Preserving the Dust

The Role of Machines in Commemorating the Industrial Revolution

Ben Russell

By the mid-nineteenth century there had emerged a well-established conception of the British industrialization as being driven preeminently by very particular inventors and the machines that they created. James Watt and the steam engine were a primary focus of attention, particularly for Bennet Woodcroft (1803–79) at the Patent Office Museum in London. Woodcroft’s early work securing items of Britain’s early industrial heritage points to the powerful commemorative role which he perceived for such objects in recording the passage of Britain’s Industrial Revolution. It also raises some issues that were amplified by the burgeoning heritage industry in the twentieth century.

The whole of the dust on the floor of the Room was swept up and put in a box for me to sort over at my leisure… Am I to understand that there is no possible chance of you requiring the dust.

The above words were written by Edward Collins in Birmingham to Henry Dickinson of the Science Museum, London, in December 1924.¹ They need a little explanation: Collins was the land agent responsible for Heathfield, the house built in 1790 by the Scottish engineer James Watt at Handsworth on the outskirts of Birmingham. The house had been sold for demolition, and Collins had packed up ready for transport to London the whole contents of Watt’s workshop, on the top floor of the house, which were being acquired by the Science Museum. The workshop contents comprise a physical record of most of the projects undertaken during the Scottish engineer’s long and varied career. Having removed
most of the items in the room, Collins carefully swept up the dust from
the floor, should it also be wanted by the Science Museum. That he did
so reflects the tremendous significance that continued to be attributed
both to Watt and to the objects in the workshop associated with him,
over a century after his death. The analogy of the dust can be extended
further, to an attempted acquisition carried out in 1861 by Bennet Wood-
croft (1803–79), founder of the Patent Office Museum, whose collection
became a nucleus for the later Science Museum. Woodcroft entered the
tomb of the 2nd Marquis of Worcester in Raglan, South Wales, in an effort
to acquire a model engine thought to have been buried there. Collins’s
workshop dust, and the dust (and worse) found in the tomb, provide a
way into a discussion of conceptions of the Industrial Revolution and how
it has been commemorated in the heritage industry. This discussion will
in particular refer to the role of three-dimensional technological objects.

In Myth, History and the Industrial Revolution, Donald Coleman
outlines the emergence of a heritage industry, with particular reference to
Britain’s industrial past, from the 1960s onwards. He does so by exam-
ing the evolution of the “myth” of the Industrial Revolution, and the
relationship between professional academic history and the wider popular
understanding of the phrase. He shows how the conception of the Indus-
trial Revolution as a catastrophe, which was developed by the former, was
accepted and expanded upon by the general public. However, even as this
process developed, so scholarly historians were redefining the Industrial
Revolution not as a catastrophe, but as a technological achievement. What
gave the debate its poignancy was that from the 1960s, even as that achieve-
ment was being most widely recognized amid promises of the potential of
the “white heat of technology,” so the industries the Industrial Revolution
had been founded upon were beginning to collapse. The combination
of a widely held conception of an Industrial Revolution (albeit vaguely
defined) and ever more derelict industry provided the motivation and
opportunity for the creation of a new heritage industry.

This new industry in large part comprised industrial museums,
preserved industrial sites, railways, canals and much else, and its chief
characteristic, as among academic historians, was a definition of the Indus-
trial Revolution based on technology: entire industrial sites and machines,
“large, complex, metallic, male manufactured or used.” A number of the
industry’s other key characteristics can be identified: it was built around
three-dimensional artefacts, the acquisition of which was given urgency by “a terminal sense of recording something which is crumbling into ruins.” And these things were presented in sites that would become “shrines” for volunteers and visitors: as Coleman put it, “cohorts of steam-railway buffs, canal restorers, cotton-mill conservers, industrial archaeologists and tourists galore.” The creation of industrial “shrines,” a dedication to technology, three-dimensional artefacts, and a sense of urgency were thus four key aspects of the late-twentieth-century heritage industry.

Just whose inheritance this new industry sought to preserve aroused considerable controversy. To give just one pair of polar opposites, Robert Hewison believed that the sense of national decline that pervaded Britain in the 1970s and 1980s catalyzed a sense of middle-class nostalgia, a rush to take shelter in a sanitized view of history, and moves by local authorities in post-industrial areas to capitalize on their crumbling past. By contrast, Raphael Samuel argued that, rather than being a middle-class reaction to the poor state of the present, the heritage industry was actually about a much more diverse and broadly held interest in the past. These opposing views demonstrate that the memorialization of the Industrial Revolution by the heritage industry, and the significance of that memorialization, have been hotly contested.

While acknowledging the disparate and contested messages conveyed by the heritage industry, here I will focus more on the medium used to convey such messages, drawing particularly on the collections held by the Science Museum, London, which contain many significant artefacts pertaining to Britain’s Industrial Revolution. As Henry Dickinson wrote, the collection (which he also curated) comprises “documents of the highest value to us, not matched and scarcely approached anywhere else in the world.” It will be argued that the heritage industry Coleman saw as emerging in the 1960s, rather than being an entirely new phenomenon, was an amplification of activities that had begun a century earlier, in the 1860s. Then, Bennet Woodcroft at the Patent Office Museum in South Kensington, London, and to a lesser extent George Wilson, founding director of Edinburgh’s Industrial Museum of Scotland for four years starting in 1855, were grappling with similar issues to those confronting the 1960s heritage industry—an emphasis on technology, a concentration on three-dimensional objects, a sense of the potential loss of such artefacts, and the construction of industrial “shrines.” These four will inform the
discussion that follows and help us explore how Woodcroft particularly made a significant contribution to shaping what the Industrial Revolution was perceived as being and how it should be commemorated.

Accounts of the character of the Industrial Revolution conventionally begin with Arnold Toynbee’s *The Industrial Revolution of the Eighteenth Century in England*, first published posthumously in 1884, and which David Cannadine argues “effectively began modern discussion on the subject.” Toynbee painted a picture of the Industrial Revolution as a social catastrophe: it was a period “as disastrous and as terrible as any through which a nation ever passed; disastrous and terrible because, side by side with a great increase of wealth was seen an enormous increase of pauperism; and production on a vast scale … led to a rapid alienation of classes and to the degradation of a large body of producers.” Toynbee emphasized the role of an unfettered free-market economy in bringing this upheaval about, and emphasized the role played by two individuals: Adam Smith, who catalyzed the doctrine of free trade, and James Watt, whose steam engine made possible the industrial transformation that followed upon its implementation. In Glasgow, home to the work of these two men, “where commercial and intellectual activity went hand in hand … the same lesson was being forced into men’s minds—the need of liberty; and at the same time great mechanical inventions were preparing the way for a new age.”

Toynbee’s conception of the Industrial Revolution as “nasty, mean, brutish, and fast” has been the subject of extended debate, and David Cannadine has deftly summarized its evolution. Much recent historiography has concentrated on the etymology of the phrase “Industrial Revolution,” tracing it back to the 1820s and Jérôme-Adolphe Blanqui’s *Histoire de l’économie politique* of 1837, and the origins of the phrase in France, rather than Britain, have also been analyzed. However, William Hardy has argued that analysis of the etymology of “Industrial Revolution” is an “over-preoccupation.” Rather than analyzing the phrase itself, what of the content of the phrase? That is, as Hardy puts it, how a particular “selective and simplified version of industrial history” emerged, forming a traditional story that “from about 1760, the national economy was transformed by a sharp discontinuity, characterized by the sudden rise of the cotton factories, the mechanical breakthroughs of Arkwright and Watt, and the emergence of new social problems and class conflicts.”
Hardy has demonstrated how, in public debates about the development of Britain’s manufactures until the 1780s, transformations effected by technical innovations, particularly the steam engine and in the cotton industry, were a key subject of discussion alongside Britain’s external trade. In the period 1780–1840, the social consequences of economic change emerged as a third agenda driving public debate. Consequently, Hardy argues, the basic building blocks of our modern definition of an Industrial Revolution had emerged by the 1840s. But if Hardy shifted the focus from the etymology to the content of the phrase “Industrial Revolution,” Christine MacLeod’s *Heroes of Invention* has concentrated on the technological aspects of what Hardy proposes, investigating how many inventors attained heroic stature in the third quarter of the nineteenth century and a few, most notably Watt, did so much earlier. Two main strands emerge from MacLeod’s work, concerning the role of inventors and that of their output, technology.

Regarding the role of inventors, James Watt plays a central role in *Heroes of Invention*: Following his death in 1819, he was the first engineer to be commemorated in Westminster Abbey, with a memorial installed in 1834 following a decade of lobbying by many prominent figures representing Britain’s new industrial interests. MacLeod describes how Watt became a new kind of hero, joining (and subverting) the old pantheon of aristocrats and monarchs, military men and statesmen, and whose work was credited with helping Britain defeat Napoleonic France and underpinning newfound national prosperity. Watt set the precedent for a broader movement that placed the work of inventors and engineers on a pedestal in the period 1850–75. As for the role of technology, the steam engine which Watt did so much to improve came to be seen as a powerful catalyst for economic, social and political change. It became an emblem of progress, and in its wake technology more widely, from railways and cotton mills to steam ships and the electric telegraph, were portrayed and celebrated as playing a crucial role in transforming Britain into an industrial powerhouse. In fact, MacLeod states that the engine was perceived as having “a life of its own,” separate from Watt.

By the middle of the century, then, the “notion of an Industrial Revolution (if not the precise term) was firmly established,” and it was “most visibly a technological revolution,” as embodied in the work of inventors, and the technology that they produced. And in contrast to
Toynbee’s pessimistic definition of an Industrial Revolution, the work of inventors was portrayed in an overwhelmingly positive light. But while both Hardy and MacLeod give a central role to technology in defining the nature of the Industrial Revolution and, indeed, use the word very extensively, the word “machine” may be more appropriate. In his 1829 essay for the *Edinburgh Review*, “Signs of the Times,” Thomas Carlyle declared it to be “not an Heroical, Devotional, Philosophical, or Moral Age, but, above all others, the Mechanical Age. It is the Age of Machinery, in every outward and inward sense of that word.”

The growing employment of machines was seen as a defining characteristic of the early nineteenth century. In 1789, William Combe wrote of “the invention of Mr Arkwright’s celebrated machine, which is so aptly constructed, and so judiciously planned, that with one great water wheel, above 4000 threads of cotton yarn are spun at once, of which the finest muslins are manufactured.”

Robert Southey argued that there had taken place in Britain “a moral revolution,” one of the chief causes of which was “to be found in the improvement of machinery, and the consequent rapid increase of manufactures.” Patrick Colquhoun credited the rapid progress of British manufactures to “the improvement of the steam engines, but above all the facilities afforded to the great branches of the woollen and cotton manufactories by ingenious machinery.”

And as Maxine Berg has shown, the early conceptualization of the Industrial Revolution was driven by the “Machinery Question” regarding the threat to employment from labor-saving machines, and whether the ban on their export should be lifted, for example. Contemporaries were fascinated by machines, which played a prominent role in Bennet Woodcroft’s museum work.

Of these industrial machines, Watt’s steam engine and, slightly more diffusely, cotton-spinning machines (often, but not necessarily always, invoking the name of Arkwright) were picked out for particular attention by those building narratives of an Industrial Revolution. Engels’s *The Condition of the Working Class in England* of 1845 described how “The history of the working class in England begins with the discovery of the steam-engine and of the machines for the manufacture of cotton.” Even Toynbee in 1884 emphasized the importance of how, “Seven years before the publication of the Wealth of Nations Arkwright had patented his water-frame and James Watt his steam-engine. A few years after its publication Cartwright invented the power-loom, Crompton the mule.” So machines
were at the heart of historical narratives of the Industrial Revolution, and Bennet Woodcroft was a key advocate of the commemorative power of the machine.  

Woodcroft was an engineer from Sheffield, with a family background in the Lancashire silk and muslin industries. Apprenticed to a silk weaver, he became an engineer and inventor, working in textiles weaving and printing, and in marine propulsion, where he patented a series of screw propellers. By 1843, he was working as a patent agent; he moved to London in 1846, and in 1847 was appointed Professor of Machinery at University College, London. When the Patent Law Amendment Act was passed in 1852, establishing a relatively cheap and simple patent infrastructure, Woodcroft became responsible for making more readily accessible the specifications of earlier patents, a task that he took to with gusto, publishing, indexing, summarizing, illustrating and disseminating over 14,000 specifications in five years. Woodcroft also began the Patent Office library of technical literature, developed a portrait gallery of inventors and, most pertinent to this discussion, began assembling a collection of artefacts that were housed in the Patent Office Museum.

Woodcroft was highly active, and his work was strategically important to Britain as nineteenth-century industry expanded. What is not so obvious, but will become clear, is that Woodcroft was a stubborn and single-minded character, unwavering in pursuit of his objectives. In addition, if conceptions of an Industrial Revolution stemmed from specific men and machines, of which James Watt was the prime example, then Watt himself provides the most appropriate case study for exploring the characteristics identified for a nineteenth-century heritage industry: the industrial shrine. The story of these two men—of how Woodcroft attempted to acquire Watt’s workshop—therefore allows us to explore the role of the Patent Office Museum as a place of commemoration.

WATT’S WORKSHOP

James Watt moved to his new home Heathfield, at Handsworth just outside Birmingham, in September 1790. A particular room on the second floor was initially used for storage, but from 1795 was converted by Watt into a more useful work space which he used regularly until his death in 1819.
In his will, Watt left the house and an income for life to Mrs. Watt, his second wife. The workshop and its contents, however, were left to James Watt Jr., who kept its door firmly shut until his own death in 1848. Thereafter, probably the first visitor to the workshop was Watt’s biographer J. P. Muirhead in 1853. In 1864, Bennet Woodcroft and Francis Pettit Smith of the Patent Office Museum had their first chance to look inside.

Acquisition negotiations for the workshop stretched from Woodcroft’s initial enquiries in 1864 until 1924 when, with Heathfield facing demolition, the entire workshop contents, comprising over eight thousand objects, and many of its structural elements including the floorboards, door, window and frame and skylight, were packed up and transported to the Science Museum. In the intervening years, the workshop acquired the status of an industrial shrine. Muirhead wrote in 1854 that “all things there seemed still to breathe of the spirit that once gave them life and energy; and only the presence of some reverend dust silently announced, that no profane hand ... had been permitted to violate the sanctities of that magical retreat.” Birmingham historian Samuel Timmins wrote that “the Tribune at Florence preserves the relics of Galileo’s genius; the relics of Shakespeare are enshrined at Stratford, and those of Burns at Dumfries; and it is most greatly to be desired that these great and priceless memorials of the genius of James Watt may ... be preserved for ever for the veneration of the future pilgrims to the shrines of industrial heroes.”

Woodcroft’s correspondence with Watt’s descendants illustrates the high regard in which Watt continued to be held, and the significance of Watt’s possessions as heritage items.

Such was Woodcroft’s eagerness to see the workshop, after some delay, that by January 1864, he wrote to his colleague Francis Pettit Smith “I am ready to go with you any day to Birmingham whether Mr Gibson Watt gives his permission or not. If I can’t go into the house I will stand outside.” Woodcroft and Pettit Smith were finally admitted to the workshop on Wednesday, April 5, 1864, after a twenty-minute struggle to open the door. They were accompanied by James W. Gibson-Watt, and were thoroughly engrossed in what they saw, spending seven hours examining the contents.

Woodcroft proposed to Gibson-Watt that they should either send the entire workshop to the Patent Museum or dispatch it to his “fire-proof, police guarded office” (presumably the Patent Commissioners’ offices
at Southampton Row) until a dedicated building could be provided in South Kensington. Gibson-Watt gives no indication of being averse to this, but what follows demonstrates some of the obstacles Woodcroft had to overcome in the course of running the museum. Gibson-Watt asked that Woodcroft arrange for a letter to be sent from the Master of the Rolls, Sir John Romilly, stating that the Patent Commissioners were authorized to acquire the workshop. Sir John briefed the Lord Chancellor but, two weeks later, the latter intervened, complaining at the expense acquiring the workshop would incur and the risk of a financial payout if it were damaged in any way.

Word of the difficulties Woodcroft faced may have traveled because in April 1865 we find Gibson-Watt writing to the Committee of the James Watt Memorial, among whom the Birmingham historian Samuel Timmins was a leading figure, and who were seeking to display the workshop’s contents in Birmingham, stating that he could not withdraw his promise to send the workshop to London. This is a timely reminder that, for all Woodcroft’s efforts in acquiring historic artefacts, there were other groups at work elsewhere in the country. Samuel Timmins tried again in 1876, managing to remove some items from the workshop before receiving a telegram instructing him to put them back again. Stuck between Woodcroft and local interests in Birmingham, Watt’s descendants thereafter maintained strict neutrality until the proposed demolition of Heathfield in 1924 forced a final decision.

Undeterred, in 1865 Woodcroft had constructed for Gibson-Watt “a model in section of the small steam engine … belonging to the late James Watt.” Work on this was complete by November 1866. Simultaneously, Woodcroft arranged the construction of a fire-proof room at Southampton Row to accommodate the contents of Watt’s workshop. Both projects appear to have been attempts to smooth the path of negotiation, but were ultimately fruitless: the Watt room at Southampton Row remained unfilled, and the model commissioned by Woodcroft remains in the Science Museum’s collections. Woodcroft wrote to Gibson-Watt twice more, in January 1872, reminding him of his promise to send the workshop to London and recommending an artist to sketch the workshop at the Commissioners of Patents’ expense. The last word on the matter comes in April 1877, almost a year after Woodcroft had officially retired. Reviewing his correspondence regarding the workshop he wrote “I felt
disappointed with my own productions. They fall far short of doing justice to the subject.”

Although the acquisition stalled during Woodcroft’s lifetime, it demonstrates the role that he expected the museum to play in commemorating the Industrial Revolution. He would go to considerable lengths to acquire for the Patent Office Museum artefacts associated with an acknowledged “great man” of the Industrial Revolution. How this fitted into the formal remit of museums in the 1860s, with Woodcroft and George Wilson as the chief protagonists, will be considered in the section that follows. Christine MacLeod has recently carried out an analysis of Woodcroft’s Patent Office Museum in South Kensington and Wilson’s Industrial Museum of Scotland, showing how both were founded to demonstrate the latest inventions and “help educate artisans, engineers and manufacturers in best practice and innovation.” However, both museum directors also appreciated not just “best practice,” but the more historical aspects of machinery. Resolving the tensions between these two issues led declared policy and actual events to follow divergent paths.

ACQUIRING THE “PATRIARCHS OF MACHINERY”

When considering Woodcroft and the Patent Office Museum in London, it is tempting in retrospect to see the history of, and education in, the industrial arts as two distinct and even competing spheres. The museum had its origins in the desire to assemble a collection of patented innovations where “models of new inventions might be exhibited and preserved.” Alain Pottage and Brad Sherman have outlined the significance of models to the patent system, comprising as they do “visible and manipulable artefacts” that were the primary means of representing and analyzing new inventions. But Woodcroft’s intention was also to use history, as conveyed by the objects he acquired, to support his educational goals and show, in the words of his curator, Francis Pettit Smith, “how greatly things may be improved.” Pettit Smith argued that “a young beginner perhaps brings a very rudely constructed model, sometimes in wood, sometimes in iron, and sometimes in paper, and it is an encouragement to him to see that even things which are now as perfect as they can be, began almost as
rudely as his own little model.”\(^49\) This dual purpose was codified in 1862 when the Patent Office Museum was defined as:

> a historical and educational institution for the benefit and instruction of the skilled workmen employed in the various factories of the Kingdom…. Amongst the various things necessary to be done in order to accomplish this object it is considered to be of great importance that machines and exact models of machines, in subjects and series of subjects, showing the progressive steps of improvement in each branch of manufacture should be exhibited.\(^50\)

The demonstration of a close relationship between history and current best practice was an integral characteristic of the museum.

This was also true of Wilson’s Industrial Museum in Edinburgh. Wilson stated that an industrial museum “should also include illustrations of the progress of each industrial art from age to age,”\(^51\) and that “An Industrial Museum cannot be complete without historical illustrations of the progress of the useful arts.”\(^52\) However, this was said within the context of a very clearly expressed focus on up-to-the-minute developments. In his paper “The Objects of Technology,” Wilson stated that the “chief and ultimate aim of an Industrial Museum is the improvement of the useful arts,”\(^53\) and he also provided considerable detail on what the museum collection would consist of, from raw materials to finished products, drawings and diagrams, and models and examples of tools and machinery.\(^54\) This made the museum, according to Wilson, “essentially a tower of refuge in commercial storms, and a castle stored with the ammunition and the weapons of commercial warfare.” To this end, the museum was to comprise an “Exhibitional gallery” for display of its collections, a laboratory and workshop, a library on industrial art, as well as producing an ongoing lecture series and publications.\(^55\)

So, both Woodcroft and Wilson had clear visions for their respective institutions, with Wilson’s informed more by an ideal of improving the useful arts to reinforce the nation’s immediate commercial strength.\(^56\) Both saw a role for history, but, while Wilson defined how this would fit into a broader strategy, Woodcroft remained ambivalent about the relative importance of history vis-à-vis that of current practice. It is important to emphasize, however, that these were their starting positions at the begin-
ning of a broad transition away from expediting industrial development and towards the task of commemorating it.

Of the two men, it was Woodcroft who took the lead in transposing history from being a means to an end, to being an end in itself; a move that can be explained with reference to wider debates about the 1850s patent system. The 1852 Patent Law Amendment Act that brought the Patent Office and the system it administered into being also created huge controversy, and with this came a threat to abolish what had been created. During the Select Committee investigation before the act was passed, a number of prominent figures, including the engineers Isambard Kingdom Brunel and William Armstrong, had advocated that the patent system as it then existed, rather than being modernized, should be removed altogether. Their views attracted considerable support, and their lobbying kept the issue alive into the 1880s. At the heart of attempts to counter them was Bennet Woodcroft who, determined to keep inventors past and present, and their achievements, in the public eye, undertook what Christine MacLeod has described as “the first systematic attempt to preserve the history of British invention.”

There were two main ways for Woodcroft to achieve this aim. First, he urged inventors to have their portraits taken, and he himself sought to obtain portraits, for a proposed “National Gallery of Inventors.” The significance of portraits of scientists and engineers, in both painted and sculptural form, has received very detailed treatment in recent literature. Portraiture was an important medium through which the identity of scientists and the institutions with which they were associated were constructed. Here, we will concentrate instead on the relatively neglected second option available to Woodcroft: a quest for historic artefacts, particularly machines, illustrating the talents of British inventors.

As this quest proceeded, the Patent Office Museum quickly became what John Hewish described as an “eminently ‘heritage’ operation.” From the beginning, Woodcroft contributed his own collection of historic artefacts including, among others, “supernumerary” models from the Society of Arts. Under Woodcroft’s auspices the museum acquired Boulton and Watt’s Old Bess and “Lap” engines of 1777 and 1788 respectively, Arkwright’s cotton machinery of 1769–80, Symington’s marine engine of 1788 (“the parent engine of steam navigation”) and Bell’s Comet marine engine of 1812, the locomotive Puffing Billy, also of 1812, Bell’s 1826
reaping machine, and Stephenson’s Rocket locomotive of 1829 (“the practical beginning of railway travelling”).64 The collection comprised an impressive array of what Henry Cole described as the “patriarchs of machinery,”65 and all remain in the Science Museum’s collection today.

Woodcroft’s move to a historic approach was part of his strategy for defending the rights and achievements of inventors. However, there were other factors in play as well, not least of which was Woodcroft’s personality. In the words of his biographer John Hewish, he had “a strong sense of the past,” and had long been “extensively acquainted with the history and uses of machines.”66 He was impulsive, obstinate, a “romantic antiquarian … [devoted to] historic machinery.”67 However, Woodcroft was also advised by a committee including the eminent engineers Sir William Armstrong and Joseph Bazalgette, who recommended the acquisition of “some few very old machines.”68 Evidently, Woodcroft was not alone in his interests.

Woodcroft’s move to a more historical approach was also driven by practical considerations. The Patent Office Museum was under continuous pressure from the Treasury and other government bodies. For instance, in 1868 Woodcroft commented, “We have much trouble here with the audit office. They query everything down to a penny postage stamp.”69 Space was at an absolute premium, and conditions for the displayed objects were poor, a source of pointed comments from the Conservatoire National des Arts et Métiers in Paris who, Woodcroft noted, “laugh at us.”70 Under these conditions, it was impossible to maintain a comprehensive display of patented objects as originally envisaged. Consequently, Woodcroft sought to collect

not all the intermediate steps, but the great steps in every invention. For instance, in the steam engine, we have collected Trevithick’s early locomotive model … the earliest engine that drove a boat … then we have the first engine that Mr Watt built to give a circular motion; then we have Stephenson’s “Rocket” … and we have only this week been promised the “Sans-Pareil”…. That is all we need for steam engines, unless some other great step is made.71

To more overtly attempt to define what Woodcroft’s approach to history was, we can state that, in undertaking the pragmatic curatorial work to represent the chief innovations in each field of technology, he was moving away from a broad and detailed collection of (mainly) patented items
towards a redacted, Whiggish representation of the progress of machines—a chronological sequence of material artefacts representing the “firsts” and “oldests” in their respective fields.

This move away from the museum’s original intentions was controversial. A Select Committee appointed to report on the future of the Patent Office library and museum in 1864 was told by Thomas Webster that “There is a historical interest about the first Watt engine, and the first locomotive; but yet, for inventors and skilled artisans, it is useless”; Francis Pettit Smith disagreed: “It is scarcely likely that any mechanic would copy the original machines of Watt in the present state of science.” For his part, Woodcroft pointed to the sheer popularity of the artefacts as historical, as opposed to purely educational, relics: “for a year at least, after … the first engines of Mr Watt were deposited, a great many people came to town on purpose to see them; and they were looked up to as being the most valuable things which we had in the place.” The museum’s machines were intended, then, to fulfill a historical purpose, and were as much inspirational as educational objects.

Given Woodcroft’s practical success in creating “an archaeological collection referring to the lives of eminent mechanists,” it is surprising that the most concise, and heartfelt, statement of the importance of preserving historic machines was given by George Wilson, during his address to the Royal Scottish Society of Arts in November 1857. He began by emphasizing “the duty which lies upon us to preserve from loss or injury those models and actual machines which represent the earliest forms of important engines.” He went on thus:

When we consider that a century hence hundreds of curious pilgrims will gladly travel from distant lands to study the famous Rocket engine, if it is in existence to be studied, we cannot but hope that at least it will not be wilfully destroyed. We may have a thousand better engines, but we never can have the Rocket again. As the first of its race, the most infantile and the most venerable of engines, it has merits which no later engine can possibly possess…. I may surely plead that all the forlorn and destitute machines which, after the death of their human parents, are cast like orphans upon the pitiless world, should be provided with houses of refuge.
This contrasts with Wilson’s pronouncements over the role of the museum as primarily supporting improvement of the useful arts. What changed? One suspects that initially, he was indifferent to the fate of historic machines or assumed that such artefacts were already preserved somewhere: “I was told this summer … that if I visited the Museum of Patent Inventions in London, I should see quite a unique machine—viz., ‘the parent engine of steam navigation.’ I asked, somewhat indifferently, what engine that could be, and was startled at learning that it was … William Symington’s Dalswinton engine, which I had imagined was carefully preserved in Scotland.” With this realization, Wilson was quick to appreciate the utility of collecting such objects, stating that they “are alike personal relics, historical monuments, and objects of instruction which grow more and more precious every year, and of which we can never have too many.”

Thus, for all the statements of intent by Woodcroft and Wilson regarding the expedition of progress and education in the industrial arts, both expressed a need to preserve the historic artefacts of invention, primarily machines, and Woodcroft followed through most energetically by acquiring physical objects. In doing so, he most firmly grasped the centrality of machines to perceptions of Britain’s industrial revolution, giving the concept tangible form. The lengths that Woodcroft could go to are most vividly portrayed in his attempted acquisition in 1861 of a model from the tomb of the 2nd Marquis of Worcester. This episode has previously been described by John Hewish, and mentioned in passing by others. What has not been explored is how it appears to have been unauthorized, changing it from being an acquisition—albeit an unusual one—into something rather darker. Such was the commemorative power that machines held for Woodcroft.

The object of Woodcroft’s interest was Edward Somerset, 2nd Marquis of Worcester, who died in 1667. As an amateur natural philosopher and man of ideas, Worcester had previously used his book *A Century of the Names and Scantlings of Such Inventions as at Present I Can Call to Mind* (1663) to describe a steam pump which, if actually realized, would have pre-dated Thomas Savery’s “Miner’s Friend” of 1698 and been the first application of steam power to perform useful work. In his description, the 2nd Marquis stated his intention “that a Model thereof be buried with me.” The possibility of acquiring “the treasure which all the mechanical world would so highly prize [sic]” was an attractive prospect for Wood-
croft, who assumed that the supposed model was with the 2nd Marquis in his burial vault beneath Raglan Church, Monmouthshire. Woodcroft also assumed that the word “model” meant a three-dimensional artefact, when it was often earlier used to refer to a description or plan of an item. And, although the best place to leave instructions for the model to be placed in his coffin was Worcester’s will, no such document is known to exist.

Having made these initial assumptions, Woodcroft’s proposed project also faced opposition. The Chancellor of the Diocese of Llandaff, under whose jurisdiction Raglan church fell, had to approve any request to open a coffin, yet found himself stalled by “the novelty of the application and the consequent necessity for consideration, search, and inquiry.” The 2nd Marquis’s descendant, the 8th Duke of Beaufort, also expressed reservations about Woodcroft’s proposal. The Duke sought to protect “the arrangements a gentleman chooses to make for himself after death.” He was also worried that the model might crumble to dust when exposed to the atmosphere. He wrote to Francis Hooper, his representative in London, stating that “I still hold to my determination that some one should be present in case of its going to pieces, in spite of Mr Woodcroft.” The Duke appears to have been sufficiently concerned that he ordered his own survey of the vault to establish its precise contents.

The conclusion of Woodcroft’s negotiations is characterized by a lack of paperwork, most notably anything looking like a permission to proceed. As John Hewish has stated, Woodcroft’s “assiduity in filing papers was probably unusual.” Given the amount of written evidence elsewhere in the case—even including the receipt slips for books on the subject borrowed by Woodcroft’s assistants, sketches and plans of Raglan Church and Castle, tracings of Worcester’s signature and much more—the lack of a formal permission seems peculiar. This is even more the case given the project’s potential for scandal. Details had unexpectedly been published in the Birmingham Daily Post on June 12, and the reputational risks to Woodcroft and the Patent Museum should be emphasized. Woodcroft had a strained relationship with the Treasury, for example, who were extremely reluctant to provide funding for acquisitions and more space for expansion by the Patent Office Museum. Surely, Woodcroft would have gone to some length to safeguard a written permission to proceed had it existed.

If a curious lack of paperwork characterizes the permission to proceed, the investigation itself was intricately recorded by Woodcroft’s colleague.
John MacGregor, in a carefully written and hand-illustrated account dated January 5, 1861, held by the Science Museum. This document forms the basis for the account that follows. On January 4, 1861, Woodcroft arrived at Raglan Church. He was accompanied by MacGregor, as well as Osmond Wyatt (representing the Duke of Beaufort), a sexton, a “confidential carpenter,” and three laborers. Intriguingly, on the day chosen the vicar was unable to witness what happened as he was attending a burial elsewhere. With the church door secured, the first job was to gain access to Worcester’s burial vault through the floor. Removing one of the pews and lifting away the flagstones and underlying rubble, and then a heavy stone slab bearing Worcester’s coat of arms, revealed steps leading into the dark. Venturing down them, with light from candles and a lantern, John MacGregor entered a vault about 10ft square and 5ft high, containing five coffins. Passing these on his left, he entered a yet smaller chamber. Before him were two coffins, one closely shaped like a human figure and, on its left, what MacGregor took to be that of the 2nd Marquis of Worcester. MacGregor and his colleagues turned to this first.

The coffin was opened at its lower end. Within, the Marquis’s remains lay preserved, carefully embalmed in strong linen coated with “white cerous soft flexible antiseptic paste,” and surrounded by “wet mud-like debris” which was “exactly like the wet slush in an Irish bog and emitted a strong but not pungent or disagreeable odour.” This was a difficult moment for Woodcroft, who had undertaken not to disturb any human remains. Even so, MacGregor proceeded to remove some of the protective linen, revealing “the two legs inside with the skin very white and the flesh not very much shrunken.” It was now that Woodcroft persuaded Wyatt, representing Worcester’s descendants, to leave the vault and go with him to inspect Raglan Castle. This is peculiar: Wyatt was responsible for the castle, and probably saw it most working days. The way was clear for MacGregor to continue his investigation, bodies or not.

MacGregor first went back to the largest of the five coffins he had passed on entering the vault, believing its extra size might enclose the model. Breaking through a wax seal released “mephitic” fumes that extinguished his lamp but, once hastily re-lit, revealed the embalmed body of a woman. Much “careful probing all around was fruitless in any discovery of aught but flesh and garments much decayed.” MacGregor returned to the first coffin opened. Smoking cigars continuously now to offset the effect of the
“pestilential atmosphere” of the vaults, MacGregor put any qualms aside and decided to open fully the Marquis of Worcester’s coffin. Perhaps the constricted space, pressure of time and “foetid gas which it was impossible not to inhale in large quantities” were having their effect on MacGregor, whose use of a pickaxe reflects a certain frustration with the course of events. As he noted the following day, “The skin and flesh were soft and little shrunk and the nails were ... perfectly preserved.” However, despite careful probing around the body with a long screwdriver, “No sign of any substance metal wood or other hard matter ... could be observed.” Unable to find the model, MacGregor traveled back to London, and wrote up the investigation in detail the following day.

Although MacGregor saw the two coffins and vault closed up as best as could be achieved, he took something home with him. Careful deciphering of a heavily crossed-out passage in the description (indeed, the only crossing-out in eleven pages of impeccably written text, and just as the description of the Marquis’s body reached its climax with mention of “a good deal of reddish hair”) reveals the hidden phrase “One of the nails of the right hand (3rd finger) came off I took it away with me as a memento of this curious investigation.” Despite the whole episode causing considerable disquiet, Woodcroft was entirely unrepentant. Francis Hooper subsequently wrote “I have had two almost sleepless nights since I heard of the Raglan vault business,” to which Woodcroft’s reply of January 31, 1861, is fairly typical: “I think you have allowed yourself to be needlessly alarmed. Mr Whyatt [sic] knows what has been done and he said he thought the Family ought to be much obliged for the trouble we have taken.”

THE COMMEMORATIVE POWER OF MACHINES

Woodcroft’s extraordinary attempt to acquire the model suggests the commemorative importance that he perceived it as having. We can examine in more detail the reasons Woodcroft went to such lengths with reference to recent literature exploring the role played by tangible things, items “of fascination, association, and endless consideration.” In “Remembrance of Science Past,” Ludmilla Jordanova explores how, through the commemoration of science, some of the “devices and ideas” generated were
turned into “cultural items.” In connection with the Industrial Revolution in particular, Jordanova identifies the close association between inventors and objects, citing James Watt and his engine “as objects inspiring awe and identification.” But a differentiation is also made between science and technology, in which it becomes more likely that there will be a physical object to act as a catalyst for recognizing and commemorating the achievement it embodies. Technology today (as with machinery in the 1860s) is uniquely well endowed with “graspable units” to expedite commemoration. This explains some of Woodcroft’s determination to acquire tangible artefacts for the Patent Office Museum. As Soraya de Chadarevian explains, “Relics, often connected to great men, facilitate the engagement of the wider public and thus, frequently fulfil a central function in commemorations and public displays.” Hence, the artefacts were endowed with tremendous inspirational potential.

If it is accepted that objects can play a central role in public discourses on science and technology, we may say that the visitors to the Patent Museum played as much of a role in creating meanings around those objects as the objects themselves or indeed their curators. This “co-constructionist” model of interaction within a museum environment acknowledges that people viewing those objects bring with them their own prior knowledge, which will influence what messages they take away with them. So who were the visitors to the Patent Office Museum? Some hints have been provided by Christine MacLeod, who quotes the Patent Office’s Leonard Edmunds explaining that “the man who goes there to obtain instruction is a mechanic understanding his business.” Certainly, the single surviving label from the Patent Office Museum is a tersely written technical summary, complete with relevant patent number, intended for a technical audience. If literature and art presented industrialization as ambivalent and halting, its reflection in the industrial machines conceived and constructed by engineers and mechanical artisans was bold and confident, and this forthrightness was articulated by their makers, who were “exhilarated and enthused about the beauty of their own creations, about whose formal qualities and the newness of these qualities they were quite clear in their minds.” Even for those visitors of a less technical mien (and Pettit Smith, the curator, noted that “as many women as men” visited on holidays), machines also held considerable appeal. Henry Cole, questioned in 1864 about the relative popularity of science or decorative
art, replied that “an exhibition of machinery, properly conducted, would be the most attractive.” Woodcroft may have been a key player in the cult of the mechanical object, but he operated within the context of a much wider popular appreciation.

Popular fascination with the machine was expressed within the museum in an extremely tactile way. In 1782, Carl Philip Moritz had seen William Shakespeare’s chair, a popular attraction at the poet’s birthplace in Stratford-Upon-Avon, but was shocked at its poor condition because “every one that travels through Stratford, cuts off a chip, as a remembrance which he carefully preserves, and deems a precious relique.” And in the 1860s, visitors to the Patent Office Museum treated the machines on display in the same way. In 1864 Francis Pettit Smith complained that “There is a very curious taste on the part of the English public to pull things about, and we are forced to put everything under glass cases, or else it would be taken to pieces.” A later curator of the Museum, Archibald Stuart Wortley, protested in 1877 that the steam locomotive Rocket suffered damage “from the public picking off scaling pieces of rust,” and “carrying them away as memorials.” Just as inventors achieved heroic status after 1850, so did the machines they built, and fragments of rust replaced the splinters from Shakespeare’s chair as the holy relics of nineteenth-century industry. The significance of physical objects to Woodcroft and the visitors to his museum provides some context to Woodcroft’s acquisitive exploits.

The survival of important machines illustrating Britain’s mechanical prowess was far from guaranteed. George Wilson had lamented that “it is only after they have fallen into a decrepit old age, when often it is too late, that we begin to think it worth while to preserve their shattered remains.” To take some other examples from the Patent Office Museum collection, Stephenson’s Rocket was considered “too lightweight and worn out” to work any longer as early as 1840, and was laid aside; Puffing Billy only survived by virtue of having been built specifically for a single, ongoing and relatively modest task. Most miraculous of all was the acquisition of the 1812 Comet marine engine, recognized as the “parent engine” of steam navigation. However, despite its significance, the Comet was wrecked off Scotland’s Western Isles. The engine was recovered and found a home at two Glasgow factories and then the Glasgow Polytechnic, which was burned down in 1855; the engine was buried when the building collapsed. It is unsurprising that by 1862 the engine was described as “in a very rusty
dilapidated condition.” As for the boiler, the donors wrote that “we had it lying outside our gate for 3 or 4 years, but it was eating itself up and was very much in our way and we sent it the way of ‘all scrap.’”105 This discovery prompted Woodcroft into rapid action, and he wrote to Francis Pettit Smith, “Get the Comet engine … in all its filth.” Even with the acquisition negotiations for the engine concluded, it remained necessary to obtain the engine’s original cylinder, which was traced to the home of the builder’s widow, where it was being used as a chimney pot.106

Besides the insecure future facing many individual machines, entire industrial sites were also under threat. The important Penydarren ironworks in South Wales were in ruins before c.1870 and many other ironworks followed, succumbing to competition from producers of cheaper steel.107 In Birmingham the establishments developed by Matthew Boulton and James Watt were also disappearing. A visitor to the Soho Foundry in July 1851 reported that it had “suffered a complete decline… The many workshops were quite empty, deserted, and decayed. What a difference from what I had seen when this plant was at the height of its glory and when the two partners enjoyed an income greater than that of many a prince. I would never have believed so rapid a change possible had I not seen it with my own eyes.”108 Not far away, the Soho Manufactory was largely empty and was finally demolished early in 1863.109 The first letters between Watt’s descendants and Woodcroft relating to the workshop date precisely from this time—May 1863—suggesting that the loss of the Soho building may have been the initial stimulus for Bennet Woodcroft’s interest in preserving Watt’s workshop in the first place.

* 

Mid-nineteenth century conceptions of an Industrial Revolution were closely concerned with the role of inventors and machines, in advance of the term “Industrial Revolution” entering widespread use. Bennet Woodcroft and the Patent Office museum actively collected such machines, putting flesh on the bones of George Wilson’s rhetoric about their value, and reflecting wider appreciation of the role of inventors and the objects that they created. Our discussion began with a brief appraisal of the heritage industry which evolved from the 1960s onwards, and its characteristics make an interesting comparison with the work of Woodcroft and the Patent Office Museum. Although Woodcroft and the Patent Office Museum did not in themselves constitute a heritage industry, when it emerged much later
it faced many of the same issues as Woodcroft: the nature of industrial shrines, the centrality of machines, the acquisition of tangible objects, and a sense of urgency. The Patent Museum was an early shrine to the machine: in his attempts to acquire James Watt’s workshop, Woodcroft sought to acquire a *religio loci* for one of the major figures in the history of machines. He did this, and carried out his abortive foray into the tomb of the Marquis of Worcester, within the context of a widely held belief in the value of three-dimensional artefacts, and knowing that artefacts of significance in the history of machines were in danger of being lost and destroyed. We can conclude by briefly returning to Coleman’s discussion of the de-industrialization that underpinned the later twentieth-century heritage movement. As so much industry proved to be obsolete at that time, so for Woodcroft machines often proved to be transient items whose survival was not guaranteed. The risks he ran, most particularly at Raglan church, were commensurate with the risks that the artefacts themselves were exposed to. But above all, the challenges Woodcroft faced reflect the continuous processes of change, obsolescence and renewal that characterized Britain’s industrial economy, and indicate the commemorative power of those relatively few artefacts that did survive.

**NOTES**

The author is immensely grateful to Daniel Wilson and Jos Betts, Christine MacLeod and two anonymous referees for their insights and very helpful comments in preparing this article.

2. Watt’s workshop (Inv. 1924-792) was on public display in the Science Museum from 1925 until 2005. In March 2011, it was redisplayed as the centerpiece of a new gallery in the museum, “James Watt and Our World: The Man, the Workshop, and the New Industrial Age.”
4. Ibid., 32–33.


18. Ibid., 11.


20. Ibid., chaps. 4 and 5.

21. Ibid., 131, 135.

22. Ibid., 143.


30. MacLeod, *Heroes of Invention*, 143.


32. Transcript of Watt’s will, provided by E. C. Smith to H. W. Dickinson, January 22, 1920, H. W. Dickinson research file “James Watt,” SM.


35. Bennet Woodcroft to Francis Pettit Smith, January 13, 1864, SM technical file T/1924-792. James W. Gibson-Watt (1831–91) was James Watt Sr.’s great-grandson via his granddaughter Agnes (the daughter of Watt Sr.’s daughter Margaret), Watt Jr. having not left an heir when he died in 1848. Gibson-Watt adopted the Watt surname in 1856.


37. Bennet Woodcroft to Sir John Romilly, May 7, 1864, SM technical file T/1924-792.


42. Letters 1097 and 1148, Bennet Woodcroft to James Watt Gibson-Watt, April 12, 1865, and November 7, 1866, SM “Z” archive, Z24/E.

43. Motive Power collection, inv. 1866-57, SM.

44. Letters 1536 and 1563, B. Woodcroft to J. W. Gibson Watt Esq., January 19, 1872, and March 9, 1872, SM “Z” archive Z24/G.


54. MacLeod, Technology on Display, 15.

55. Wilson, The Industrial Museum of Scotland, 43.


57. MacLeod, Heroes of Invention, 250.

58. Ibid., 251.

59. Ibid., 259.

60. Ibid., chaps. 4, 7 and 8; Ludmilla Jordanova, Defining Features: Scientific and Medical Portraits 1660–2000 (London: Reaktion, 2000).


62. Hewish, Rooms near Chancery Lane, 124.

63. Ibid., 117.

64. Select Committee Report, 3, 93.

65. Ibid., 118.
68. Ibid., 124.
71. Ibid., 3.
72. Ibid., 76, 92, 91, 90.
76. Ibid., 51, 53.
81. Ibid., 186.
83. Duke of Beaufort to Francis Hooper, April 22, 1860, ibid.
84. Osmond Wyatt to Francis Hooper, December 11, 1860, ibid.
86. The account is held in SM technical file T/1897-114-116.
88. Thanks to Christine MacLeod for first suggesting that this single deletion in such a long, carefully written document might be suspicious.


95. MacLeod, *Technology on Display*, 24.


101. Select Committee Report, 93.


103. “Notes from Address Given to Royal Scottish Society of Arts by Prof George Wilson,” 50.


