

(149)

INDEX TO THE WORDS,

ALPHABETICALLY ARRANGED.

	PAGE.	ARTICLE.
A.		
Aboukir Bay, disposition of the ships in	108	134
Action, direct, inconveniences of, on the axes of paddle- wheels and screws	57	64
Alecto and Rattler, experimental trials by the	50	50
Alignment of a fleet, manner of reversing the	124	158
Archimedes and Widgeon, experimental trials by the	50	50
Assaults by boarding will hereafter be frequent	126	160
Atmospherical steam-engine, nature of the	1	1
Attack, success in, depends on the relative speed of the fleets	114	141
——— should be made by bringing up a superior force to the point attacked	117	146
——— of a fleet in line ahead may be made in two parallel divisions coming up from the rear	113	140
——— of a fleet in line ahead should be made at the head of the line	121	153
——— of a fleet in line ahead may be made in three divisions of double columns	122	156
——— from the windward, advantages of	80	92
B.		
Barricades, loopholed, should be placed across decks to resist boarders	126	161
Basilisk and Niger, experimental trials by the	51	54
Bee, remarkable experiment made with the steamer	52	57
Blade or feather of a screw should be less in breadth than a complete turn of a spiral	35	30
———, formula for the figure of a	38	34
Boarding may occasionally occur in naval actions	126	160
Bow and stern batteries, strength of, in a two-decked ship	102	124
Bramah obtained a patent for a submerged propeller	24	7
C.		
Calm, disadvantages of a perfect, in naval actions under steam	86	100
Centre of pressure in paddle-boards	31	23
Coal can be carried in steamers only for a few days	81	94

150 NAVAL WARFARE WITH STEAM.

	PAGE.	ARTICLE.
Columns, double, should make with each other an angle of 90 degrees	95	115
Crankshafts are means of converting a reciprocating into a rotatory motion	27	13
Cross attacks, the nature of	118, 120	149, 151
Cylinders, oscillatory, used with direct action on shafts of wheel and screw propellers	57	64
D.		
Defence, reciprocal, may be applied to naval as well as to military tactics	99	120
—, reciprocal, may be obtained by ranging the ships parallel to one another in a line oblique to that of the enemy	122	156
Distances between ships in line ahead	75	85
— between ships in line en échelon	100	121
Doubling on a line of ships, modes of resisting the attempt at	114	142
— on an enemy's line, manner of, with sailing ships	108	133
Driver, H.M.S., made the circuit of the earth in 1842-5	23	6
Dynamometer, description of the	47	46
E.		
Echelon formation allows a reciprocal defence from the stern and broadside guns	104	128
— formation advantageous for an attack at either extremity of a fleet in line ahead	121	155
— formation advantageous in respect of the crossing fires of the ships	102	122
— formation is consistent with sound tactics	93	111
—, a fleet <i>en</i> , compared to a retrenched line for an army	102	122
—, double, manner of strengthening a line of battle by	106	130
<i>Echiquier</i> , manner of disposing two lines of ships <i>en</i>	107	132
Enfiladed, or raked, necessity of avoiding being	104	129
Enfilading or raking fire, effective only when near the enemy	117	144
Ereosson, Capt., exhibited on the Thames a steam-vessel with screw-propeller in 1836	24	7
Expansion principle explained	24, 26	8, 10
Enfiladed, ships liable to be, when bearing down directly on an enemy	111	137
F.		
Feather of a screw less than a complete turn of the spiral in breadth	34	27
Feathering of paddle-boards objectionable for ships of war	43	41
—, Mr. Galloway's invention for	39	36
Fleets may be moved in divisions, as armies on land are moved in columns	90	106

INDEX TO WORDS.

151

	PAGE.	ARTICLE.
Fleets of ships, moved both by sail and steam, should perform the evolutions under steam only	84	97
— en échelon not liable to be enfiladed in approaching an enemy	117	144
Formations en échelon, advantage of, for making false demonstrations	121	154
Fouling of a screw by floating materials	63, 64	74-76
— method of diminishing the risk of, previous to action	64	77
Fuel, consumption of, less with the screw than with the paddle, the velocities being equal	59	69
—, economy of, gained by working steam expansively	60	70
—, consumption of, proportional to the number of revolutions of the shaft	60	71
—, economy of, by allowing greater space for expansion	60	72
Fulton executes the 'Clermont' paddle-steamer in America in 1807	23	4
G.		
Galloway, invention of, for feathering paddle-boards ..	39	36
Garay, Capt., pretensions of, to the invention of steam-propulsion	22	3
Gearing, inconvenience of, for steering screw-steamers	57	63
Gunnery, good, might have prevented the British fleet from breaking the line at Trafalgar	113	139
Gun-ports, dimensions of	126	161
Guns may be trained to fire at 37° 30' before the beam	103	125
H.		
Horse-power, estimated value in pounds weight	49	48
—, discrepancy between, and gunnery force in British ships of war	83	95 Note ^a
I.		
Indicator, description of the	44	43
Introduction	vii	..
L.		
Leeward, a fleet to, may decline action	77	88
Line abreast, advance in, is difficult for sailing ships ..	117	144
— should change into line en échelon when near the enemy	117	145
—, a fleet in, may obtain a powerful defence from the fire of the bow-guns	99	120
Line ahead, a fleet in, affords no reciprocal defence ..	103	125
—, single, disadvantage of	120	150
—, a fleet in, may be more advantageously attacked by a steam fleet at the head than at the rear	121	153

152 NAVAL WARFARE WITH STEAM.

	PAGE.	ARTICLE.
Line of battle, reversing the extremities of, a difficult and complex operation	124	157
—, difficulty of penetrating a, from the leeward ..	78	89
—, manner of forming the, with sailing ships ..	75	84
—, reason why ships are close-hauled in the ..	75	85
—, difficulty of penetrating, obviated by steam-propulsion	79	91
— may be strengthened by a double échelon on the centre	106	130
— may be formed by steamers as easily as by an army in the field	98	119
— may be strengthened by ships en échelon on the wings	99, 106	120, 130
Line of bearing defined	73	82 Note.
— should make an angle of 45° with the keels of the ships	100	121
—, double, ships may be formed in, in order to obtain reciprocal defence	97	118
—, double, the wings of, with steamers, may make with each other occasionally less than 90°	97	118
—, sailing ships in, should be close-hauled	75	85
—, with ships en échelon, should be the general order of sailing or steaming	132	167
Lines en échiquier, manner of disposing ships in	107	132
M.		
Marine steam-engines more powerful than formerly ..	27	11
Masts, necessity of still firing at the	85	99
Méleés may occasionally occur in naval actions	126	160
Millar of Dalswinton employed paddle-wheels moved by mechanical means	22	3
N.		
Naval tactics, earliest writers on	73	81 Note.
Niger and Basilisk, experimental trials by the	51	54
Norman head	69	79
O.		
Order of battle, the enemy assumed to be close-hauled in	75	84
—, oblique, manner of forming	118	147
—, oblique, in attack must be formed with ships in line ahead	118	148
—, oblique, two cases of: when fleets move in like directions, and in contrary directions	118	149
—, oblique, may be used at sea as on land	117	146
Order of retreat is in two lines of bearing	95	114
—, defensive, may be converted into an offensive order	97	117
Orders of sailing, in double échelon	95	114-118
—, Paul Hoste enumerates six	73	82

INDEX TO WORDS.

153

	PAGE.	ARTICLE.
P.		
Paddle-board, the upper edge of the lowest, should be on a level with the surface of the water	27	15
Paddle-boards act directly and obliquely on the water	27	14
——, lengths and breadths of	28	17, 19
——, strains on, caused by the oblique action of the water	27	14
——, defects in the common manner of fixing	39	35
—— liable to be too little or too much immersed	40	37
——, the operation of reefing, difficult	41	37 Note.
——, improvements on, by Mr. Field, and in America	43	42
Paddle-wheels, steam-vessels with, first constructed in 1802	22	3
——, diameters of	28	16
—— and the screw are the means of propelling ships by steam-power	27	12
Paddles, feathering, Mr. Galloway's invention	39	36
Paul Hoste, work on Naval Tactics by	73	81
Parallel order of battle renounced in modern tactics	88	105
Piston, the reciprocating motion of the, produces revolving motion in the wheel and screw	27	13
Pitch of a screw defined	33	24
—— increasing, described	37	33
Preventive tiller	55	60
Principles, general, can alone be laid down for attack and defence in naval warfare	125	159
Prometheus and Rattler, experimental trials by the	51	53
Pursuit after victory, a duty in steam-warfare at sea	133	168
R.		
Raking or enfilading fire, can only take place when ships are near one another	117	144
Rattler and Alecto, experimental trials by the	50	50, 51
Rattler and Prometheus, experimental trials by the	51	53
Rattler, screw of the, entangled with warps, nets, &c.	63	75
Reaction of water, force of, against a paddle-board and a screw	33	26
Reserve, a second line of ships should be considered as a	107	132
——, use of a, when the fleet is attacked at the rear	114	142
Resistance of water against paddle-boards	29, 30	20, 21
Reversing ships is difficult and dangerous in line of battle when near the enemy	124	157
Rodney breaks the French line in 1782	76	87
Royal Albert, accident to the	60	73 Note.
S.		
Savannah, steamer, first crossed the Atlantic in 1819	23	6
Screw, the blade or feather of a, defined	33	24
——, action of a, in the water	33	25
——, best form of a, in two halves of a spiral feather	37	33
——, shake of a, injurious in the stern of a ship	41	38
——, effects of a, diminished by the disturbance of the water at the stern of the ship	42	39
——, risk of injury to a, by its being struck by shot	54	59

L

154 NAVAL WARFARE WITH STEAM.

	PAGE.	ARTICLE.
Screw liable to be fouled by floating materials	63, 64	74, 76
——, manner of clearing the obstruction on a	64	78
——, Maudslay and Field's, described	55	61
——, advantage of a, over a wheel	56	62
——, inconvenience of a, from friction when the velocity is great	57	64
——, form of a, producing a diminished shake	60	73
——, manner of hoisting, and replacing a	71	79
Shake of a screw, causes of the	60	73
Ships, small, in advance of a line, the importance of ..	107	131
Ship defined	28	16 Note.
—— is occasionally negative	36, 58	32, 65
Speed, advantage of superior, in the battle of February, 1797	120	152
—— of steamers in the same fleet should be uniform	82	95
—— of steamers increased by increasing the length of the vessel	58	66
Steam-fleet, en échelon, difficulty of penetrating a .. }	110	136
——, manner in which a, might counteract an effort to double it	114	142
Steam-fleets not limited to any line of bearing	94	113
—— should always act offensively	116	143
—— may move to an attack in two divisions	113	140
Steam, importance of, in reaping the fruits of victory ..	128	163
Steam-ships in line of battle may be reversed individually	124	158
Steam-speed, a superiority of, advantageous in making the cross attack	120	151
Steam-power cannot be conveniently combined with wind-power in paddle-wheel ships	42	40
—— cannot be combined with wind-power in the manœuvres of fleets	87, 94	102, 112, 113
Steamers (wheel and screw), objects to be attended to in obtaining their relative values	53	58
Steam-vessels employed on the Thames in 1815	23	5
Steering apparatus for the rudder of a screw-steamer described	54-67	60-79
Stevens, of New York, first took a steamboat to sea, in 1804	23	6
Stockton, Captain, U.S. Navy, constructed an iron steamboat with screw-propeller	24	7
Symington built two steam-vessels in 1802	23	3
T.		
Taylor first employed steam-power to move small wheels	22	3
Tiller, short	69	79
Trochoidal curves are described by the edges of paddle- boards	31	22, 23
Trunk, through which to hoist or lower the screw of a steamer, described	54	60
——, space occupied by the, on each deck	72	79
Trafalgar, peculiar formation of the French and Spanish fleets, at	111	138
V.		
Victoria and Albert, paddles of the, are on the feathering principle	40	37

INDEX TO WORDS.

155

W.	PAGE.	ARTICLE.
Watt, patent for the improved steam-engine taken out by	22	2
Wheel and screw, points to be attended to in finding the relative capabilities of the }	53	58
Wheel, locomotive powers of the, greater than those of a screw with an equal consumption of fuel }	59	68
Widgeon and Archimedes, experimental trial by the . .	50	50
Wladimir, steam-power of the }	46	45
Windward position, advantage of the, for sailing ships	80	92
 Y.		
Yokes employed for steering screw-steamers	54-67	60-97