

‘I alone am hung in chains’: Isambard Kingdom Brunel examined through a photograph and the ugly beauty of his industrial world

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Isambard Kingdom Brunel was both man and myth. He left a physical imprint on the nation through his bridges, railways, tunnels and ships and, despite some notorious failures, evolved into a symbol for all that was noble and inventive about the Victorian industrial age. Any assessment of his reputation should accommodate his real, material world and the semi-fictional one created around his memory. This article will analyse Brunel’s historical and imagined ‘selves’ through two artefacts which inhabit both these ‘worlds’ and with which he was closely associated. These are the now-iconic photograph of him by Robert Howlett taken at the launch of the SS Great Eastern in 1857 and iron-ore chain links made by a London-Welsh company, Brown, Lenox which Brunel championed and which demonstrate his life-long passion for resolving real-world engineering problems.

In *The Age of Revolution 1789-1848*, Eric Hobsbawm describes Isambard Kingdom Brunel as an ‘imaginative, sophisticated and daring engineer’ whose ornamental and technically dazzling structures helped Victorian Britain make great Darwinian leaps forward.¹ Brunel’s contemporary Samuel Smiles, however, denies him a place in *The Lives of Engineers*, his celebrated pantheon of great industrial innovators, for being ‘the very Napoleon of engineers, thinking more of glory than of profit’.² Smiles, an exponent of Victorian liberal values, saw engineers as extended expositions of how self-help could advance civilisation, and Brunel, with his frequent glorious disasters, did not qualify. Brunel’s works have, however, clearly benefited Britain with his historical ‘self’ crystallising in the national memory into that of the pugnacious Victorian hero whose failures could be ignored because of the thrill of his triumphs. While acknowledging that his real self has been overlaid with a posthumous persona, this paper will examine Brunel’s reputation through two artefacts; a photographic image (Fig.1) and an iron ore chain link (Fig.2). These objects have physical existences but can also be read as symbols, raising intriguing questions about the authorship of Brunel’s identity and nature of his achievements. Therefore, a central theme of this exploration will be to discover if these objects collaborated with (or resisted) one another in fashioning Brunel, and whether he was elevated or shackled by his creations.

¹ Eric Hobsbawm, *The Age of Revolution 1789-1848* (London: Phoenix Press, 2000), p.196. Kindle edition.

² Samuel Smiles, *The Lives of the Engineers* (London: John Murray, 1879), p. 215.

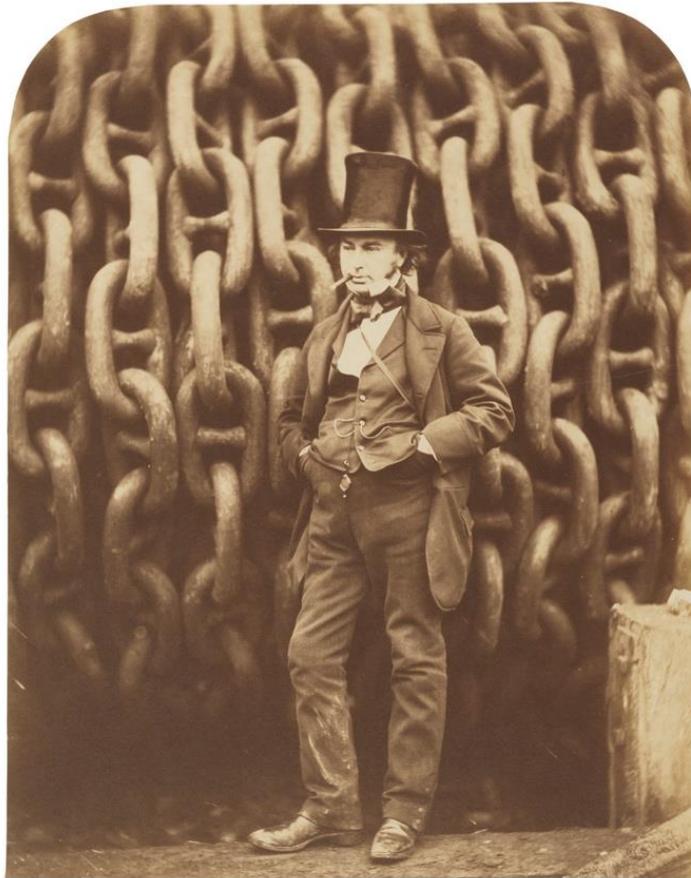


Figure 1: Robert Howlett, *Isambard Kingdom Brunel* (1857), albumen print, 28.6 × 22.5 cm
(National Portrait Gallery Primary Collection; © National Portrait Gallery, London)



Figure 2: Brown, Lenox iron-ore chain link with cross stud (Pontypridd Museum collection, Pontypridd; photograph, author's own)

Isambard Kingdom Brunel (1806-1859) was a flamboyant innovator who revolutionised public transport by designing and managing engineering ‘firsts’ such as the Great Western Railway, *The SS Great Britain* and the Clifton Suspension Bridge. He was a self-publicist with a large public following. However, Brunel was also notorious for wasting clients’ money and was, in the view of his biographer Adrian Vaughan, a ‘knight errant’ and a ‘capricious and dictatorial’ bully incapable of creating anything other than on a grand scale.³ *The Engineer* observes caustically in its obituary of Brunel that his ‘reputation was largely due to the applications which he had made of the applications of others’.⁴ The photographic historian Rose Teanby notes more sympathetically, however, that he seemed fatally besotted with his engineering projects, ‘often working 18 hours a day’.⁵ His early death at 53 years old from a stroke, stress and injuries sustained through work, also suggests his creations controlled him in a personally destructive way.

Brunel’s final project, the *SS Great Eastern*, provides a dramatic demonstration of a man unable to compromise or marry his genius for innovation with sound commercial sense.⁶ The vessel was scheduled for launch on 3 November 1857 at the Napier Yard in London’s Millwall and, in theory, it was a modern wonder. A double-hulled, iron steamship, five times the size of anything built before. It was 211 metres in length, had five engines, seven-metre paddlewheels, a four-bladed screw propeller and could carry 4,000 passengers non-stop to Australia. But like all Brunel’s projects, it was a gamble, as his clients, the Eastern Steam Navigation Company came to realise. It had budgeted £800,000 to build the *Great Eastern* but its engineer-in-chief, Brunel, was pathologically incapable of simplifying his elaborate and technically demanding designs. The project fell two years behind schedule, the money ran out and the shipbuilder, John Scott Russell, went bankrupt. On 21 October 1857, company secretary John Yates ordered the immediate reduction of ‘our present enormous expenditure’ and the ‘discharge of every person not actually engaged either in preparing for the launch’.⁷ Angus Buchanan’s analysis of the commercial reality of Brunel’s projects, judges the *Great Eastern* to be ‘the most contentious episode’ of his life.⁸

While Brunel’s working life was often chaotic the country was mesmerised by his *vision* of the *Great Eastern*. Desperate to reassure shareholders, the ESN.Co.’s directors held open days and 70,000 visitors marvelled

³ Adrian Vaughan, *Isambard Kingdom Brunel: Engineering Knight Errant* (London: John Murray, 1991), p. 234.

⁴ ‘The Late Mr. Brunel’, *The Engineer*, 23 September 1859, p. 219,

<https://theengineer.markallengroup.com/production/content/uploads/2012/09/Brunel-obituary1.pdf> [accessed 21 February 2020].

⁵ Rose Teanby, ‘Brunel, Hung in Chains: A new look at the story behind the photograph’, *PhotoHistorian* (Royal Photographic Society), No. 175 (Spring 2016).

⁶ Vaughan, pp. 234-253.

⁷ John Yates, letter to Brunel, 21 October 1857, *Eastern Steam Navigation Company report book IV*, Ref: DM1306/11/1/4, folios 294-295 (Brunel Institute/ Bristol University Library, Special Collections).

⁸ Angus Buchanan, *Brunel: The Life and Times of Isambard Kingdom Brunel* (London and Hambledon, Hants: Hambledon Continuum, 2001) p. 115.

at the gargantuan vessel with the *Illustrated London News* reporting that ‘crowds of persons daily thronged her deck’.⁹ Much to the irritation of a highly stressed and overworked Brunel, ‘who watched with anger and despair’, they turned launch day into a ticketed event for 3,000 guests.¹⁰ Few, if any realised the *Great Eastern* was a ‘white elephant’ that would never reach the speeds predicted by Brunel. Usually three-quarters empty, it was converted into a floating music-hall before being scrapped in 1889. But inevitably to the modern mind, the photograph taken at the launch of Brunel is embedded with a sense of doom and heroic poignancy.

Robert Howlett (1831-1858) did not set out to immortalise Brunel but to create images for the *Illustrated Times*’s 24-page special ‘Leviathan’ report of 16 January 1858. Although only 26 years old, Howlett had influential establishment patrons with *The Times* describing him as ‘one of the most skilful photographers of the day’.¹¹ In 1856, Queen Victoria had commissioned Howlett to create a series of portraits of veterans entitled ‘Crimean Heroes’ and presumably, it was hoped by Brunel and the company, that he would appear heroic by association. Howlett was technically highly skilled and had improved the light sensitivity of the latest albumen silver and wet-plate glass collodion slides that had replaced the delicate, slower daguerreotype. But he also had a ‘modern’ artistic eye and his ‘Brunel’ photograph is still considered ‘one of the first and finest examples of environmental portraiture’,¹² and ‘strikingly untypical’ of the staid studio commissions of the past.¹³

A close reading of the photograph suggests that while Brunel conveys an air of apparent insouciance, the pose has been carefully staged to allow Brunel to ‘speak’ directly to the viewer. He wears a trademark stovepipe hat and his boots and trousers are covered in mud. His hands are stuffed in his pockets and a bag of cigars, ready to replace the one clamped (always) to the right side of his mouth, is slung over his left shoulder. No record exists of any conversation or correspondence between Howlett and Brunel about the portrait. However, between 1854 and 1856, Brunel had issued precise instructions for a set of detailed photographs to record the building of the *Great Eastern*.¹⁴ This offers the intriguing prospect that Brunel, a known show-off, may have been involved in the composition of his own portrait. David White, who has re-created Howlett’s method, believes the now-iconic pose was the third of three, with two earlier poses

⁹ *Illustrated London News*, vol. 34, no. 953, 1 January 1859, p. 14.

¹⁰ Buchanan, p. 258.

¹¹ *Illustrated Times*, (Leviathan Number), vol. 6, no. 145, 16 January 1858, pp. 68-86.

¹² *Encyclopaedia of Nineteenth-century Photography: vol. 1, A-I index*, edited by John Hannavy (New York and London: Routledge Taylor and Francis Group, 2013), p. 718.

¹³ Rob Powell, *Photography and the Making of History: Brunel’s Kingdom*, (Bristol: Watershed Media Centre, 1985), p. 46.

¹⁴ Brunel’s Letter books, *Eastern Steam Navigation Company report book I*, Ref: DM1306/11/1/1/folios 72, 85-86 and 304-305 (Brunel Institute/Bristol University, Special Collections), <https://specialcollections.blogs.bristol.ac.uk/2020/01/31/photographing-isambard-kingdom-brunels-s-s-great-eastern/> [accessed 22 February 2020].

showing Brunel leaning and sitting, being judged as being too casual.¹⁵ To the art critic Jonathan Jones, the single moment of the final portrait's creation signals the birth of modern photography; its Victorian swagger and 'butch accessories' allowing Brunel a moment of machismo in which to display his authority 'as he displayed it to the men in the shipyard'.¹⁶

If the specific pose creates Brunel as a symbol of Victorian manhood, what transforms his image into that of an enigmatic giant of the age, are the multiple 'readings' made possible by the backdrop. The giant checking reel of iron ore chain links dwarfs the single human figure while also inferring a world of enormous power beyond. Monstrously large chains lend Brunel authority by suggesting he is in charge of a monstrously large project for country and Empire. The National Portrait Gallery suggests the photograph places Brunel at the epicentre of the Victorian economic project by giving him 'control over the vast forces of nature through industrial innovation'.¹⁷ Rose Teanby meanwhile, sees the image as one of 'defiance and self-confidence' and its two distinct halves representing, in human form, the Industrial Revolution. As she puts it, 'the lower being a common workman with muddied trousers, the upper part, a Victorian gentleman framed by the iron which had been such an essential part of all his engineering triumphs'.¹⁸

However, the very breadth of the symbolic power of the chains, renders them open to different, possibly less optimistic perspectives. Jonathan Jones's comment that these are chains 'rattling down into hell',¹⁹ would perhaps resonate with a contemporary Victorian view. The chains are reminiscent of the one 'forged in life' made 'link by link', which Charles Dickens used to torment his Jacob Marley in *A Christmas Carol*, and which caused such alarm during his popular readings during the 1850s.²⁰ Similarly, Victorian classicists might view Brunel himself as a type of Prometheus. They frequently used the term adjectively for machines, and engineering, and 'gigantic, world-changing, world-shocking design'.²¹ A more cynical mind might, however, interpret an endlessly reproduced photograph as a visual metaphor for Zeus's perpetual punishment.

¹⁵ David White, 'The Light Shone and Was Spent: Robert Howlett and the Power of Photography', *Photo Histories*, 22 February 2020, <http://www.photohistories.com/Photo-Histories/51/robert-howlett-and-the-power-of-photography> [accessed 22 February 2020].

¹⁶ Jonathan Jones, 'Isambard Kingdom Brunel, Robert Howlett, 1857', *Guardian*, Portrait of the Week, Culture, 17 June 2000, <https://www.theguardian.com/culture/2000/jun/17/art> [accessed 2 January 2020].

¹⁷ Robert Howlett, *Isambard Kingdom Brunel*, panel notes, Ref: P112, Primary Collection, National Portrait Gallery, London.

¹⁸ Rose Teanby, *PhotoHistorian*.

¹⁹ Jones, *Guardian*.

²⁰ Charles Dickens, *A Christmas Carol*, (Ware, Herts: Wordsworth Editions, 2018), p.25.

²¹ Robert Hulse, *Brunel: The Man Who Changed the World*, notes for a lecture to the English-Speaking Union and the Victorian Society in America, The West End Museum, Boston, Massachusetts, 22 April 2015, <https://thewestendmuseum.org/events/talk-brunel-the-man-who-changed-the-world/> [accessed 15 February 2020].

Brunel himself, may have seen the chain as symbols of achievement and as shackles because on good days, he described the ship as his ‘Great Babe’, but on bad ones, it became his *The Leviathan*, after the great Biblical sea-monster.²² On launch day, he asked George William Lenox, who owned Brown, Lenox, to pose with him, scrawling on the back of one photographic print, ‘I asked Mr Lenox to stand with me, but he would not. So, I alone am hung in chains’.²³ Brunel’s contemporaries may have understood this as gallows humour and a reference to the gibbet where the bodies of murderers were ‘hung in chains’, a practice which ended in 1832 with a repeal of the Murder Act (1751). Teanby believes Brunel was conscious that Execution Dock, where pirates were hung, was only five miles from Napier Yard.²⁴ It is, however, a curious anecdote because while Brunel may have wanted moral support from Lenox, he had an ‘obsession with his status’,²⁵ and the chain maker’s appearance would have diluted the image’s heroic symbolism.

Brunel’s relationship with the chain links became symbolic through the photograph but it was originally forged in the real world of engineering. An examination of his working relationships and practices reveals differences between the materiality and symbolism of the chain links. While he was shockingly casual about deadlines and budgets, Brunel demanded precision and solutions to impossible problems from his sub-contractors. This brought him into contact with Brown, Lenox, an iron-ore chain maker with foundries at Millwall (Fig.3) and Pontypridd in South Wales. In 1818, its founder Samuel Brown, (1776-1852), (Fig.4), a former naval captain, had patented a design for oval, iron-ore chain links with stay-pins (Fig.5 and Fig.6).²⁶ These appealed to the visionary in Brunel because they resolved one of engineering’s perpetual problems; how to combine strength with flexibility. Brown, Lenox was a prestigious company with an exclusive contract with the Admiralty to replace the hemp rope cables on its Royal Navy vessels.²⁷ What distinguished the company from its rivals was its ‘proving’ house where each link was rigorously tested. It also shared Brunel’s calculating management style. In the unromantic world of Victorian manufacturing, Brunel and George William Lenox (who took over the company in 1851) both believed production lines were chains of human activity and weakness would not be tolerated. Brunel was a strict boss even at 21 years old and according to Colin Maggs, he ‘withheld wages for poor performance’.²⁸ Similarly, Lenox

²² Rose Teanby, ‘Around the World in 80 yards – Brunel and the SS Great Britain’, <https://talbot.bodleian.ox.ac.uk/2018/01/12/around-the-world-in-80-yards-brunel-and-the-ss-great-britain/> [accessed 3 January 2020].

²³ J. P. M. Pannell, *Man the Builder, An Illustrated History of Engineering* (Book Club Associates, London; Book Club Edition (1977), p.113. Also, in Stephen K. Jones, *A Link with the Past: The History of the Newbridge Works of Brown Lenox and Co., Pontypridd*, in Denning Roy (ed.), *Glamorgan Historian*, Vol.12 (Stewart Williams: Barry), p.43, and a Brown, Lenox company magazine, p. 12 (Brunel Institute and Bristol University Library Special Collections).

²⁴ Teanby, *PhotoHistorian*.

²⁵ Vaughan, p. 253.

²⁶ *Gentleman’s Magazine*, May 1852, (Obituary Sir Samuel Brown) ser. 2., vol. 37, p. 519., <https://babel.hathitrust.org/cgi/pt?id=pst.000068790783&view=1up&seq=534>, [accessed 3 January 2020].

²⁷ John H. Harland, ‘The Transition from Hemp to Chain Cable: Innovations and Innovators, *The Mariner’s Mirror*’, 99:1 (72-85), (Routledge Taylor & Francis Group), <https://www.tandfonline.com/doi/pdf/10.1080/00253359.2013.767000> [accessed 15 January 2020].

²⁸ Colin Maggs, *Isambard Kingdom Brunel: The Life of an Engineering Genius* (Amberley Publishing, 2016), p. 30.

believed, 'A workman's wages should not be stinted and then he can afford to be fined if his work is found faulty in the machine. A drunken man should always be got rid of, as a few bad or burnt links put into a cable by him while in a state of inebriety, renders the whole cable doubtful'.²⁹

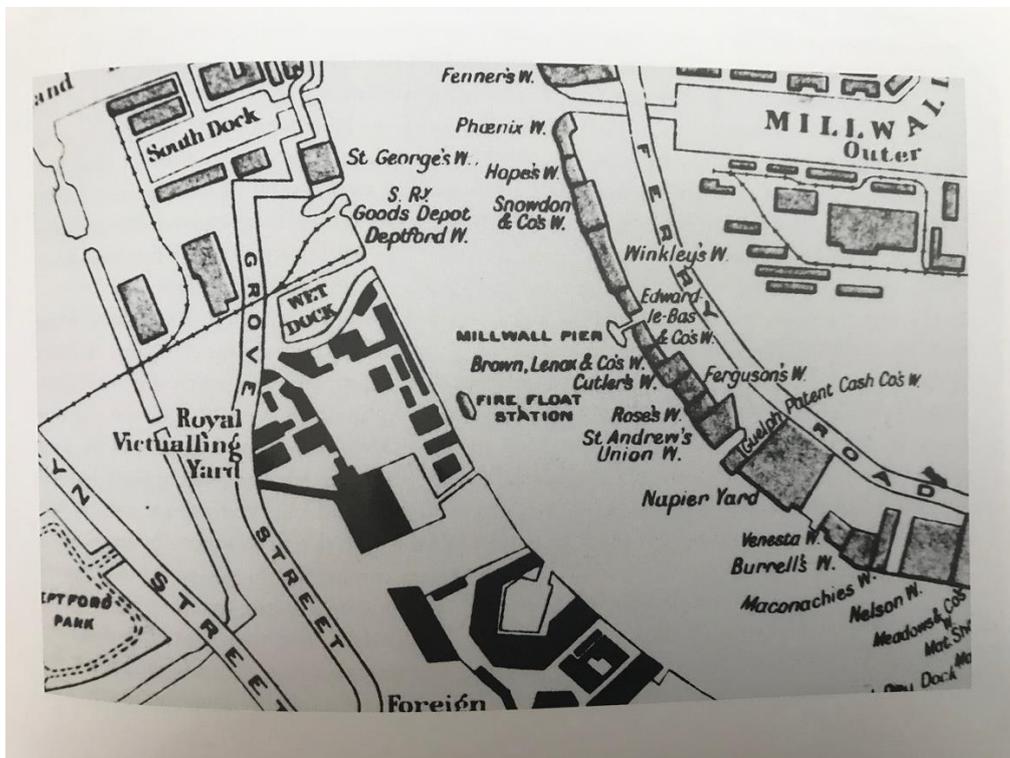


Figure 3: Detailed map of Brown, Lenox Wharf and Napier Yard at Millwall, London (© Stephen K. Jones)

²⁹ George William Lenox, 'On Chain-Cables' in *Transactions of the Institution of Naval Architects* vol 1. Edited by E. J. Reed (London: The Institute of Naval Architects, 1928), p. 166. Transcript of a speech made by Lenox on 1 March 1860 at the inaugural meeting of the Institute at its then headquarters at Adelphi Street in London.



Figure 4: Unknown, (British School) *Captain Samuel Brown*, (1820), Oil on canvas, 134.5 × 104cm (Royal Pavilion & Museums Brighton and Hove; © Royal Pavilion & Museums, Brighton & Hove)

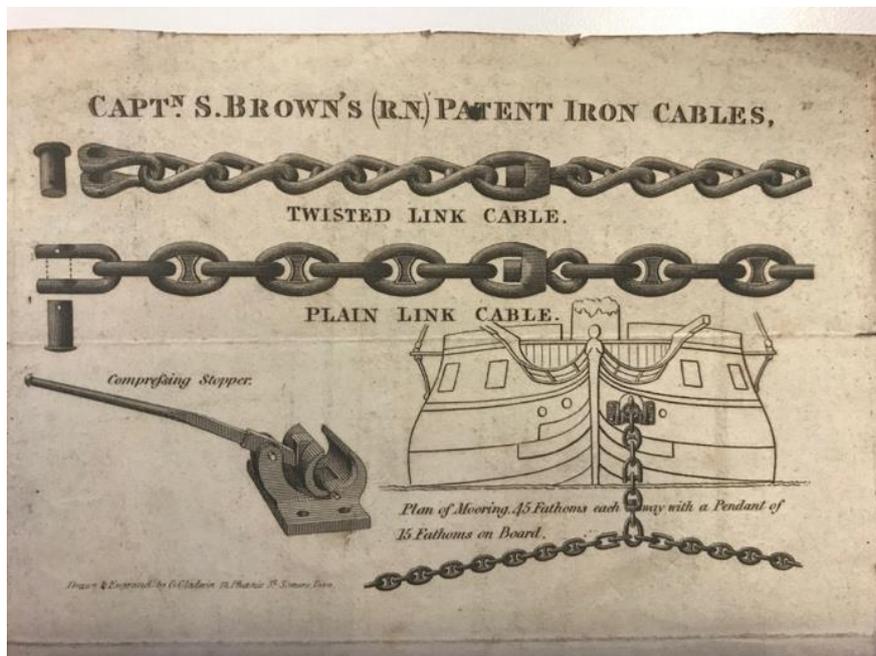


Figure 5: Capt. S. Brown's (R.N.) Patent Iron Cables, diagram, scale of sizes, and description (1818), GB214 DBL/61 (Glamorgan Archives; Courtesy of Glamorgan Archives, Cardiff)

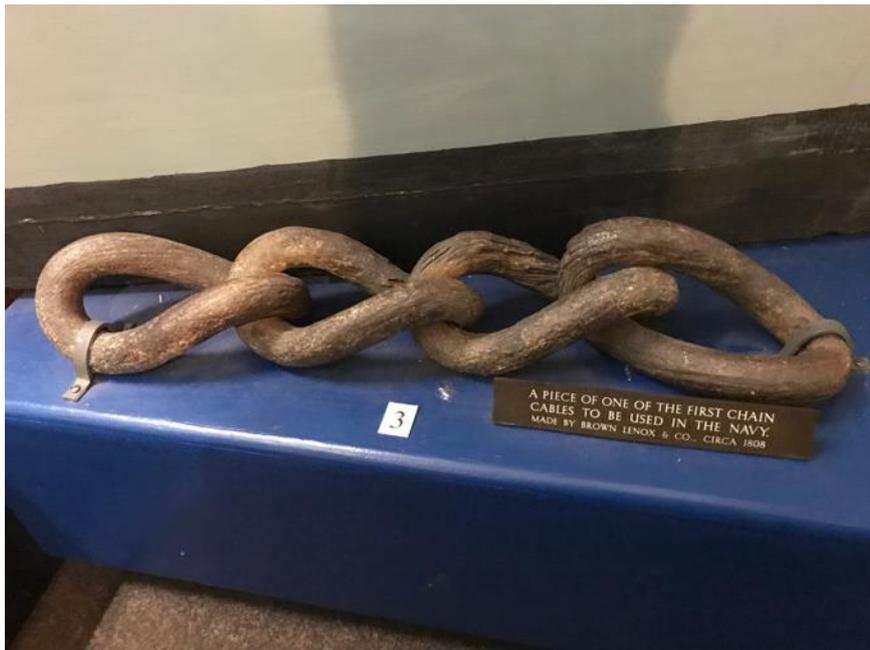


Figure 6: Brown, Lenox prototype 'twisted' rope cable, (1808) (Pontypridd Museum collection; © Pontypridd Museum, Pontypridd)

The *Great Eastern's* chain cables would be the largest ever made. Brown's letter to Lenox of July 1855 (Fig: 7) demonstrates a bossy charm he reserved for respected inventors. 'I am anxious to hear the result of the proof of your new machine. It is almost as imaginative to me as to you – will you have the products to send me [...] on this evening's post'.³⁰

³⁰ Isambard Kingdom Brunel, letter to George William Lenox, July 1855, Ref: DBL 100 (Glamorgan Archives, Cardiff).

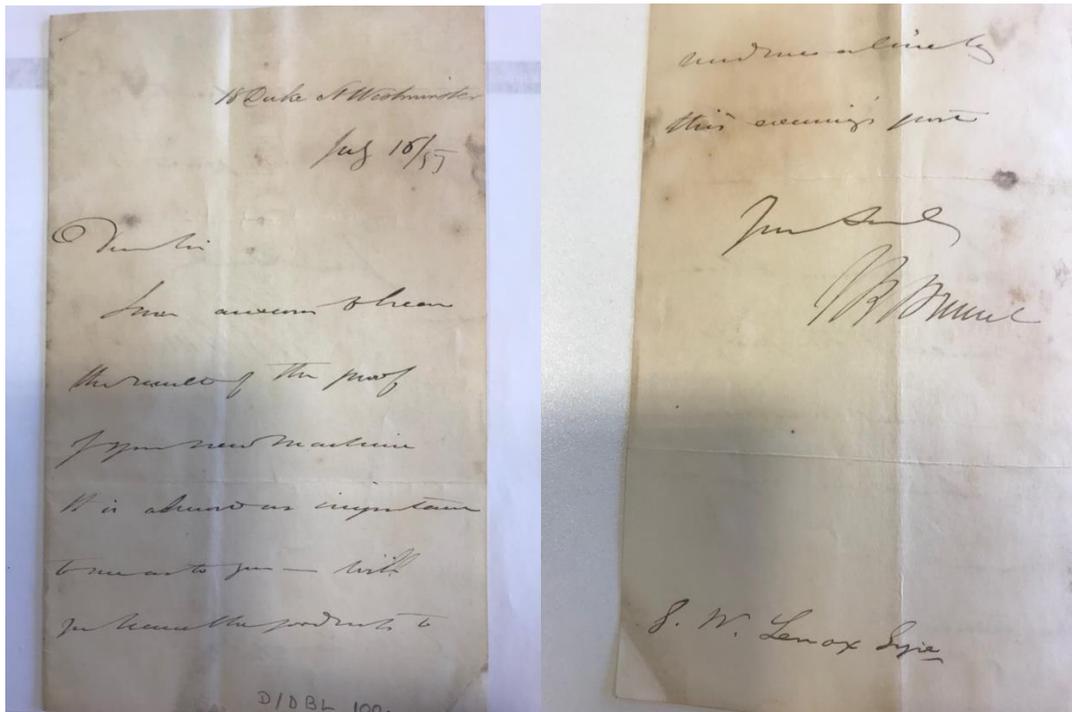


Figure 7: Letter from Isambard Kingdom Brunel to George William Lenox, (July 1855) GB214 DBL/100 (Glamorgan Archives; Courtesy of Glamorgan Archives, Cardiff)

In March 1857, Brown, Lenox was contracted to provide 400 fathoms of iron-ore chain of $2\frac{5}{8}$ ins diameter,³¹ promising to ‘prove’ the links to Brunel’s required strain of ‘not less than 230 tons’.³² Brunel proved a harsh client. When Lenox told him ‘we hope to be prepared’, Brunel replied sarcastically that he ‘must not qualify it by saying you hope to be prepared’,³³ later threatening, ‘I must have the chains and if you have not the means of supplying them on the terms you undertook – while others have offered to do so – what am I to do?’.³⁴ Yet on 3 October, a month before the proposed launch, Lenox reported on the impossibility of the task and that the chains were breaking at 185 tons considerably below the standard of the original specification.³⁵ By then, in poor health and exhausted by having to constantly feed his sea-monster, the *Great Eastern*, Brunel seemed in no position to argue. But in any case, he had over-estimated the required strain needed as the chains had proved more than adequate for the *Great Eastern* at sea.³⁶ The completed chains were taken by canal barge, then coastal vessel to Millwall, where they began their journey into photographic history.

³¹ Eastern Steam Navigation Company Specification: Chain Cables, *ESN Company report book IV*, Ref: DM1306/11/1/4, folio 156 (Brunel Institute/Bristol University Library, Special Collections).

³² Brunel letter to Brown, Lenox, 9 March 1857, *ESN Company report book IV*, Ref: DM1306/11/1/4, folio 217 (Brunel Institute/ Bristol University Library, Special Collections).

³³ George William Lenox letter to Isambard Kingdom Brunel and Brunel’s response to Lenox, *ESN Company report book IV*, Ref: DM1306/11/1/4, folios 193-194 (Brunel Institute/ Bristol University, Special Collections).

³⁴ Brunel letter to Lenox, 2 July 1857, *ESN Company report book IV*, Ref: DM1306/11/1/4, folio. 467 (Brunel Institute/Bristol University Special Collections).

³⁵ Proving house reports to Lenox, 3 October 1857, Ref: DBL6 (Glamorgan Archives, Cardiff).

³⁶ Lenox, p. 168.

Ironically, Howlett's photograph had little direct impact at the time because the *Illustrated Times*, like other newspapers and magazines, used woodcut engravings, made from photographic impressions. Although a limited number of prints were produced as 'stereocards' and *carte-de-visites*, it was not until the 1890s that newspapers began reproducing photographs and by then the *Great Eastern* had proved a disaster and Brunel and Howlett were long since dead. All posthumous prints of Howlett's original have therefore become detached from the moment and place of creation making a shift in meaning inevitable. In Rob Powell's intriguing analysis, each reproduction of the photograph renders the image 'increasingly open to more general, and less tangible, meanings'.³⁷ The underlying ambiguity in Howlett's imagery may, therefore, have been deliberate. Howlett was an astute photographer ahead of his time who knew Brunel was a complex man and he allowed the viewer to decide 'who' they wanted him to be. The semiotic language he deploys chimes with the views of theologian and philosopher Paul Tillich that a symbol 'points beyond itself' to something unquantifiable and mysterious, opening up the 'depth dimension of reality itself'.³⁸ The image of Brunel and the chain links as representations of Victorian courage and enterprise, certainly do this and their symbolic value has also withstood the passage of time. Yet as symbols, the chains, the stovepipe hat and the cigars, have always been at risk of becoming idolatrous and 'taken for reality', becoming poor *substitutes* for the 'deeper meaning' they were originally intended to convey.³⁹ It is a possible explanation of the transformation of the man into myth.

Like many controversial Victorians, Brunel's reputation has been reassessed, first, in a sympathetic but authoritative account by Tom Rolt in 1957 which concludes Brunel was 'the last great figure of the European Renaissance'.⁴⁰ This view was later popularised by the art historian Kenneth Clark in his television series *Civilisation*, which suggests Brunel's engineering achievements mark an era of 'heroic materialism' equivalent to the humanitarianism of William Wilberforce and the Earl of Shaftsbury.⁴¹ However, it is still not clear where the 'real' Brunel ends, and his 'representational' and 'mythical' versions begin because they cut across time, co-existing as historical fact and in the imagination of a nation that longs for heroes. If these three 'Brunels' exist with a fluid, co-dependency, to what extent has their 'shape' been affected by the materiality of the chain links and the imagery of the photograph and who was in charge, the artefacts or Brunel? His spectacular projects exist today, not as museum pieces but as working bridges, tunnels and railways while the emblems of 'Brunel's Britain' captured the imaginations of the 2012 London Olympics crowds in much the same way as the Victorians marvelled at his vision. Brunel liked to

³⁷ Powell, pp. 7-8.

³⁸ Paul Tillich, *Theology of Culture* (New York: Oxford University Press USA, 1964), p. 59.

³⁹ *Ibid.*, p. 54.

⁴⁰ L.T.C Rolt, *Isambard Kingdom Brunel*, 3rd edition (London: Penguin, 1989) p. 420.

⁴¹ Kenneth Clark, *Civilisation, A Personal View*, 2nd edition (London: BBC and John Murray, 2005) p. 226., and *Civilisation, A Personal View*, BBC 2, 'Heroic Materialism', episode 13, 13 May, 1969 <https://www.youtube.com/watch?v=IQm2UyEy65U>, [accessed 5 February 2020].

create, by controlling his material world and the men around him and was conscious, at all times, of his image.⁴² He acknowledged in his personal diary, ‘My self-conceit and love of glory vie with each other which shall govern me’ and that he wanted ‘to be the first engineer and example for future ones’.⁴³ But Brunel was also a melancholic, possessed by his creations and chained literally and metaphorically to his work. As he admitted, ‘I am addicted to excess, to castle-building and in the wildest, and most impossible’.⁴⁴ Over a lifetime, these obsessions built into an existential longing also revealed in Brunel’s private thoughts. ‘How painfull’ (sic) it would be to see how every event passed off unheeded’... ‘As on we fly, and nothing to rest a permanent idea or hope on but our prospects in the next world’.⁴⁵ As physical objects during his lifetime, one could conclude that the artefacts had a limited impact on Brunel’s reputation. The chain links confirmed Brunel’s ‘meticulous’ calculations could be incorrect and as part of a ferocious workload, helped hasten his death. Howlett’s photograph was ahead of its time and could not be mass-produced to Brunel’s advantage until after his death. Yet as timeless symbols the photograph and chain links change everything; their images play with our needy, collective memory, providing Brunel with a refuge through the transformation of a single instant into a form of immortality.

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⁴² Julia Elton, *In our Time*, BBC Radio 4, 13 November 2014, 9 a.m., <https://www.bbc.co.uk/programmes/b04nvp1> [accessed 1 February 2020].

⁴³ Isambard Kingdom Brunel, *Brunel’s “Locked Diary”*, BIAS *histories* No 4, transcribed by Angus Buchanan (Bristol: The Bristol Industrial Archaeological Society, BIAS, 2012), p. 12.

⁴⁴ Isambard Kingdom Brunel, Letter to Benjamin Hawes, 8 April 1829, “The Locked Diary”, DM 1306/II/1 (Brunel Institute/Bristol University Library Special Collections). Benjamin Hawes (1797-1862) MP, KCB, Undersecretary for War, 1857-62, married to Sophia Brunel, IKB’s elder sister. Also, in *Brunel’s “Locked Diary”*, p. 8.

⁴⁵ Brunel, *Brunel’s “Locked Diary”*, p. 8.

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