

To the fellow officers of my department I am indebted for much valuable aid, particularly to Messrs. Bradley Stoughton, instructor in metallurgy, and I. C. Bull, assistant.

To nobody am I more indebted than to my assistant, Mr. R. W. Page, for his painstaking and intelligent aid in preparing the work and in passing it through the press.

The reader should have tolerantly in mind the difficulty of preparing a work to-day dealing with the metallography of iron, with our knowledge at once so fragmentary and so rapidly growing. To keep the work fully up to every latest development of this knowledge would mean publishing it on the Greek kalends.

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COLUMBIA UNIVERSITY  
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#### PREFACE TO THE SECOND EDITION

IN preparing this edition, besides making a few minor corrections and other changes, I have added the classification and definitions of iron and steel which Professor Sauveur and I made for the International Association for Testing Materials; I have described and discussed the Roe puddler, the Mond gas-producer (very briefly), and the Gayley dry-blast process; and rewritten the part relating to the transition substances, martensite, troostite, and sorbite. Here a puzzling question arose. In a view of the fact that, of the students for whose use this work is chiefly designed, twenty would hereafter practice civil, mining, mechanical engineering or chemistry, for every one who would practice metallurgy, ought I to complicate further this already very complex subject by insisting on the part played by the still hypothetical *beta* iron, or simplify it by slurring over this allotropic form, and treating these transition substances as simply mechanical mixtures, in varying proportions and varying states of aggregation, of the three known primary substances, austenite, ferrite and cementite? I have followed the latter course, though not without grave misgivings.

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