public benefit at the hazard of gaining 40 per cent without fear of loss.

**PREPARATIONS AND CANVASSING FOR SUPPORT**

Evans and Beresford had completed the Petition and Bill for reading at a public meeting in Nottingham during February 1789. Written details of that event have not survived, but the Dukes of Newcastle and Devonshire, and Lords Middleton and Rawdon were present, besides representatives from the Erewash, Loughborough and proposed Leicester Canal Companies, and industrialists with premises on the River Derwent. As a result, several clauses were revised as it was desirable to gain support locally as much as possible.

Beresford skilfully directed much of this business and also pressed his colleagues to seek support from all canal riparian owners and keep ownership of the waterway within the hands of local enterprise and away from unwelcome speculators. Several landowners were slow to respond, including Peter Nightingale (father of Florence) of Leashaw Hall, who owned quarries adjacent to the Canal. He was known as a wild eccentric, and was not the easiest man to deal with. Beresford wished 'somebody would persuade Mr Nightingale to take £1,000. Pray send somebody to him that bears an influence over him, if any such person there is . . .'\(^3\)

His gracious neighbours were unwilling, so the unsuspecting Benjamin Outram went instead. Surprisingly he succeeded and ... was with Mr Nightingale a few days ago. He seemed very

\(^1\)Ibid. D258/41/32u, F. Beresford to Philip Gell, 3.1.1789.

\(^2\)Ibid. D258/50/15k, J. Wilkinson to Philip Gell, 11.3.1789.

\(^3\)Ibid. D258/41/32u, F. Beresford to Philip Gell, 3.1.1789.
anxious for the success of the measure and wishes to meet you and Mr Milne . . .'.1 Arranging the campaign was a part-time activity of the principals and Beresford must have found his duties trying because ' . . . I am engaged all next week in Leicestershire and most of the week following in Staffordshire. I cannot until after that time attend you to look over the Bill.'2

Similarly, Outram visited Nightingale whilst he was surveying and allotting the Belper enclosures, preparing the Broomhall Estate Bill for the Gells, and also 'waiting on' landowners who requested advice on canal investment. Jessop also directed his attention to engineering aspects of the scheme which might need to be justified in Parliament. Hence 'Mr Jessop is with me and we are going together to get ourselves informed about the mills and reservoirs'.3 After that journey Jessop delegated to Outram the tasks of measuring river discharges and investigating mill machinery on the Derwent and tributaries. Not surprisingly, they proved to be competent witnesses in the House.

During Spring 1789 Captain Cell did much to canvass support for the Bill, particularly in the Lords where he persisted in his task, though frequently rebuffed. 'You have a most active agent I perceive in London, your brother, who scarce takes rest day or night from his labours in soliciting the Navigation Bill.'4

Other proprietors took up residence in town during the passage of the Bill, although their precise tasks are unknown. Behind all was the reassuring presence of Jessop. 'I have much dependence on Jessop if examined before the whole House. They all respect him and attend to what he says.'5

Their opponents included the Earl of Harrington with the Mayor and Burgesses of Derby, industrialists occupying mills on the Derwent and tributaries, and the Erewash Company. All objected to this newcomer sharing in the limited water resources of the Derwent and Erewash, although the evidence suggests that the

1Ibid. D258/41/32v, B. Outram to Philip Gell, 20.2.1789.
2Ibid. D258/41/32u, F. Beresford to Philip Gell, 3.1.1789.
3Ibid. D258/50/13a, B. Outram to Philip Gell, 5.3.1789.
4Ibid. D258/50/15k, J. Wilkinson to Philip Gell, 11.3.1789.
5Ibid. D258/50/13q, John Gell to Philip Gell, (3).5.1789.
Derby party were mainly concerned with the diversion of their trade and the Erewash Company held similar beliefs.

Captain Gell's letters imply that they had other, lesser opponents with localized interests who influenced events through Members of Parliament. Probably quarry and mine owners situated at a distance from the canal, and the road hauliers serving them, were in this category. Perhaps this explains the embarrassed, evasive answers or unexpected blunt refusals he had from several local Members. Some Lords, notably the Duke of Newcastle, supported the venture but others, including the Devonshires, remained publicly uncommitted throughout, unwilling to offend anyone yet secretly encouraging because their private interests stood to benefit.

John Gell's canvassing commenced with his meeting Lord George Cavendish (of the Devonshire family) who agreed 'to carry up the Petition and promote the business forward'. Lord George was always ready 'to obey the commands of the Gentlemen of Derbyshire', and promised to watch that nothing would be carried out against them 'in a clandestine manner'. And yet he felt he could not oppose the Derby party, and said the project compared with the Erewash proposals of twelve years previous when 'Loughborough had all the advantages and Derby none'. Hence '... I think he is with us but did not promise absolutely'. Gell visited the Duke of Devonshire but 'Devon's Duke was not up at two...'. He then called on the Duke of Newcastle who received him courteously and guaranteed support. Thus elated, Gell returned

... at half past three at Devon House. He was but just up. If God does not please to alter the mode of the world there is a certain number of people living in this place who do not see the day or the blessing of the sun. His Grace was evasive and, following some argument, Gell left, claiming to have 'kept his temper and was not caught talking'. Apparently they were good friends on parting, the Duke promising 'to let him know'. He never did.

Not all his pleas were made to such distinguished persons because he met with an unscrupulous Irish politician

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1Ibid. D258/41/32/z, John Gell to Philip Gell, 27.2.1789.
2Ibid. D258/41/32/aa, Ditto, undated, 2.1789(?)
Mc Namara who attends at the Treasury this evening and swears by Jesus he will begin a canvass for the Cromford Canal directly. I said we only desired our merits to be considered. He said that is nothing, nobody talks of merits now...  

He also urged brother Philip to help with some letter writing ‘Can you with any propriety write to the Bishop of Llandarff? He is a Liberal, though a Bishop...’

Meanwhile he interviewed Britain’s leading seaman:

‘This morning been with Lord Howe. He is not against canals that do not join the seas and cross the island. In his mind he is with us. I mentioned the great number of people employed on the Trent and this could increase and draw many to work on water than never had any idea of it and men may be raised for the navy, and answered that I would engage to raise 300 men. ...

Lords Sydney, Scarsdale, Oxford and others were approached but it was becoming clear that many were like the Cavendishes. They ‘... are with us in their hearts. How their deeds may be, only time must show, and our evidence will sway much with them.’

Throughout this trying period Captain Gell kept his sense of humour. ‘I am now called—poor Gell, he has got a Canal Mania. My solicitations are generally: which side are you of—Gell?’ Lord George presented the Petition on 10 March, but even that did not pass without incident: ‘The Petition was in Lord George’s hand when the Black Rod came to the door and the Speaker said it was too late. So Friday it will be presented.’

The Petition had passed through many hands for signature, and its whereabouts was frequently in doubt. John Gell stressed the need for signatures of men of substance, preferably free-holders, and would not ‘have any child support it’. He noted, with exasperation, that Arkwright and Hurt had avoided signing. Not everyone seemed to be taking matters as seriously as John Gell. He wrote home on some hearsay that

‘I wish the gents at Wirksworth would keep their feastings and gluttonizing till the Bill is past for I have been told of burning the papers more than once. Pray desire Charles Hurt to be easy for a little time and then they may riot as they please. ...’

1 Ibid. D258/50/13/c, Ditto, 9.3.1789.
2 Ibid. D258/50/13/p, Ditto, 19.3.1789.
3 Ibid. D258/50/13/m, Ditto, 14.3.1789.
4 Ibid. D258/50/13/g, Ditto, 12.3.1789.
5 Ibid. D258/50/13/f, Ditto, 11.3.1789.
Those papers could have been the petition; if so, it was a relief to hear from their lawyers that 'The Petition is not to be used now nor need be in the House. It is a prevention in case of necessity.'

Just at that time Arkwright's behaviour began to worry the Captain, who reported that Sir Richard was seen too often in the company of the Derby party. The 'Knight' (as he was disparagingly called) then complained of the inconvenience he would suffer by the canal crossing his lands and even that '... the roads would be soiled during construction and that the horses used on the canal will eat all the meadows'. And later on 'Arkwright declared his direct opposition to our plans unless a certain alternative can be adopted which Mr Jessop declares is quite impracticable. Between ourselves he seems to have no regard to consistency of character.'

After much argument, Arkwright was satisfied with the promise that the canal line would be moved away from his house 'so as not to be hemmed in'. Unfortunately that was not all. The Knight was constantly bickering and complaining about the most trivial matters.

He appeared to think he has been deceived and even angry at Nightingale's name being in the plan and not his own. How frivolous. I never knew before he likes a touch of flattery.

Captain Gell kept his feelings to himself, or in his letters, but not all his colleagues were so circumspect because

He (Arkwright) complains of Outram talking disrespectfully of him, of which he hears in the country, such as he ought to have his head off. I wish Outram would not say any such thing, nor is it proper he should. ...

Outram was unaware of this because he wrote to Philip Gell that

Your brother the Captain has been this morning with Mr Beresford and Sir Richard Arkwright who behaves rather strangely. I do not know what to make of him.

Sir Richard was not to forget those remarks when appointments were made at a later date.

1Ibid. D258/50/13/d, Ditto, 13.3.1789.
2Ibid. D258/50/14/t, Ditto, 20.4.1789.
3Ibid. D258/50/14/j, Francis Beresford to Philip Gell, 28.4.1789.
4Ibid. D258/50/14/b, John Gell to Philip Gell, 22.4.1789.
5Ibid. D258/50/14/ta, Ditto, (71.5.1789.
6Ibid. D258/50/14/sa, Benjamin Outram to Philip Gell, (??)4.1789.
A Committee of the Lower House convened to consider the Bill, and immediately asked about plans for extending the canal north to Cheshire and Manchester. The question was unexpected; Jessop had earlier reconnoitred the route but his proprietors had rejected the plan on cost grounds. Gilbert\(^1\) of the Grand Trunk Canal raised the matter on the advice of Evans, Town Clerk of Derby, who attempted to show, even by commissioning a survey, that an extension was a simple matter, that the Cromford party were aware of this, and were dishonestly secretive about future intentions.

The Committee were not taken in by this malicious manoeuvre but Beresford noted that ‘our opponents at Derby, it is plain, will stick at nothing’. He invited the opinion of the eminent physician and scientist Dr Erasmus Darwin\(^2\) who wrote that

> The report of the surveyors will determine the practicality of carrying a canal by Buxton to Manchester. No doubt a tunnel near Buxton would endanger the springs as happened some years ago at Wirksworth where a warm spring was taken away by driving a sough up to a mine. The Buxton water is of additional concern, particularly so to the Devonshire family who have laid out so much money in a noble piece of architecture that is an ornament to the Kingdom, as well as an honour to the Duke. . . .

Naturally the Cromford party would not wish to extend their canal at the risk of such important assets. Gilbert was convinced of their honourable intentions and when, on the day before the Bill was settled, 22 May, Gell met him in the House

> I asked Mr Gilbert to step into the Committee Room on Thursday, the critical time . . . he said . . . he would not oppose it nor take any position in it. So much for your Grand Trunk.\(^3\)

The crisis passed and the idea of a northern link languished until thirty years later when Jessop’s son constructed the High Peak Railway to link Cromford with Whaley Bridge.

While official business continued in the House, the proprietors were still having serious disagreements. Beresford warned ‘. . . we


\(^2\) Gell MSS D258/50/14/w, Erasmus Darwin to Philip Gell, 22.4.1789.

\(^3\) Ibid. D258/41/32/ha, John Gell to Philip Gell, 23.5.1789.
have reason to fear that Sir Richard Arkwright and Mr Hurt are becoming cool, if not adverse to the business... Arkwright even then was making fresh efforts to gain advantage, possibly realising his colleagues were more likely to appease rather than risk dissensions at that critical time in the House.

Beresford shrewdly noted they would have to make a stand sometime because each concession appeared to lead just to another demand.

The promoters were alarmed by a major submission Arkwright made regarding the source of the canal's water supply, and Gell reported

We are attending the Canal Office to consider another proposal from Sir Richard, which is to take the water by an aqueduct from his dam at Masson Mill which must be raised some few feet and he will submit to the aqueduct coming on the Willesley side under the new mansion.

Until then Jessop was undecided on the position of the canal feeder, but probably intended to draw directly from Cromford Sough, a mine-drainage tunnel which discharged into the river near the canal terminal. Arkwright's idea had merits but he gained personal advantages as well, because his weir would need to be raised to the level of the canal thus providing more water and power for his mills. The canal's feeder and sluices would lie on his land in full view of his new house and the Cromford Sough, which he diverted occasionally for his own use, would remain untouched (Fig. 2).

The idea appealed to Gell but Jessop and the solicitors were scandalized by this major diversion and refused to consider it. Arkwright then began to complain of his expenses. He retained counsel and several solicitors to oversee his interests and yet felt their costs should be paid by the Company.

The unfortunate Captain was '... so taken up in reconciliations that I have no time to see anybody' but then 'I have the satisfaction to hear it called Cell's Canal for the whole town knows it now'.

Eventually he persuaded Jessop to accept Arkwright's scheme

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1Ibid. D258/50/14/f, F. Beresford to Philip Cell, 9.4.1789.
2Ibid. D258/50/14/f, John Cell to Philip Cell, 30.4.1789.
3Ibid. D258/50/14, John Cell to Philip Gell, 30.4.1789.
CROMFORD BRIDGE

details from a map produced by Simon Stoker, Cromford.

Figure 2.

SCALE (feet)

To Matlock

To Wirksworth

Figure 2.
but not before Fletcher checked the levels and found the weir would need raising sixteen feet.

The Knight was satisfied and Gell wrote

... I am his friend. He even smiled today which he has never done before on the subject and talks of pleasure boats and entertaining company on the water. ... What do you think of him now? I think more than I shall say. ¹

It was becoming clear that Arkwright's scheming was related to his plans to develop quarries behind his new mansion and link up with the Cromford terminal by a wagon-way or short private canal. The costs and problems this created for others were of no account. And there was another matter. Arkwright was too fond of the company of the Derby party for the comfort of the Cromford Proprietors. Gell wrote to his brother

... it had not a good appearance of our side. [our] Evans had given him a good talk that the whole country would be alarmed. The meetings had been held in his name and people had subscribed their money on that and it would have an odd appearance. ... ²

With that there was peace, although Arkwright was never forgiven, nor did he show signs of repentance.

The Bill had a steady passage through the Lower House, because the Cromford witnesses were better prepared than those summoned by their opponents. Gell was elated to report

Mr Varley the Chesterfield engineer appeared against us and two others, Jones and Hodgkinson. They all agreed that one twenty-third part of the water would supply us and we only want 150th part by Jessop's account. ... Snape, a millwright of Derby, did lie most gloriously. Hodgkinson said it was impossible to make the Canal as intended. Jones was right about this water and calculated nearly the same as Jessop at Cromford Bridge. Exhalations and absorptions were spoken of and Mr Gilbert questioned Varley much how he calculated the last, so he was done away in the House. They desired him to leave his calculations. He assented so his falseities are before them. ... ³

Gell went back to his canvassing and approached some famous personalities.

'Did you write to General Burgoyne? He was there. ... Spoke to Wilberforce and could not get him to move into the House as he said he had never attended it. I told him we had two majorities in our favour. He would not come so I said I was one of his constituents ... mind, I do not vote for him.' ⁴

¹ibid. D258/50/14/h, Ditto, 1.5.1789. ²ibid. D258/50/14/kb, Ditto, 8.5.1789. ³ibid. D258/50/14, Ditto, 21.4.1789. ⁴ibid. D258/41/32/ka, Ditto, 23.5.1789.
Important agreements on tonnage (or tolls) and water supplies from the Erewash catchment had to be made between the Cromford and Erewash Canal Companies before the Bill passed finally from the Lower House.

From the beginning the Erewash Company had been asked to reduce tolls so that vessels from the Cromford carrying lime would pay half tolls and all other articles, including coal, one quarter of the tolls. That would make the Cromford industries competitive, and eventually the Erewash Company agreed to reduce tonnage on all articles except coal to half tolls. This was an equitable arrangement which aided the declining coal industry of the Erewash valley and yet did not seriously affect those at the eastern end of the Cromford Canal, because trade outlets were along the summit level. There was little need, in the immediate future at least, for them to seek new markets beyond the Erewash Navigation.

As regards water rights, Jessop had originally intended to draw from the Erewash catchment should future developments require this, but the Erewash Committee would have none of that. They insisted that water taken into the summit level from the River Erewash should be from ground thirty feet below the canal's water surface. This prevented the newcomers intercepting streams from higher ground, although they could pump from a lower level including coal mines, albeit at some cost.

The Cromford Committee had to sign a bond for £10,000 to guarantee acceptance of these requirements and clauses to this effect were introduced in an amended Bill a year later.¹

Benjamin Outram wrote to Philip Cell with details of these agreements with which he seemed pleased. Apparently 'all else is gone through the Committee to the Commons' and their report was expected in the House the next Monday. He mentioned that Arkwright's proposals 'will be a little inconvenient but I think he will not wish to have them adopted when he sees more clearly the business'.² The Bill passed on to the House of Lords.

Their agreement with the Erewash Company behind them, the Proprietors realized that the battle in the Lords would be with the

¹Cromford Canal Act, 30 Geo. III, c. 56. RA. 1.4.1790.
²Cell MSS D258/50/14/sa, Benjamin Outram to Philip Cell, 23.5.1789.
Derby group, mainly about the Derwent water abstractions. Gell felt they had a good case because 'B. Outram is full fraught with knowledge of the Derwent and knows to a fraction what quantities of water every dam contains'.

It was also pleasing to hear 'Mr Leaper told Lord Harrington if they had no better plea than they had exhibited they had but little chance'. At that time Captain Gell thought up a scheme which might mollify the Derby party.

What think you of a branch from our canal from near about Critch Chase or where it takes a turn towards the Amber and so by the side of the Derwent to Derby and to the Trent and to consolidate the Derby Navigation with this branch? I shall ask Jessop about it.

Unfortunately Harrington rejected this idea.

Benjamin Outram gave a useful resumé of progress on 13 June in which he mentioned delays in the Lords, and that four petitions had been presented against them by Lord Rawdon,

viz Town of Derby and Corporation, Lord Harrington and Millowners proprietors Derwent Navigation and the proprietors of the Erewash Navigation.

Craddock, the Erewash Clerk, had led a few proprietors of his company to petition against them regarding water rights, in spite of the agreement already made. His reasons are obscure but presumably had much to do with the associated canals with which the Erewash Company shared common managements. In the event, the move had little influence on progress.

Outram went on to say that Lord Stanhope means to be our champion. He has had several consultations with Jessop and has pumped Upton, who I suppose thinks his Lordship means to support them.

He also referred to a curious matter which suggested that he and other proprietors were not averse to bribery on occasions. One of the Cromford Company's agents was a Mr Bloxam who was frequently praised for his work on their behalf. His efforts were not entirely unselfish, however, and for several weeks he had been

1Ibid. D258/50/14/pa, John Gell to Philip Gell, 9.6.1789.
2Ibid. D258/50/14/ha, Ditto, 18.4.1789.
3Ibid. D258/50/14/eb, Benjamin Outram to Philip Gell, 13.6.1789.
hinting that he would appreciate the gift of a gun dog, preferably a young but seasoned pointer. Ostensibly this was because

... Mr Bloxam wishes to have a pointer that has been hunted a season or two which, along with a staunch one that he has already got, he means to present to Mr Pitt's private secretary from whom he now is asking some favours, and who has hinted that he wants a brace of good pointers. You will do an essential piece of service of sending him such a dog immediately—a favour well-timed has a double effect—I beg you to do this directly for he cannot bring forward his request till he has got his dogs.¹

Whether Philip Gell approved of such measures we cannot tell but he seemed reluctant to part with his dogs, because he had failed to comply with this plea, and others as well, as late as October that year when the Bill was clear of danger and work on the canal was in progress.

And the canvassing continued. Philip Gell received a letter from Lord Walpole, who said

I should be very happy to coincide with your sentiments but understand opinions are various as I have been solicited by gentlemen against the Bill who think they shall be materially injured if it passes into law.²

It was gratifying to find that, selfish needs satisfied, Sir Richard had taken up the cause in earnest and '... will move everything for the canal so far we have satisfied him and he has begun to move among the Lords, particularly the Scotch Lords.'³ The Duke of Devonshire was as evasive as ever!

... he said he would not go to the House today for I was at him yesterday. He said Derby people would be angry with him. So shall we I said. However he declared the canal to be a good thing for himself and I really believe he never made any stir against us or the elder George, but he did not vote for us. ...⁴

PROGRESS IN THE LORDS

The inquiry continued at the bar of the House of Lords on 22 June 1789, with the appearance of John Varley, 'Surveyor and Engineer',⁵ the first witness for the Derby party. Varley seemed an unwise choice on several counts. He had been appointed

¹Ibid. D258/50/14/eb, Benjamin Outram to Philip Gell, 13.6.1789.
³Ibid. D258/50/14/kb, John Gell to Philip Gell, 8.5.1789.
⁴Ibid. D258/50/14/pa, Ditto, 9.6.1789.
⁵H.O.L.R.O., Evidence on the Cromford Canal Bill, 22.6.1789.
Resident Engineer for the Chesterfield Canal on the death of James Brindley in 1772 and, although the works were completed under his direction, he proved an incompetent contract administrator. After irregularities had been found in the books he was fortunate to keep his job, and the same thing happened five years later while he was employed as Engineer to the Erewash Canal; but on that occasion his ignorance of paperwork and accounts led to his dismissal.\textsuperscript{1} Hence it is surprising that a few years later this ordinary fellow should be invited to give evidence in Parliament to debunk a project designed by the country’s leading engineer. It was perhaps indicative of the small numbers of canal engineers then in practice.

Varley’s evidence was negative and lacked substance. His uneducated manner and inability to substantiate his calculations did not inspire the confidence of the House, at least that was the view of Captain Cell, who gleefully dismissed him as a witness of little account.

Now Jessop’s proposals on canal water supplies required an abstraction of one twentieth of 570 tons per minute, this being related to river flow in a dry season as previously described. This discharge, collected over a 24-hour period each Saturday night and Sunday when the factories were closed, gave 41,040 tons of water, sufficient to fill up the summit level and provide for the canal’s operation during the following week. Jessop never expressed doubts about the sufficiency of this quantity of water even when other sources of supply described in his report were denied to him. The opposition attacked his figures with vigour. Varley commenced by stating that the ground crossed by the navigation was unsuitable ‘stony and loose soil’ which could not be made to contain water. He made no mention of the common practice of waterproofing by clay-puddling in such circumstances, however, until pressed to admit to this. He then described experiments he had made on a 24-mile level pound of the Chesterfield Canal to prove that the water loss due to absorption (or leakage) and evaporation was of the order of $73\frac{1}{2}$ tons per mile of canal per hour, asserting that 28,224 tons of water each day would be required to make up this loss. He then added an amount

required for lockage based on Jessop’s report, to give a total figure of 34,516 tons of water each day or 241,612 tons each week; just six times the amount Jessop stated!

Cross examination of this witness was surprisingly mild, and he was soon allowed to withdraw. Perhaps nobody believed him, or respected his judgement, which was unfortunate because he was correct in drawing attention to several important problems associated with the maintenance of man-made waterways and which had never been mentioned in Jessop’s report. Jessop, indeed, was only cursorily examined on such matters, presumably in deference to his long experience and national fame. Varley did not have such prestige. Although described by his Counsel as a ‘man of science’ it seemed to most others present that he had more in common with a tradesman.

Not all opposition witnesses were so lightweight. Robert Mylne, FRS, the Scottish engineer and architect, had been engaged and he lost no time in setting about his task. Mylne was well established in London, having designed and constructed the old Blackfriar’s Bridge¹ and several major docks. He was then engineer to the Lea Navigation, but agreed under cross-examination that he had never designed a canal nor had he even built a lock. An irascible fellow, he knew Jessop well because they were members of the Smeatonian Society of Civil Engineers. It seems they had not much liking for each other, although most of the dislike seems to have emanated from Mylne rather than the amiable Jessop. Mylne was verbose and opinionated. Regarding the water abstractions and the effect on the mills of the Derwent, he said

... considering the nature of those works it will be of very considerable detriment indeed. They are various in their purposes and very different in their effects. The prime mover and original power which sets them all in motion is the quantity of water. Any quantity taken from the water of the Derwent is the cause of deprivation of the principal mover. . . .²

This went on interminably. Rather like Varley before him, Mylne’s method was to disagree with everything and ridicule where possible.

¹C. M. Norrie, Bridging the Years, London, '1956.
Now Jessop had anticipated there would be opposition from mill-owners along the river, and it seems clear that he was sympathetic to their interests when devising his scheme. He required a trivial amount of water compared with the normal flow of the river; moreover the take-off point at Cromford was well upstream of the Derwent and most of the cumulative river flow drained from the tributaries and the catchment between there and the locations of industry in Belper and Derby.

Mylne ignored all this and insisted that abstractions of 1/20th of the flow at Cromford meant 1/20th less power for the mills located anywhere downstream. He made a curious remark to amplify this argument.

... if I may be allowed the expression; a man finding by his trade that a lever of 20 inches long is necessary with his strength to perform the business, if an inch on a foot is taken away all his business is stood still.¹

This was a gross overstatement of the effects, but he went on to say that the average velocity of the river was one mile per hour and the full effects of the 'deprivations' would be felt in Derby and district at least 24 hours after the week-end abstractions had been completed. Mylne sought to mislead the House but several of those present would not have been taken in, including that eminent authority on canals '... the Duke of Bridgewater, who shook his head generally when he was giving his opinions'.² Mylne was questioned closely regarding the sufficiency of the abstractions for the weekly operation of the canal. His observations were at variance with Varley's outrageous computations but, based upon his experiments on a 20-mile stretch of canal, he claimed that losses of 5,000 tons per week could be expected '... but in this case I suppose they will take a great deal of pain to make it tight and it will only be 4,000 tons'.¹ However, he calculated that total losses on the Cromford Canal to the junction with the Erewash Canal would be 48,854 tons. To this he added lockage water so as to allow the estimated exports of 53,700 tons of lime; 25,000 tons of coal; 6,240 tons of other goods and thus assessed the entire water usage each week at 86,284 tons. This was twice that required by Jessop's calculations.

²Gell MSS D258/50/14/jb, John Gell to Philip Gell, 4.7.1789.
Although he methodically debunked every feature of the canal on which his opinion was invited, on one matter at least he was correct. He pointed out that it would be difficult to ensure that at all times of the year no more than 41,040 tons were drawn from the river during the week-end periods stipulated. The measurement of river flows is never an easy matter, particularly if levels are changing constantly, and he doubted, quite rightly, that it could be done without close control. He concluded this part of his evidence by stating

... I think for these reasons that the method of taking the water is not the method which will hold the scales of justice between the parties and fit for the legislative to patronize. ...

As a result of this a clause was included into the Bill to ensure that independent inspectors were appointed to supervise the weekly event.

Once more Captain Gell did not take to this witness: '... being a Scotch man he is very prolix... Jessop says his calculations are false, he means to refute them.' \(^2\) It is noticeable how rarely Counsel would attack professional witnesses during cross-examination and the engineers generally got off lightly, sometimes undeservedly so, because the lawyers had little knowledge or understanding of the, then, state of engineering mechanics, even though this was elementary from today's standpoint. Captain Gell felt that opportunities were being lost when he wrote '... I think Pigot our first Counsel is behind Mr Graham our opponent. This Pigot will not be instructed enough ...'. \(^3\)

An indication of the importance of the River Derwent in local domestic and industrial communities can be obtained from the documents tabled in the House listing mills and works 'from the tail of the Cromford Mills to the place where it falls into the Trent near Sawley'. \(^4\) There were upwards of thirty mills and a 'water engine' \(^5\) which supplied tenants of the town of Derby, besides

\(^1\)H.O.L.R.O., Evidence of Robert Mylne on the Cromford Canal Bill, 22.6.1789.  
\(^2\)Gell MSS D258/50/14/y, John Gell to Philip Gell, 4.7.1789.  
\(^3\)Ibid. D258/50/14/jb, Ditto, 23.6.1789.  
\(^5\)Presumably a pump to supply individual domestic water supplies to the inhabitants of the town.
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‘common cocks’ for the poor. In fact there were fifty-three wheels in use with a total head of 55 ft 3 inches, and the value of the buildings and machinery was £84,247 with a return per annum of £97,092. Most important, 1800 people were employed, ‘and moreover the Salmon Fisheries produce £500 a year’.

A few of the biggest mills and their owners were listed thus.

<table>
<thead>
<tr>
<th>Location</th>
<th>Wheels</th>
<th>Head</th>
<th>Value of Building</th>
<th>Return per annum</th>
<th>No. of work</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belper</td>
<td>3</td>
<td>6 ft</td>
<td>£26,247</td>
<td>£36,400</td>
<td>800</td>
<td>Cotton</td>
</tr>
<tr>
<td>Makency &amp; New Mills (Strutt)</td>
<td>9</td>
<td>8 ft</td>
<td>£11,000</td>
<td></td>
<td></td>
<td>Cotton</td>
</tr>
<tr>
<td>Darley (Evans)</td>
<td>7</td>
<td>5 ft 8 in.</td>
<td>£13,000</td>
<td>£20,800</td>
<td>450</td>
<td>Cotton, Lead Paper</td>
</tr>
<tr>
<td>Derby or St. Michaels (Corp. of Derby)</td>
<td>6</td>
<td>4 ft</td>
<td>£11,000</td>
<td>£22,152</td>
<td>90</td>
<td>Copper, Zinc</td>
</tr>
</tbody>
</table>

Mylne was knowledgeable on the characteristics of prime movers, or water wheels, then used in these mills, and stated that many were of the undershot type which rotated by the force of fast-flowing water striking paddles at the base of the wheel. He considered these were wasteful, outmoded machines, preferring the breast-filled wheel because ‘in these modern times it is generally allowed by the best engineers that the water acts to the best advantage by gravity by bringing it slowly and coolly’. By that quaint statement Mylne showed a glimmer of understanding of the nature of hydraulic power and demonstrated that engineers, even at that early date, were beginning to understand the relationship between water supply and head in the design of water turbines; ideas which inevitably led in Victorian times to the development of pressure and impulse turbines which utilized more effectively the range of circumstances encountered in nature.

Mylne referred to another factor, well-known by engineers today but which was then lost on his cross-examiners and the assembled House. He stated in his pompous manner

1 H.O.L.R.O., Evidence of Robert Mylne on the Cromford Canal Bill, 22.6.1789.
There is an effect, which is rather delicate in its nature and not easily understood. The taking away any proportional part of a first mover is a proportional loss in the value of the works, but the business to be performed by the remainder of the power is not of so good a quality as that which was performed by the whole power. He meant that if a wheel had been designed and built for a given water supply and head, then it would operate efficiently. However, if the water supply were suddenly reduced, then the efficiency of the machine would fall.

Thus Captain Gell was to report home that

The Lords are certainly tired of us and I am sure we are sufficiently so of them. It is difficult to get attendance so late. Many are going. I am of the opinion the Chancellor will do for us when the water is cleared up, for many are swayed by his opinion.

Gell kept an anxious eye open for the reactions of his Peers. He thought much of the Chancellor who ‘... is much quicker than anybody that ever came my way in stating, and raking up matters, and explaining ...’ and ‘Marquis Townsend constantly taking notes and making good observations and asks really very pertinent questions. Lord Walpole has been there every day. I find he attends on the request of Bloxam. ...’ Lord Hopetown was a constant supporter of their cause but Stanhope was an uncertain quantity ‘... he asks questions which signify very little ...’

The formidable Lord Rawdon had openly declared his opposition and

Lord Fitzwilliam and Loughborough are his friends. They say nothing nor does Rawdon ask a question. He gives me a laugh when your eyes meet for we are yet well acquainted by this business.

Gell was forever counting heads for and against and had realized long since that success or otherwise would owe much to the whims and fancies of these uninterested Peers!

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2 Gell MSS D258/50/14x, John Gell to Philip Gell, 22.6.1789.
3 Ibid. D258/50/14/jb, Ditto, 23.6.1789.
4 Ibid. D258/50/14/jb, John Gell to Philip Gell, 23.6.1789.
. . . we had lost many of our friends. Lord Scarborough did not vote. He said he did not understand it. Lord Carlisle did not vote—came, talked upon it, said much of what went before.¹

'. . . no more canals for me'
said Captain Gell.

The weather was helping neither attendance nor concentration at that time

The weather is exceeding hot and not pleasant, after this hope never to be concerned in soliciting a Bill. Beresford in my opinion has had a sufficiency. He is certainly the most sensible and cleverest personage of us all. . . .²

The evidence of the Cromford engineers was refreshingly different from the negative attitude of Mylne and his colleagues. Jessop and Outram were confident and well-informed and the former, who bore the brunt of the attacks on the design, responded convincingly.³ He described the nature of the soil and agreed that some waterproofing or puddling would be necessary. In explaining the water supplies for his canal, Jessop stated that even in normal dry seasons the quantity abstracted amounted only to 1/140th of the river flow. He observed that the water ‘wasted’ (i.e. not used for power) on week days even in dry seasons was as much as 50 times or more as he ‘asked for’, and thus the abstraction would have no effect on other users. Moreover, out of 60 wheels in use, about 50 used twice as much water as was necessary because they were in a poor state of repair.

Most of the other 10 wheels are much better and some of them perhaps as good as can be made, but those mills never work on Sundays and therefore have the water running waste most part of the day.⁴

In addition, he stressed that out of 180 feet of fall available on the river, use was not made of more than 110 feet and there was four times as much power available to do work as was already used. Jessop was directed to withdraw. His evidence was convincing,

¹ibid. D258/50/14/x, Ditto, (7.7.1789.
²ibid. D258/15/14/u, Ditto, 28.6.1789.
³H.O.L.R.O., Evidence of William Jessop on the Cromford Canal Bill, 1 to 7.7.1789.
⁴ibid.
yet before he was to appear a final time there was an interesting interlude in which two local worthies namely William Kirkland of Cromford, a miner, and William Longden of Derby, a stocking maker, were called to give evidence on behalf of the Cromford Company regarding river levels in dry seasons. Their simplistic evidence, in the absence of the hydrological and meteorological data which would be available today, was all that could be presented by the Cromford promoters.

Both men lived close by the river and claimed to have noted its floods and depth changes over the years. They confirmed Jessop's claim that the river was as low as it had ever been when he recorded its flow as 570 tons per minute in 1788. Their methods were hardly scientific. Kirkland for example said

. . . there are steps lead down to the river to fetch water out of it, and by means of these steps and the rising and falling of the water, I judge of the height. (He noted it] because he regularly fetched water. ¹

He unwisely claimed that in November 1788 the level was 2 inches lower than in the dry season of 1785, after which Counsel set about to confuse this humble witness with questions of levels in different months and years, all of which showed the inadequacies of his memory, unsupported as it was by written memoranda.

Outram was also called and questioned on the capacity of weir pools and the operation of water wheels. He knew a great deal about each mill, just as Captain Cell had claimed, and was able to quote quantities of flow and operating times with surprising confidence for a man of twenty-four years. His evidence suggested that none of the mill owners had much cause for concern, and that the canal abstractions were trivial compared with their requirements and the capacity of the river in its lower reaches. He stressed the fact, previously ignored by Mylne, that the Derwent received the flow from several tributaries below Cromford Bridge which swelled it considerably before it reached the industries of Belper and beyond.

Of much interest was his description of the Derwent Navigation at that time, which drew attention to the unsatisfactory character of such obsolescent waterways. Of its present state

¹Ibid., Evidence of William Kirkland on the Cromford Canal Bill, 6.7.1789.
There are a number of rapid streams and shallows in it, which render it extremely difficult to get any boat up in dry seasons... it would take as much water to bring up one boat in a dry season from Lord Harrington's Mills as this proposed canal would be empowered to take in a month.¹

As regards the movement of vessels through shallow parts, this was achieved '... by opening the sluices of the mill ponds and by that means making an artificial flash, and by lighters to take out part of the cargo'.

On that day, 6 July 1789, proceedings were drawing to a close as the two engineers continued to display their understanding of the Derwent's flow characteristics. Jessop followed his young colleague and supported the view that the Derwent Navigation could not possibly be affected.

If it (the abstraction) was taken every day in the week in very dry seasons it could not reduce the depth of the water more than one eight of an inch over the shallows and being taken only on a Sunday it might for some portion of the Monday, reduce it near an inch. This arises not from want of water in the river but from the very great imperfection of the navigation, for less than one five hundredth part of the water should be sufficient to make it a complete navigation... the amount of injury would be if a boat should happen to pass on the Monday, the boat must discharge two tons more into the lighter than they would have occasion to do... not likely to happen more than five or six times in a year, it may be easier to make compensation for it.²

The last observation was a sensible opinion, commonly accepted today. Engineering schemes relying on the vagaries of nature should not be constructed so as to accommodate every possible contingency, but instead should be designed to reasonable criteria. When the extremes occur, then those suffering damage should be generously compensated.

His concluding evidence ranged widely over the details of his project and included a description of the aqueduct proposed by Arkwright, the effects of the long Butterley Tunnel on springs and the natural water table, and the manner in which streams might be taken underneath his canal. He was questioned at some length on the method of measuring the exact quantity of water entering the canal from the proposed aqueduct, and he perhaps made

¹H.O.L.R.O., Evidence of Benjamin Outram on the Cromford Canal Bill, 6.7.1789.
²Ibid., Evidence of William Jessop on the Cromford Canal Bill, 6.7.1789.
more light of the matter than he should. This line of questioning persisted into the following, and final, day of 7 July, but Jessop still fenced cleverly with the opposition Counsel without giving precise details of what at that time must have been a difficult problem to resolve except by trial and error. Counsel then appeared to give up, perhaps overawed by the engineer's confidence and reputation. At one point he asked Jessop if he really meant to say that the velocity of flowing water at the surface of the aqueduct was the same as that at the bottom. With confidence the great man replied that '... I certainly mean to say so, or I should be more ignorant than a schoolboy'. It was difficult to counter that statement then but modern theory shows his belief was incorrect! Further considerations of the Bill were then adjourned.

Victory was at hand, and, as Jessop was concluding his evidence, John Gell was writing to his brother that

Jessop came on again today... the Lords are tired of us and many declare in our favour... the trial is to be for three days to come and Lord Sandwich is in the Chair. Lord Scarsdale has never appeared and Upton [Derby’s Counsel] prevented him he told me today. This youth I really think has more assurance and impudence than most people possess.

Lord Stanhope had not been as consistent a supporter as Gell would have wished at times, so he was singled out for caustic comments, for he

... is for teaching everybody. The Bishops religion and the Chancellor the law, and now Jessop, an engineer. They all say our evidence is so clear and steady.

And so it must have been because a week later ‘we are all over and passed yesterday and the message sent to the Commons, for I went to hear it there read’. He also had ‘... thanked Lord Sandwich, and Lord Hopeton told me to do it. And of my own accord the Archbishop who was very civil and said he was glad to be of service to you at any time’.

Obviously Philip Gell’s letters had proved worthwhile.

1H.O.L.R.O., Evidence of William Jessop on the Cromford Canal Bill, 7.7.1789.
2Gell MSS D258/50/14/x, John Gell to Philip Gell, (7).7.1789.
3Ibid. D258/50/14/ya, Ditto, 7.7.1789.
4Ibid. D258/50/14/ob, Ditto, 16.7.1789.
Congratulations were in order and young Outram wrote to Philip Gell:

Lord Rawdon and the Derby people seemed disappointed by the offer of terms of accommodation. . . . I sincerely wish they may be mortified by seeing in a few years a most extensive trade carried on upon this canal, such as may exceed even the hopes of its promoters. . . . the Peak. . . . must ever remember with respect this great debt they owe you and those other gentlemen who have been the active promoters of this measure.  

THE FINAL PLANS

The Bill safely passed, the proprietors held several meetings to discuss appointments and to prepare legal documents and further enactments to consolidate the agreements reached with the Erewash proprietors and other vanquished opponents.

Jessop was appointed, as was young Outram, although, rather surprisingly, Gell’s correspondence implies that there had been some opposition from certain quarters:

obliged to you for such profitable sentiments of the undertaking and the trouble you are taking and the expense. Yet Mr Erdington and myself think that Jessop is the most proper person for the general direction of the work and he has answered for the quantity of water being sufficient for his canal and asserted that he was certain it was enough . . . his practice on many canals . . . certainly points him out. B. Outram and he are very great friends and he may be his resident executioner. I should think Jessop will be much disappointed if he is not concerned. . . .  

Much of the opposition came from Sir Richard, a man who harboured grudges for trivial, or even imagined slights.

. . . I know he will oppose Mr Jessop. Where you will find a better engineer or a more able practical man I do not know.

Fortunately the successful partnership was allowed to embark on the next stage of design and construction, because some days later

. . . I am glad Jessop is likely to be employed and B. Outram. They are certainly very proper persons. It is a serious business the carrying on of our works with judgement, and Mr Jessop has seen much.

1 Ibid. D258/50/14/ca, Benjamin Outram to Philip Gell, 19.7.1789.
3 Ibid. D258/50/14/da, Ditto, 18.7.1789.
John Gell continued to show mistrust for Sir Richard, who by now he clearly disliked. He had not forgotten the several uneasy days he had spent humouring the moody Knight. Thus, when discussing the Company’s first business meetings and the important issues to be raised, he asked Philip Gell to take the proxies of their sisters Bella and Catherine as well as his own and that of Mr Erdington, ‘... for I will give them to nobody who is likely to be influenced by Sir Richard ...’.¹ He gave some of his reasons

... Sir Richard has never paid any subscription money and perhaps has some intentions of making a charge of his expense and employing Counsel and four Solicitors which he had at one time. I do not intend myself to allow of this charge...²

and he implied that the Knight’s ethical standards were not as they might be, because

I have never been well pleased with him for putting that question to me that if we had 10 per cent from our money and it was necessary to lower the tonnage for the good of the country if I would vote for it. I told him most assuredly I should. He said he never would... I am convinced he has many designs which the world cannot know of. He has not so much of the milk of human kindness in him as the world would give him credit for.³

There was another matter to which Captain Gell directed his attention with almost vindictive pleasure. The problem of the water supply for the canal was then under review, even though Jessop had confidently described Arkwright’s proposals in the House of Lords on 7 July as though this was the only possible solution. Circumstances were rather different now, and it seems likely that John Gell was the instigator of the move to revert to the use of Cromford Sough as the principal water supply. The aqueduct leading to Arkwright’s Masson weir was never built, nor was the weir raised because of

The clauses added to please Sir Richard, particularly raising the weir and making a channel through his meadows. My opinion from the first was we should not have occasion for this but if it pleases him, so we made a friend of him. But he held us all here, as enemies... no doubt our way will be the cheapest...

¹Ibid. D258/50/14/ob, Ditto, 16.7.1789.
²Ibid. D258/50/14/da, Ditto, 18.7.1789.
³Ibid. D258/50/14/da. Ditto, 18.7.1789.
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and

... I do not see why if it is no use to us that we are obliged to raise Sir Richard's weir for him. ...

So Arkwright's proposals were never constructed and this must have displeased the Knight greatly, because the weir construction would have enhanced his own power supplies at the Mill at no cost to himself. Perhaps he had also seen some advantage in controlling the supplies to the canal. The Act clearly denied him any rights to interfere, but his devious mind could have contrived many discomforts for the canal proprietors in the ensuing years of operation if it had suited his purposes. Although this is another story, it is of interest to note that shortly after the opening of the canal, the vindictive Arkwright saw fit to divert the discharge from Cromford Sough into his own weir pool, and this engaged him in acrimonious litigation with the Canal Company.

And not surprisingly, Sir Richard settled a few old scores as well. For example, the young Benjamin Outram was made Superintendent to the Canal with '... the annual salary of £200 to commence on the 24th August 1789.' This appointment pleased his friends among the proprietors, but not apparently Sir Richard, because subsequently the Committee of Proprietors (chaired by himself on that occasion) resolved that Sir Richard Arkwright be requested to recommend a proper person to superintend the execution of that part of the canal which goes through his property under the direction of Mr Jessop the Engineer, and at the expense of the Company, and that Mr Benjamin Outram's offices as Surveyor shall not extend to such part of the said canal.

It is surprising that the Committee supported this malicious and incompetent resolution because they were expected to defray the costs as well. But once again Arkwright was humoured by his fellow proprietors and, if it gave him personal gratification, no doubt it lost him even more of the goodwill of his more worthy neighbours. It did not hinder the progress of the industrious

1 Private Correspondence, Simon Stoker of Cromford with the Author.
2 Resolution of the Second General Assembly of the Cromford Canal Company, 5.10.1789 (British Transport Historical Archives, London).
3 Resolution of The Committee of the Cromford Canal Company, 14.1.1790 (Ibid.).
partnership of Jessop and Outram, which saw the completion of this navigable waterway by the year 1794, at a cost of £78,900.

The construction of this great undertaking is yet another story, but sufficient to say that it was always the success that Jessop had foretold. Massive industrial developments followed hard on the heels of the construction gangs, bringing much employment and prosperity to that lovely part of Derbyshire. No doubt it also brought great personal satisfaction to the Gells of Hopton, and to Francis Beresford of Ashbourne without whose sustained enthusiasm would not have been seen the survival of their first Act for the making and maintaining a navigable canal from or from near to Cromford Bridge in the County of Derby, to join and communicate with the Erewash Canal. . . .