PRINCIPLES OF MECHANICS, AND THEIR APPLICATION TO PRIME MOVERS, NAVAL ARCHITECTURE, IRON BRIDGES, WATER SUPPLY, &C.; BEING AN ABSTRACT OF LECTURES

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649535545

Principles of Mechanics, and Their Application to Prime Movers, Naval Architecture, Iron Bridges, Water Supply, &c.; Being an Abstract of Lectures by W. J. Millar

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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Trieste

PRINCIPLES OF MECHANICS,

AND THEIR APPLICATION TO

PRIME MOVERS, NAVAL ARCHITECTURE, IRON BRIDGES, WATER SUPPLY, &c.

THERMODYNAMICS, WITH SPECIAL REFERENCE TO THE STEAM ENGINE.

BEING AN ABSTRACT OF LECTURES

DELIVERED TO

THE CLASS OF CIVIL ENGINEERING AND MECHANICS IN THE UNIVERSITY OF GLASGOW, SESSION 1872-73.

BY

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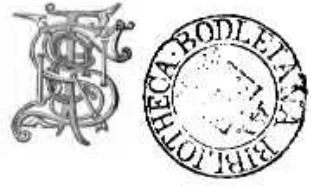

LONDON:
E. & F. N. SPON, 48, CHARING CROSS.
NEW YORK:
446, BROOME STREET.
1874.

PREFACE.

As indicated on the title-page, the subjects treated of in this book constituted in a more extended form a series of Lectures delivered to the Class of Civil Engineering and Mechanics in the University of Glasgow during the latter part of session 1872–73.

Shortly after the death of Professor Rankine, the author was appointed to conduct the class referred to during the Professorial vacancy; and the various subjects treated of formed part of the complete course as entered in the syllabus of the class.

It having occurred to the author that a carefully-revised abstract of these Lectures might be of use to students and others studying the various subjects treated of, the work as contained in the following pages is the result.

The subjects have been treated of as concisely as possible, numerical illustrations being occasionally given to assist the reader.

Various authorities have been consulted in the preparation of the present work; amongst others,

Professor Rankine's Works;
Moseley's Engineering and Architecture;
Fairbairn's Mills and Millwork;

Deschanel's Natural Philosophy, by Prof. Everett;
Shipbuilding in Iron and Steel (Reed);
Transactions Inst. Civil Engineers;
Transactions Inst. Engineers and Shipbuilders in Scotland;
Transactions Inst. Naval Architects;
Report (British Assoc.) Sea-going Qualities of Ships, 1869;
Annual of the Royal School of Naval Architecture and Marine Engineering;

and the various Engineering and Scientific periodicals, &c.

W. J. M.

GLASGOW, *October*, 1874.

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PRINCIPLES OF MECHANICS.

ENERGY.

THE meaning of the term energy is capacity for performing work, or of overcoming resistance. This term has been further distinguished as follows:—

1. Potential energy, which means a capacity or ability to perform work in virtue of position.

Example.—A weight of 10 lbs. placed at a height of 10 feet above the ground, is said to have 10×10 foot pounds of potential energy.

2. Actual energy, or the capacity of performing work in virtue of motion against a resistance. This term applies to moving bodies, and is expressed by the symbol $\frac{W v^2}{2g}$, where W represents the weight of the body in lbs., v the velocity of feet per second, and g equal to the force of gravity at the earth's surface; or generally, $g = 32{\cdot}2$.

Example.—A body weighing 10 lbs. is moving with a velocity of 10 feet per second; then the actual energy of the body is $= \frac{10 \times 10^2}{2 \times 32{\cdot}2} = 15{\cdot}5$ foot pounds. The symbol $\frac{v^2}{2g}$ represents the height through which a body would fall to acquire the velocity v.

The general expression of the law of energy is, that