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A Memoir on Suspension Bridges

Published in 1832, this was the first English textbook dedicated to the topic of suspension bridges in Britain and continental Europe. Having assisted the naval officer and civil engineer Samuel Brown in preparing plans for the Clifton Suspension Bridge, Charles Stewart Drewry (1805–81) used information supplied directly by his engineering contemporaries to give an overview of the principles and challenges involved in the construction of suspension bridges. A key reference for the early history of this type of structure, the book discusses various methods and materials, ranging across rope, wood, chain and wire. Details regarding experiments on the strength of iron bars and wires are also given. Enhanced by lithographic plates and woodcut illustrations, the work is notable for its discussion of many examples of important bridges, such as Thomas Telford's Menai Suspension Bridge and the first such construction over the Thames at Hammersmith, as well as designs from overseas.

A Memoir on Suspension Bridges

Comprising the History of Their Origin and Progress, and of Their Application to Civil and Military Purposes

Charles Stewart Drewry

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University Printing House, Cambridge, CB2 8BS, United Kingdom

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It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781108070539

This edition first published 1832
This digitally printed version 2014

ISBN 978-1-108-07053-9 Paperback

A

MEMOIR

ON

SUSPENSION BRIDGES,

COMPRISING THE

HISTORY OF THEIR ORIGIN AND PROGRESS,

AND OF

THEIR APPLICATION TO CIVIL AND MILITARY PURPOSES;

WITH

Descriptions of some of the most important Bridges;

VIZ.

MENAI; BERWICK; NEWHAVEN; BRIGHTON; ISLE DE BOURBON; HAMMERSMITH; BATH; MARLOW; SHOREHAM; PONT DES INVALIDES AT PARIS; PONT D'ARCOLE; JARNAC; TOURNON; GENEVA, ETC.

ALSO

AN ACCOUNT OF EXPERIMENTS

ON

THE STRENGTH OF IRON WIRES AND IRON BARS

AND

RULES AND TABLES FOR FACILITATING COMPUTATIONS

RELATING TO

SUSPENSION BRIDGES.

ILLUSTRATED BY LITHOGRAPHIC PLATES AND WOOD-CUTS.

BY

CHARLES STEWART DREWRY,

ASSOCIATE MEMBER OF THE INSTITUTION OF CIVIL ENGINEERS.

LONDON:

PRINTED FOR

LONGMAN, REES, ORME, BROWN, GREEN, & LONGMAN

PATERNOSTER-ROW.

1832.

TO

COMMANDER SAMUEL BROWN, R.N.

THIS WORK IS INSCRIBED

BY HIS OBLIGED FRIEND,

THE AUTHOR.

LONDON.
Printed by A. and R. Spottiswoode,
New-Street-Square.

PREFACE.

THE great extension that has been given, within the last ten years, to Suspension Bridges, and the hold they have acquired on public attention, have begun to render them so much an object of general as well as professional interest, that the want of something like a methodical treatise on them is beginning to be felt. Accounts of the most remarkable Suspension Bridges have been published, at various times, in scientific Journals; and investigations of parts of the theory are to be met with in works on other branches of mechanical science. But, except a very short work by Mr. Cumming, and the account of the erection of the Menai Bridge, by Mr. Provis, we have no book in the language treating exclusively of Suspension Bridges. A blank is thus left in professional literature, which it has been the attempt of the Author to fill up.

His object, therefore, in the following pages, has been to collect into one volume whatever he could find interesting and useful on Suspension Bridges; *viz.* first, to draw up a connected account of the History of Suspension Bridges, followed by descrip-

tions of the most important works of that class. Secondly, to draw from the practice of eminent Engineers inferences useful to those who have not opportunities of acquiring, by practice, a knowledge of Suspension Bridges; and to apply to this branch of engineering, rules which have been established by long practice in other departments of mechanical construction.

In a work of this character, much, particularly in the descriptive part, must, from its very nature, be compilation; and, accordingly, much has been selected from the scattered information communicated by other writers, in detached accounts, and in Papers and Reports printed in various scientific Journals.

To the writers of whose previous labours the Author has thus availed himself, he takes this opportunity of acknowledging his obligations; and as he has generally been careful to cite his authorities, his readers will know both to whom to assign the credit, and where to find the originals, if they desire so to do.* He has great pleasure, in particular, in expressing how much he is indebted to Captain S. Brown, R.N., Mr. W. Tierney Clark, and Mr. Brunel, jun., for the kindness with which they have communicated to him information on their works.

For the few opinions and rules which proceed from the Author himself, as they have no established authority to support them, so they will, of course, be

* A list of the works cited and referred to is subjoined.

received with doubt, and examined with severity. The method which he has pursued in forming the rules has been to establish some mode of calculation on the groundwork of experiments, and on the received principles of the strength of materials; and then to modify the formula so constructed, until its results would correspond tolerably with the proportions adopted in practice in the best existing examples of Suspension Bridges. This method is not, perhaps, the most scientific, but it is sufficient for practical purposes, because the object of rules, in practical construction, is to find results for new cases, proportionate to those that time has stamped as sufficient in previous practice. Experience, therefore, alone can determine how far the rules given are efficient; and if, upon trial, they are found to be so, the object of the Author will be attained.

Chancery Lane, London,
September, 1832.

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LIST OF THE BOOKS AND PAPERS

CITED IN THE FOLLOWING WORK.

W. A. Provis. Account of the Erection of the Menai Bridge, in folio. London. 1828.

Stevenson. A Paper on Suspension Bridges. Edinburgh Phil. Journ. No. 10.

Captain Brown. Account of Trinity Pier. Edinburgh Phil. Journ. No. 11.

Navier. Mémoire sur les Ponts Suspendus. Paris: Bachelier.

Seguin. Sur les Ponts Suspendus. Paris: Bachelier.

Quenôt. Description du Pont de Jarnac. Paris: Bachelier.

Vicât. Description du Pont d'Argentât. Paris: Bachelier.

I. von Mitis. An Account of a Steel Suspension Bridge at Vienna. Published in German.*

Professor Barlow. Essay on the Strength and Stress of Timber. London.

Farey. Treatise on the Steam Engine. London.

Dufour. Description du Pont en Fil de Fer à Genève. Paris: Bachelier.

Symes. Account of Brighton Pier. Brighton.

Buchanan. Report on a Suspension Bridge proposed at Montrose. Edinburgh Phil. Journ. Nos. 21. and 22.

Parliamentary Reports on the Menai Bridge.

Dr. Gregory. Mathematics for Practical Men. London.

* A copy is in the library of the Institution of Civil Engineers.

ERRATA.

Page 19. line 1. of note, for "in art. 28." read "in art. 29."
26. note, for "Stephenson" read "*Stevenson.*"
61. last line of note, for "art. 33." read "art. 32."
69. line 10. from bottom, for "256 feet" read "255 feet."
89. lines 9. and 10. from bottom, for "by coupling links" read "by *open* coupling links."
91. lines 15. and 16. for "2 persons per square foot" read "1 person per 2 square feet."
95. the small figure, which is an end or cross view of the bridge, is placed upside down.
102. last line but one, for "square inches +" read "square inches ×."
106. line 12., for "+ 8" read "× 8."
111. line 21., for "on *the* two lines" read "on two lines."
139. line 6., for "joints," read "joists."
170. for "The strain on the point A, for instance $= \frac{A\ e \times \frac{1}{2}\text{weight}}{1\ b\ e}$" read "$\frac{A\ e \times \frac{1}{2}\text{weight}}{b\ e}$."
179. line 13. from bottom, for "in page 162." read "in page 167.
189. line 3., for "by the foregoing rule" read "by the standard of 70 lbs. per square foot of platform."
194. for "Then the breadth $= \sqrt{\frac{56000 \times 20}{250 \times 1296}}$" read "$\frac{56000 \times 20}{250 \times 1296}$."
201. line 5. from bottom, for "in art. 192." read "in art. 194."