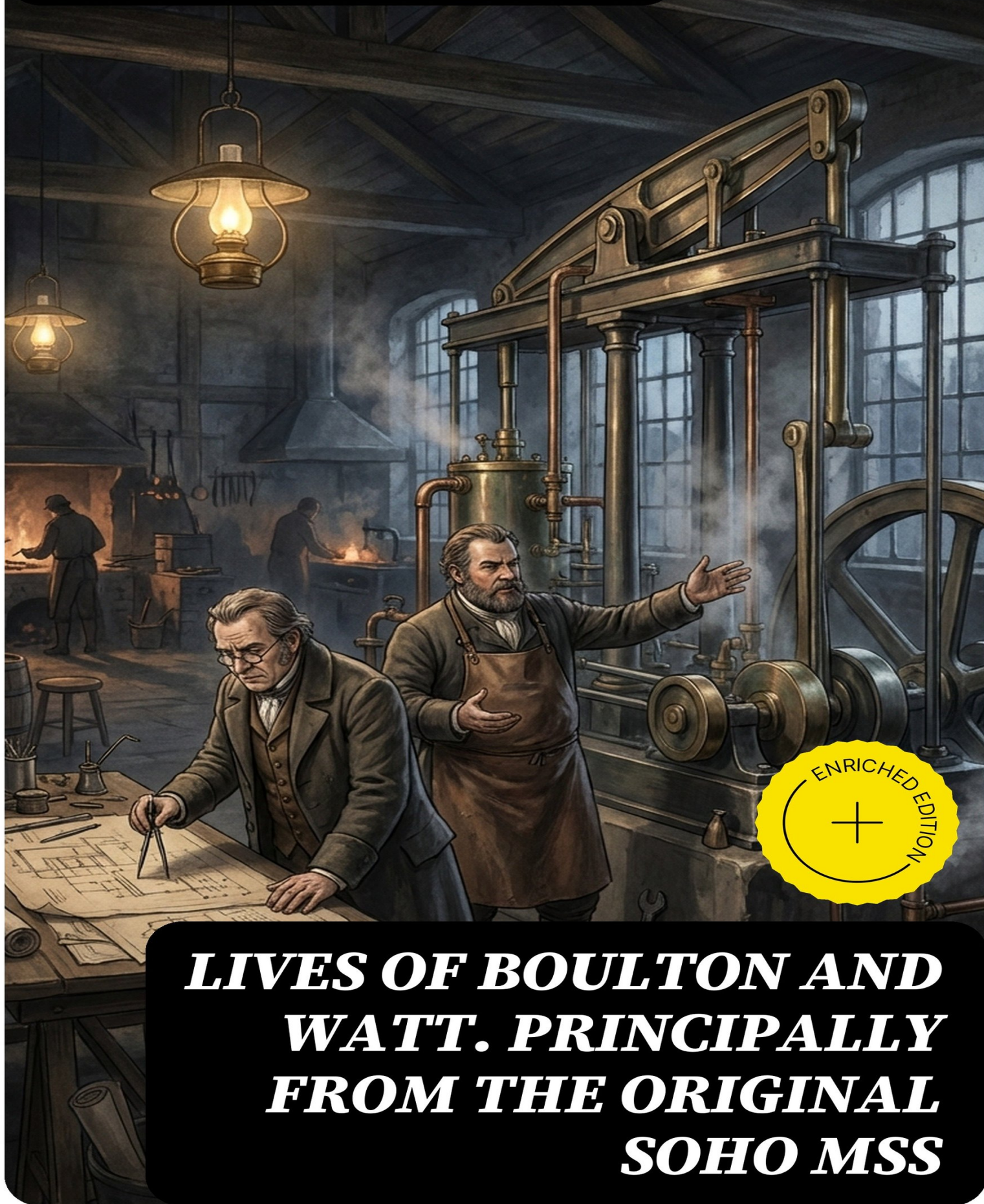
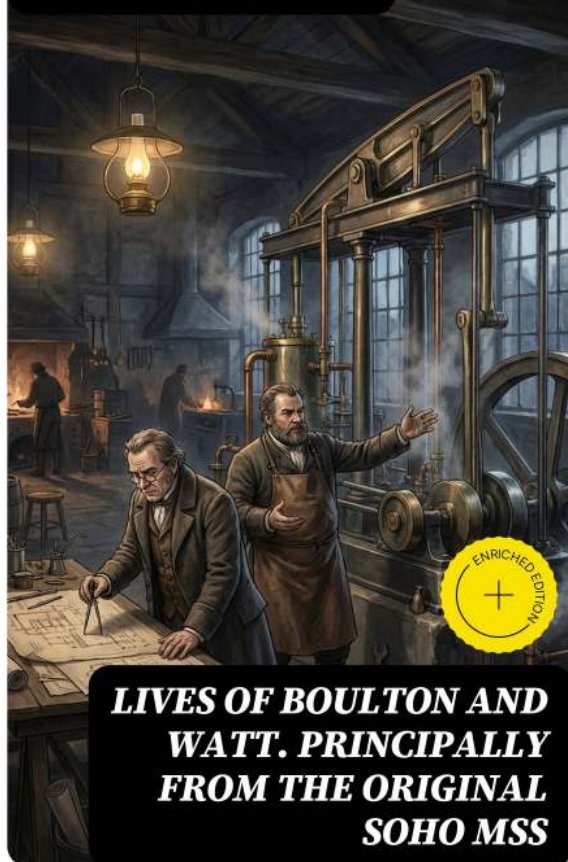


SAMUEL SMILES



***LIVES OF BOULTON AND
WATT. PRINCIPALLY
FROM THE ORIGINAL
SOHO MSS***

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Samuel Smiles

Lives of Boulton and Watt. Principally from the Original Soho Mss

**Enriched edition. Comprising also a history of the
invention and introduction of the steam engine**

Introduction, Studies and Commentaries by Max Dillon

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Introduction

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At the heart of Samuel Smiles's *Lives of Boulton and Watt* lies the drama of how inventive insight, disciplined workmanship, and commercial courage had to be bound together—across workshops, ledgers, and drawing boards—to turn the uncertain promise of early steam into a reliable engine of industry, and how a partnership between a meticulous Scottish engineer and a far-seeing Birmingham manufacturer forged not only machines but methods, institutions, and habits of mind that would organize power, capital, and skill into a new kind of productive order whose pressures and possibilities still echo in modern laboratories, startups, and factories.

Composed as a historical-biographical study in the mid-nineteenth century, *Lives of Boulton and Watt*, Principally from the Original Soho Mss draws on business papers and private memoranda preserved at the Soho Manufactory to narrate the rise of a transformative partnership. The book inhabits the late eighteenth- and early nineteenth-century world of British industry, centering on Birmingham and radiating through ports, mines, and workshops connected by commerce and correspondence. Smiles writes within a Victorian culture fascinated by enterprise and technical progress, framing his subjects within the broader making of industrial Britain while anchoring his account in the documentary record of their working lives.

The narrative follows the separate formation of Matthew Boulton and James Watt—one steeped in management and manufacture, the other in precise problem-solving—toward a collaboration that reshaped how steam could be built, sold, and maintained. Without presuming technical expertise, Smiles explains mechanisms and practices in clear, patient prose, allowing letters, notebooks, and contracts to supply texture and cadence. The tone is measured and admiring rather than sensational, moving steadily from workshop to counting-house, from experiment to negotiation. Readers encounter not a romantic myth of instant genius, but a cumulative, documentary portrait in which setbacks, calculations, and careful alliances drive the story's momentum.

Central themes emerge with clarity: invention as a social labor, business as an enabling discipline of technology, and partnership as a demanding craft in its own right. Smiles shows how ideas must pass through tools, schedules, wages, and law before they become productive realities, and how trust, credit, and reputation can be as decisive as a drawing or a patent. The book thus treats intellectual property, financing, and after-sales service alongside cylinders and valves, insisting that engineering success depends on organization. In doing so, it reveals the negotiation between standardization and adaptation that underpins scalable innovation, a negotiation still familiar today.

Attention to place and process grounds the story in the material circuits of an expanding industrial nation. Birmingham's manufactories, Scottish workshops, and

mining regions such as Cornwall appear not as backdrops but as testing grounds where supply chains, measurement, and maintenance practices are hammered into routine. Smiles traces how correspondence knits dispersed collaborators into project teams, how legal frameworks shape contracts, and how customers' needs discipline design. In this view, steam power does not simply substitute energy; it reorganizes time, labor, and expectation. The book therefore doubles as a study of infrastructure-in-the-making, revealing how technologies embed themselves in everyday economic life.

Smiles's method is documentary and character-centered, shaped by access to the Original Soho manuscripts, which supply dates, voices, and the procedural detail of work well done. He selects scenes that illustrate habits—care, thrift, perseverance—without reducing his subjects to mottoes, and he balances technical description with the rhythms of partnership, travel, and negotiation. The result is a biography that reads as institutional history as much as life-writing, attentive both to individual temperament and to the systems that enable or constrain it. The prose is lucid and unhurried, guiding readers through complexity by accumulation rather than spectacle, with steady emphasis on evidence.

For contemporary readers, the book matters because it unsentimentally shows how innovation succeeds when vision is joined to organization, and how ethical conduct, clear contracts, and patient iteration build durable value. Entrepreneurs will recognize dilemmas about financing, market entry, and intellectual property; engineers will see

the craft of specification, testing, and service; policy makers will meet the long horizon of infrastructure and standards. Above all, the study offers a durable vocabulary for thinking about collaborative work in any technology. By returning to first sources and steady narrative, Smiles provides both an engrossing history and a guide to practical imagination.

Synopsis

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Samuel Smiles's *Lives of Boulton and Watt*. Principally from the Original Soho Mss presents a documentary biography of Matthew Boulton and James Watt, the partnership that helped transform steam power into a disciplined industrial system. Drawing on letters, notebooks, and business papers preserved at the Soho Manufactory, Smiles reconstructs their careers in the wider setting of eighteenth-century British industry and science. The narrative follows a chronological course, tracing personal formation, collaborative breakthroughs, and the institutional structures that sustained innovation. Without romanticizing, Smiles uses primary materials to show character and method: the practical habits, commercial calculations, and steady correspondence that underpinned celebrated technical results.

Smiles begins with James Watt's early training as an instrument maker and his association with the University of Glasgow, where scientific acquaintances and precision work shaped his habits of measurement. A crucial episode is his study of the Newcomen engine, leading him to conceive an arrangement that conserved heat and vastly improved efficiency. The book details his initial experiments, patenting efforts, and the obstacles of capital, materials, and patronage that delayed practical adoption. Early business ties, including a partnership formed to advance the new engine, expose fragile finances and the difficulty of

translating experimental insight into robust, manufacturable machinery.

Matthew Boulton enters as a manufacturer of metal goods at Birmingham's Soho, already experienced in organizing skilled labor and selling high-quality wares. Smiles portrays him as commercially energetic and technically observant, seeking dependable power for expanding production. The narrative culminates in Boulton's acquisition of a stake in Watt's patent after earlier backers faltered, and in the formation of their partnership. An Act of Parliament extends the patent term, securing time to perfect and apply the invention. Smiles emphasizes their complementary roles—Watt chiefly responsible for design and improvement, Boulton for finance, contracts, and management—bound by frequent, practical correspondence.

With legal security and capital in place, the partners pursue rigorous engineering. Smiles describes the separate condenser's adoption in pumping work, especially in mining districts where fuel savings could be measured. Precision boring of cylinders, arranged through collaboration with ironmasters, improves reliability. As applications broaden, Watt develops arrangements for double-acting operation, linkages to guide piston rods, methods for expansive use of steam, and contrivances for converting reciprocation to rotation. Speed-regulating devices and careful valve gear refine control. Smiles highlights the contributions of able assistants, notably William Murdoch, whose resourcefulness aided engine experiments and who later advanced gas illumination at Soho.

Smiles turns to the making of an enterprise: foundry practice, drawing offices, and field engineers standardize construction and erection of engines. Royalty terms based on fuel saved, comparative trials, and meticulous record-keeping codify performance and incentivize adoption. Reports from collieries and copper mines show how duty—work done per unit of fuel—became a shared metric. The narrative also treats the Soho Mint, where power-driven presses and careful die work sought to deter counterfeiting and supply coinage at scale. Here Boulton's administrative skill, procurement, and negotiations with authorities illustrate how industrial method migrated from engines to monetary manufacture.

Resistance and litigation occupy an important portion of the story. Smiles traces disputes over the scope of the patent, efforts by rivals to evade or contest it, and the partners' costly legal defenses. Mine owners weigh license payments against promised savings; engineers propose alternative arrangements. Through letters and memoranda, the book shows technical argument becoming legal argument, and the strain this placed on Watt's health and temper. Socially, the partners move within an inventive circle in the Midlands, exchanging ideas while guarding priorities. Family involvement grows as sons assume responsibilities, and the firm's organization adapts to larger orders and wider markets.

In its closing movement, the book assesses long-range consequences rather than a single culminating moment. Smiles situates Boulton and Watt within the consolidation of industrial practice: engines that became dependable power,

a business model that priced performance, and a professional ethos that linked workshop, laboratory, and ledger. The narrative suggests how their partnership helped define modern relationships between invention, capital, and law, while influencing factory power, mining, and manufacturing routines. Relying on the Soho manuscripts, Smiles leaves a record of personalities and procedures whose significance extends beyond two lives, offering a study in disciplined innovation that retains historical resonance.

Historical Context

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Samuel Smiles's *Lives of Boulton and Watt* (1865) appears amid Victorian Britain's celebration of industrial pioneers. Its subjects worked in eighteenth-century Scotland and England, centered on Glasgow, Birmingham, and the Soho Manufactory near Birmingham. There, Matthew Boulton organized large-scale metalworking, while James Watt, a Glasgow-trained instrument-maker, transformed the steam engine. Universities, dissenting networks, and learned circles such as the Lunar Society provided intellectual exchange. British patent institutions and Parliament framed invention and enterprise. Drawing on the "Original Soho Manuscripts" of the Boulton & Watt firm, Smiles situates technical progress within commercial organization, presenting documentary evidence that anchors engineering achievement in place, partnership, and evolving institutions.

Mid-eighteenth-century Britain relied on Newcomen pumping engines, vital to mines yet wasteful of fuel. While servicing a small Newcomen model at the University of Glasgow, Watt conceived the separate condenser, reducing steam consumption and heat loss. He patented the invention in 1769, aided financially by John Roebuck of the Carron ironworks. Roebuck's bankruptcy transferred his interest to Boulton, who brought Watt to Soho. Parliament's 1775 Act extended Watt's patent to 1800, enabling long-term exploitation. Smiles emphasizes these verifiable

milestones—scientific insight, capital, and law—as the enabling triad through which invention moved from laboratory reflection to manufacturable, licensable power.

The Soho Manufactory, established by Boulton in the 1760s at Handsworth, became a landmark of organized manufacture. It integrated skilled artisans, specialized shops, and disciplined accounting to produce metalwares, buttons, and later complex engines. Proximity to Midlands metalworking, road and canal improvements, and connections with suppliers like Carron linked Soho to national markets. In Smiles's account, this facility exemplifies the managerial and logistical innovations that made sophisticated engineering feasible. The partnership's correspondence—orders, specifications, costings—preserved in the Soho papers, reveals how design decisions, procurement, and quality control were negotiated, giving readers a documentary view of industrial coordination before the factory age fully matured.

Commercialization hinged on pumping contracts, especially in Cornwall, where deep mines demanded efficient drainage. Boulton & Watt deployed engines under a royalty system based on coal saved compared with local practice, aligning their interests with mine adventurers. Field trials, careful measurements, and iterative adjustments were routine, and Soho's agents reported performance, maintenance, and terms. These disciplined practices, visible in the manuscripts, show technology diffusing through negotiation and proof, not proclamation. Smiles highlights how travel, correspondence, and accounting sustained trust at a distance, presenting

enterprise as a continuous testing ground that linked metropolitan design rooms with remote engine houses and balance sheets.

Extending steam power beyond mines required smooth rotary motion for mills and factories. With James Pickard holding a 1780 patent on the crank and flywheel, the firm adopted William Murdoch's sun-and-planet gear (1781) to convert reciprocation into rotation without infringement. Watt's additional patents in the early 1780s covered separate improvements, including expansive and double-acting working and the parallel motion linkage, stabilizing force and efficiency. These steps, documented in drawings and specifications, allowed standardized rotative engines to drive textile machinery, flour mills, and other works. Smiles treats such incremental patents as a methodical program, aligning scientific insight with manufacturable mechanisms.

Enforcement of patent rights shaped the firm's strategy. In the 1790s they pursued actions against alleged infringers, including Edward Bull and Jonathan Hornblower, to defend Watt's separate-condenser principle. Early proceedings produced mixed outcomes, but in 1799 a landmark judgment in the Hornblower case confirmed that their method, embodied in specific machinery, was protectable, strengthening their position as the 1800 expiry approached. Smiles, drawing on counsel opinions, affidavits, and board minutes, presents legal conflict as costly yet formative, showing how British patent law, rooted in the Statute of Monopolies, mediated between technological diffusion and the promised reward to original inventors.

The broader milieu included the Lunar Society's exchanges among Boulton, Watt, Joseph Priestley, Erasmus Darwin, Josiah Wedgwood, and others, advancing chemistry, materials, and mechanics. Political turbulence touched Birmingham in the 1791 riots that targeted dissenters, altering the society's tenor. Boulton established the Soho Mint, and in 1797, under government contract, produced steam-struck copper pennies and twopences to relieve small-coin shortages. William Murdoch's experiments with coal-gas illumination, demonstrated widely by 1802 at Soho, signaled new urban technologies. Smiles uses these episodes to frame the partners as civic industrialists whose workshops linked scientific practice, public order, and state needs.

Published in 1865, the work belongs to a Victorian genre that treated engineers as nation-builders. Smiles had already argued, in biographies and *Self-Help*, that character underpinned progress; here he grounds that ethic in primary sources—the Soho correspondence, notebooks, and plans—complementing James P. Muirhead's earlier *Life of James Watt* (1858). The narrative reflects mid-nineteenth-century faith in practical science, private enterprise, and orderly improvement, while implicitly critiquing waste through its attention to measurement, standardization, and legal clarity. By documenting negotiations, failures, and successes, it presents Boulton and Watt as exemplars of institutional modernity rather than solitary genius, matching its era's documentary expectations.

**LIVES OF BOULTON AND WATT.
PRINCIPALLY FROM THE ORIGINAL SOHO
MSS**

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PREFACE.

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THE present volume concludes the author's 'Lives of the Engineers.' Its preparation was begun many years since. The favourable reception given to the 'Life of George Stephenson,' the principal improver and introducer of the locomotive engine, encouraged the author to follow it by a Life of James Watt, the principal inventor and introducer of the condensing engine. On making inquiries, however, he found that the subject had already been taken in hand by J. P. Muirhead, Esq., the literary executor of the late Mr. Watt, of Aston Hall, near Birmingham. As Mr. Muirhead was in all respects entitled to precedence, and was, moreover, in possession of the best sources of information, the author's contemplated Life of Watt was abandoned, and he satisfied himself with embodying the substance of the materials he had collected in a review of Mr. Muirhead's work, which appeared in the 'Quarterly Review' for July, 1858.

Having recently, however, through the kindness of M. P. W. Boulton, Esq., of Tew Park, Oxon, been enabled to examine the extensive collection of documents brought from Soho, including the original correspondence between Watt and Small, between Watt and Boulton, and between the latter and his numerous intimate friends and business correspondents, it has appeared to the author that, notwithstanding the valuable publications of Mr. Muirhead, the story of the life of Watt is one that will well bear to be told again, in connexion with the life and labours of Matthew Boulton of Soho. The two men were so intimately related

during the most important period of their lives, and their biographies so closely intermingle, that it is almost impossible to separate them. They are therefore treated conjointly in the present volume, under the title of 'Boulton and Watt,' the name of the old Soho firm which so long enjoyed a world-wide reputation. But though the name of Boulton takes priority in the title, that of Watt will be found in many respects the most prominent in the narrative.

The MS. papers which have been consulted for the purposes of the present volume are of an unusually complete and varied character. They consist of several thousand documents selected from the tons of business books and correspondence which had accumulated at Soho. The most important were selected and arranged by the late M. Robinson Boulton, Esq., who entertained the highest regard for his father's memory; and, from the character of the collection, the author inclines to the opinion that it must have been made with a view to the preparation and publication of a Life of Matthew Boulton,—which has not, however, until now been undertaken. Thus, among sundry papers endorsed "M. Boulton—Biographical Memoirs," is found a MS. memoir in the handwriting of James Watt, entitled "Memorandum concerning Mr. Boulton, commencing with my first acquaintance with him," and another of a similar character, by Mr. James Keir,—both written shortly after Mr. Boulton's death. Another collection, endorsed "Familiarum Epistolæ et Selectæ, 1755 to 1808," contains letters received from various distinguished personages in the course of Mr. Boulton's long and interesting career. The number of original documents is

indeed so large, that, but for a rigid exclusion of non-essential matter, these Lives must have expanded into several volumes, instead of being compressed into one. But the author believes labour to be well bestowed in practising the art of condensation, and that the interest of biography gains much by judicious rejection. What Watt said to Murdock as to the production of a machine, holds equally true as to the production of a book,—“It is a great thing,” said Watt, “to know what to do without.”

Besides the memoirs of Boulton and Watt, which occupy the principal places in the following volume, it will also be found to contain memoirs of the other inventors who have at various times laboured at the invention and application of the steam-engine,—of the Marquis of Worcester, Dionysius Papin, Thomas Savery, and Thomas Newcomen. The author has also been enabled to gather from the Boulton papers a memoir of William Murdock, which probably contains all that is likely to be collected respecting that excellent and most ingenious mechanic.

In addition to the essential assistance received from M. P. W. Boulton, Esq., in preparing the present book, without which it would not have been undertaken, the author desires to record his acknowledgments to J. W. Gibson Watt, Esq., for information relative to James Watt;—to Charles Savery, Esq., Clifton, J. T. Savery, Esq., Modbury, Lieutenant-Colonel Yolland, R.E., and Quartermaster Connolly, R.E., for various facts as to the family history and professional career of Thomas Savery, inventor of the “Fire Engine;”—and to Thomas Pemberton, Esq., Heathfield; W. C. Aitkin, Esq., Coventry; George Williamson, Esq., Greenock; the late J.

Murdock, Esq., Handsworth; and the late Mr. William Buckle, of the Royal Mint, formerly of Soho,—for various information as to the lives and labours of Boulton and Watt.

In his treatment of the subject, it will be observed that the author has endeavoured, as much as possible, to avoid introducing technical details relating to the steam-engine. Those who desire further information on such points, are referred to the works of Farey, Tredgold, Bourne, Scott Russell, Muirhead ('Mechanical Inventions of James Watt'), and other technical treatises on the subject, where they will find detailed particulars of the various inventions which are only incidentally referred to in the following pages.

London, October, 1865.

BEGINNINGS OF THE STEAM-ENGINE: THE EARLY INVENTORS.

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EDWARD, SECOND MARQUIS OF WORCESTER.

[By T. D. Scott after Vandyck.]



ANCIENT GREEK ÆOLIPILE[3].

BEGINNINGS OF THE STEAM-ENGINE: THE EARLY INVENTORS.

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CHAPTER I.

DAWNINGS OF STEAM POWER—THE MARQUIS OF WORCESTER.

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WHEN Matthew Boulton entered into partnership with James Watt, he gave up the ormolu[1] business in which he had before been principally engaged. He had been

accustomed to supply George III. with articles of this manufacture, but ceased to wait upon the King for orders after embarking in his new enterprise. Some time after, he appeared at the Royal Levee[2] and was at once recognised by the King. "Ha! Boulton," said he, "it is long since we have seen you at Court. Pray, what business are you now engaged in?" "I am engaged, your Majesty, in the production of a commodity which is the desire of kings[1q]." "And what is that? what is that?" asked the King. "POWER, your Majesty," replied Boulton, who proceeded to give a description of the great uses to which the steam-engine was capable of being applied.

If the theory of James Mill[1] be true, that government is founded on the desire which exists among men to secure and enjoy the products of labour, by whatsoever means produced, probably the answer of Boulton to George III. was not far from correct. In the infancy of nations this desire manifested itself in the enforcement of labour by one class upon another, in the various forms of slavery and serfdom. To evade the more onerous and exhausting kinds of bodily toil, men were impelled to exercise their ingenuity in improving old tools and inventing new ones,—while, to increase production, they called the powers of nature to their aid. They tamed the horse, and made him their servant; they caught the winds as they blew, and the waters as they fell, and applied their powers to the driving of mills and machines of various kinds.

But there was a power greater by far than that of horses, wind, or water,—a power of which poets and philosophers had long dreamt,—capable of being applied alike to the

burial site for Matthew Boulton and James Watt and was a focal point for local commemorations.

74 A French-derived term meaning small metalware, trinkets, or hardware; here it denotes petty metal goods or baubles, an archaic or colloquial expression in 18th–19th-century English writing.

75 A mining shaft cage or tub (related to the term ‘corf’/‘corve’) used historically to raise and lower miners or materials in a mine shaft; the word denotes the enclosed carrier in which people or goods were transported.

76 Refers to Aimé (or Ami) Argand (c.1750–1803), the Swiss-born inventor of the Argand lamp whose improved oil-lamp burner and chimney greatly increased brightness and efficiency and who was well known in late 18th-century scientific circles.

77 Refers to Erasmus Darwin (1731–1802), an English physician, natural philosopher, poet, and member of the Lunar Society who wrote the long didactic poem *The Botanic Garden* and corresponded with many contemporary scientists and inventors.

78 An informal late-18th-century club of industrialists, natural philosophers and intellectuals in the Birmingham area—active roughly c.1765–c.1813—whose members included figures such as Matthew Boulton, James Watt, and Erasmus Darwin among others.

79 Nickname of a specific early stationary beam steam-engine at the Soho manufactory associated with Boulton & Watt; noted in 18th–19th-century accounts for its long service as an example of their improved steam-engines.

80 Refers to the road-builder generally identified with John Metcalf (commonly called 'Blind Jack of Knaresborough', c.1717–c.1810), an Englishman who, despite being blind, built many roads and bridges in 18th-century northern England.

81 A Dutch engineer (1595–1677) noted for directing large-scale reclamation and drainage of the English Fens in the 17th century, introducing Dutch techniques to English land-drainage projects.

82 Bicêtre is a historic château and institutional site just south of Paris that long served as a prison, hospital and asylum; references to persons being 'shut up in the Bicêtre' refer to that notorious confinement facility.

83 Latin title for Morland's speaking-trumpet (an early megaphone or voice-amplifying trumpet) attributed to Sir Samuel Morland; a surviving example was reported as being at Trinity College, Cambridge.

84 A valve (called a 'clack') used on early Newcomen atmospheric steam engines to admit or release air during the condensation stroke; the term 'sniffling' alludes to the characteristic rushing or snifflike noise made when the valve was opened.

85 A municipal officer in Scottish burghs historically responsible for the Dean of Guild Court, which regulated building works, trades, and the admission of freemen; the office dates from the medieval period and retained various local regulatory powers into the 18th–19th centuries.

86 A Scots culinary term for a hen-broth or pottage made from fowls (often thickened with beans or grains); a

traditional, inexpensive dish common in historical Scottish domestic cookery (spelling and recipes vary regionally).

87 The institution founded from the bequest of Professor John Anderson to provide scientific instruction for working people, opened in 1796 as Anderson's Institution (often called the Andersonian), and later became a central predecessor of the University of Strathclyde.

88 Refers to John Smeaton (1724–1792), an English civil engineer often called the 'father of civil engineering', noted for projects like the Eddystone Lighthouse and for applying scientific methods to engineering problems, including studies relevant to engines.

89 A name Watt gave to an early steam engine (originally brought from Kinneil) that he repeatedly altered and used for experiments; it was later superseded by larger, improved engines.

90 Sir John Fielding (c.1721–1780) was a London magistrate and reformer (half-brother of novelist Henry Fielding) associated with the Bow Street magistrates and the early Bow Street Runners; the phrase refers to an arrest warrant he might issue in his official policing role.

91 Refers to people associated with Wheal Chance, a Cornish mine — including miners, investors, or local stakeholders — who in the late 18th century were involved in disputes and litigation over engine rights and mine management.

92 A rope used to raise and lower a kibble (a large bucket or receptacle) in deep mines to bring up ore and waste; period accounts note such ropes were heavy, wore out quickly, and constrained hauling speed.

93 Latin for ‘first mover,’ a term from medieval and early modern cosmology meaning the primary source of motion; Boulton uses it figuratively here to mean the original source or sum total of motive power.

94 Refers to the patent on the Argand lamp, an improved oil-burning lamp invented by Aimé Argand in the late 18th century; a legal decision against this patent is mentioned as an example of rulings that discouraged inventors from bringing improvements to Britain.

95 An 18th-century term used by chemist Joseph Black for what is now called carbon dioxide (then called carbonic acid gas), named because it was thought to be ‘fixed’ in solid materials like chalk until released by heating.

96 Here denotes a private issuer of copper coinage (provincial halfpence) known as the Anglesey Company; such token issues circulated in the late 18th century and are described in the text as effectively an illegal coinage despite being of full copper weight.

97 An 18th-century proverb meaning ‘live within your means’; the tailoring metaphor advises adjusting one’s spending (coat) to available resources (cloth).

98 A long-established legal protection against unlawful detention; its suspension (noted here on 23rd May 1794) allowed the government temporarily to detain persons without the usual immediate recourse to court during political unrest.

99 A cosmetic starch or powder used in the 18th century to whiten and style wigs or tied hair (queues); it became subject to government taxation and shortages during the late 18th–early 19th-century wartime period.