

INDEX

NOTE.—All items in this index refer first to the section and then to the page of the section. Thus, "Boosters 36 17" means that boosters will be found on page 17 of section 36.

	Sec.	Page		Sec.	Page
A			Arc headlight circuit	41	32
Acceleration, Force required for	36	48	Area of cross-section of steel rails	37	37
" " Train	36	46	" " heating surface required		
Acids and alkalies in water	28	33	in feedwater heaters	28	52
Adhesion, Limit of	36	50	Armature fit	30	21
Adjuster, Automatic slack	41	66	" G. E. 51B	40	34
Advantages and disadvantages of			" G. E. 52	40	34
forced draft	29	19	" G. E. 54	40	35
" " disadvantages of			" G. E. 55	40	35
induced draft	29	21	" G. E. 57	40	35
" of several motor cars			" G. E. 67	40	35
per train	42	2	" G. E. 800	40	35
Air and circulating pumps	30	44	" G. E. 1000	40	34
" brake equipment, Storage	41	62	" of G. E. 52 motor	40	22
" " lever system	41	53	" Westinghouse, No. 3	40	36
" brakes, Automatic	41	68	" Westinghouse, No. 12 or		
" " Straight	41	42	12A	40	36
" circulation through cooling			" Westinghouse, No. 38 or		
towers	39	70	38B	40	36
" compressor	41	43	" Westinghouse, No. 49	40	36
" compressors, Capacity of			" windings for railway		
motor-driven	41	47	motors	40	22
" leaks	30	60	Arrangement of lights	38	36
" or unit switches	43	39	Arresters, Lighting	41	17
" pump and jet condensers	30	47	Ash-pits	29	44
" required for combustion of			Automatic air brakes	41	66
fuel	29	2	" governor	41	43
" space, Size of grate bars and	29	33	" "	41	53
" tile	29	48	" relief valve	30	61
Allowable load for piles	28	26	" slack adjuster	41	66
" " per square foot on			" stokers	29	45
soils	28	25	" Advantages of	29	54
Alternating-current motors	40	29	Auxiliary equipment	39	28
" " motors, Coal			Axle-driven compressor	41	43
trol of	40	74	" Revolutions of car	40	3
" " supply	36	27			
" "	41	73	B		
American electric brake	29	52	Babcock and Wilcox boilers	29	24
" stoker			Baragwanath condenser	30	53
Anthracite, Horizontal pressure	28	15	Barnard's fanless self-cooling		
exerted by	41	25	tower	50	73
Appliances, Electric car-heating	28	13	Barnard-Wheeler cooling tower	30	71
" Labor-saving					
" Motor-circuit	41	1			

	Sec.	Page		Sec.	Page
Barometric column, or siphon, condenser	30	52	Brake cylinder	41	43
Base-supporting joints	38	2	" The	41	55
Bituminous coal, Horizontal pressure exerted by	28	14	" General Electric	41	76
Blacksmith shop	39	35	" rigging, Single-truck	41	38
Blow-off valves	31	26	" Westinghouse electric	41	77
Blower, McClave Argand steam	29	17	Brakes	41	36
Board, Transite	41	22	" Automatic air	41	68
Bodies and trucks, Car	39	36	" Double-truck	41	40
Boiler efficiency	28	6	" Electric	41	76
foundations	29	42	" Hand	41	38
Heating surface of	29	35	" Maximum traction	41	42
Heine	29	25	" Releasing	41	75
Horizontal return-tubular	29	30	" Straight air	41	42
Morris climax	29	28	Branch-off, Left-hand	37	52
oil injector	28	44	" Right-hand	37	52
Sederholm	29	31	Breakers and switches	41	9
settings	29	43	Brush holders	40	22
Stirling	29	28	" and connections	31	37
Surface ratio of a	29	36	Bus-bars, High- and low-potential	36	15
units, Size of	29	35			
Vertical tubular	29	31			
Boilers, Babcock and Wilcox	29	24			
Fire-tube	29	30			
Influence of types of engines on	29	35			
Location of	29	42			
Selection of	29	34			
Steam	29	23			
Types of	29	24			
Water-tube	29	24			
Bond, Plastic	38	19			
tester, Conant	38	29			
testing	38	27			
with a amalgamated contacts, Wire	38	21			
Bonds, Protected	38	16			
Rail	38	14			
Resistance of	38	22			
" " rail	38	25			
Solid copper protected	38	17			
Unprotected	38	16			
Booster connections	36	20			
Convertible	36	23			
Economy of	36	25			
feeders	37	6			
Location of	36	25			
used with high- and low-potential bus-bars	36	22			
Boosters	36	17			
Output of	36	20			
Boxes, Connection	42	1			
Braces, Rail chairs and	37	59			
Tie-rods, or	37	61			
Brake, American electric	41	76			

	Sec.	Page		Sec.	Page
Cars on city roads, Power consumption of	36	62	Coal Horizontal pressure exerted by bituminous	28	14
" Power consumption of	36	59	" Miscellaneous devices for handling	28	20
" Weights of	38	4	" Pressure exerted by	28	12
Cast-welded joints	36	40	" Storage of	28	46
Center of load, Rule for locating pole construction	37	15	Cochrane heater	41	20
Centrifugal pumps	29	51	Coil, General Electric grid	41	21
Chain-grate stoker	40	11	" Lundie grid	42	51
Change in gear-ratio, Effect of	40	13	" Resistance	41	21
" wheel diameter, Effect of	38	2	" Westinghouse grid	41	18
Channel plates	40	7	" starting	40	21
Characteristic, Motor	40	8	Coils, Field	40	36
" Speed	40	9	" Resistance	41	18
" Tractive effort	40	15	Combination joints	29	1
Characteristics, Heating	41	73	Combustible	29	1
Charging train line	29	10	Combustion	29	7
Chimney construction, Types of	29	11	" for different total draft pressures	29	1
" Custodis	29	10	" of fuel	39	33
" Forms of	29	10	Commutator room	31	36
" Octagonal	29	10	Commutators, Generator	42	1
" Round	29	10	ods	37	38
" Square	29	4	Composition, Rail	37	56
Chimneys	29	1	Compound curves	30	3
" and mechanical draft	29	12	" engines	30	12
" Dimensions of	29	8	" Reheaters for	30	5
" Finding the cross-sectional area of	29	7	" Tandem	30	12
" Rules relating to	29	5	" used with condensers	41	43
" Size of	29	15	Compressor, Axle-driven	41	43
" Strength of	28	32	" Independent-motor-driven	38	29
Chloride of calcium in water	41	32	Conant bond tester	40	38
Circuit, Arc headlight	41	11	" field-coil tester	30	4
" breaker, General Electric car	41	12	Condensation, Cylinder	31	1
" " Westinghouse car	41	10	" Dynamic	30	66
" breakers, Car	37	32	" Limit of	31	1
" " Line	38	33	" Static	30	53
" Testing resistance of track-return	41	29	Condenser, Baragwanath	30	52
Circuits, Incandescent lighting	30	44	" Barometric column, or siphon	30	42
Circulating pumps, Air and	36	61	" Cooling surface of	30	56
City roads	38	37	" Induction	30	53
" 	39	38	" Injector	30	47
Classes of trucks	29	28	" Jet	30	39
Climax boiler, Morrin	28	45	" Object of the	30	60
Closed exhaust-steam feedwater heaters	28	48	" precautions and auxiliary fittings	30	42
" heaters	29	39	" Surface	30	41
Coal burned per square foot of grate surface	29	40	Condensers, Advantages of surface	30	38
" consumption per square foot of grate surface	28	15	" and condensing appliances	30	38
" Horizontal pressure exerted by anthracite	28	15			

INDEX

	Sec.	Page		Sec.	Page
Electric railways, Cost of power			Entry head	31	53
for	36	65	Equipment, Auxiliary	39	28
Equipment of	36	63	Electric power	41	1
roadbeds, Methods of in-			Examples of railway	36	63
stalling	38	35	Independent-motor-		
stations, Water-power	31	38	driven compressor	41	44
Electrically welded joint	38	5	of electric railways	36	63
Electrobestos	41	22	Operation of	41	60
Electrolysis	39	18	Parts of straight air	41	43
due to railway cur-			Selecting station	28	8
rents	39	21	Storage air-brake	41	62
Prevention of	39	25	Erection of wire at curves	37	22
Principles of	39	18	Evaporation	29	36
Systems free from	39	28	Loss of water by	30	69
Testing for	39	23	Table of average	29	37
Electromagnetic, or surface-con-			Example of calculations for dis-		
tact, systems	36	10	tributed load	39	8
Elementary operating principles	42	3	" feeder calculation	39	3
Emergency position	41	46	" incandescent lighting		
reduction	41	73	circuits	41	29
stop	41	46	" railway equipment	36	63
" Making an	41	74	Excavation	28	22
Enclosed fireroom method	29	18	Excess pressure, Value of	41	75
fuses	41	15	Exhaust piping	31	19
Endless-chain, or traveling, grates	29	48	steam feedwater heaters	28	45
Engine, Duplex vertical and hori-			Expansion in pipe	31	2
zontal compound	30	11	of wrought-iron pipes	31	20
efficiency	28	6	Rail	38	3
friction	30	15	Extension, Influence of future	36	35
regulation	30	21			
Engines and generators, Standard					
dimensions and speeds					
for direct-connected	30	18			
Compound	30	3			
Cross-compound	30	5			
Desirability of several	30	17			
direct-connected to alter-					
nators, Maximum per-					
missible angular varia-					
tion of	30	25			
for alternating current,					
Regulation for	30	23			
Horizontal	30	2			
Influence of types of, on					
boilers	29	35			
Reheaters for compound	30	12			
Simple	30	2			
Speed classification of	30	13			
Steam	30	1			
" consumption of					
various types of	30	41			
Tandem compound	30	5			
Vertical	30	2			
Engineer's valve	41	43			
" The	41	46			
" "	41	71			

F		
Falling water, Velocity of flowing	31	53
and		
Fans	29	16
for induced draft	29	21
Feeder cables, Weatherproof	37	8
calculation, Examples of	39	3
Current-carrying capacity		
of	39	16
ear wire hanger	37	28
insulators	37	34
splicing	37	32
Feeders, Booster	37	6
Carrying capacity of	39	15
Connecting, to trolley		
wire	37	35
Economical use of	39	1
Electric-railway	37	3
Overhead	37	8
Return	38	24
Small road with return	39	13
Trolley wire and	37	21
Feeding, General methods of	37	3
methods, Relative value		
of	28	62
Feedwater heater, Cochrane	28	46

	Sec.	Page		Sec.	Page
Feedwater heater, Open	28	45	Foundation rigging	41	3
" heaters, Closed	28	48	Foundations, Boiler	29	42
" " Closed ex- haust-steam	28	45	" for power stations	28	21
" " Heating sur- face of	28	51	" Grillage work under	28	26
" " Live-steam	28	40	" Piles for	28	25
" heating	28	44	Friction, Engine	30	15
" "	30	61	" head	31	53
" " by waste flue gases	28	53	" in pipe	31	1
" into boilers, Methods of forcing	28	63	" Loss of pressure by	31	2
" system, Piping for	31	25	Frogs, Trolley-wire	37	29
" Testing	28	34	Fuel, Air required for combustion of	29	2
Field-coil tester, Conant	40	38	" burned per square foot of grate surface	29	6
" coils	40	21	" Combustion of	29	1
" "	40	36	Fuse, Size of copper-wire	41	15
" frame construction	40	18	" Westinghouse car	41	14
" terminals	31	37	Fuses	41	14
Fire-tube boilers	29	30	" Enclosed	41	15
Fireproof construction, Impor- tance of	28	27	G		
Fireroom method, Enclosed	29	18	G. E. 52 armature	40	34
First notch of master controller, Operation on	42	27	" " 54 armature	40	35
" parallel notch, Operation on	42	30	" " 55 armature	40	35
Fish-plates, or splice bars	38	2	" " 57 armature	40	35
Fittings, Overhead-trolley	41	4	" " 51B armature	40	34
Flange fittings, Dimensions of	31	13	" " 67 armature	40	35
Flanged joints	31	11	" " 800 armature	40	33
" " Methods of making	31	13	" " 1000 armature	40	34
Flow in large streams, Measure- ment of	31	47	" " 52 motor	40	18
" of steam under pressure	31	3	" " 69 motor	40	26
Flowing and falling water, Velocity of	31	53	" " 70 motor	40	23
Flue areas, Desirability of ample	29	41	Gases, Relation between draft and temperature of	29	8
Flume	31	41	Gaskets	31	20
Flumes or pipes, Influence of in- side surface of	31	54	Gate valves	31	17
Flywheels	30	21	Gauge, Draft	29	4
Force required for acceleration	36	48	" Pressure	41	43
" " to move car on level track	36	42	" Standard track	37	50
Forced draft	29	19	Gear-ratio	40	2
" " Advantages of	29	19	" " Effect of change in	40	11
" " Disadvantages of	31	41	" " Effect on tractive effort of change in	40	12
Forebay	38	41	" " motor torque, speed, and tractive effort, Relation between	40	9
Form of third rail	29	10	General Electric brake	41	76
Forms of chimney	37	39	" " car circuit- breaker	41	11
Formula to find the weight of rails required per mile of track	36	42	" " control	40	77
Formulas for power estimates	37	40	" " grid coil	41	20
" " track resistance	28	26	" " surface-contact system	36	11
Foundation bolts, Setting			Generating sets, Direct-connected units, Combined effi- ciency of	30	19

	Sec.	Page		Sec.	Page
Generator, Capacity and temperature rise of	31	37	Harp pole, and wheel	41	6
" efficiency	28	7	Head and discharge, Relation between	31	61
" Efficiency of	31	38	" Entry	31	53
Generators and special apparatus, Electric	31	33	" Friction	31	53
" Insulation of windings of	31	36	" or fall, Measurement of	31	48
" Requisite characteristics of	31	35	" Velocity	31	53
" Standard dimensions and speeds for direct-connected engines and	30	18	Headlight, Arc circuit	41	32
Girder rails	37	47	Heat, Sources of waste	28	45
" " T and	37	42	Heater-switch	41	25
Globe valves	31	16	" Type of panel	41	27
Governor, Automatic	41	43	" wiring diagram	41	27
" "	41	53	Heaters and connections, Electric	41	29
" Lombard	31	72	" used with condensing engines	28	57
" Pump	28	59	Heating characteristics	40	15
Governors, Waterwheel	31	71	" feedwater	28	44
Grades, Effect of	36	43	" " by waste flue gases	28	53
Grate bars	29	38	" Other systems of	41	28
" and air space, Size of	29	39	" surface of boiler	29	35
" surface	29	38	" surface of feedwater heaters	28	51
" Coal burned per square foot of	29	39	" surface required in feedwater heaters	28	52
" Coal consumption per square foot of	29	40	" system, Starting-coil	41	29
" Fuel burned per square foot of	29	6	Heine boiler	29	25
Grates, Endless-chain, or traveling	29	48	High- and low-potential bus-bars	36	15
Grease extractors	30	62	" and low-potential bus-bars, Booster used with	36	22
Grid coil, General Electric	41	20	" pressure steam, Comparative economy of	31	5
" Lundie	41	1	Highway crossings, Arrangement of third rail at	38	45
" Westinghouse	41	21	Holders, Brush	40	22
Grillage work under foundations	28	26	Hood switches	41	9
Grinding room	39	35	Hoppes purifier	28	40
Group, Unit-switch	42	39	Horizontal engines	30	2
Groove rails	37	42	" pressure exerted by anthracite	28	15
Guard rails	37	58	" pressure exerted by bituminous coal	28	14
" curves, and special work	37	51	" return-tubular boiler	29	30
" wires	37	24	Horsepower, Estimation of	31	49
H			" per cubic foot of water	31	50
Hand-brake lever system	41	60	Hose, Insulation	41	60
" brakes	41	38	Hot-water system	41	28
Handling coal, Miscellaneous devices for	28	20	House, The car	39	28
Hangers, Feeder-ear wire	37	28	" Wiring of car	39	30
" Plain-ear wire	37	27	I		
" Strain-ear wire	37	27	Impulse wheels	31	67
Hard-drawn copper trolley wire	37	10	" " Operation of	31	70
Harp	41	4	Impure water, Extra cost due to	28	40

	Sec.	Page		Sec.	Page
Impurities in water	28	31	Labor-saving appliances	28	13
Incandescent lighting circuit	41	29	Lap position	41	46
Increase in voltage, Effect of	40	9	Last parallel notch, Operation on	42	30
Independent-motor-driven compressor	41	43	" series notch, Operation on	42	29
Index wheel or star wheel	40	43	Leakage, Third-rail	38	49
Induced draft	29	20	Left-hand branch-off	37	52
" Fans for	29	21	Lever system, Air-brake	41	53
Induction condenser	30	56	" Hand-brake	41	60
Injection water, Determination of amount of	30	63	Lighting circuits, Incandescent	41	29
Injector condenser	30	53	" Electric car	41	17
Inside surface of flumes or pipes, Influence of	31	54	Lightning arresters	37	36
Insulation hose	41	60	" Line	37	36
" of windings of generators	31	36	Lime precipitated from water, Percentage of	28	51
Insulators	37	25	" " "	36	50
" Feeder	37	34	Limit of adhesion	30	66
" Section	37	31	" " condensation	42	47
" Third-rail	38	48	" switch	37	1
Interlocking device	40	43	Line	37	1
Interurban roads	36	58	" and track	38	1
" "	38	36	" " "	39	1
Iron in water	28	33	" calculations	39	9
" poles, Approximate weights of	37	19	" Calculations for a loop	37	32
J					
Jet condenser	30	47	" circuit-breakers	37	21
Joint, Continuous	38	5	" fittings and line erection	37	36
" Electrically welded	38	2	" lightning arresters	39	6
" plates	38	9	" Power house in middle of	42	50
" Thermit	38	3	" relay	42	48
" Weber	38	11	" switch	37	1
" Zinc	38	35	" work, Overhead	28	40
Joints, Arrangement of	38	2	Live-steam feedwater heaters	36	37
" Base-supporting	38	4	Load center, Determining the	28	8
" Cast welded	38	13	" curves	28	8
" Combination	31	11	" Determination of probable	28	9
" Flanged	38	1	" diagram, Example of	39	7
" Rail	38	1	" Effect of distributed	39	8
" Resistance of electrically welded rail	38	9	" Example of calculations for distributed	28	26
" Steam	31	19	" for piles, Allowable	28	22
K					
Kennicott water softener	28	36	" on soils, Allowable	29	42
K2 controller	40	52	Location of boilers	28	2
K6 controller	40	58	" " electric-power stations	31	72
K10 and K11 controllers	40	58	Lombard governor	39	9
K11 and K10 controllers	40	58	Loop line, Calculations for a	36	13
K12 controller	40	64	Lorain system	31	53
K14 controller	40	67	Loss of head due to velocity in open channels	31	53
K27 controller	40	67	" " head in smooth, straight pipes	31	55
			" " pressure by friction	31	2
			" " pressure in piping	30	69
			" " water by evaporation	28	7
			Losses, Outside	28	7
			" Switchboard	39	16
			Low voltage, Effects of	39	16

	Sec.	Page		Sec.	Page
Rail resistance	37	43	Resistance of electrically-welded		
" return	37	2	" rail joints	38	9
" sections	37	42	" rail bonds	38	25
Rails	37	37	" track rails	37	39
" Composition of track	37	37	" track-return circuit, Testing	38	33
" Cross-section and weight of	37	37	" Rail	37	43
" Girder	37	47	" Train	36	52
" Groove	37	42	Return feeders	38	24
" Guard	37	58	" Return road with	39	13
" required per mile of track, Weight of	37	39	" Rail	37	2
" Resistance of track	37	39	" tubular boiler, Horizontal	29	30
" Steel for conductor	37	39	Reverse curve	37	52
" T and girder	37	42	" cylinder	40	43
" Tram	37	42	" switch	42	44
" Weights and dimensions of standard T	37	45	" Operation of	40	47
" with conical tread	37	50	Reverser	42	18
Railway currents, Electrolysis due to	39	21	Revolutions of car axle	40	3
" equipment, Examples of	36	63	Rheostat, Control circuit	42	26
" motors, Armature windings for	40	32	" Motor circuit	42	26
" Output of	40	18	Rheostatic control	40	40
Railways, Cost of power for electric	36	65	" controllers, Car with two	40	47
" Equipment of electric	36	63	Rigging, Foundation	41	43
Rate of combustion for different total draft pressures	29	7	Right-hand branch-off	37	52
Rating of motors	40	5	Risdon turbine	31	58
Receivers	31	18	Roadbeds, Methods of installing electric	38	35
Recharging train line	41	73	" Typical	38	36
Reducing valve, The	41	64	Road fed from one end	39	5
Reduction, Speed	40	2	Roads, City	36	61
Reheaters for compound engines	30	12	" "	38	37
Relation between draft and temperature of gases	29	8	" Conduit	38	51
" between head and discharge	31	61	" Interurban	36	58
" between motor torque, gear-ratio, speed, and tractive effort	40	9	" "	38	36
Relative vacuum	30	66	" Surface-contact	38	55
Relay, Line	42	50	" Third-rail	38	41
Releasing brakes	41	75	Room, Commutator	39	33
Reliability of power stations	28	4	" Controller	39	33
Relief valve, Automatic	30	61	" Grinding	39	35
Repair shop, The	39	31	" Winding	39	32
Requirements, Car-wiring	41	21	Roney mechanical stoker	29	45
Reservoir, Mean	41	43	Round chimney	29	10
" Service	41	44	Rule for finding the cross-sectional area of chimneys	29	8
" The	41	57	" for finding area of cross-section of steel rails	37	37
Resistance coil	42	51	Rules relating to chimneys	29	7
" coils	41	18	Running position	41	48
" Formulas for track	37	40	" travel	41	66
" of bonds	38	22	R11 controller	40	41

S

Scale, Effects of	28	30
Second position, Operation on	42	55
Section insulators	37	31

	Sec.	Page		Sec.	Page
Sectional third rail	36	14	Span wire construction	37	11
Sections, Rail	37	42	Special work, Designation of	37	52
Sederholm boiler	29	31	Speed characteristic	40	8
Selecting station equipment	28	8	" classification of engines	30	13
Selection of boilers	29	34	" control	40	40
" car body	39	36	" Effect on, of change in gear-ratio	40	11
" exhaust-steam feed-water heater	28	45	" motor torque, gear-ratio, and tractive effort, Relation between	40	9
" motors	40	4	" reduction	40	2
Self-cooling tower, Barnard's fan-less	30	73	Splice bars, or fish-plates	38	2
Series-parallel control	40	50	Splicing, Feeder	37	32
Service capacity	40	5	" trolley wires	37	33
" position	41	46	Sprague General Electric multiple-unit system	42	6
" reduction	41	73	Spring base	41	4
" reservoir	41	44	Spring base	29	10
" stop	41	46	Square chimney	41	5
" Making a	41	74	Stand, Nuttall	41	5
Setting foundation bolts	28	26	" Union	41	5
" wooden poles	37	18	Standard dimensions and speeds for direct-connected engines and generators	30	18
Several motor cars per train, Advantages of	42	2	" dimensions of pipe	31	24
Shop, Blacksmith	39	35	" track gauge	37	50
" Mill and carpenter	39	34	" T rails, Weights and dimensions of	37	45
" Paint	39	34	Standing travel	41	6
" The repair	39	31	Star wheel or index wheel	40	43
Side-bracket construction	37	15	Starting-coil heating system	41	29
Siding	37	52	" Westinghouse	31	1
Signal system, Simple	41	35	Static condensation	28	8
Signals, Track	41	34	Station equipment, Selecting	36	64
Silica in water	28	33	" record	29	17
Simple curves	37	56	Steam blower, McClave Argand	29	23
" engines	30	2	" boilers	31	5
" signal system	41	35	" Comparative economy of high-pressure	30	14
Single-phase motors	36	29	" consumption	31	6
" transmission	36	29	" consumption of perfect engine	31	6
" truck brake rigging	39	38	" consumption of various types of engines	30	41
" trucks	39	38	" delivered per minute, Weight of	31	5
Size of chimneys	29	5	" engines	29	20
" copper-wire fuse	41	15	" jet in stack	31	19
" trunk wires	41	24	" joints	31	9
Sizes and weights of wooden poles	37	18	" main, Placing of	31	3
Slack adjuster, Automatic	41	66	" Movement of	31	2
Sleet cutters for third rail	38	49	" pipe, Expansion in	31	1
" wheel	41	48	" Friction in	31	1
Slow release	39	13	" piping and general arrangement of plant	31	28
Small road with return feeders	39	13	" piping, Drainage for	31	8
Smooth straight pipes, Loss of head in	31	55			
Sodium carbonate in water	28	33			
" sulphate and sodium chloride in water	28	33			
Solid copper protected bonds	38	17			
Sources of waste heat	28	45			
Span wire	37	25			

	Sec.	Page		Sec.	Page
Steam piping system, Principal re-			Switches, Cut-out	40	73
quirements of the	31	6	Hood	41	9
pressures	30	17	Motor cut-out	40	56
turbine plant	31	33	Unit or air	42	39
turbines	30	26	System, Definition of multiple-unit	42	3
" Advantages of	30	37	Hot-water	41	28
" Types of	30	28	Piping	41	60
under pressure, Flow of	31	3	Simple signal	41	35
Steel for conductor rails	37	39	Starting-coil heating	41	29
poles, Tubular	37	19	Systems free from electrolysis	39	28
Stirling boiler	29	28	Multiple-unit	42	1
Stocker cooling tower	30	76	of heating, Other	41	28
Stoker, American	29	52			
Playford chain-grate	29	51	T		
Roney mechanical	29	45	T rails and girder rails	37	42
Stokers, Advantages of automatic	29	54	Weights and dimensions of		
Automatic	29	45	standard	37	45
Overfeed	29	45	Table of air required for combus-		
Underfeed	29	52	tion of fuel	29	2
Stops, Influence of, on power con-			of allowable load for piles	28	26
sumption of cars	36	59	of allowable load per square		
Making emergency	41	74	foot on soils	28	22
" service	41	74	of approximate sizes and		
Storage air brake equipment	41	62	weights of wooden poles	37	18
" system	41	43	of approximate weights of		
battery systems	36	14	iron poles	37	19
of coal	28	12	of area of heating surface		
" water	31	40	required in feed water		
Straight air brakes	41	42	heaters	28	52
Strain-ear wire hangers	37	27	of average evaporation	29	37
Street-railway motors	40	1	of capacity of motor-driven		
Strength of chimneys	29	15	air compressors	41	47
Suction draft	29	20	of coal consumption per		
Sulphate of lime in water	28	32	square foot of grate sur-		
Supply, Alternating-current	36	27	face	29	40
Surface condenser	30	42	of cost of power for electric		
condensers, Operation of	30	46	railways	36	65
contact, or electro-			of current-carrying capacity		
magnetic systems	36	10	of feeders	39	16
contact roads	38	55	of dimensions of chimneys	29	12
contact system, General-			of dimensions of extra-		
Electric	36	11	heavy pipe flanges	31	12
ratio of a boiler	29	36	of dimensions of pipe bends	31	11
Suspended matter in water	28	34	of electrolytic effect of cur-		
Suspension, Westinghouse cradle	39	48	rent on metals	39	19
Suspensions, Trolley-wire	37	26	of equipment of electric rail-		
Switch, Cut-out	42	24	ways	36	63
Heater	41	25	of flow for each inch in		
Limit	42	47	width of weir	31	46
Line	42	48	of hard-drawn copper trolley		
Motor cut-out	42	45	wire	37	10
Operation of reverse	40	47	of horizontal pressure		
Reverse	42	44	exerted by anthracite	28	15
Type of	41	9	of horizontal pressure		
Switchboard losses	28	7	exerted by bituminous		
Switches and breakers	41	9	coal	28	14

	Sec.	Page		Sec.	Page
Table of horsepower per cubic foot			Tandem compound engines	30	5
of water	31	50	Telltale	41	16
of lengths of rail equal in			Temperature of gases, Relation		
resistance to bond 1 foot			between draft and	29	8
long	38	23	" Reduction of	30	69
of maximum permissible			Tension on trolley wire	37	24
angular variation of en-			Test, Drop-of-potential	38	27
gines direct-connected to			for acid or alkali in water	28	35
alternators	30	25	" carbonic acid in water	28	35
of output of railway mo-			" copper in water	28	35
tors	40	18	" hard or soft water	28	35
of percentage of lime pre-			" iron in water	28	35
cipitated from water	28	51	" lead in water	28	35
of pounds of injection water			" magnesia in water	28	35
required per pound of			" sulphate of lime or gyp-		
steam condensed	30	64	sum in water	28	35
of power consumption of			Tester, Conant bond	38	29
cars	36	59	Conant Field coil	40	38
of power consumption of			Testing, Bond	38	27
cars on city roads	36	62	feedwater	28	34
of rail composition	37	38	for electrolysis	39	23
of rail resistance	37	43	resistance of track-return		
of rate of combustion for			circuit	38	33
different total draft pres-			Tests for water, Simple	28	36
sures	29	7	on cooling towers	30	70
of relative economy of			Power consumption	36	58
methods for forcing feed-			Thermit joint	38	9
water into boilers	28	63	Thickness of flange fittings	31	13
of resistance of electrically			Third position, Operation on	42	55
welded rail joints	38	9	rail at highway crossings	38	45
of resistance of rail bonds	38	25	" Form of	38	41
of results of rail-bond tests	38	32	" insulators	38	48
of results of tests on cooling			" leakage	38	49
towers	30	70	" Location of	38	42
of revolution of car axle	40	3	" Protection of	38	43
of size of chimneys	29	5	" roads	38	41
of size of grate bars and air			" Sectional	36	14
space	29	39	" Sleet cutters for	38	49
of size of trunk wires	41	24	" system	36	6
of sizes, speeds, and stand-			Threads, Pipe	31	15
ard dimensions of direct-			Three-part V	37	52
connected generating sets	30	19	Through V	37	52
of standard dimensions of			Thrown-over turnout	37	61
pipe	31	24	Tie-rods, or braces	38	34
of steam consumption of			Ties	30	66
perfect engine	31	6	Towers, Cooling	38	34
of steam consumption of			Track construction	37	36
various types of engines	30	41	Electric	37	50
of thickness of pipe flanges	31	14	gauge, Standard	37	1
of weatherproof feeder			Line and	38	1
cables	37	8	" "	37	39
of weight of steam delivered			rails, Resistance of	37	40
per minute	31	5	resistance, Formulas for	37	40
of weights and dimensions			return circuit, Testing re-		
of standard T rails	37	45	sistance of	38	33
of weights of cars	36	41	signals	41	34

INDEX

	Sec.	Page		Sec.	Page
Track work, guard rails, and curves, Special	37	51	Turbine-dynamo set, De Laval . . .	30	30
Traction methods, Comparison of . . .	42	1	" Draft tube of	31	59
Tractive effort characteristic	40	9	" installations, Examples of . . .	31	61
" " Effect on, of change			" pumps	28	62
" " in gear-ratio	40	12	" Risdon	31	58
" " motor torque, gear-ratio, and speed, Relation between	40	9	" waterwheel	31	56
Trailers	39	37	Turbines	31	56
Train acceleration	36	46	" Advantages of steam	30	37
" handling	41	73	" Examples of	31	57
" line, Charging	41	73	" Steam	30	26
" " coupler	42	46	" Types of steam	30	28
" " Overcharging	41	73	Turbo-alternator, Curtis	30	31
" " Recharging	41	73	" " Parsons	30	30
" " reduction	41	73	Turnout, Diamond	37	52
" resistance	36	52	" Thrown-over	37	52
Tram rails	37	42	Tuyère blocks	29	54
Transite board	41	22	Tuyères	29	54
Transition curves	37	56	Type M control	42	6
" or compound, curves	37	57	" " " Wiring diagram for	42	26
Transmission, Polyphase	36	27	" " " with current-limiting device	42	32
" Single-phase	36	29	" of panel heater	41	27
Triplex pump	28	62	" switch	41	9
Triple valve, The	41	69	Types of motors	40	16
Trolley	41	4	" multiple-unit control	42	6
" pole	41	4	" series-parallel controllers	40	51
" system, Overhead	36	4	" trucks	39	41
" wheel	41	7			
" wire	37	9	U		
" " and feeders	37	21	Underfeed stokers	29	52
" " Connecting feeders to	37	35	Union stand	41	5
" " cross-overs	37	31	Unit or air switches	42	36
" " frogs	37	29	" switch control, Car wiring diagram for	42	56
" " Hard-drawn copper	37	10	" " control, Westing-house	42	36
" " Methods of arranging	37	11	" " group	42	39
" " Offset in	37	23	Unprotected bonds	38	16
" " Shape of	37	10	Use of feeders, Economical	39	1
" " suspensions	37	26			
" " Tension on	37	24	V		
" wires, Splicing	37	33	Vacuum gauge, Position of	30	61
Truck, Method of suspending motors on	39	46	" Relative	30	66
Trucks	39	38	Value of excess pressure	41	75
" and bodies, Car	39	36	Valve, Automatic relief	30	61
" Classes of	39	38	" Engineer's	41	43
" Double	39	38	" The engineer's	41	46
" Maximum-traction	41	42	" " reducing	41	71
" Single	39	38	" triple	41	64
" Types of	39	41	Valves	31	16
Trunk connections	41	1	" Blow-off	31	26
" wire	41	2	" Gate	31	17

	Sec.	Page		Sec.	Page
Velocity head	31	53	Water, Test for sulphate of lime	28	35
" in open channels, Loss of			or gypsum in	29	24
head due to	31	53	tube boilers	30	63
" of flowing and falling			used for condensing	30	68
water	31	53	Vaporization of the cooling	31	53
Vertical engines	30	2	Velocity of flowing and fall-	31	71
" tubular boiler	29	31	Waterwheel governors	31	56
Voltage	36	2	" Turbine	31	56
"	36	60	Waterwheels	31	67
" Effect of increase in	40	9	" Impulse	31	56
" " " low	39	16	" Kinds of	37	8
Volume of water, Measuring the	31	44	Weatherproof feeder cables . .	38	3
W			Weber joint	37	37
Waste heat, Sources of	28	45	Weight of rails, Cross-section and		
Water, Acids and alkalies in . .	28	33	" of rails required per mile	37	39
" and steam-power plants,			of track	31	5
Combined	31	41	" of steam delivered per		
" Calcium nitrate in	28	32	minute	37	39
" Carbonate of lime in	28	31	Weights and dimensions of stand-		
" Carbonic acid in	28	33	ard T rails	37	45
" Chloride of calcium in . . .	28	32	" sizes of wooden poles . .	37	18
" Determination of amount			" of cars	36	41
of injection	30	36	" iron poles, Approximate	37	19
" Improvement of, by chem-			mate	31	45
ical treatment	28	36	Weir	31	46
" Impurities in	28	31	" table	38	4
" Iron in	28	33	Welded joints, Cast	41	12
" Magnesium carbonate in . .	28	32	Westinghouse car circuit-breaker	41	14
" " chloride in	28	32	" fuse	40	74
" " sulphate in	28	32	" control	39	48
" Measuring the volume of . .	31	44	" cradle suspension	41	77
" power electric stations . .	31	38	" electric brake	41	21
" " Measurement of	31	44	" grid coil	40	36
" Purification of, by live			" No. 3 armature	40	36
steam	28	40	" No. 12 or 12A arma-	40	36
" required per pound of			ture	40	36
steam condensed,			" No. 38 or 38B arma-	40	36
Pounds of injection . .	30	64	ture	40	27
" Silica in	28	33	" No. 49 armature	40	27
" Simple tests for	28	36	" No. 56 motor	40	18
" Sodium carbonate in	28	33	" No. 86 motor	42	36
" Sodium sulphate and so-			" starting coil	41	4
dium chloride in	28	33	" unit-switch control	41	4
" softener, Kennicott	31	40	Wheel		
" Storage of	28	32	" diameter, Effect of change	40	13
" Sulphate of lime in	28	29	in	31	68
" supply	28	34	" for low heads, Impulse . .	41	8
" Suspended matter in	28	35	" on wire, Pressure of	41	6
" Test for acid or alkali in . .	28	35	" pole, and harp	41	8
" Test for carbonic acid in . .	28	35	" Sleet	41	7
" Test for copper in	28	35	" Trolley	39	44
" Test for hard or soft	28	35	Wheels	39	32
" Test for iron in	28	35	Winding room		
" Test for lead in	28	35	Windings of generators, Insula-	31	36
" Test for magnesia in	28	35	tion of		

	<i>Sec.</i>	<i>Page</i>		<i>Sec.</i>	<i>Page</i>
Wire at curves, Erection of	37	22	Wiring diagram	40	54
" bond with amalgamated con-			" diagram for type M control	42	26
tacts	38	21	" diagram of type M control		
" Construction of span	37	11	of current-limiting de-		
" hanger, Feeder-ear	37	28	vice	42	32
" hangers, Plain-ear	37	27	" of car house	39	30
" " Strain-ear	37	27	Wooden poles	37	17
" Hard-drawn copper trolley	37	10	" " Setting	37	18
" Methods of arranging trolley	37	11	" " Sizes and weights of	37	18
" Offset in trolley	37	23	Working conductor	37	3
" Pressure of wheel on	41	8	Worthington cooling tower	30	71
" Shape of trolley	37	10	Wrought-iron pipes, Expansion of	31	20
" Splicing trolley	37	33			
" Span	37	25			
" Tension on trolley	37	24			
" Trolley	37	9			
" " and feeders	37	21			
" Trunk	41	2			
Wires, Guard	37	24			
" Size of trunk	41	24			

Y

Y, Plain	37	52
" Three-part	37	52
" Through	37	52

Z

Zinc joint	38	11
----------------------	----	----