

NICHOLLS'S

# Seamanship and Nautical Knowledge

FOR

Second Mates', Mates' and Masters'  
Examinations

BY

CHARLES H. BROWN, F.R.S.G.S., EXTRA MASTER

*Revised by*

H. H. BROWN, D.S.C.\*, R.D., F.R.A.S., EXTRA MASTER



GLASGOW  
BROWN, SON & FERGUSON, LTD., NAUTICAL PUBLISHERS  
52 DARNLEY STREET

# CONTENTS.

## CHAPTER I.

- The Division of the Day at Sea—Helm Orders—Conning the Ship—  
Sailing Ship Rigs—Types of Ships .. .. . 1

## CHAPTER II.—KNOTS, BENDS AND SPLICES.

- Knots, Hitches, Bends and Splices—Types of Rope—Wire Splicing—  
Blocks—Purchases and Mechanical Advantage .. .. . 9

## CHAPTER III.—ROPES AND PURCHASES.

- Strength of Ropes, Wire and Manila—How to Handle Wire Rope—  
Strength of Chain—Theoretical Advantage of Tackles—Test  
Loads on Derricks—Questions .. .. . 37

## CHAPTER IV.—THE RIGGING OF A STEAMSHIP.

- Standing Rigging—Telescopic Topmast, Sending Topmast Up and  
Down—Sending Down a Signal Yard—Rigging Derricks .. 52

## CHAPTER V.—BOAT SAILING.

- Lifeboat Sails—Lug Sails—Terms Used When Sailing a Boat—Boat  
Sailing and Her Management in Heavy Weather—Sailing Ship  
Rule of the Road .. .. . 60

## CHAPTER VI.—BOAT CONSTRUCTION AND EQUIPMENT.

- Ship's Boats—Boat Lowering—Davits, Radial, Luffing and Gravity  
Types—The Motor Lifeboat—Diesel Engines—Manoeuvring the  
Motor Boat—Motor Boat Rule of the Road—Effect of Oil on  
Waves—Construction of Ship's Boats—Boat Equipment—Types  
of Boats, their Capacity, Buoyancy, Marking, etc.—Life-Saving  
Apparatus—Life-buoys—Life-jackets—Boat Drill—Painting  
Metal Boats—Inflatable Lifecrafts .. .. . 74

## CHAPTER VII.—ANCHORS AND CABLES.

- Parts of an Anchor—Bow Stoppers—Mooring Anchors—Chain Cables  
and Shackles—Anchor and Chain Cables Act .. .. . 108

## CHAPTER VIII.—DECK APPLIANCES AND APPARATUS.

- Telegraphs—Lead Line—Patent Sounding Machine—Echo Sounding  
Machine—Common Log—Patent Log—Electric Ship Log—

## CONTENTS

<p><b>Speed of Propeller—Fuel Consumption and Speed—Meteorological Instruments—Barometer and Vernier—Aneroid—Barograph—Thermometer Scales—Maximum and Minimum Thermometers—Hygrometer—Rain Gauge—Radio Direction Finder—Radar—Sluices and Watertight Doors—Steering Gears—Deck Winches and Capstans—Windlass—Propelling Machinery—Boilers—Reciprocating and Turbine Motor Engines—Fire Extinguishing Appliances—Precautions to Prevent Fire—Fire Drill—Board of Trade Regulations regarding Fire Fighting Apparatus—Standing Rules for Steam Vessels at Sea, in Port and at Anchor—Questions .. .. .</b></p>	<p><b>117</b></p>
<p><b>CHAPTER IX.—REGULATIONS FOR PREVENTING COLLISION AT SEA</b></p>	
<p><b>Rules 1 to 16—Ship's Lights and Fog Signals—Recognition of Lights—Questions and Answers on Contents of Rules .. .. .</b></p>	<p><b>187</b></p>
<p><b>CHAPTER X.—STEERING AND SAILING RULES.</b></p>	
<p><b>Rules 17 to 32—Rule of the Road—Questions and Answers on Contents of Rules—To Find Out How Another Vessel is Heading at Night—Diagrams relating to Rule of the Road .. .. .</b></p>	<p><b>210</b></p>
<p><b>CHAPTER XI.—NOTICES TO MARINERS.</b></p>	
<p><b>Closing of Ports—Mine Sweeping Operations—Warning Signals denoting Submarines—Aircraft Signals—Light Vessels—Navigating Stern Foremost—Submarine Cables—Uniform System of Maritime Buoyage—Wreck Marking Signals—Fog Signals—Life-Saving Organisation—Distress Signals—Screening of Navigation Lights—Questions .. .. .</b></p>	<p><b>242</b></p>
<p><b>CHAPTER XII.—PARALLELOGRAM OF FORCES.</b></p>	
<p><b>Examples—A Canal Boat—Current Sailing—Moorings—Action of the Rudder and Turning Circle—True and Apparent Wind—Boat Sailing—Cargo Spans—Derricks—Questions .. .. .</b></p>	<p><b>265</b></p>
<p><b>CHAPTER XIII.—SCREW RACE AND SHIP HANDLING.</b></p>	
<p><b>The Wake Current—The Transverse Thrust—The Screw Race—Effect with Headway, Sternway, and at Starting—Twin Screws—Turning Circle—Ship Handling—Anchoring, Mooring and Berthing—Tending Ship at Anchor—Getting under way—Emergencies—Accidents—Jury Gear—Towing—Ship's Log Book ..</b></p>	<p><b>289</b></p>
<p><b>CHAPTER XIV.—MENSURATION.</b></p>	
<p><b>Weights and Measures—Areas and Volumes—Stowage Factors—Simpson's Rules—Examples .. .. .</b></p>	<p><b>344</b></p>

## CONTENTS

### CHAPTER XV.—HYDROSTATICS.

- The Hydrometer—Buoyancy—Water Pressure—Atmospheric Sounding Tube—Markings on a Ship—Variations in Density and Draught—Load Lines for Sailing Ships, Cargo Steamers, Tankers and Timber Laden Steamers—Zones and Seasonal Areas—The Load Line—Headings of the Official Log—Questions .. .. . 360

### CHAPTER XVI.—CARGO.

- Cargo Gear—Factory and Workshops Act—Dunnage—Homogeneous Cargoes, Coal, Ore, Grain, Rice—Stowage of Various Cargoes—Questions and Answers—Dangerous Cargoes—Details of Grain—Oil and Timber Cargoes—Frozen and Chilled Cargoes, Meat, Fruit, etc.—Bulk Oil—Cargo Plan—Questions .. .. . 383

### CHAPTER XVII.—SHIP CONSTRUCTION.

- The Stresses on a Ship—Riveting—Welding—Built Sections—Transverse Sections—Cellular Double Bottom—Beams—Bulkheads—Deep Tank—Shell Plating—Planking—Pillars—Hatchways—Stem and Stern—Rudders—Screws—Pipe Lines—Ship Building Photographs—Ventilation—Properties and Uses of Paint—Scantlings—Questions .. .. . 425

### CHAPTER XVIII.—STABILITY, CARGO AND TRIM.

- Levers—Parallel Forces and Principle of Moments—The Wheel and Axle—A Couple—Centre of Gravity of a System of Weights—Various Distributions of Weights—Equilibrium, Stable, Neutral and Stable—Displacement, Tonnage and Volume—Coefficient of Fineness—Ship Stability—Metacentre—The Heeling Experiment—Ship Graphs: Curves of Displacement, Tons per Inch Immersion, Stability, Buoyancy and Metacentre—Cargo and Stability—Cargo Plan—Cargo and Trim—Examples and Calculations—Questions .. .. . 490

### CHAPTER XIX.—REGISTRATION OF SHIPS AND SEAMEN.

- The Board of Trade—Customs and Excise—Ministry of Health—Port and Local Authorities—Classification Societies—H.M. Stationery Office—The New Ship—Plans—Launching—Dry-docking—Certificate of Registry—Certificates under the Anchor and Cables Act—Freeboard and Load Line—Life-Saving Appliances—Safety Certificate—International Load Line Certificate—Certificated Lifeboatmen—Panama and Suez Canal Certificates—Declaration of Health—Deratisation of Ships—Factory and Workshops Act—Classification Surveys .. .. . 540

### CHAPTER XX.—SIGNALLING.

- The International Code of Flags—One, Two, Three and Four Flag Signals—Alphabetical and Numeral Signals—Instructions How to Signal—Notes on Signalling—Distant, Semaphore and Morse Signalling—Questions and Answers .. .. . 567

## INDEX.

	PAGE		PAGE
<b>A</b>			
Accidents—		Beacon, wireless .. .. .	252
Anchor foul .. .. .	299	Beam—	
Disabled ship .. .. .	331	Deck .. .. .	440
Engine breakdown .. .. .	332	Hatch .. .. .	452
Fire .. .. .	176	Knees .. .. .	441
Funnel damaged .. .. .	326	Panting .. .. .	454
Hatches at sea .. .. .	325	Berthing-ship .. .. .	302
Man overboard .. .. .	297, 327	Bells .. .. .	257
Report of .. .. .	241	• Bends and hitches	9-25
Rudder damaged .. .. .	328	Blackwall hitch .. .. .	17
Steering gear .. .. .	325	Bowline .. .. .	13
Vessel aground .. .. .	327, 334	Catspaw .. .. .	20
Windlass damaged .. .. .	330	Carrick bend .. .. .	21
Air fog signals .. .. .	251	Clove hitch .. .. .	15
Anchor—		Fishermen's bend .. .. .	14
Bower .. .. .	108, 331, 335	Half hitches .. .. .	17
Bow stoppers .. .. .	110	Marline-spike hitch .. .. .	19
Dredging .. .. .	306	Midshipman's hitch .. .. .	18
Kedge .. .. .	300	Mousing .. .. .	22
Lights .. .. .	197	Reef knot .. .. .	20
Mooring .. .. .	111	Rolling hitch .. .. .	15
Mushroom .. .. .	111	Sheet bend .. .. .	20
Parts of .. .. .	108	Sheepshank .. .. .	19
Riding at .. .. .	312	Timber hitch .. .. .	16
Sea .. .. .	105, 112, 333	Whippings .. .. .	12
Shackles .. .. .	112	Bilges .. .. .	436
Stockless .. .. .	108	Bilge suction pipe .. .. .	464
Stoppers .. .. .	110	• Bitts or bollards .. .. .	340
Stream .. .. .	108	Bitumastic paints .. .. .	483
Tending ship at .. .. .	298, 312, 315	• Block—	
Testing of .. .. .	115, 108	Cargo .. .. .	31, 562
Watch .. .. .	173, 300	Clump .. .. .	29
Work .. .. .	316	Coefficient .. .. .	504
External bound .. .. .		External bound .. .. .	30
Anchors and Chain Cables Act	115, 545	Gin .. .. .	31, 288
Anchoring and mooring .. .. .	321	Internal bound .. .. .	30
Aneroid barometer .. .. .	139	Metal .. .. .	31
Annealing .. .. .	108	Snatch .. .. .	30
Answers .. .. .	620	Board of Trade .. .. .	xiii, 373, 540
Antifouling paints .. .. .	477	• Boat—	
Areas and volumes .. .. .	348	Beaching of .. .. .	70
Atmospheric sounders .. .. .	367	Beaching signals for .. .. .	253
		Capacity of .. .. .	100
<b>B</b>		Carvel and clincher .. .. .	91-95
Balanced rudders .. .. .	460	Construction of .. .. .	95
Ballast tanks .. .. .	444	Classes of .. .. .	97
Barnacles .. .. .	482	Davits .. .. .	74
Barometer .. .. .	134, 139	Davit falls .. .. .	74, 82
Barograph .. .. .	139	Drill .. .. .	79, 104, 181
Barque .. .. .	4	Equipment .. .. .	97

	PAGE		PAGE
Boat (contd.)—		<b>C</b>	
Gybing .. .. .	68	Cable—	
Hoisting .. .. .	78	Chain .. .. .	112
Launching .. .. .	74	Marking .. .. .	115
Lowering .. .. .	74	Mooring swivel .. .. .	112
Lugsail .. .. .	60	Inboard end .. .. .	114
Management .. .. .	85	Inspection .. .. .	114
Man overboard .. .. .	85	Laid rope .. .. .	9
Motor .. .. .	83	Length .. .. .	112
Markings .. .. .	100	Shackles .. .. .	112
Names of parts .. .. .	92	Strength .. .. .	115
Number of .. .. .	98	Veering .. .. .	313
Painting metal lifeboats .. .. .	106	Plans— See Pocket	
Parts of a .. .. .	92	Camber .. .. .	401
Position of .. .. .	104	Canvas, rope, sails .. .. .	65
Rule of Road .. .. .	71	Capacity plans— See Pocket	
Sails .. .. .	60	<i>Cape Horn</i>	
Sailing .. .. .	60, 65, 270	Capstans .. .. .	169, 497
Sailing terms .. .. .	62	Cargo work .. .. .	394, 555
Sea anchor .. .. .	105, 112	Bags .. .. .	400
Sections .. .. .	91	Bales .. .. .	400
Signals .. .. .	253	Bananas .. .. .	413
At sea .. .. .	82	Barrels .. .. .	399
Tanks .. .. .	98	Battens .. .. .	389
Tacking .. .. .	63	Capacity .. .. .	420
Types of .. .. .	97	Coal .. .. .	388, 401
Boiler, Scotch .. .. .	170	Dangerous .. .. .	176, 405, 477
" water-tube .. .. .	170	Deck .. .. .	396, 401
Boot-topping paint .. .. .	483	Explosives .. .. .	176, 405
Bosom piece .. .. .	433	Flour .. .. .	399
Boss propeller .. .. .	456	Food and fruit .. .. .	413
Bow stoppers .. .. .	110	Frozen .. .. .	408
Bower anchor .. .. .	108	Gear .. .. .	383, 557
Boyle's Law .. .. .	122	Grain .. .. .	391
Bracket plate .. .. .	439	Hatches .. .. .	451, 553
Breast hooks and crutches .. .. .	454	Liquid .. .. .	401, 416
Breeches buoy .. .. .	254	Mineral .. .. .	403
Brig .. .. .	4	Mixed .. .. .	398
Body post .. .. .	455	Oil .. .. .	401, 416
Bowline .. .. .	13	Ore .. .. .	391
Bull rope .. .. .	384	Plans .. .. .	419, 542
Bunker coal .. .. .	133	Preparation .. .. .	388, 397
Buoyage system .. .. .	248	Questions .. .. .	397
Buoyance .. .. .	362, 505	Railway iron .. .. .	398
" Centre of .. .. .	505	Receiving .. .. .	394, 403, 410
" Curve .. .. .	516	Responsibility .. .. .	397, 403
" Tanks .. .. .	98	Rice .. .. .	393
Bulb angles .. .. .	435	Safety precautions .. .. .	560
Bulkhead .. .. .	443	Spaces .. .. .	475
" Collision .. .. .	454	Spans .. .. .	271
" Doors .. .. .	155	Special .. .. .	404
" Sluices .. .. .	155	Stowage .. .. .	396
" Frames .. .. .	443	Stability and trim .. .. .	517-527
" Stiffeners .. .. .	443	Stresses .. .. .	275
Bulkhead watertight .. .. .	443	Sugar .. .. .	398
Bulk cargo .. .. .	392	Testing gear .. .. .	557
Butt joints .. .. .	433	Timber .. .. .	406
Buttock lines .. .. .	542	Cargo, ventilation of .. .. .	394, 475

	PAGE		PAGE
Cargo gear—Bull ropes, can hooks, gins, guys, nets, shackles, slings, snotters, trays .. .. .	383, 387, 559	Current sailing .. .. .	265
Carlings .. .. .	452	"    wake .. .. .	289
Carving note .. .. .	545	Curve of buoyancy .. .. .	516
Cavitation .. .. .	289	"    displacement .. .. .	513
Ceiling .. .. .	388	"    metacentre .. .. .	516
Cellular double bottom .. .. .	436 438	"    stability .. .. .	514
Central Training Board .. .. .	xxi	"    tons per inch .. .. .	513
Centre of buoyancy .. .. .	503	Custom House .. .. .	540
"    effort .. .. .	270		
"    gravity .. .. .	497, 516, 518	<b>D</b>	
"    pressure .. .. .	460	Dangerous cargoes .. .. .	176, 404, 477
"    tipping .. .. .	522	Davits, gravity .. .. .	76
Certificate—		"    number of .. .. .	98
Anchors and cables .. .. .	114, 545	"    radial .. .. .	74
Cargo lifting gear .. .. .	557	"    Welin-Maclachlan .. .. .	75
Declaration of health .. .. .	549	Day at sea .. .. .	2
Deratisation .. .. .	551	Day signals for—	
Lifeboatmen .. .. .	547	Aircraft .. .. .	244
Life-saving appliances .. .. .	545	Cable ship .. .. .	191
Load line .. .. .	545	Escorting submarines .. .. .	244
Panama and Suez Canals .. .. .	548	Examination ship .. .. .	242
Passenger ship .. .. .	546	Fishing vessels .. .. .	195
Radiotelegraphy .. .. .	546	Mine-sweeping .. .. .	243
Ship's register .. .. .	545	Navigating stern foremost .. .. .	246
Certification of ships .. .. .	540	Not under command .. .. .	191, 200
Chain strength .. .. .	41	Vessel under sail and power .. .. .	199
"    hoists .. .. .	49	Vessels in distress .. .. .	255
"    stud link .. .. .	112	Wreck marking .. .. .	250
"    stopper .. .. .	36, 110	Deadweight .. .. .	369
Classification societies .. .. .	373, 541	Deadwood .. .. .	93, 94
Classification surveys .. .. .	563	Deck appliances .. .. .	117
Clear hawse .. .. .	315	Bulkhead doors .. .. .	155
Cleats hatch .. .. .	453	Docking telegraphs .. .. .	119
"    stop .. .. .	458	Drill, fire and boat .. .. .	181
Coal consumption .. .. .	133	Engine-room .. .. .	118
Coamings .. .. .	452	Echo sounding .. .. .	125
Code of Signals .. .. .	569	Fire appliances .. .. .	178
Coefficient of fineness .. .. .	369, 504	Lead lines .. .. .	120
Cofferdam .. .. .	416	Meteorological instruments .. .. .	134
Collars' thrust block .. .. .	462	Navigation lights sentinel .. .. .	120
Collision—		Radio direction finder .. .. .	145
Avoiding .. .. .	218	Sounding machine .. .. .	122
Bulkhead .. .. .	454	Steering gear .. .. .	158
Diagrams 72, 87, 216, 217, 219, 225, 226, 232, 234, 236, 238	187, 240, 215	Steam capstan .. .. .	169
Prevention of .. .. .	187	"    winch .. .. .	168
Procedure after .. .. .	240	"    windlass .. .. .	169
Risk of .. .. .	215	Deck beam .. .. .	440
Compositions, antifouling .. .. .	479	"    camber .. .. .	401, 439
Composition paints .. .. .	479	"    planking .. .. .	448
Conning the ship .. .. .	3	"    line .. .. .	373
Corrosion .. .. .	477	Deep tanks .. .. .	445
"    electrolytic .. .. .	478	Density .. .. .	360, 370
"    mechanical .. .. .	497	Deratisation .. .. .	552
Crutches and breasthooks .. .. .	454	Derricks .. .. .	56, 273, 562
		"    heavy lifts .. .. .	56-58, 385
		"    rigging of .. .. .	56
		Diagrams—	
		Buoyage .. .. .	248

	PAGE		PAGE
Diagrams (cont)—		Fid .. .. .	54
Rule of the Road .. .	219, 225, 226	Fire appliances .. .	179
Screw race .. .	289	" chemical extinguishers .. .	177, 180
Ship's lights .. .	200	" detection .. .	176, 178
" and signals .. .	242, 253, 254	" drill and inspection .. .	181
Diaphone fog horn .. .	251	" muster list .. .	181
Diesel engines .. .	83	" precautions .. .	176
Displacement tonnage .. .	504	" tube boiler .. .	170
" volume .. .	504	Firefoam .. .	177
Distress signals .. .	214, 256a	Flags .. .	569
Docking and mooring .. .	302	Flat plate keel .. .	436, 438
Door in bulkhead .. .	155	Floating drydock .. .	544
Double bottom .. .	437, 439	Floor .. .	437, 438
Dowels .. .	449	Fog signals .. .	199-201
Drainage system .. .	440, 463	Cable ships .. .	200
Draught marks .. .	369	Fishing vessels .. .	200
Dredging anchor .. .	306	Fog horns .. .	251, 258
Dry docking .. .	429, 544	Information <i>vs</i> .. .	251
Dunnage .. .	388	Not under command .. .	200
Dunstos brake .. .	166	Power driven vessels .. .	199
		Shore stations .. .	251
<b>E</b>		Submarine .. .	252
Echo sounding machine .. .	125	Towing .. .	200
Edge, sight .. .	447	Vessels at anchor .. .	200
Economical speed .. .	133	Wireless signals .. .	252
Electric navigation lights .. .	260	Wreck marking .. .	250
Engine—		Forces, moment of .. .	490
Break down of .. .	325, 330	Forces, parallel .. .	491
Cylinders .. .	172	Fore and afters .. .	467, 471
Deck .. .	168	Foundation plate .. .	436
Internal combustion .. .	175	Frames .. .	446
Engine (cont.)—		" cant .. .	456
Marine motor .. .	83, 174	" liner .. .	447
Reciprocating .. .	173	" longitudinal .. .	446, 467
Speed .. .	133	" spacing of .. .	446
Steam circulation .. .	172	" stern .. .	455
Steering .. .	158	" web .. .	446, 468
Telemotor .. .	162	Freeboard .. .	374
Turbine .. .	174	Freeing ports .. .	451
Ensign, flying .. .	578	Frictional resistance .. .	42
Equations—		Fuel consumption .. .	133, 186
Chain .. .	42	Fulcrum .. .	490
Coal consumption .. .	133	Fumigation .. .	554
Stability .. .	527	Funnel damaged .. .	326
Strength of rope .. .	37, 40		
Equilibrium .. .	503	<b>G</b>	
Examination papers .. .	595	Gangways .. .	555, 560
" syllabuses .. .	xiii, xxi	Garboard strake .. .	466
		Gauge, rain .. .	144
<b>F</b>		" rope .. .	28
Factor of safety .. .	37	Gear, cargo .. .	383, 557
Factory and Workshops Act .. .	385, 555	" steering .. .	158
" gangways .. .	555	Geometrical figures—Areas and	
" hatches .. .	555	volumes of barrel, box, circle,	
" lifting gear .. .	557	cone, cylinder, prism, pyra-	
" safety precautions .. .	560	mid, rectangle, ring, sector,	
" testing schedule .. .	562	square, sphere, triangle,	
Fairing the plans .. .	542	wedge .. .	348, 350
Fathom .. .	120, 344		



	PAGE		PAGE
Getting under way .. .. .	303	International load lines .. .. .	372
Girders, ship .. .. .	425	"    Rules, Preventing	
Gland, stern tube .. .. .	461	Collision .. .. .	188-215
Gongs .. .. .	258	Isherwood ships .. .. .	446
Grain feeders .. .. .	392		
"    cargo .. .. .	392	<b>J</b>	
Graphs and curves .. .. .	511	Joggled plating .. .. .	447
Graving dock .. .. .	544	Jury rudder .. .. .	337
Gravity, centre of .. .. .	497, 517	"    steering gear .. .. .	336
Gripe boat .. .. .	79		
Gross tonnage .. .. .	373, 548	<b>K</b>	
Grounding .. .. .	327, 334	Kedge anchor .. .. .	108, 300
Gudgeons, rudder .. .. .	457	Keel .. .. .	438
Gun line throwing .. .. .	256	Knees, beam .. .. .	440
Gun tackle .. .. .	34	"    boat .. .. .	91
Gunwale bar .. .. .	451	Knots—See Bends and Hitches	13-23
Gusset plate .. .. .	437		
Gybing .. .. .	63, 69	<b>L</b>	
		Landing edge .. .. .	447
<b>H</b>		Launch, motor .. .. .	83
Hatch—		Launching ways .. .. .	543
Beams .. .. .	556	Lead line .. .. .	120
Cargo .. .. .	452	"    cast of .. .. .	122, 124
Cleats .. .. .	453	Leach .. .. .	61
Coamings .. .. .	452	Lever .. .. .	490-494
Deep tank .. .. .	445	Lifeboatmen .. .. .	547
Openings .. .. .	452	Life-belts .. .. .	102
Tarpaulins .. .. .	401	Life-boats .. .. .	97
Hatch sliding beam .. .. .	556	Life-buoys .. .. .	102
Hawser .. .. .	9	Life-raft, inflatable .. .. .	107
Heading? "How is she?" .. .. .	224	Lifting gear .. .. .	557
Heaving-to .. .. .	325	Lights—	
Heavy derricks .. .. .	57	Identification .. .. .	198
Heeling experiment .. .. .	509	Screening of .. .. .	258
Helm orders .. .. .	3	Stern .. .. .	258
Her Majesty's Stationery Office	541	Side .. .. .	258
Hitches .. .. .	14-22	Masthead .. .. .	258
Hogging .. .. .	426	Lights to be carried by—	
Hold, preparation of .. .. .	388-394, 410	Cable ships .. .. .	191
"    pillars .. .. .	449	Examination vessels .. .. .	242
Home Office .. .. .	540, 555	Fishing vessels .. .. .	195
Hose, fire .. .. .	179	Mine-sweepers .. .. .	243
Hound band .. .. .	52	Overtaken vessels .. .. .	197
"How is she heading?" .. .. .	224	Pilot vessels .. .. .	194
Hydrometer .. .. .	360	Sailing vessels .. .. .	192
Hydrostatics .. .. .	360	Power-driven vessels .. .. .	189
Hygrometer .. .. .	143	Small vessels .. .. .	193
		Towing vessels .. .. .	191
<b>I</b>		Vessels at anchor .. .. .	197
Inch-trim-moment .. .. .	523	"    aground .. .. .	198
Infectious diseases .. .. .	549	"    not under command .. .. .	191
Inflatable liferaft .. .. .	106	"    wreck-marking .. .. .	250
"    equipment of .. .. .	107	Life-saving apparatus .. .. .	254
Initial stability .. .. .	507	"    penalties .. .. .	104
Inner bottom plating .. .. .	436	"    precautions .. .. .	103
Intercostals .. .. .	436	"    rules .. .. .	106
International Code of Signals	569-593	"    service .. .. .	253
		"    signals .. .. .	253

	PAGE		PAGE
Lightening holes .. .. .	439	Motor boat manoeuvring .. .. .	85
Line-throwing gun .. .. .	256b	"    engine .. .. .	83
Load draught .. .. .	373	"    Rule of Road .. .. .	86
"    lines .. .. .	373-379	Motor ship .. .. .	174
Load line, assigning .. .. .	372, 545	Mousing .. .. .	22
"    authorities .. .. .	373	Muster list .. .. .	181
"    deck cargo .. .. .	375	Mushroom anchor .. .. .	111
"    seasons .. .. .	379		
"    tankers .. .. .	376	<b>N</b>	
Log book .. .. .	341	Nautical mile .. .. .	127, 344
"    patent .. .. .	128	Nautophone fog horn .. .. .	251
"    common .. .. .	127	Navigation lights .. .. .	195
"    electrical .. .. .	131	Net tonnage .. .. .	548
Long splice .. .. .	24	Neutral axis .. .. .	426
Longitudinal framing .. .. .	446	Non-return valve .. .. .	463
"    bulkheads .. .. .	446	Notices to Mariners—	
"    stresses .. .. .	425	Aircraft at anchor .. .. .	243
Lookoutman .. .. .	2	"    in distress .. .. .	243
Lower-mast, parts of .. .. .	54	Air fog signals by bells, dia-	
Luff tackle .. .. .	34	"    phone, gun, nautophone,	
Lugsail .. .. .	60	"    whistle .. .. .	251
		Buoyage system .. .. .	248
<b>M</b>		Buoys and beacons .. .. .	250
Machinery—		Closing of ports .. .. .	242
Boiler .. .. .	170	Collision with lightvessels .. .. .	246
Compound engine .. .. .	173	General notices .. .. .	251
Deck .. .. .	168	Lightvessels .. .. .	245
Motor engine .. .. .	83, 174	Life-saving service .. .. .	253
Steering engine .. .. .	160	Mine-sweeping .. .. .	243
Triple engine .. .. .	173	Navigating stern foremost .. .. .	246
Turbine .. .. .	174	Squadrons .. .. .	243
Management of vessel at anchor	315	Submarines .. .. .	243
Man overboard .. .. .	85, 297	Submarine cables .. .. .	247
Manila rope .. .. .	9, 37	"    sound signals .. .. .	251
Margin plate .. .. .	436, 439	Wireless fog signals .. .. .	251
Marine growths .. .. .	480	Wreck-marking signals .. .. .	250
Marking of ships .. .. .	369	Numerals .. .. .	576
Materials, strength of .. .. .	347	Nylon rope .. .. .	10
Mast and rigging .. .. .	53		
Mechanical advantage .. .. .	34, 44	<b>O</b>	
Mensuration .. .. .	344	Oertz rudder .. .. .	459
Merchant Shipping Act .. .. .	540	Oil cargo .. .. .	416
Metacentric height .. .. .	508, 516, 522	"    flash point .. .. .	418
"    diagram .. .. .	516	"    on waves .. .. .	87
Meteorological instruments—		"    linseed .. .. .	479
Aneroid, barometer, thermo-		Oscillator submarine signal .. .. .	251
"    meters, hygrometer, rain		Ore carrier .. .. .	391, 429
"    gauge .. .. .	135-155		
Metric measure and weights .. .. .	347	<b>P</b>	
Millibar .. .. .	136	Paints, properties of .. .. .	477-482
Ministry of Agriculture .. .. .	540	Panting .. .. .	454
"    Health .. .. .	540, 549	Parallelogram of forces—	
Moment to change trim .. .. .	523	Action of rudder .. .. .	266
Moment of a force .. .. .	495	Canal boat .. .. .	265
Mooring .. .. .	141, 266, 298, 315	Cargo spans .. .. .	271
Motor Boat .. .. .	83	Current sailing .. .. .	265
		Derricks .. .. .	273

	PAGE		PAGE
Parallelogram of forces (cont.)—		Purchase (cont.)—	
Moorings .. .. .	266	Luff tackle .. .. .	46
Sail propulsion .. .. .	270	Single, double, treble .. .. .	31, 32
True and apparent wind .. .. .	268	Spanish burton .. .. .	35
Parbuckling .. .. .	401	Watch tackle .. .. .	34
Parcelling .. .. .	11		
Partners, mast .. .. .	453		
Penalties relating to—		Quadrant rudder .. .. .	159, 336
Boat drill .. .. .	104	Quarter .. .. .	2
Life-saving appliances .. .. .	104	Questions on—	
Collision .. .. .	240	Accidents .. .. .	325
Reporting accidents .. .. .	241	Anchoring and mooring .. .. .	321
Grain cargoes .. .. .	391	Anchor work .. .. .	316
Load lines .. .. .	372-377	Anchors and cables .. .. .	116
Not showing ensign .. .. .	578	Boat lowering .. .. .	74
Pillars .. .. .	449	"  construction .. .. .	91
Pintles .. .. .	457	"  drill .. .. .	104
Pipe lines .. .. .	463	"  equipment .. .. .	97
Pipe sounding .. .. .	464	Cargo .. .. .	397, 422, 424
Piston .. .. .	173	Cargo and trim .. .. .	522
Plating, snell .. .. .	447	Collision regulations .. .. .	222
"  deck .. .. .	448	Deck appliances .. .. .	117
Plan cargo .. .. .	419	Docking and berthing .. .. .	321
Planking boat .. .. .	91	Fire emergency .. .. .	176
"  deck .. .. .	448	Fog signals .. .. .	208
Plans, sheer, body, half breadth	542	Getting underway .. .. .	303
Poop fittings .. .. .	159	Heaving-off .. .. .	334
Poppets or cradle .. .. .	543	"  How is she heading?" .. .. .	224
Port Authorities .. .. .	541, 549	Hydrostatics .. .. .	370
Port Sanitary Authority .. .. .	551	Life-saving appliances .. .. .	95
Post, rudder .. .. .	455	Motor boat .. .. .	86
Power of purchases .. .. .	34, 44	Notices to Mariners .. .. .	262
Preparing for sea .. .. .	296	Parallelogram of forces .. .. .	287
Pressure of water .. .. .	364	Rope and wire purchases .. .. .	34
Proof strength .. .. .	347, 562	Lights .. .. .	188
Propeller—		Mensuration .. .. .	357
Action of .. .. .	287	Ship construction .. .. .	485
Bossing .. .. .	330, 463	"  handling .. .. .	296
Cavitation .. .. .	289	"  log books .. .. .	341
Pitch .. .. .	133	"  stability .. .. .	503
Race .. .. .	291		
Shaft .. .. .	461	<b>R</b>	
Slip .. .. .	133	Racking .. .. .	428
Speed .. .. .	132	Radio aids and radar .. .. .	145
Steering effect .. .. .	290	Raft construction .. .. .	341
Strut .. .. .	462	Rain gauge .. .. .	145
To unship .. .. .	330, 461	Ratline .. .. .	11
Thrust .. .. .	290	Rats .. .. .	552
Propelling machinery .. .. .	173	Reciprocating engines .. .. .	173
Pulleys .. .. .	31	Red lead .. .. .	479
Pumps .. .. .	416	Reef .. .. .	68
Purchase—		Refrigeration of cargoes .. .. .	408
Advantage of .. .. .	34, 42, 48	Register certificate .. .. .	545
Differential .. .. .	49	tonnage .. .. .	548
Equations .. .. .	45, 347	Registration of ships .. .. .	540
Friction .. .. .	42	Regulations, Examination .. .. .	xiii
Gun tackle .. .. .	34	"  collision .. .. .	182-241
Handy billy .. .. .	34		



	PAGE		PAGE
Ship construction (cont.)—		Stability calculations	503-532
Web frame .. .. .	446	" equilibrium .. .. .	503
Welding .. .. .	434	" equations .. .. .	527-528
Ship handling .. .. .	296	Standing orders .. .. .	182
Docking and berthing	302	Stays .. .. .	52
Disabled .. .. .	328	Steam circulation .. .. .	172
Getting under way .. .. .	307	Steamship types .. .. .	5
Management at anchor .. .. .	312	Steamships, Rule of the Road	215
Manoeuvring .. .. .	294	Steering chains .. .. .	158
Man overboard .. .. .	297	" electric hydraulic .. .. .	165
River work .. .. .	302	" emergency gear .. .. .	165
Tending at anchor .. .. .	298, 312	" hand gear .. .. .	158
Shrouds .. .. .	49	" engines .. .. .	160, 570
Signalling—		" telemotor .. .. .	162
Azimuth bearings .. .. .	578	" turning circles .. .. .	268, 295
Code flags .. .. .	569	" rules .. .. .	215
Four-letter signals .. .. .	573	Stern framing .. .. .	455, 471
Gale warning signals .. .. .	590	" tube .. .. .	462
International Code signals .. .. .	569	" cruiser .. .. .	460
International Morse .. .. .	582	Stiff ship .. .. .	403, 508
Latitude and longitude .. .. .	577	Stowage of cargo .. .. .	383-423
Morse signalling .. .. .	581	Stowage factors .. .. .	348
Numeral hoists .. .. .	576	Stop valves .. .. .	416
Pilot signals .. .. .	590	Stops, rudder .. .. .	458
Procedure signals .. .. .	583	Strakes of plating .. .. .	433, 447
Quarantine signals .. .. .	589	Stream anchor .. .. .	108
Questions and answers .. .. .	591	Strength of cargo gear .. .. .	347, 557
Semaphore .. .. .	579	Strength of material .. .. .	347
Semaphore alphabet .. .. .	580	Stresses .. .. .	425
Signalling by flashing .. .. .	586	Strum box .. .. .	464
Signalling by sound .. .. .	588	Strum or rose box .. .. .	397, 464
Single-letter hoists .. .. .	569	Struts .. .. .	462
Single-letter signals .. .. .	570	Submarine bell .. .. .	252
Three-letter signals .. .. .	573	" cable .. .. .	247
Time signals .. .. .	577	" escort .. .. .	243
Two-letter signals .. .. .	572	" signals .. .. .	252
Use of substitutes .. .. .	574	Summer load line .. .. .	374
Simpson's Rules .. .. .	353	Survey—	
Slings .. .. .	279, 383	Classification .. .. .	563
Slip of propeller .. .. .	133	Machinery .. .. .	566
Slipping cable .. .. .	318	Steering engine .. .. .	566
Sloop .. .. .	4	Tanks .. .. .	566
Sluices .. .. .	155		
Snatch block .. .. .	30	<b>T</b>	
Snubbing round .. .. .	324	Table wire rope .. .. .	40
Sounding machines .. .. .	122, 125	Tack .. .. .	63
Sounding pipes .. .. .	464	Tackles, various .. .. .	34-36
Spanish burton .. .. .	35	Tail shaft .. .. .	461
Spanish windlass .. .. .	23	Tank, deep .. .. .	444
Specific gravity .. .. .	360	" Sounding .. .. .	464
Speed-and fuel .. .. .	133	Tanks—	
Splice eye .. .. .	23	Side .. .. .	439
" grommet .. .. .	24	Testing .. .. .	365
" long .. .. .	24	Tankers—	
" short .. .. .	23	Air valves .. .. .	419
" wire .. .. .	25, 559	Cofferdam .. .. .	416
Sprocket chain .. .. .	50	Fire precautions .. .. .	418
Stability .. .. .	490	Flash point, oil .. .. .	418

	PAGE		PAGE
Bankers (cont.)—		Ventilation of ship	172, 175, 393, 475
Heating coil .. .. .	418	Ventilator .. .. .	476
Isherwood system .. ..	446	Volumes and surface areas of	
Pipe lines .. .. .	463	box-shaped bodies, cylinders	
Pump room .. .. .	416	and wedges .. .. .	350
Steam valves .. .. .	418	Volume of displacement .. ..	504
Ullage .. .. .	419	Vernier .. .. .	136
Tarpaulin .. .. .	401		
Tender ship .. .. .	402, 508	<b>W</b>	
Telegraphs .. .. .	117	Water pressure .. .. .	364
Telemotor .. .. .	162	Watertight flats .. .. .	441
Temperature, standard .. ..	361	"  bulkheads .. .. .	443
Tending ship at anchor .. ..	312	"  doors .. .. .	155
Terylene rope .. .. .	10	Wake current .. .. .	289
Testing Material .. .. .	115, 562	Wash ports .. .. .	451
Thermometers .. .. .	140	Waterplanes .. .. .	542
Thermotank ventilation .. ..	475	Watches at sea .. .. .	3
Thrust block .. .. .	462	Weather tide .. .. .	298
Tide, effect of .. .. .	313	Welding .. .. .	434
Tide-rode .. .. .	298	Weights and measures—Troy,	
Tiller .. .. .	3	avoirdupois, lineal, survey-	
Timber load line .. .. .	375	ors', square, cubic, liquid,	
"  deck cargo .. .. .	396	dry, time, angular, metric,	
"  miscellaneous ship measures		"  miscellaneous ship measures	347
Tipping centre .. .. .	522	Wetted surface equation .. ..	483
Tons per inch .. .. .	513	Web frames .. .. .	446
Tonnage, gross, net .. .. .	373, 548	Wheel and axle .. .. .	496
Topmast .. .. .	52	Whippings .. .. .	12
"  telescopic .. .. .	54	Whistles .. .. .	258
Towing .. .. .	331, 338	Winches and capstan .. .. .	168
Transom frame .. .. .	456	Windlass .. .. .	165
Transverse section .. .. .	436	Windlass damages .. .. .	330
"  thrust .. .. .	290	Wind and tide .. .. .	314
Trim .. .. .	521	Wind-rode .. .. .	298
Tube, boiler .. .. .	170	Wind, true and apparent .. ..	268
"  sounding .. .. .	367	Winging out weights .. .. .	402
Turbine .. .. .	174	Winter load line .. .. .	374
Turning circle .. .. .	295	Wire, care of .. .. .	39
"  centre .. .. .	267	"  gauge .. .. .	28
Twin screws .. .. .	295	"  grip .. .. .	28
Types of ships .. .. .	4-8	"  sections .. .. .	28
		"  splicing .. .. .	22-24
		"  strength .. .. .	40
<b>U</b>		Wireless bearing .. .. .	154
Ullage .. .. .	419	Wireless fog signal .. .. .	248
Unstable equilibrium .. .. .	503	Wood decks .. .. .	440
Upper deck .. .. .	440		
Uptake in boilers .. .. .	170	<b>Y</b>	
		Yard, signal .. .. .	54
<b>V</b>		<b>Z</b>	
Valves, tank air .. .. .	416	Zones, seasonal .. .. .	377
"  stop .. .. .	416, 463		
Veering cable .. .. .	313		
Vehicle, paint .. .. .	479		