ELEMENTS OF HYDRAULICS: A TEXT-BOOK FOR SECONDARY TECHNICAL SCHOOLS

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Elements of Hydraulics: a Text-Book for Secondary Technical Schools by Mansfield Merriman

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Trieste

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HYDRAULICS

A TEXT-BOOK

FOR SECONDARY TECHNICAL SCHOOLS

BY

MANSFIELD MERRIMAN

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PREFACE

In the following pages the attempt is made to give a presentation of the subject of hydraulics without the use of higher mathematics. The degree of preparation required of the reader is merely that now given in high schools, and includes only arithmetic, algebra, trigonometry, and an elementary course in mechanics. In particular the author has had in mind the students in the upper classes of secondary technical schools, and it has been his aim to present the subject in such a manner that it may be readily comprehended by them.

It is believed that the essential principles and methods of hydraulics have been covered, although an expert can easily criticise the book on the ground that certain topics have been inadequately treated or omitted altogether. While it has been harder for the author to decide what should be omitted than what should be included, it has been his intention to discuss, as fully as seemed consistent with the assigned limit of space, those topics which are of greatest importance in practical engineering work.

MANSFIELD MERRIMAN.

NEW YORK, October, 1912.

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ELEMENTS OF HYDRAULICS

CHAPTER 1

HYDROSTATICS

ARTICLE 1. UNITS OF MEASURE

Hydraulics is that science which treats of water in motion. Hydrostatics is that part of hydraulics which treats of the equilibrium and pressure of water for the case when it is at rest. The unit of linear measure used in this book is the foot, while inches must always be reduced to feet for use in the hydraulic formulas. The units of volume are the cubic foot and the gallon, but the latter must always be reduced to cubic feet for insertion in the formulas. The gallon used in the United States contains 231 cubic inches, while in Great Britain the Imperial gallon is employed which is about 20 percent larger.

The unit of force is the pound, or the force exerted by gravity at the surface of the earth on a mass of matter called the avoirdupois pound. This unit is also used in measuring weights and pressures of water. The intensity of pressure is usually measured in pounds per square inch. The unit of time to be used in all hydraulic formulas is the second, although in numerical problems the time is often stated in minutes, hours, or days. Velocity is defined as the space passed over by a body in one second under the condition of uniform motion, so that velocities are to be always expressed in feet per second, or are to be reduced to these units if stated in miles per hour or

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