

Technology in the Industrial Revolution

Technological change is about more than inventions. This concise history of the Industrial Revolution places the eighteenth-century British Industrial Revolution in global context, locating its causes in government protection, global competition, and colonialism. Inventions from spinning jennies to steam engines came to define an age that culminated in the acceleration of the fashion cycle, the intensification in demand and supply of raw materials and the rise of a plantation system that would reconfigure world history in favor of British (and European) global domination. In this accessible analysis of the classic case of rapid and revolutionary technological change, Barbara Hahn takes readers from the north of England to slavery, cotton plantations, the Anglo-Indian trade and beyond – placing technological change at the center of world history.

Barbara Hahn is a prize-winning author in business history and the history of technology. Her publications include *Plantation Kingdom: The South and Its Global Commodities* (2016), which she co-authored. She is Associate Professor of History at Texas Tech University and was the associate editor of the journal *Technology and Culture*.



New Approaches to the History of Science and Medicine

This dynamic new series publishes concise but authoritative surveys on the key themes and problems in the history of science and medicine. Books in the series are written by established scholars at a level and length accessible to students and general readers, introducing and engaging major questions of historical analysis and debate.

Other Books in the Series

John Gascoigne, Science and the State: From the Scientific Revolution to World War II



Technology in the Industrial Revolution

Barbara Hahn

Texas Tech University





CAMBRIDGEUNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India

79 Anson Road, #06-04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning, and research at the highest international levels of excellence.

www.cambridge.org

 $Information\ on\ this\ title:\ www.cambridge.org/9781107186804$

DOI: 10.1017/9781316900864

© Barbara Hahn 2020

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2020

Printed in the United Kingdom by TJ International Ltd, Padstow Cornwall

A catalogue record for this publication is available from the British Library.

ISBN 978-1-107-18680-4 Hardback ISBN 978-1-316-63746-3 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.



For the British working people





Contents

| | List of Figures Acknowledgments | page viii ix |
|---|------------------------------------|-----------------|
| | Introduction | 1 |
| 1 | Sugar and Spice | 22 |
| 2 | Myths and Machines | 57 |
| 3 | Cottonopolis | 90 |
| 4 | Power and the People | 120 |
| 5 | The Vertical Mill | 152 |
| | Conclusion | 185 |
| | Appendix: Alternative Examples | 188 |
| | Bibliography | 193 |
| | Index | 217 |

vii



Figures

| 1.1 | Traditional weaving | page 21 |
|-----|---|---------|
| 1.2 | The twisted teardrop design now known as Paisley | 39 |
| 1.3 | Spinning wheel, outfitted with a flyer | 45 |
| 1.4 | Preparing fiber for spinning woolens and worsteds | 48 |
| 1.5 | Eighteenth-century cloth hall, Leeds, interior and exterior | 55 |
| 2.1 | John Kay's flying shuttle, 1733 | 59 |
| 2.2 | James Hargreaves' spinning jenny, 1769 | 63 |
| 2.3 | Richard Arkwright's water-frame, 1769 | 66 |
| 2.4 | An Arkwright-style factory | 72 |
| 2.5 | Weavers' cottage, commissioned by Richard Arkwright, 177 | 7 78 |
| 3.1 | Cotton mills of McConnell & Kennedy, 1798–1912 | 98 |
| 3.2 | Cotton imported to Great Britain in the eighteenth century | 103 |
| 3.3 | Manchester's working-class tenements | 111 |
| 4.1 | Nineteenth-century gig-mill | 133 |
| 4.2 | Spinning mule, before the addition of the Iron Man | 143 |
| 4.3 | James Watt's steam engine, 1769 | 146 |
| 5.1 | Victorian fashion | 153 |
| 5.2 | Weaving shed in John Marshall's flax mill | 170 |
| 5.3 | A medallion from Manchester's Free Trade Hall | 177 |
| 5.4 | The Victoria Quarter shopping arcade in Leeds | 183 |

viii



Acknowledgments

This book is a product of a long conversation with people, places, and primary sources, both documents and artifacts. I first went to England in 1989, and worked as a cleaner in a Pontin's on Camber Sands. I returned to investigate this topic in 2012, as a guest of the Marcus Cunliffe Centre for the Study of the American South, at the University of Sussex, where I spoke about tobacco. There was then a mad dash through the industrial museums of the North based around a very comfortable ten-day stay in Burnley. I thank my guides over the years and their institutions: the downloadable walking tour of industrial Manchester offered by the Ancoats History Project, Bolton Library and Museum Services, the Bradford Industrial Museum, Bridport Museum, Crewkerne and District Museum, The Dean Clough Mills, Helmshore Mills Textile Museum, Kelvingrove Art Gallery and Museum, Leeds City Museum, Leeds Discovery Centre, Leeds Industrial Museum at Armley Mills, Museo della Setta in Como, Manchester Museum of Science and Industry, New Lanark Village, Quarry Bank Mill in Styal, Queen Street Mill in Harle Syke, Paisley Museum and Art Galleries, the People's History Museum, Saltaire, Stockport Hat Museum, Temple Newsam, Thwaite Mills Watermill, a twine works ropewalk, Verdant Works jute mill in Dundee, the Westbury Manor Museum in Fareham, the Whitchurch Silk Mill, Winchester City Flour Mill, and the Working Class Movement Library in Salford. I learned so much there, and I am so thankful for the opportunity. Some of these have since closed.

In summer 2013, I was back again, a month in Liverpool and two in Manchester, supported by Texas Tech University (thank you!), and then was lucky to spend two years in Leeds as a Marie Curie International Incoming Fellow (MCIIF #628722) of the European Commission, as part of "Rethinking Textiles," (itself part of the "Enterprise of Culture" project), whose principal investigator was Regina Lee Blaszczyk. Special thanks to Reggie Blaszczyk, the European Union, the University of Leeds, and swathes of its staff, especially Mike Bellhouse, Fiona Blair, and Paul

ix



x Acknowledgments

McShane – and, quite separately, my Leeds landlord, Mr. John S. House, of St. John's Terrace, at the top of the Bellevue Road.

Immersion was invaluable. It helped me understand Britain better than I had done before: the rock-bottom importance of class structure to the society made there and contested there every day, in every way – in the fourteenth and the eighteenth centuries as well as today. I began to realize that class is as important to English history as race is to American history. Being there over time also introduced me to a large and diverse community of scholars and other people talking and thinking about the Industrial Revolution. My American Midwestern tendency to talk to strangers could open up conversations, especially in the North, and many people I encountered offered their own interpretations, shared local and family history, or suggested places to visit or things to read. I followed my nose. Halifax and Hebden Bridge, Huddersfield and even Honley, Preston and Shipley and Sheffield, Hawick and Jedburgh, Glasgow and Edinburgh, and, of course, Manchester and Liverpool and Leeds, the industrial North and the Scottish borders. At one point, outdoors on Deansgate, in Manchester, over a bowl of soup, John Pickstone asked, "Who have you spoken to?" Invitations flowed from there. Some of these people I already knew and some came from Pickstone and others from others. I wish I could explain to you how each one helped, or tell a story about each one so you'd know how amazing they are:

Larra Anderson, Robert J. Aram, William Ashworth, Kellen Backer, Sharon Bainbridge, Bruce E. Baker, Sara Barker, Sarah Barton, Maxine Berg, Leonie Betts, Linda Betts, Fiona Blair, Regina Lee Blaszczyk, Tilly Blyth, Kathryn Boodry, Anna Bowman, Emily Buchnea, Robert Bud, Sarah Butler, Malcolm Chase, Eric Chiappinelli, David Churchill, Peter Coclanis, Gill Cookson, Hansa and Kish Dabhi, Keith Dando, Sarah Dietz, Alice Dolan, Peter Doré, Kate Dossett, Robert Du Plessis, Gökhan Ersan, Elaine Evans, Helen Farrar, Mike Finn, Richard Follett, Ester Galeci, Graeme Gooday, William Gould, Shane Hamilton, Sasha Handley, Michael Hann, James Harris, Abigail Harrison-Moore, Tiana Harper, Jan Hersheimer, Jan Hicks, Richard High, the Reverend Richard L Hills, Steve Hindle, Philip T. Hoffman, Pat Hudson, Jane Humphries, Karolina Hutkova, Kenneth Jackson, Amy Jenkinson, Finn Arne and Dolly and Marion and Lina Jørgensen, Jen Kaines, Nina Kane, Hannah Kemp, Jack Kirby, Ursula Klein, Kazuo Kobayashi, Renée Lane, David Larmour, Mitch Larson, Pamela Long, Graham Loud, Antonia Lovelace, Andreas Malm, Annapurna Mamidipudi, Daniel Martin, Judith Mary Martin and Nigel Martin, Peter Maw, Meg McHugh, Liz McIvor, Vincent McKernan, Philippe Minard, Lesley Miller, Laura Millward, Luca Mola, Craig Muldrew, Anne Murphy, Camilla Nichol, Eugene Nicholson, Tom Nies, Scot Ninnemann, Lisa O'Brien, Nicholas Oddy, Alan Olmstead, Jenifer Parks, Prasannan Parthasarathi, Bruce Peter, John Pickstone, Andrew Popp, Paul and Mindy and Alice Quigley, Anita Quye, Greg Radick, Natalie Raw, Phil Reekers, Paul Rhode, Giorgio Riello, Lissa



Acknowledgments

χi

Roberts, Frances Robertson, Alex Roland, Stephanie Roper, Mary B. Rose, Jean-Laurent Rosenthal, Sally Rush, Ann Schofield, Yda Schreuder, Jan Shearsmith, Pamela Smith, Jennifer Snead, Danielle Sprecher, John Styles, Keith Sugden, Ann Sumner, James Sumner, Abigail Swingen, Philip Sykas, Fiona Tait, Steve Toms, E. B. Toon, Sally Tuckett, Leucha Veneer, Jeff Waddington, Andrew Walden, Claire Watson, Dan Weldon, Corbin Williamson, Susan Williamson, Deirdre and Nigel Wood, Chris Wrigley, Joseph Wright-Pangolin, and last but not least – Natalie Zacek.

There are so many more who helped, whose names I don't know: archivists, tour guides, the barmaid who worked the locks on the Manchester canal tour (twice). Likewise thanks to the kind woman who delayed her lunch to give me an unscheduled tour of Johnston's cashmere mill in Hawick. She picked up a jumper from her chair and carried it through the factory and showed me what each machine did in putting it together, and for the first time I understood machine knitting a little bit. Sasha Handley, Elizabeth Toon, and Natalie Zacek opened their homes to me for extended stays. James Sumner and Leucha Veneer, and Nigel and Judith Mary Martin, provided tours and discussions of specific regions, and ropewalks, and the sailcloth industry. I'm sad that I could not include every detail of what each one helped me learn. Between book contract and due date I also benefitted tremendously from a month at the Max-Planck-Institut für Wissenschaftsgeschichte in Berlin, where chapters four and five first took shape and where the Moving Crops collaborators kept me focused on assemblages in the form of cropscapes. Thanks to Dagmar Schäffer and her office angels, and Francesca Bray, Alina-Sandra Cucu, John Bosco Lourdusamy, and Tiago Saraiva. Similar quiet hallways, library service, and lunch, permeated a summer residency at the National Humanities Center, where I am grateful to have had the opportunity to begin revising my first draft.

Gill Cookson, Eugene Nicholson, and Alex Roland deserve thanks for reading a first version of the entire manuscript and saving me from significant errors of fact, tone, and interpretation. Thanks too to Lucy Rhymer, and the anonymous readers whose comments changed my course midway through. Audiences and their questions also helped me think through this project. Over the years, they have included: the Arkwright Society, Association of Business Historians, the Business History Conference, Caltech and the Huntington Library, the Centre for the History and Philosophy of Science at Leeds, the Glasgow School of Art (Focus on Critical Inquiry), Heritage Show+Tell, ICHOTEC and ICHSTM, the Institute for the Study of Western Civilization at Texas Tech, the Society for the History of Technology (SHOT), Umeå University, University of Liverpool (Port City Lives), and the University of York Management School.



xii Acknowledgments

Flaws that remain are, of course, my own.

Texas Tech has been my intellectual home for more than a decade, and I am grateful for the support and friendships nourished here. The indefatigable Document Delivery office and Jack Becker in the library deserve special thanks. The TTU Humanities Center subvented the publication of illustrations. Sean Cunningham and Randy McBee helped me meet ambitious research goals. I thank them and the whole institution.

Lancashire and Yorkshire and the people of the British Isles have themselves taught me so much. It has been a pleasure to be your guest.