
Contents

Acknowledgements	x
Preface	xi
1 Introduction: a manufacturing people	1
 Part I ‘Illustrious followers of science’	
2 Fuelling growth: energy and power for industry	41
Wood, peat and coal before the industrial revolution	41
The enduring importance of muscle power, water and wind	45
A revolution in power: the development of steam	52
3 Making machines	67
Techniques of machine making	70
Machine tools	71
New forms of power transmission	74
Networks of engineers around the British Isles	76
A wide variety of engineering and mechanical skills	86
Market-town foundries	92
Conclusions: a diffusion of technical skills	93
4 Comprehending structures: the evolution of civil engineering	95
Sappers and architects	96
Designing new roads: turnpikes and the road to Holyhead	97
Bigger and better structures: the development of arches and beams	101
Bridges, aqueducts and viaducts on canals and railways	105
Wooden bridges	111
The age of iron: new forms in civil engineering	112
Waterway engineering: the building of canals, locks, bridges and tunnels	122
Building ports, docks and harbours	129

Draining land, controlling water	134
Contractors and navvies	140
Understanding the earth beneath	144
Civil engineering: an evolving profession	145
5 Changing horizons: transport in an industrial age	147
To distant shores in little ships	147
Coastal shipping	154
Transporting goods by canal and inland waterway	159
Passenger traffic on the canal network	169
Coaches and carriers: a golden age of road transport	171
Railways: creating a national network for goods and passengers	178
A transport revolution?	199

Part II Creating the ‘workshop of the world’

6 Coal mining and coalfield industries	203
Working the seams	203
The industrial uses and consumers of coal	211
Salt and soda ash	212
Glass making	213
Pottery	215
Limestone burning, brick making and other uses of coal	217
First and foremost: coal mining and industry in north-east England	219
Industrial innovation on the Shropshire coalfields	229
Coal mining in Ireland	235
Industry on the fringe: the Cumberland coalfield	236
Coal mining and industry in Scotland	239
The coalfields of Yorkshire	243
The East Midlands seams	250
South Derbyshire and north Leicestershire	256
Warwickshire	259
The Black Country	260
Coal and pottery in the north Staffordshire coalfield	269
A complete industrial landscape: the Lancashire coalfield	274
The coalfields of North Wales	280
The Forest of Dean	280
Coal mining and industry around Bristol	282
Coal and industry in the Valleys: the South Wales coalfields	283
Conclusions	289

7	‘Iron in the blood’: the making of iron and steel	291
	Developments in the technology of iron making	292
	Traditional charcoal-fired furnaces	293
	Coke and coal replace charcoal	296
	Henry Cort and the puddling process	297
	New steel-making technologies	299
	How iron was used	301
	Iron making in Shropshire and the West Midlands	303
	North Staffordshire	310
	Volcanoes in the Valleys: iron making in South Wales	311
	North Wales	322
	The ancient iron-making industry of Dean	322
	Iron making in the East Midlands	324
	Sheffield: cutlery, iron and steel	326
	Beyond Sheffield: iron making elsewhere in west Yorkshire	330
	Iron making in lowland Lancashire	333
	The Irish and Scottish iron-making industries	334
	Iron in west Cumberland and Furness	340
	Ironstone along the Jurassic Ridge	343
	Iron in the North East: Tyneside, Weardale and Cleveland	344
	Conclusions	349
8	Precious veins: non-ferrous metals	351
	The tin industry	353
	The tin and copper mines of Cornwall	355
	Bristol and brass	358
	A copper revolution	360
	The lead industry	369
	The lead industries of Derbyshire and the northern Pennines	370
	Lead production in Scotland, Man and Ireland	380
	Lead mining in Shropshire and Wales	380
	Lead processing in towns and cities	383
	Conclusions: mining and processing	384
9	‘The spinners’ ardent toil’: the textile industries	387
	Innovations in cotton machinery	389
	Cotton mills: a revolution in factory working	395
	Divergent patterns of growth and production in the cotton industry	401
	Weaving cotton cloth on handlooms	404
	Cotton manufacturing across Lancashire	407
	Middleton	410

Oldham	411
Bolton	412
Bacup	413
Power-weaving communities	413
Manchester as 'Cottonopolis'	414
Lancashire in 1870	421
Cotton across the Midlands	422
The spread of cotton	427
The Scottish cotton industry	429
The cotton industry in Ireland	432
The silk industry	433
Flax, hemp, linen and jute	441
Wool and woollens	449
Woollens elsewhere in England	457
The woollen industry in Wales	461
The Scottish woollen industry	462
Lace and hosiery	463
Conclusions: leading the industrial revolution	468
10 Rags to riches: a revolution in paper	470
The mechanisation of paper making	472
Patterns of paper making	475
Developments in paper making after 1850	479

Part III Towns, cities, and communities

11 Great cities, old and new	483
Urban thinking	486
Living quarters	486
Capital cities	490
Towns of the North and the Midlands	495
Facing the Atlantic	502
An east-coast metropolis: Hull	511
Conclusions	515
12 Capital industries: manufacturing in London	517
The changing topography of London	518
Trade and the city	521
London as showcase	523
Retailing and manufacturing in London	525
Precious materials, precision goods and music	531

	Brewing	532
	Leather and glass	535
	Engines, carriages and ships	537
	Sugar importing and processing	542
	Bricks and stones	543
	London's housing	543
	Spreading suburbs	546
	Conclusions: London as an industrial centre	549
13	Towns of a different kind: resorts	550
	Bath: the archetype	551
	Bathing, piers and promenading: Britain's coastal resorts	555
	Taking the waters: inland spas and resorts	560
	Hydrotherapy	561
	A variety of resorts	563
	Manufacturing in resort towns	573
14	Creating communities: calculations and aspirations	575
	'Open' and 'close' communities	575
	Seigniorial enterprise	578
	Improvement	582
	Improvement at the margins	584
	The Fens	589
	Improvement in the Highlands	589
	Communities in Ireland	594
	Moravian communities	596
	Robert Owen: New Lanark and after	597
	The Chartists	601
	Industrial communities	602
15	Epilogue: a revolution in context	603
	Changing manufactures	603
	The wider world	605
	Glossary	611
	Further reading	620
	Index	638