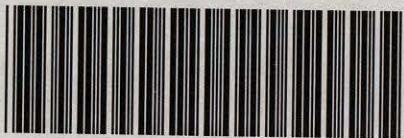


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Waverly Press, Baltimore, Md.

PREFACE TO FIRST EDITION

This treatise is designed for practicing engineers and contractors, and also for a text and reference book on concrete for engineering students.

To broaden the scope of the work and avoid personal inaccuracies, each chapter has been submitted for criticism to at least one, and, in some cases, to three or four specialists in the particular line treated. We have aimed to refer by name to all authorities quoted, and where the data is taken from books or periodicals, to give the original publication, so that each subject may be investigated further. Proof clippings have also been submitted for approval to those whose names are mentioned. Numerous cross references will be found as well as many repetitions, inserted for the purpose of emphasizing important facts.

The chapters are arranged for convenience in reference, and therefore are not always in logical order.

The Concrete Data in Chapter I presents a list of definitions of words and terms relating distinctively to cement and concrete; a summary of the most important facts and conclusions, with references to the pages discussing them; data on concrete labor, and conversion ratios.

The Elementary Outline of the Process of Concreting, Chapter II, is designed, not for the civil engineer, but for those seeking simple directions as to the exact procedure in laying a small quantity of concrete. Most of the subjects there treated are discussed at length in subsequent chapters.

The Specifications for Cement in Chapter III include the latest recommendations of committees of our national societies, with incidental changes to adapt them for direct use in purchase specifications. The Concrete Specifications have been prepared by the authors to represent standard practice. Specifications for First-class or High Steel, drawn up by Mr. Taylor, are, we believe, the first recommendations which have been made to safely adapt this important material to reinforced concrete construction.

In Chapter IV the Choice of Cement is considered in an elementary fashion, which will serve as a guide to the constructor. Classification of Cements, Chapter V, distinguishes the various cements and limes manufactured in the United States and Europe.

Mr. Spencer B. Newberry, an international authority on the subject treated, has very kindly written for us Chapter VI on the Chemistry of Hydraulic Cement, discussing this complex subject in such a clear and practical manner that it will be of interest not only to the scientist, but also to the general reader and to the cement manufacturer. Mr. Newberry has also criticised Chapter V.

Chapters VII and VIII give the latest information on the testing of cement. Chapter IX presents practical rules for selecting sand for mortar, and the effect of different sands and of foreign ingredients upon its quality. Characteristics of the Aggregate are further treated, and practical data in regard to it are given in Chapter X.

The subject of Proportioning Concrete has been treated, at our request, by Mr. William B. Fuller, the concrete expert, and his practical use of mechanical analysis is fully discussed.

The tables of Quantities of Materials for Concrete and Mortar, in Chapter XII, and the diagram of curves, will be found useful in estimating materials.

The Strength of Concrete, Chapter XX, is taken up from a practical standpoint so that the data may be directly employed in design.

The theory and design of reinforced concrete are as yet in an elementary stage, but the rules and tables in Chapter XXI represent the most advanced knowledge on the subject.

Practical methods of Mixing and Laying Concrete are treated in Chapters XIII, XIV and XV.

Mr. René Feret, of Boulogne-sur-Mer, France, whose extended researches enable him to speak with authority, has kindly written for us Chapter XVI, entitled The Effect of Sea Water.

Chapters XVII, XVIII and XIX, on Freezing, Fire and Rust Protection, and Water-Tightness are of practical interest to the contracting engineer.

Plain and Reinforced Concrete Structures are treated in as much detail as space permits in Chapters XXIII to XXVIII inclusive. The designs are taken mostly from original drawings redrawn by the authors. They have been selected, not as extraordinary productions, but because the data in regard to them may be of use in designing similar structures.

Methods of Cement Manufacture in its modern types are described in detail in Chapter XXX.

The References in Chapter XXXI will be found especially valuable to one pursuing more extended investigations than can be presented in a volume of this size.

They have been selected from the large number contained in the authors' index, as those which it may be to the advantage of the reader to consult.

NOTE: The chapter numbers have been changed to agree with the Second Edition.

The articles are usually described by their subject-matter rather than by their titles verbatim.

Appendix I gives the method of chemically analyzing cement and cement materials according to the recommendations of the American Chemical Society.

Additional formulas for reinforced concrete beams, too complicated for insertion in the body of the book, are given in Appendix II, these having been kindly compiled by Prof. Frank P. McKibben for this treatise.

The authors desire to express their sincere appreciation of the various kindnesses extended to them while compiling the work. It has been necessary, because of the lack of authoritative information on many fundamental questions, not only to conduct numerous original investigations, but also to correspond with the most prominent engineers in this country, and with experts in England, France, and Austria.

Mr. Feret, besides writing the chapter on The Effect of Sea Water, has kindly criticised Chapter IX, and made numerous suggestions which have been incorporated.

Mr. Fuller has examined and criticised all the chapters on practical construction, and Prof. McKibben has rendered material assistance in the line of investigations and criticisms relating to the theories of reinforced concrete.

The authors are indebted to many gentlemen for careful criticism of chapters or portions of chapters, for drawings, or for replies to questions, and take this opportunity to express their sincere appreciation of all such assistance. Among those to whom especial acknowledgment is due are the following:

Messrs. Earle C. Bacon, David B. Butler (England), Harry T. Buttolph, Howard A. Carson, Edwin C. Eckel, William E. Foss, George B. Francis, John R. Freeman, Charles S. Gowen, Allen Hazen, Rudolph Hering, James E. Howard, Richard L. Humphrey, A. L. Johnson, George A. Kimball, Robert W. Lesley, Alfred Noble, William Barclay Parsons, Henry H. Quimby, George W. Rafter, Ernest L. Ransome, Clifford Richardson, Thomas F. Richardson, A. E. Schutté, W. Purves Taylor, Edwin Thacher, Leonard C. Wason, George S. Webster, Robert Spurr Weston, Joseph R. Worcester; and Professors Ira O. Baker, Lewis J. Johnson, Edgar B. Kay, Gaetano Lanza, Charles L. Norton, Charles M. Spofford, George F. Swain, Arthur N. Talbot.

Cuts have kindly been furnished by Allis-Chalmers Co., Austin Manufacturing Co., Automatic Weighing Machine Co., Bonnot Co., Bradley Pulverizer Co., Clyde Iron Works, Contractors Plant Co., Drake Standard

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Machine Works, Fairbanks Co., Falkenau-Sinclair Machine Co., Farrel Foundry and Machine Co., Iroquois Iron Works, Kent Mill Co., Link-Belt Engineering Co., McKelvey Concrete Machinery Co., W. F. Mosher & Son, Tinius Olsen and Co., Philadelphia Pneumatic Tool Co., Thos. Prosser and Son, Ransome Concrete Machinery Co., Riehlé Bros. Testing Machine Co., Robins Conveying Belt Co., Sherburne and Co., T. L. Smith, Henry Troemner, Tucker and Vinton.

FREDERICK W. TAYLOR.
SANFORD E. THOMPSON.

February, 1905.

The writer wishes to state that the investigation and study necessary for the writing of this book were done by his colleague, Mr. Thompson, and desires that full credit for this should be given to him.

FREDERICK W. TAYLOR.

PREFACE TO SECOND EDITION

The second edition aims to cover the developments in the design and construction of reinforced concrete since the issue of the first edition. To accomplish this, more than 200 pages of entirely new and original text and tables have been added, giving to the constructing engineer, the architect, and the contractor data for design and for building, and to the student a comprehensive and practical text and reference book.

One of the principal objects also in writing and in revising the book has been to make it useful to those men who are practically engaged in this class of work and yet who are unable to devote enough of their time to make either a profound or an original study of it. Attention is directed to the new Chapter I, in which many of the essentials of concrete construction are pointed out and the reader is warned against the serious errors that have frequently been made in this field.

The chapter on Reinforced Concrete Design, which is increased from 51 to 131 pages, includes a comprehensive statement of the details of design. Features of special interest in this chapter are the treatment of column design; the discussion of shear and diagonal tension; the design of the supports of beams and girders; the treatment of bending moments; the design of flat plates; the most recent tests on hooked bars; the analysis of shrinkage and temperature reinforcement; and careful notes relating to many smaller though not less important details. Tables and diagrams for design covering over 20 pages are prepared for office use. A complete example of floor design gives the mathematical computations in detail for all the parts of the several members.

In subsequent chapters are treated the designs of retaining walls, footings, culverts, and chimneys.

Prof. Frank P. McKibben has kindly prepared the chapter on Arches, which presents the design of the arch by the elastic theory and gives a complete example with all the steps to be followed.

In Chapter XXIX brief reference is made to a variety of structures in which concrete is employed as the building material.

Prominent among the changes in the first part of the book, which is devoted to plain concrete, are the revised Specifications for Cement and Con-

crete in Chapter III; Chapter IX on Proportioning; the enlargement of Chapters XIV and XV on Mixing and Depositing; the addition on pages 236 and 237 of tables for quantities of materials for rubble concrete; and the insertion of the most recent tests and conclusions on the strength and permeability of concrete. The list of references in Chapter XXXI has been increased over fifty per cent, new references having been carefully selected from the immense quantity of current literature published since the first issue of our book.

The large increase in the quantity of material has necessitated a rearrangement of the matter and beyond page 235 the pages have been renumbered. To simplify the formulas, the demonstrations have been placed as far as possible in footnotes or appendices. By the use of a thinner but higher quality of paper the book is increased but slightly in size.

The authors desire to express their appreciation of assistance rendered in the work of revision. Special acknowledgment is due to Messrs. E. D. Boyer, R. D. Bradbury, William B. Fuller, Frank P. McKibben, Spencer B. Newberry, George F. Swain, Arthur N. Talbot, and Joseph R. Worcester; also to Mr. Edward Smulski for his original studies for the matter on Reinforced Concrete Design.

September, 1909

FREDERICK W. TAYLOR.
SANFORD E. THOMPSON.

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