

**THE CAPABILITY OF STEAM SHIPS,
BASED ON THE MUTUAL RELATIONS OF
DISPLACEMENT, POWER AND SPEED.
ILLUSTRATED BY TABLES, ADAPTED FOR
MERCANTILE REFERENCE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649477692

The Capability of Steam Ships, Based on the Mutual Relations of Displacement, Power and Speed. Illustrated by Tables, Adapted for Mercantile Reference by Charles Atherton

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

CHARLES ATHERTON

**THE CAPABILITY OF STEAM SHIPS,
BASED ON THE MUTUAL RELATIONS OF
DISPLACEMENT, POWER AND SPEED.
ILLUSTRATED BY TABLES, ADAPTED FOR
MERCANTILE REFERENCE**

STEAM SHIP CAPABILITY.

THE
CAPABILITY
OF
STEAM SHIPS;
BASED ON THE MUTUAL RELATIONS OF
DISPLACEMENT, POWER, AND SPEED;
ILLUSTRATED BY
TABLES,
ADAPTED FOR
MERCANTILE REFERENCE.

BY
CHARLES ATHERTON,
MEM. INST. C. E.,
CHIEF ENGINEER ROYAL DOCKYARD, WOOLWICH.

SECOND EDITION

LONDON:
JOHN WEALB, 59, HIGH HOLBORN.
1855.

106. h. 32.

PREFACE.

IN explanation of the object sought to be attained by the publication of the following Treatise, it may be premised that Shipping may now be regarded as in a state of transition; for, though the use of Sail may not be superseded by the agency of Steam, it seems apparent that the co-operation of sail and steam will be universally introduced. Under this aspect of shipping interests, it is desirable that the public have the means of becoming familiar with the mutual relation of Steam-ship Displacement, Power, and Speed, in order that the conditions of Steam-ship mechanical and nautical efficiency may be foreknown, and that the commercial balance account between estimated Speed and Cost may be duly calculated: in short, it is the compound combinations of **DISPLACEMENT, POWER, and SPEED**, in relation to the **COST of FREIGHT**, which constitute the arithmetic of Steam-ship adaptation to the requirements of mercantile service.

Thus, to bring under view the mutual relations of Steam-ship Displacement, Power, and Speed, with reference to the Cost of Freight, is the task that has been attempted in this Essay. The results can only be regarded as approximate; and the system of calculation is admissibly still open to corrective research; but, being based on generalized data, derived from practical experience, it is expected that the **WORK** will present a substantially

correct digest of the CAPABILITIES of Steam as now applied to Navigation ; and that it will point out a course of investigation not hitherto thrown open, and on which much labour may be usefully bestowed.

The primary matter, however, necessarily brought forward for consideration as being the base of all Steam-ship calculations as respects the mutual relation of Power and Speed, and therefore, indispensable to the prosecution of these inquiries, is a proposition for assigning some *definite* and *legalized* STANDARD VALUE to the term HORSE-POWER as the UNIT of power applicable to Steam-ship Navigation ; by which Constant Quantity, marine engine contracts may, as regards the measure of power, be assimilated, and by which the available ENGINE-POWER of all steamers may be duly registered together with the Tonnage and the Displacement of the ship at a given draught ; but this proposition is of a nature that can only be dealt with by legislative authority on representations backed by the greatest commercial weight ; and should this Essay promote the realisation of a step so essential in the progress of *systematizing* the science of Steam-ship construction, and of Steam-ship adaptation and management, its publication will have conduced to public utility in a department of national enterprise of the utmost importance to the manufacturing and mercantile interests of the country.

CHARLES ATHERTON.

Woolwich Dockyard,
1st. March, 1853.

PREFACE
TO THE
SECOND EDITION.

THE Author avails himself of the opportunity afforded by a further issue of this Essay to extend the investigations so as to present a tabular exposition of estimated £ s. d. outlay actually incurred in the conveyance of Cargo per ton weight of cargo conveyed on any given passage, and to shew the degree in which such expenses are affected by *differences* in the Dynamic QUALITY of the Ship employed; also to enter more fully into a consideration of the *limitation* of the superior Dynamic capability which is admitted to be the inherent property of large ships as compared with smaller vessels.

The object of the Author in this publication has been to stimulate inquiry into the comparative qualities and capabilities for transport of Steam-ships and reduce the subject of comparative Steam-ship Capability for goods' transport, to some SYSTEM of Mercantile arithmetic. He does not aspire to having produced a finished work, but merely to have broken up ground in a neglected department of Mercantile pursuit,—the cultivation of which will not fail to be of national importance.

Woolwich Dockyard,
30th. September, 1854.

CONTENTS.

SECTION I., page 1 to 7.—The nominal Horse-power generally referred to in Steam-ship Navigation, and registered as the Engine-power, does not define the Motive-power capable of being developed by the Engines. Necessity for determining upon some specific amount of Power to be assigned to the term Horse-power, and to be legally recognised as the Standard Measure of the UNIT of Power implied by that term.

SECTION II., page 8 to 21.—The recorded test trials and duly authenticated performances of H.M. Steam-vessels RATTLE, FAIRY, ARROGANT, and HOGUE assumed as the base of calculations shewing the differences of Steam-ship locomotive performance which result from differences of Build and of Engine adaptation thereto; illustrated by Tables shewing the mutual relation of Displacement, Power, and Speed in Vessels built on those various types of form respectively.

SECTION III., page 22 to 40.—Tables (Series 1, Nos. 1 to 13) shewing the CAPABILITIES of Steam-ships on the type of H.M. Steam-sloop RATTLE, from 500 to 10,000 tons Displacement, embracing the mutual relation of Displacement, Power, Speed, Weight of Hull and Equipment, Coals, Freight, Time the coals will last, and the Distance capable of being traversed without re-coaling; with deductions shewing the progressively increasing difficulties which attend the realisation of increasing speed.

SECTION IV., page 41 to 60.—The mutual relation of Distance, Speed, Time, Coal, and Cargo; illustrated by Tables (Series 2, Nos. 1 to 13) constructed especially with reference to Passages of 500, 1,000, 2,000, 3,000, 4,500, and 6,000 nautical miles, with deductions shewing the proportional increase of expenses in the Engine department consequent on increasing speed, and the proportional reduction of Freight expenses per ton of Cargo, consequent on increased size of ships.

SECTION V., page 61 to 72.—Investigation as to the comparative extent to which the Cost of Freight *per ton weight of cargo* is affected by differences of original Construction as regards the Locomotive Properties of different ships, or by different degrees of *falling off* in the working condition of the Hull, Engines, and Boilers of the same ship.

SUPPLEMENT, page 73 to 89.—Shewing by approximate £ s. d. estimate, based on assumed data, the actual cost expenses of Freight per ton of Cargo conveyed, as affected by differences in the *Dynamic Quality* of the Hull, the *economic quality* of the Machinery and progressive *increase* in the Size of vessels, including vessels of hypothetical magnitude; also, shewing the superior dynamic capability of large ships compared with smaller vessels for the performance of any given service under the *same conditions* of speed and distance without re-coaling, and investigating the degree in which such superiority of large ships may become neutralized on long passages by the greater facilities for *re-coaling* that may be available to smaller vessels.