



***THOMAS WALTER
BARBER***

***THE ENGINEER'S
SKETCH-BOOK***

Thomas Walter Barber

The Engineer's Sketch-Book

EAN 8596547170426

DigiCat, 2022

Contact: DigiCat@okpublishing.info



TABLE OF CONTENTS

PREFACE.

PART I. SECTIONS 1-106.

Section 1.—ANCHORING.

Section 2.—ADJUSTING DEVICES.

Section 3.—BELT GEARING.

Section 4.—BALL-AND-SOCKET JOINTS.

Section 5.—BRAKES AND RETARDING APPLIANCES.

Section 6.—TYPES OF BOILERS.

Section 7.—BLOWING AND EXHAUSTING.

Section 8.—BEDPLATES, FOUNDATIONS, AND FRAMING OF MACHINES.

Section 9.—CAM, TAPPET, AND WIPER GEAR.

Section 10.—CRANK AND ECCENTRIC GEAR.

Section 11.—CHAINS AND LINKS.

Section 12.—CARRIAGES AND CARS.

Section 13.—CRUSHING, GRINDING, AND DISINTEGRATING.

Section 14.—CENTRIFUGAL FORCE, APPLICATIONS OF.

Section 15.—CLUTCHES.

Section 16.—COUPLINGS FOR SHAFTING.

Section 17.—CONNECTING RODS AND LINKS.

Section 18.—CRANES, TYPES OF.

Section 19.—CONVEYING MESSAGES.

Section 20.—COMPENSATING AND BALANCE WEIGHTS.

Section 21.—CIRCULAR AND RECIPROCATING MOTION.

Section 22.—CONCENTRATED POWER.

Section 23.—CONVEYING MOTION TO MOVABLE PARTS OF MACHINERY.

Section 24.—CUTTING TOOLS.
Section 25.—CONDENSING AND COOLING APPLIANCES.
Section 26.—CONCENTRATING AND SEPARATING.
Section 27.—CHOPPING, SLICING, AND MINCING.
Section 28.—CHUCKS, GRIPS, AND HOLDERS.
Section 29.—CUSHIONING.
Section 30.—DRILLING, BORING, &c.
Section 31.—DIFFERENTIAL GEAR.
Section 32.—ENGINES (TYPES OF).
Section 33.—ENGINES AND BOILERS COMBINED (see also Boilers,).
Section 34.—ELLIPTICAL MOTION.
Section 35.—ELASTIC WHEELS.
Section 36.—EXPANDING AND CONTRACTING DEVICES.
Section 37.—FASTENING WHEELS TO SHAFTS.
Section 38.—FRICTION GEAR.
Section 39.—GUIDES, SLIDES, &c.
Section 40.—GEARING, VARIOUS DEVICES IN (not otherwise classed).
Section 41.—GOVERNING AND REGULATING SPEED, POWER, &c.
Section 42.—HYDRAULIC MULTIPLYING GEAR.
Section 43.—HOOKS, SWIVELS, &c.
Section 44.—INDICATING SPEEDS, &c.
Section 45.—JETS, NOZZLES, AND INJECTORS.
Section 46.—JOURNALS, BEARINGS, PIVOTS, &c.
Section 47.—PLATE WORK.
Section 48.—LEVERS.
Section 49.—LOCKING DEVICES.
Section 50.—HINGES AND JOINTS.

Section 51.—LUBRICATORS.

Section 52.—LEVELLING AND PLUMBING.

Section 53.—MECHANICAL POWERS. APPLIANCES TO VARY POWER AND SPEED.

Section 54.—MIXING AND INCORPORATING.

Section 55.—PARALLEL MOTIONS.

Section 56.—PUMPING AND RAISING WATER.

Section 57.—PIPES AND CONVEYORS.

Section 58.—PACKINGS, JOINTS, STUFFING BOXES, &c.

Section 59.—PROPULSION.

Section 60.—MOTIVE POWER.

Section 61.—PUMPING ENGINES, TYPES OF.

Section 62.—PAWL AND RATCHET MOTIONS.

Section 63.—PRESSING.

Section 64.—POWER AND SPEED, CONTRIVANCES TO VARY.

Section 65.—QUICK RETURN MOTIONS.

Section 66.—ROPE GEARING.

Section 67.—RESERVOIRS OF POWER. ACCUMULATORS.

Section 68.—RECIPROCATING AND CIRCULAR MOTION, CONVERTING ONE INTO THE OTHER.

Section 69.—RAISING AND LOWERING.

(3.) HYDRAULIC GEAR. See .

Section 70.—RELIEVING PRESSURE ON BEARINGS. ANTI-FRICTION BEARINGS.

Section 71.—ROPE, BELT, AND CHAIN PULLEYS.

Section 72.—RIDDLING AND SCREENING.

Section 73.—RAIL AND TRAM ROADS.

Section 74.—REVERSING GEAR.

Section 75.—ROTARY ENGINES, PUMPS, &c.

Section 76.—SHAFTING.

Section 77.—SPINDLES AND CENTRES.
Section 78.—SCREW GEAR, BOLTS, &c.
Section 79.—SLIDE AND OTHER VALVE GEAR.
Section 80.—SPRINGS.
Section 81.—SAFETY APPLIANCES FOR VARIOUS USES.
Section 82.—STEAM TRAPS.
Section 83.—STARTING VALVES.
Section 84.—TOOTHED GEARING.
Section 85.—TRANSMISSION OF POWER.
Section 86.—TANKS AND CISTERNS.
Section 87.—THROWING IN AND OUT OF GEAR.
Section 88.—VARIABLE MOTION AND VARIABLE POWER.
Section 89.—VALVES AND COCKS.
Section 90.—WATER WHEELS AND TURBINES.
Section 91.—WHEELS IN SEGMENTS.
Section 92.—WEIGHING, MEASURING, INDICATING PRESSURES, etc.
Section 93.—WATER-PRESSURE ENGINES.
Section 94.—WASHING.
Section 95.—WINDMILLS AND FEATHERING WHEELS.
Section 96.—WINDING APPARATUS.
Section 97.—HANDLES, &c., FOR VARIOUS PURPOSES.
Section 98.—APPARATUS FOR DRAWING CURVES.
Section 99.—MATERIALS EMPLOYED IN CONSTRUCTION
Section 100.—HEATING APPARATUS.
Section 101.—DRAWING AND ROLLING METALS, &c.
Section 102.—STRUTS AND TIES.
Section 103.—MARINE ENGINES (TYPES OF) .
Section 104.—STRIKING AND HAMMERING: IMPACT.
Section 105.—SOUND.

Section 106.—DOORS, MANHOLES AND COVERS.

PART II. ADDITIONS TO SECTIONS 1-106.

Section 1.—ANCHORING.

Section 2.—ADJUSTING DEVICES.

Section 3.—BELT GEARING.

Section 4.—BALL AND SOCKET JOINTS.

Section 5.—BRAKES AND RETARDING APPLIANCES.

Section 6.—BOILERS, TYPES OF.

Section 7.—BLOWING AND EXHAUSTING.

Section 8.—BED-PLATES, FOUNDATIONS AND FRAMING OF MACHINES.

Section 9.—CAM, TAPPET AND WIPER GEAR.

Section 10.—CRANK AND ECCENTRIC GEAR.

Section 11.—CHAIN GEAR.

Section 12.—CARRIAGES AND CARS.

Section 13.—CRUSHING, GRINDING & DISINTEGRATING.

Section 15.—CLUTCHES.

Section 16.—COUPLINGS FOR SHAFTING.

Section 17.—CONNECTING RODS AND LINKS.

Section 18.—CRANES, TYPES OF.

Section 20.—COMPENSATING AND BALANCE WEIGHTS.

Section 21.—CIRCULAR AND RECIPROCATING MOTION.

Section 22.—CONCENTRATED POWER.

Section 23.—CONVEYING MOTION TO MOVABLE PARTS OF MACHINERY.

Section 24.—CUTTING TOOLS.

Section 25.—CONDENSING AND COOLING.

Section 26.—CONCENTRATING AND SEPARATING.

Section 27.—CHOPPING, SLICING AND MINCING.

Section 28.—CHUCKS, GRIPS AND HOLDERS.

Section 29.—CUSHIONING.
Section 30.—DRILLING, BORING, &c.
Section 31.—DIFFERENTIAL GEAR.
Section 32.—ENGINES, TYPES OF.
Section 34.—ELLIPTICAL MOTION.
Section 36.—EXPANDING AND CONTRACTING DEVICES.
Section 37.—FASTENING WHEELS, &c., TO SHAFTS.
Section 38.—FRICTION GEAR.
Section 39.—GUIDES, SLIDES, &c.
Section 40.—GEARING, VARIOUS DEVICES IN.
Section 41.—GOVERNING AND REGULATING SPEED, &c.
Section 43.—HOOKS, SWIVELS, &c.
Section 44.—INDICATING SPEEDS, &c.
Section 45.—JETS, NOZZLES AND INJECTORS.
Section 46.—JOURNALS, BEARINGS, PIVOTS, &c.
Section 47.—PLATE WORK.
Section 48.—LEVERS.
Section 49.—LOCKING DEVICES.
Section 50.—HINGES AND JOINTS.
Section 51.—LUBRICATORS.
Section 54.—MIXING AND INCORPORATING.
Section 55.—PARALLEL MOTIONS.
Section 56.—PUMPING AND RAISING WATER.
Section 57.—PIPES AND CONVEYORS.
Section 58.—PACKINGS, JOINTS, STUFFING-BOXES AND PISTONS.
Section 59.—PROPULSION.
Section 60.—MOTIVE POWER. MOTORS.
Section 62.—PAWL AND RATCHET MOTIONS.
Section 63.—PRESSING.

Section 66.—ROPE GEAR.

Section 69.—RAISING AND LOWERING.

Section 70.—ANTI-FRICTION BEARINGS.

Section 71.—ROPE, BELT AND CHAIN PULLEYS.

Section 73.—RAIL AND TRAM ROADS.

Section 74.—REVERSING GEAR.

Section 75.—ROTARY MOTORS.

Section 76.—SHAFTING.

Section 77.—SPINDLES AND CENTRES.

Section 78.—SCREW GEAR, BOLTS, &c.

Section 79.—SLIDE AND OTHER VALVE GEAR.

Section 80.—SPRINGS.

Section 81.—SAFETY APPLIANCES.

Section 82.—STEAM TRAPS.

Section 84.—TOOTHED GEARING.

Section 85.—TRANSMISSION OF POWER.

Section 86.—TANKS, CISTERNS AND RESERVOIRS.

Section 87.—THROWING IN AND OUT OF GEAR.

Section 88.—VARIABLE MOTION AND POWER.

Section 89.—VALVES AND COCKS.

Section 90.—WATER WHEELS AND TURBINES.

Section 91.—WHEELS IN SEGMENTS.

Section 92.—WEIGHING AND MEASURING.

Section 94.—WASHING.

Section 95.—WINDMILLS AND FEATHERING WHEELS.

Section 96.—WINDING APPARATUS.

Section 97.—HANDLES, HANDWHEELS, KEYS AND SPANNERS.

Section 98.—APPARATUS FOR DRAWING CURVES.

Section 99.—MATERIALS EMPLOYED IN CONSTRUCTION.

Section 101.—DRAWING AND ROLLING METALS, &c.

Section 106.—DOORS, MANHOLES AND COVERS.

Section 107.—FEED GEAR.

Section 108.—FILTERING.

PREFACE.

Table of Contents



Every successful engineer is a born inventor; indeed the daily work of an engineer in practice largely consists in scheming and devising from previous experience new and improved processes, methods, and details for accomplishing them, and for simplifying or cheapening old forms of machinery and the work they produce, to enable him to successfully compete with others, who are perhaps as ingenious and enterprising as himself.

In the work of designing machinery the draughtsman has to rely mainly on his memory for inspiration; and, for lack of an idea, has frequently to wade through numerous volumes to find a detail or movement to effect a particular purpose. Hence, as a rule, every man's work runs in a groove, his productions generally having the stamp of his particular experience and training clearly marked upon them.

In the course of twenty-five years of such experience, I have found the want of such a volume as the present, and endeavoured to supply the deficiency in my own practice by private notes and sketches, gathered promiscuously, until the difficulty of selection and arrangement became so apparent that I began to classify them, as they exist in the following pages. A few weeks of unusual leisure have enabled me to complete this work and amplify it by numerous additions, and it is now presented in the hope that it will be found of equal service to others engaged in the head-splitting, exhausting work of scheming and

devising machinery, than which I can conceive of no head-work more wearing and anxious, Several valuable works have already found numerous users, and there is no lack of admirable collections of memoranda, rules, and data for designing and proportioning the various constructive details of machinery; but, as far as I am aware, there is no work in existence which aims at the same purpose as is attempted in the following pages, viz. to provide side by side suggestive sketches of the various methods in use for accomplishing any particular mechanical movement or work, in a form easily referred to, and devoid of needless detail and elaboration. A sketch, properly executed, is—to a practical man—worth a folio of description; and it is to such that these pages are addressed. For the same reason it has been deemed undesirable to add to the various sketches any rules or tables relating to strengths or dimensions, which may be found in numerous well-known volumes.

Any suggestions or additions will be entertained and gratefully acknowledged.

THOMAS WALTER BARBER.

PAGES SECTION

Accumulators	147	67
Adjusting devices	10, 246	2
Anchoring	10, 246	1
Anti-friction bearings	152, 306	70
Apparatus for drawing curves	224, 330	98
Automatic cut off. See Valve gear	172, 312	79
Balance weights	54,	

	258	20
Ball and socket joints	12, 248	4
Beam-engines, types of	80, 270	32
Bearings	102, 282	46
Bearings, relieving pressure on	152, 306	70
Bed-plates, foundations, and framing of machines	22, 250	8
Belt gearing	12, 248	3

Belt pulleys	12, 248	3
Blowing and exhausting	20, 250	7
Boilers, types of	16, 250	6
Bolts, &c.	168, 310	78
Boring, drilling, &c.	72, 270	30
Brakes and retarding appliances	14, 248	5
Cams, tappets, and wipers	24, 250	

		9
Carriages, cars, &c.	32, 252	12
Centres	164, 308	77
Centrifugal force, applications of	38	14
Chains, links, and couplings	30, 252	11
Chopping, slicing, and mincing	68, 264	27
Chucks, grips, and holders	68, 264	28

Circular and reciprocating motion	56, 258	21
Clutches	40, 254	15
Compensating and balance weights	54, 258	20
Concentrated power	62, 260	22
Concentrating and separating	66, 264	26
Condensing and cooling	66, 264	25
Connecting rods and links	42, 254	17

Contracting and expanding	84, 272	36
Conveying messages, &c.	52	19
Conveying motion to movable parts	62, 260	23
Conveyors	128, 298	57
Cotters, &c.	86, 274	37
Couplings	42, 254	16
Couplings for shafting	42, 254	

		16
Covers, doors, &c.	242, 332	106
Cranes, types of	46, 256	18
Cranks and eccentrics	28, 252	10
Crushing, rolling, and disintegrating	36, 254	13
Curves, apparatus for drawing	224, 330	98
Cushioning	72, 268	29

Cutting tools	64, 260	24
Differential gear	74, 270	31
Disintegrating	36, 254	13
Doors, covers, manholes	242, 332	106
Drawing and rolling metals, &c.	234, 332	101
Drawing curves, &c., apparatus for	224, 330	98
Drilling, boring, &c.	72, 270	30

Eccentrics	28, 252	10
Elastic wheels	84	35
Elliptical motion	82, 272	34
Engines and boilers combined, types of	82	33
Engines, types of	76, 270	32
Exhausting and blowing	20, 250	7
Expanding and contracting devices	84, 272	

		36
Fastening wheels to shafts	86, 274	37
Feed gear	334	107
Filtering	334	108
Foundations and framing	22, 250	8
Friction gear	88, 276	38
Gear, differential	74, 270	31

Gear, friction	88, 276	38
Gear, reversing	158, 308	74
Gear, rope	146, 302	66
Gear, valve	172, 312	79
Gearing, belt	12, 248	3
Gearing, toothed	186, 318	84
Gearing, various devices in	92, 278	40

Governing and regulating speed, power, &c.	96, 280	41
Grips and holders	68, 264	28
Guides, slides, &c.	90, 276	39
Handles, &c.	220, 328	97
Heating appliances	234	100
Hinges and joints	116, 292	50
Holdings and grips	68, 264	

		28
Hooks, swivels, &c.	98, 280	43
Hydraulic multiplying gear	96	42
Impact. See Striking and hammering	238	104
Incorporating	122, 294	54
Indicating pressure, &c.	214, 326	92
Indicating speed, &c.	100, 282	44

Intermittent motion	140, 300	62
Iron and steel	224, 330	99
Jets, nozzles, &c.	102, 282	45
Joints and hinges	116, 292	50
Journals, bearings, pivots, &c.	102, 282	46
Keys, cotters, pins, &c.	86, 274	37
Levelling and plumbing	122	52

Levers	108, 286	48
Links	30, 252	11
Locking devices	110, 288	49
Lowering	148, 304	69
Lubricators	120, 294	51
Marine engines, types of	236	103
Materials of construction	224, 330	

		99
Measuring and weighing	214, 326	92
Mechanical powers	122	53
Messages, conveying	52	19
Mincing	68, 264	27
Mixing and incorporating	122, 294	54
Motive power	136, 300	60

Movable parts, conveying motion to	62, 260	23
Multiplying gear—hydraulic	96	42
Nozzles and jets	102, 282	45
Packings, joints, stuffing-boxes, &c.	132, 298	58
Parallel motions	124, 296	55
Pawl and ratchet motions, intermittent motion	140, 300	62
Pins, &c.	164, 308	77

Pipes and conveyors	128, 298	57
Pivots	102, 282	46
Plate work	106, 286	47
Plumbing and levelling	122	52
Power and speed, to vary	146	64
Power, motive	136, 300	60
Power, reservoirs of	147	