

Inventing the Industrial Revolutionby **Christine MacLeod**

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MacLeod, C., Inventing the Industrial Revolution – the English Patent System 1660-1800. Cambridge University Press – Cambridge 1988, 302 pages.

Christine MacLeod was research fellow at Clare Hall Cambridge University when this, based on her PhD thesis, was published. It won the Wadsworth Prize for business history 1989. Presently she is professor of history, University of Bristol, with a long list of publications in the historical evolution of technology and the patent system to her credit.

Eleven chapters referenced by detailed appendix, excellent bibliography and primary/secondary sources, e.g. Jill Denton discussions on the technical aspects of pottery making, Thomas Savery “The miner’s friend, or an engine to raise water by fire” 1702, “Report from the Select Committee on the Law relating to Patents for Invention” Parliamentary Papers 1808 II, Richard L. Hills “Power in the industrial revolution” Manchester 1970 pp34-5.

1660-1800 was a time of change in Britain which MacLeod waltzes through giving details on many inventions, and inventors. Patent-wise legislation was stable 1624-1835, with the Patent Office not established until 1852 (registration not examination). Beforehand Scotland & Ireland maintained separate systems. The Stuart patent was a policy instrument – technology importation. The 1535 Clerks Act first laid down the patent route and 1624 Statute of Monopolies refined – 14yr term, first true inventor/importer, no-other using at the time, privilege not contrary to the law, should not lead to rise in price, should not hurt trade, or be “generally inconvenient”. Royal license validity was henceforth liable to common law trial where one could sue for relief with triple damages and double costs. Normally no examination whilst a sworn affidavit assured novelty (1707) v France (1699 statute *Académie des Sciences* examined applications, issuing reports 1735). Exact specifications not required to be made public until early 18th century. Before 1778 it was a problem patentees faced pragmatically, i.e. secrecy v more clear better chance in court. A patentee was entitled to improve his invention between enrollment and specification! Announcement in the London Gazette followed granting. Design & copyright registration came later – Hogarth’s Act 1735 protection for artists and printmakers, 1787 Copyright Act for cotton textile printers. Design protection extended 1839 to ceramics & articles of manufacturing. Expense was a major deterrent – official fees 1660-1852 were ~£70, gratuities added ~£30. Extending protection to Scotland and Ireland raised this to £350. Many remained ignorant of the system’s existence, e.g. Henry Bessemer 1834 “knew nothing of patents or patent law”. Monopolies were considered “odious in the eyes of the law” (1684 case). The attitude of common law judges 1780-1830 was largely hostile with 61% rulings against patentees in 2nd half 18th century. The law courts were dreaded: financial costs was ruinous, outcome seemed random and too often depended on a technicality. Marc Isambard Brunel told a Select Committee 1829 “I might as well toss for the fate of a patent”. In the 18th century patentee’s power was rarely enhanced by an Act beyond the prolongation of his term of protection, e.g. James Watt; by 1829 such were “very difficult to obtain and very expensive to solicit”.

The Poor Law made employment sacrosanct placing responsibility on each parish to maintain its own unemployed. Agriculture, the economy’s largest sector, was under-represented by patents; innovation had enabled England to feed its growing population (double the previous century’s, 1798 Malthus specter) and become a food exporter 2nd half 18th century. Most of this was not patentable e.g. crop rotation, selective breeding, pasture management. Similarly for mining (primarily via water pumps). Projecting mania of the early 1690s led 1705-15 to the first wave of stock market speculation (stock jobbing) – the South Sea Bubble. The 1718 Bubble Act put a limit of five owners/interests per patent halting their potential mushrooming. Late 17th century military inventions provided the largest category of patents (unhindered access guaranteed the Crown). Timber stock conservation was critical to the Royal Navy. Sharply rising cost of charcoal post-1750 prompted renewed interest in mineral fuels (coal) smelting. Windmills numbers in Britain doubled 1760-1820 though contribution to total national horsepower halved to 6%. Attempts were made to escape natural power’s constraints, e.g. John Allen’s gunpowder engine 1743. Industrial machinery investment trebled 1760-80, quadrupled 1780-1800, but still accounted for a small proportion of national income. Newcomen’s engine and Lombe’s silk throwing machinery were particularly influential. Government dared not trample roughshod on Guilds who distrusted invention patents which created independent pockets in their midst, loosening control & maintenance of standards. e.g. the London Clockmakers Guild were especially vigilant,

spending >£500 to defeat 3 patents and two Acts 1688-1718. Their declining power and the increasingly laissez-faire principles of ministers relaxed this constraint during the 2nd half of 18th century. The leather and building trades, two of England's largest industries at this time, where Guilds remained strong until mid 18th century, showed little evidence of innovation – but after 1760 saw an outburst of patenting. Many patents were taken out in years of prosperity, few in years of depression. Waves of patentable subjects included consumer goods and medicine. Trade cycles and the typical projectors patent of the early 1790s covered canal locks, or linked with building cycles. Patenting was more likely sought for mechanical invention than chemical which pertained to a centralized highly capitalized field where competition was fiercer than usual. About 20% patents 1660-1800 related to chemical industries – dyeing, bleaching, brewing & distilling, metallurgy but at least half involved mechanical aspects, e.g. grinding machinery, furnaces etc... Patents exhibited a remarkable degree of geographic concentration e.g. Sheffield for metal tools for cutlery, Nottingham for knitting, Yorkshire for woolen industry. London patentees dominated at 59.6% of the total 1660-99, decreasing 1750-99 to 54.9% when 77.8% patentees held only one patent, whilst 3% had five or more. The quasi-professional inventor had arrived but manufacturers held center-stage. The number of invention patents rose from <10 in 1660 to >70/yr 1800, with most increase from 1750 on. Across the British Isles 1750-99 – Ireland had 9 patents, Scotland 56, Europe 12, America/West Indies 18, from a global 1712 total. Publicity, piracy, and a rise in disposable incomes driving consumer demand lay behind.

The Royal Society was an alternative forum for inventors. Other approaches included the 1713 Longitude Act which offered a £20,000 prize, led to the Harrison chronometer, but cost him 33yrs and George-III's intervention to collect. Steps were taken in Ireland and Scotland to encourage agricultural and industrial development with premiums and sponsorship of research, e.g. the Dublin Society founded 1731 to finance new manufacture and agricultural experiments switched 1740 to annual competitions, and by 1761-67 had disbursed £42,000.

An excellent insight into culture, technology, law, economy, politics and the patent system – however the 1660-1800 focus is limiting. Expansion backward and forward in time would be helpful, e.g. comparison to peer systems should be expanded, e.g. France, Holland. Perhaps this is partially covered by her following books.

Overall – recommended: a fascinating insight into the early days of the patent system and its development. Surprise surprise, many of the issues discussed today, e.g. the pros & cons of the system, were faced back then as well.