

THE
STEEL
FOUNDRY

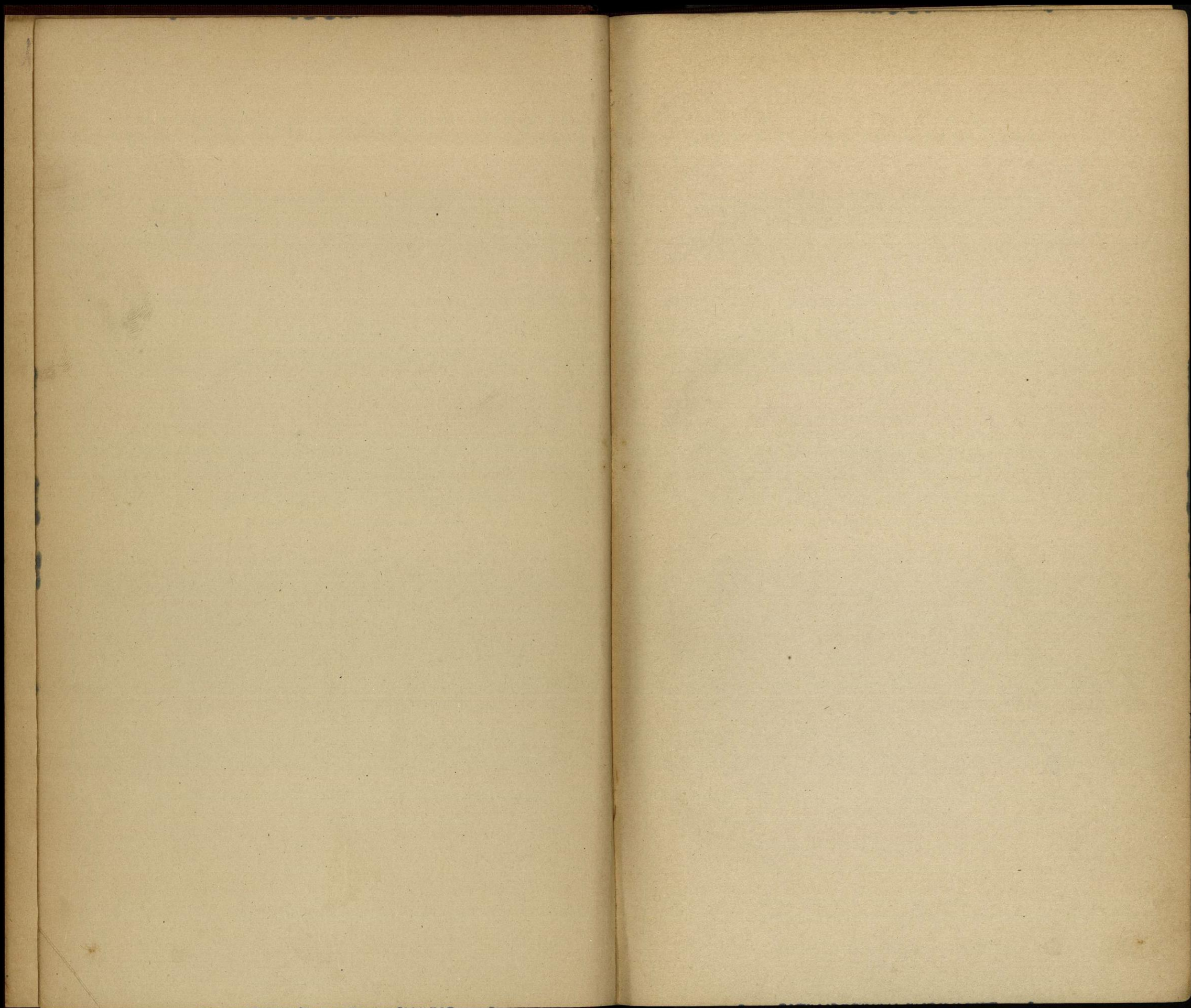
—
HALL

TN730
H23

072
H
MCGRAW-
HILL



1020061151



THE STEEL FOUNDRY

THE STEEL FOUNDRY

BY
JOHN HOWE HALL
CONSULTING ENGINEER



FIRST EDITION

McGraw-Hill Book Company

Publishers of Books for

Electrical World	The Engineering and Mining Journal
Engineering Record	Engineering News
Railway Age Gazette	American Machinist
Signal Engineer	American Engineer
Electric Railway Journal	Coal Age
Metallurgical and Chemical Engineering	Power

McGraw-Hill Book Company, Inc.
239 West 39th Street, New York
6 Bouverie Street, London, E. C.
1914

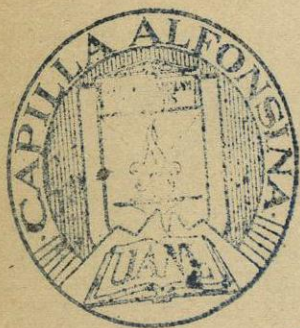
27464

H
672

TN730

H23

COPYRIGHT, 1914, BY THE
MCGRAW-HILL BOOK COMPANY, INC.



ACERVO GENERAL

127340

THE MAPLE PRESS YORK PA

To
HENRY MARION HOWE, LL. D.
UNDER WHOSE INSPIRING GUIDANCE IT HAS BEEN
MY GOOD FORTUNE TO WORK—THIS BOOK
IS AFFECTIONATELY DEDICATED

PREFACE

In this work the object has been to set forth the metallurgy of the steel foundry from the point of view of the engineer who keeps constantly in mind that his is a profession whose usefulness consists in prescribing the cheapest means of producing objects or structures of sufficient excellence for the purposes for which they are intended. The aim of the engineer in his work should be three-fold—to produce an article that will completely serve its purpose, to provide in the object the highest excellence that is justified by the use for which it is intended (and hence the price that can be paid for it), and to produce these objects at the least possible expense.

In the present volume are considered the classes of steel castings that are in demand in this country to-day, and their characteristics from a manufacturing point of view; the types of steel-making processes that are in use, and their characteristic features, such as relative cost of installation, relative cost and quality of steel produced, etc., that prescribe the use of one or another for manufacturing the sort of castings desired; and the procedure throughout the shop, such as moulding, pouring, annealing, etc., in the light of its influence on the quality and cost of the product. It is the hope of the author that this volume will prove of interest and benefit to steel foundry metallurgists and superintendents, and to the managers, officers and stockholders of existing or projected foundries; and to their judgment he submits these pages, hoping to be repaid for the labor of authorship by the knowledge that they have assisted to some degree the efforts of his co-workers in the great field in which we all labor.

The author wishes especially to thank Professor Joseph W. Richards, Professor Albert Sauveur, Professor Henry M. Howe, and Mr. Arthur Simonson for valuable advice and counsel; and Mr. A. H. Jameson and the David Williams Company for permission to reprint the article from the "Iron Age" on the building-up of impurities in steel. Certain of the micrographs and data in the chapter on heat-treatment have already been published in the author's papers before the American Institute of Mining Engineers and the American Society for Testing Materials; they are republished here with more detailed comment and explanation.

New York City, January, 1914.

CONTENTS

CHAPTER	PAGE
PREFACE	v
I. INTRODUCTORY	i
II. GENERAL CONSIDERATIONS GOVERNING THE CHOICE OF A METHOD OF STEEL MAKING	6
III. THE CRUCIBLE PROCESS	33
IV. THE BESSEMER PROCESS	66
V. THE OPEN-HEARTH PROCESS	113
VI. THE ELECTRIC FURNACE	170
VII. SUMMARY—SPECIAL DEOXIDIZERS—LADLES	196
VIII. MOULDING, POURING AND DIGGING OUT	201
IX. HEAT TREATMENT AND ANNEALING	220
X. FINISHING, STRAIGHTENING AND WELDING	252
XI. LABORATORIES	255
XII. "BUILDING UP" IMPURITIES IN STEEL	258
INDEX	261