RAILWAYS FOR ALL

BY

J. F. GAIRNS, M.Inst.T., M.I.Loco.E.

Editor of the "Railway Magazine," "Railway Year Book," etc. Author of "Locomotive Compounding and Superheating," "Superheating on Locomotives," etc.

WITH A HUNDRED ILLUSTRATIONS

THIRD EDITION_REVISED

WARD, LOCK & CO., LIM'I'ED LONDON AND MELBOURNY

CONTENTS

												PAGE
	INTRODUCTION					•	e			•		9
1	THE GROUPING	OF BRI	TISH	RAILWA	AYS	•						15
	Timber and Stone-v "Edge"—Rail pered Equine I and Cable Ra a Railway is	vays—Fl ways ar Passenger ilways—J	ange R nd Flai s—Eig Mono-F	nged Wh hteen Mi	-The neels- les by pende	First 1 -Horse 7 Swite d and	Fare- es as chbac l Rac	Paying Locor k Rai	notive lway—	s—Pa -Grav	m- ity	17
	Excursions by Coa (1825)—The L (1829)—Early I —The "Battle First European of the World— Building a Rai	l Wagon iverpool Difficultio of the G Railway Cruelty	—The and I es—The tauges s—The to Loco	Surrey In Manchesto "Railwa "—The I "Kitten omotives!	ron R er Ra ay Ma Last o n " in !—Ea	tailway ailway nia ''- f the J Canad	7 (18) (183 –Mr. Broad a—T	80)—" Punch l Gaug he Rai	The i's "F ge (189 lway (Rocke rescoe 92)—T Conqu	t" s" 'he est	25
]	Prize Competition I —The Era of "Bloomers," ' Steam Tenders,	Locomoti Big Dri 'Precede '' Eight	ves—T ving-W onts,"	heels—Seand Con	n Thu ome	imb "- Famou ids on	The us Lo	First	Six-V tive (th W	Classes estern	_	07
	Abroad—Numb CHA The Boiler and Fire Connecting Roo	PTER I	V.—H(OW THE	eam-	The C	yling	lers-	Slide '	Valves	• 	37
	Connecting Roo Reversing—Joy Wheels—Wheel CHAPTEI	Arrange	Valscha	ert Gear	-Pis	ton V	alves	-The	Frai	ne—T	he •	47
	Superheating and Lubricators—W Steam and Air The Vacuum B	Superh Vater Ga Reversi	eaters- uges	-Feed-W The Reg	ater ulator Brake	Heat Valv s—Th	ers— e—Ir e We	Inject the stingl	ors—I Engin 10use	Pumps e Cab Brake	<u> </u>	
	Coal—Mechanic CHAPTER VI	-BRITIS	ers—Th SH LO	e Tender	r—Wa VES-	-(A)	ough	s.	•	•	•	57
1	British "Pacifics" for Mixed Traf CHAPTER	-4-6-0 fic-Goo	Types- ds and	—" Atlar Mineral	ntics ' Loco	-4-4 motiv	es					71
1	Small Tank Engine —Ten-wheeled wheeled Tank	s—Six-w Tank H	heeled	Tank En —Twelve	ngines o-whee Types	-Eigl	ht-wh	reeled	Tank	Engin	105	78

CONTENTS

	PAGE
CHAPTER VIIILOCOMOTIVES OF THE EMPIRE	
Canada—South Africa—The Cape to Cairo—India—Australia—New Zealand	85
CHAPTER IXTHE LOCOMOTIVE ENGINE IN OTHER LANDS	
Continental Locomotives-European Express Locomotives-Goods and Mineral	
Locomotives—Eastern Locomotives—American Locomotives—South Ameri- can Locomotives	92
	04
CHAPTER XFLEXIBLE LOCOMOTIVES	
The Fairlie Type—The Mallet Type—Garratt Engines—The Kitson-Meyer Type—Shay Engines—The "Booster".	100
	100
CHAPTER XIFAMOUS EXPRESSES OF ALL COUNTRIES	
British "Fliers "-Business Express Trains-United States and Canadian Expresses-Trans-Continental Trains-Empire Express Trains-Famous	
Continental Expresses—International Trains	106
CHAPTER XIIKNIGHTS OF THE FOOTPLATE	
A Romantic Occupation—The Young Cleaner—The Fireman—Heroism on the Footplate—Promoted to Driver—The "Link" System—Express Drivers—	
"Double-crewing"—The Top of the Ladder	115
CHAPTER XIII ROUND THE WORKS OF A GREAT RAILWAY	
Headquarters Offices-The Stores-The Foundry and Pattern Shop-The	
Forge-The Plate Shop-The Boiler Shop-The Machine Shops-Miscel-	
laneous Departments-The Erecting Shop-Repairs-The Carriage Shops	124
CHAPTER XIV RAILWAY CARRIAGES : ANCIENT AND MODERN	T
The Unfortunate "Third "-Going to the Derby-" Smoking Forbidden "-	
"Top-Deckers"—Comfort for All—Stops for Refreshments—Dining-Cars—	
The Era of Luxurious Travel-Modern Main Line Stock-Travelling Hotels	
-Railway Travel in India-Special Cars-Postal Carriages	133
CHAPTER XV.—WHEN ROYALTY TRAVELS	
Royal Trains-Safeguarding Royalty-The Royal Saloons-Royal Engines-	
Historic Royal Journeys-British Royal Trains-King George in India .	145
CHAPTER XVI.—RAILWAY WAGONS	
British and Foreign Wagons-The Useful Four-Wheeler-Special Wagons-	
Large Steel Wagons-Cattle Trucks and Brake Vans-American Freight	1 60
	153
CHAPTER XVII.—SEMAPHORE AND OTHER SIGNALS	
Early Signals-The "Policeman"-The Block System-Distant and Home	
Signals-Junction Signals-"Splitting" Distants-Route Indicating	
Signals—Starting Signals—Signal Lights—Three-Position Signals—Light Signals—Junction Signals—"Splitting" Distants—Route Indicating Signals—"Speed" Signalling—Automatic Signals—Siding and Shunting Signals—The "Banner" Type—What the "X" means—Some French	
Signals-The "Banner" Type-What the "X" means-Some French	V2107837
Signals	159
CHAPTER XVIII.—SIGNAL-BOXES AND SIGNALMEN	
Inside a Signal-Box-The Levers-Interlocking-" Setting the Road "-Block	
Instruments—Bell Signals—Signalling a Train—Standard Code Rings— Safety Devices—Trains that Signal Themselves—Single Line Working—	
Electric Train Staffs and Tablets—Changing the Staff or Tablet.	171
CHAPTER XIX.—THE WORKING OF SIGNALS AND POINTS	
How Signals are Operated-Slotted Signals-The Points-Power-Signalling-	
Semi-Automatic Working-Illuminated Diagrams-Fog Signals-Deton-	
ator-Placing Machines-Automatic Train Stops-Platform Indicators .	184

CONTENTS

CHAPTER XX.-WORKING THE TRAINS-THE RAILWAYMAN'S "BRADSHAW"

DIVADSHAW	
The Origin of "Bradshaw"—Working Time-tables—The "Appendix"— Arranging a Time-table—Junctions and Four-Track Lines—Head Codes— The Standard Code—Discs and Boards—Tail Lamps—Slipping Coaches— Flags—Whistles—Exchanging the Mails—"Specials"—Snow Ploughs .	192
CHAPTER XXI.—ELECTRIC TRACTION	
Transmitting the Current—Direct Current—Alternating Current—The Elec- trical Gear—Monster Electric Locomotives—Electric Power Stations— Regenerative Braking	205
CHAPTER XXIIBY TUBE OR UNDERGROUND	
The Original "Underground "—Early Overhead Lines—The First Underground Electric Line—The Liverpool Overhead—The First "Tubes"—The Glas- gow Cable Subway—New York Subways—Lifts and Escalators—Rolling Stock—"Multiple-Unit" Trains—The "Dead Man's Handle"—Working the Passenger Traffic—21 Million Electric Passengers Daily	214
CHAPTER XXIIIHOW RAILWAYS HAVE CHANGED THE WORLD	
Across the World by Rail—Trans-Continental Travelling Hotels—British Trans- Continental Routes—Traffic of all Sorts by Rail—A Railway-tracked World—Some Railway Mileage Figures—£15,000,000 Worth of Railways.	224
CHAPTER XXIVTHE ROMANCE OF RAILWAY BUILDING	
Difficulties of Construction—Pioneer Lines—Records of Devotion and Privation —The First Trans-Continental Line in the States—Constructing the C.P.R. —New Lines Replacing the Old Ones—The Cordilleras and the Andes—The Snow-Fiend—Fighting Nature in the Mountains—The World's Highest Railways—Crossing the Great Deserts—Railways Amid Snow and Ice— Building Bridges under Difficulties—The Railway to Mecca	234
CHAPTER XXV.—CONQUERING THE MOUNTAINS	
The St. Gothard Lines—Mount Tamalpais—The Darjeeling-Himalayan Railway —Zig-Zags over the Blue Mountains—The Fell Centre-Rail System—Rack Railways—Mountain Electric Lines	248
CHAPTER XXVITHE BUSINESS SIDE OF RAILWAY-MAKING	
Projecting a Railway—Land Grants and Subsidies—Raising the Money—Stocks and Shares—Legal Preliminaries—The Secretary and Accountant .	256
CHAPTER XXVII.—CONSTRUCTING THE LINE	
Setting out the Route—" Navigators "—Machine Diggers—The Temporary Line—Removing the "Spoil "—Building Embankments—Overcoming Difficulties—Cuttings—Finishing off the Track—Construction Towns—The Final Stages—" Passing " the Line	263
CHAPTER XXVIIITHE PERMANENT WAY	
The Formation-Sleepers-Types of Rails-Fishplates-Points and Crossings- Check Rails-Conductor Rails-" Odds and Ends"	272
CHAPTER XXIXTHE BRIDGE BUILDER	
Arches-Girder Bridges-Cantilever Bridges-Viaduots-Brickwork, Stone and Concrete-Bridge Piers-Crossing Wide Rivers-Erecting Steel-Work- New Bridges for Old-Types of Girder Bridges-Special Forms of Railway	
Bridges	280

PAGE

CHAPTER XXX.—GREAT RAILWAY BRIDGES, VIADUCTS AND EMBANKMENTS

The Loftiest Railway Bridge—The Zambezi Bridge—The Faux Namti Bridge— Other Lofty Bridges—The Lethbridge Viaduct—The Quebec Bridge—The Forth Bridge—Niagara Falls Bridges—Brunel's Saltash Bridge—The Vic- toria Tubular Bridge—The Menai Straits Tubular Bridge—Brunel's Timber Trestle Bridges—Notable Swiss Viaducts—A Viaduct which has become an	
Embankment—The Largest Viaducts—A Railway which Goes to Sea— Crossing the Great Salt Lake—Bascule Bridges	290
CHAPTER XXXI.—THE TUNNNEL BUILDER	
The First Tunnel—Driving a Tunnel—Rock Drills and Cutters—Ventilation— Working from Both Ends and the Middle—Lining and Completing—The "Shield" Method—Compressed Air—The "Air Lock"—"Cut and Cover" CHAPTER XXXII.—THE WORLD'S LONGEST RAILWAY TUNNELS	304
The Simplon Tunnel—The St. Gothard Tunnel—The Loetschberg Tunnel—The Mont Cenis Tunnel—Other Long Tunnels—Roger's Pass Tunnel—The Severn Tunnel—The Cascade Tunnel—British Three-mile Tunnels—The	
Albula Tunnel-British Two-mile Tunnels-The St. Clair Tunnel-Mush-	313
room-growing in Tunnels	010
CHAPTER XXXIII.—THE WORLD'S LARGEST RAILWAY STATIONS	
Clapham Junction—Large Terminal Stations—Euston and Liverpool Street— Waterloo and Waverley—The Largest British Stations—Washington Union	
Station-Large European Stations-In India and the Dominions-The	321
Pennsylvania and Grand Central Stations, New York	941
CHAPTER XXXIVTWICE ROUND THE CLOCK AT A RAILWAY	
STATION The Railway Day—" In the Small Hours "—Morning Trains—Saturday Afternoon	
-Evening Hours-Junction Traffic-When Railway Stations Dress up-Paa- sengers of all Kinds-Meeting Emergencies-Eight Million Passengers Daily	330
CHAPTER XXXV.—THE GOODS TRAFFIC OF A GREAT RAILWAY	000
Goods more Profitable than Passengers—" Black Diamonds "—At a Busy Goods	
Station-The "Outwards" Shed-The "Inwards" Shed-"C. & D." and	
"S. to S."-The Mileage Yard-Coal Sidings, Repair Roads, etcMar-	339
shalling Yards-The "Control" System-Loading of Goods Trains	000
CHAPTER XXXVIRAILWAY "SIDE-SHOWS"	
Miscellaneous Work of a Railway—Tramways—Motor Omnibuses—Motor Vans and Lorries—Railway Horses—Steamships and Ferry Boats—Railway	
Ports and Docks-Railway Canals-Railway Hotels	348
CHAPTER XXXVII.—THE RAILWAY SERVICE	010
Numbers of Employees-Advantages of the Railway Service-Classes of the	
Staff-The Directors and Chief Officers-The General Manager-The Oper-	
ating Department—The Engineering Departments—Other Chief Officers— Looking after the Staff—Railway Uniforms—Women as Railway Servants—	
Railway Staff Abroad	357
CHAPTER XXXVIII.—RAILWAYS AND THE GREAT WAR	001
War Use of Railways—The Government and Railways—Railway War Practice—	
British Railways' War Achievements-Ambulance Trains-Special War	
Work—On the War Fronts	366
CHAPTER XXXIXSOME RAILWAY ODDS AND ENDS	
Rail Motor Cars and Motor Trains-Special Locomotives-Sailing on a Rail-	
way-Boating in a Railway Station-Atmospheric Railways-A "Levi-	
tated " Railway—A "Sliding " Railway—Mono-Railways—Suspended	
Railways-The Kearney and other High-Speed Railways	372
INDEX	379