

**THE BOILERMAKERS' AND IRON
SHIPBUILDERS' COMPANION:
COMPRISING ORIGINAL AND
CAREFULLY CALCULATED TABLES OF
THE UTMOST UTILITY TO PERSONS
INTERESTED IN THE IRON TRADES**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649138968

The boilermakers' and iron shipbuilders' companion: comprising original and carefully calculated tables of the utmost utility to persons interested in the iron trades by James Foden

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

JAMES FODEN

**THE BOILERMAKERS' AND IRON
SHIPBUILDERS' COMPANION:
COMPRISING ORIGINAL AND
CAREFULLY CALCULATED TABLES OF
THE UTMOST UTILITY TO PERSONS
INTERESTED IN THE IRON TRADES**

T
T
F

Trades

GETO WIDEN

THE
BOILERMAKERS'
AND
IRON SHIPBUILDERS' COMPANION:

COMPRISING A SERIES OF
ORIGINAL AND CAREFULLY CALCULATED TABLES
OF THE UTMOST UTILITY TO PERSONS INTERESTED
IN THE IRON TRADES.

FOURTH EDITION.

BY JAMES FODEN,

AUTHOR OF 'MECHANICAL TABLES.'



107992
7/2/11

E. & F. N. SPON, 125, STRAND, LONDON.
NEW YORK: 12, CORTLANDT STREET.

1892.

P R E F A C E .

In presenting this work to the practical Boilermakers and Iron Shipbuilders of Great Britain and Ireland, I hope they will study it with attention, to enable them to become acquainted with the elucidations of the practical examples which are given in the observations accompanying each section, as it is the result of my leisure hours, and has been accomplished by the aid of the lamp after the labours of the day, and is a humble effort to remove many difficulties under which they have laboured for the want of a more general knowledge of the practical part of their business.

The purport of the work is to impart knowledge to all those requiring it; because the value of mechanical science is most appreciated on account of the ease with which the workman can perform and lay out his work in a practical and scientific manner.

In the various rules and examples given in the work, I have taken care to present them in the most simple manner, so that there may be nothing discouraging by any unnecessary display of formulas. All may understand who are familiar with the four rules of arithmetic—Addition, Subtraction, Multiplication, and Division.

Some men, of contracted minds, think it unwise to impart a general knowledge of business to all—but I think otherwise. The practical man should be learned in all things relative to his trade, to enable him to do and finish a piece of work in a business-like manner.

I have given in the work all the requirements for constructing templates for cylindrical boilers, consisting of conic frustrums, egg-end boilers, domes, barrels &c., and I hope that my humble efforts will be appreciated by those workmen who are employed in the construction of them.

In conclusion, let me remind the practical man that the science of mechanics is the greatest of all sciences; it teaches the mind to think correctly, and produces that intellectual enjoyment which no other study can impart.

JAMES FODEN.

PREFACE TO THE SECOND EDITION.

The very favourable reception which the first edition of the Boilermakers' and Iron Shipbuilders' Companion has received has induced me to undertake an entire revision of the work, in order to render it as complete and accurate as possible. The rules given in this edition, it is hoped, will prove invaluable to any person desirous of obtaining a thorough knowledge of his trade.

I am, with all respect,

Your servant,

JAMES FODEN.

CONTENTS.

SECTION 1.	Page.
Tables of lengths for the formation of circular and oval angled iron rings, flange outside, from 6 inches to 8 feet 8½ inches diameter, and ½ inch to 1¼ inch thick	1
SECTION 2.	
Tables of lengths for the formation of circular and oval angled iron rings, flange inside, from 6 inches to 8 feet 8½ inches diameter, and ½ inch to 1¼ inch thick.	57
SECTION 3.	
Tables for the formation of circular and oval pipes, from 1 inch diameter to 2 feet 8½ inches, made of iron plates from ⅜ inch to ½ inch thick.	113
SECTION 4.	
Tables of diameters and circumferences for the formation of plain hoops and rings, from ⅜ inch diameter to 16 feet	129
SECTION 5.	
Tables for the formation of templates for tubes, flues, and boilers, from 2 feet to 10 feet diameter, made of iron plates from ⅞ inch thick to ½ inch, giving the versed line for 770 templates, with instructions to find the versed line by calculations.	143
To find the template for a given cone.	176
To find the template for a given frustum of a cone.	176
To find the template for a given cylinder, having a portion cut off, so that one of the ends shall be at a given angle to its sides.	177
To find the breadth of template for a given dome at any particular place, by calculation	178
To find the template for a given short egg-end spherical	179
To find the template for a given long egg-end parabola, the breadth and length of the template at any particular place	182
To find the template for a given barrel spheroid, with the breadth and length of the template at any particular place, by calculation	184

vi.

SECTION 6.

Approximate rules for finding the weight of different figures of wrought iron and steel	- 187
Weight of a cubic foot and cubic inch of wrought iron and steel	- 189
Weight of boiler plates per square foot, from $\frac{1}{2}$ inch to $1\frac{1}{2}$ inch thick in qrs. and lbs.	- 189
Weight of malleable round iron, from 1 foot to 5 feet in length, in qrs. and lbs.	- 190
Weight of malleable square iron, from 1 foot to 5 feet in length, in qrs. and lbs.	- 191
Weight of malleable flat iron, from 1 foot to 5 feet in length, in qrs. and lbs.	- 192
Weight of ordinary angled iron from 1 foot to 7 feet in length, in qrs. and lbs.	- 196
Weight of a superficial square foot of plate or sheet iron in lbs. and ounces; thickness measured by the Birmingham wire gauge	- 198
For ascertaining the weight of malleable iron pipes, 12 inches long, of various thicknesses and diameters	- 198

SECTION 7.

To find the area of a four-sided figure, whether it be a square, a rectangle, a rhombus, or a rhomboid	- 199
To find the area of a triangle, whether it be isosceles, scalena, or right-angled	- 200
Any two sides of a right-angled triangle being given, to find the third side	- 200
To find the area of a trapezoid	- 202
To find the area of a trapezium	- 202
To find the circumference of a circle when the diameter is given, or the diameter when the circumference is given	- 202
The area of a circle given, to find the diameter or circumference	- 203
To find the circumference of an ellipse or oval	- 204
To find the area of an ellipse or oval	- 205
To find the superficies and solidity of a cube	- 205
To find the superficies and solidity of a parallelepipedon	- 206
To find the solidity of cylinders and prisms	- 206
To find the convex surface of a cylinder	- 207
To find the solidity of a cone or pyramid	- 207
To find the solidity of the frustum of a cone	- 207

VII.

To find the solidity of the frustum of a pyramid	-	-	-	208
To find the convex surface of a right cone or pyramid	-	-	-	208
To find the convex surface of the frustum of a right cone or pyramid	-	-	-	208
To find the solid content and convex surface of a sphere or globe also to find the solid content and convex surface of the segment of a sphere or globe	-	-	-	209
To find the number of imperial gallons contained in any square or rectangular cistern or tank	-	-	-	211
Any two dimensions of a square or rectangular cistern or tank being given, to find the third that shall contain any number of imperial gallons required	-	-	-	211
To find the content of a cylinder in imperial gallons	-	-	-	212
The length of a cylinder given, to find the diameter, or the diameter given, to find the length that shall contain any number of imperial gallons required	-	-	-	213
To find the content of a sphere or globe in imperial gallons	-	-	-	213
To find the weight of a cubic or cylindrical foot of water	-	-	-	214
To erect a perpendicular on a given right line from a given point in that line	-	-	-	214
To bisect a given line	-	-	-	214
To bisect a given angle	-	-	-	215
To draw a line parallel to a given line	-	-	-	215
To draw an oval of the first kind, having the length given	-	-	-	215
To draw an oval of the second kind, having the length given	-	-	-	216
To construct a regular hexagon upon a given right line	-	-	-	216
To cut off the corners of a given square so as to form an octagon	-	-	-	216
To draw a parabola by finding any number of points in the curve	-	-	-	217
To draw the curve line of an arc without having resource to the centre	-	-	-	217
To describe an ellipse, having two diameters given	-	-	-	217
To describe the template for a given diameter of sugar pan of the spherical form	-	-	-	218
To cut the selvage of a plate required to form a given cylinder, which is to be flanged, and made to fit a given circle	-	-	-	219
Table of strengths of steel and iron	-	-	-	220
To find the ultimate cohesive strength of square, flat, and round bars	-	-	-	220
Table containing the fractional parts of an inch when divided into thirty-two parts, also a foot of twelve inches reduced to decimals	-	-	-	221
Tempering steel tools	-	-	-	222
Case hardening	-	-	-	222

