

GRUNDZÜGE DER SIDEROLOGIE, ZWEITER THEIL: ZUSAMMENHANG ZWISCHEN THERMISCHER UND MECHANISCHER BEARBEITUNG, KONSTITUTION UND EIGENSCHAFTEN DER EISENLEGIRUNGEN, VON HANNS FREIHERR VON JÜPTNER, Docent an der K. K. Bergakademie in Leoben. Leipzig: Verlag von Arthur Felix. 1901.

The first volume of this book, which was issued about one and a half years ago, treated of the morphological constituents, and of the physico-chemical ideas as applied to the constitution of iron alloys and slags. With the same care and completeness which characterized the first volume, the author, in the present book, deals with the relations which exist between the heat treatment and work to which iron or steel may be subjected in the process of manufacture, and the physical properties of the finished product. Since the introduction of physico-chemical ideas to the study of iron and steel, especially the idea of considering all alloys as solutions, the growth of the literature on the subject has been extremely rapid. Every person interested in the subject of iron and steel, whether from the point of view of the practical metallurgist or from the purely theoretical side, owes a debt of gratitude to Baron Jüptner for his splendid effort in arranging and systematizing the literature upon this subject. Since the appearance of the first volume, the theoretical knowledge has been so enriched by the applications of the phase rule to the explanation of the equilibrium phenomena, that it has been necessary for the author to give the important work of LeChatelier, Roozeboom, and others, as an introductory chapter in this volume. The book is divided into three parts: I. The influence of heat treatment and work upon the constitution of iron alloys. II. The physical properties of iron alloys in their connection with the chemical composition, the morphological structure, and the thermal and mechanical treatment. III. Relations between constitution, work, and mechanical properties of iron alloys.

In the first part is given a very complete and detailed discussion of Roozeboom's and LeChatelier's application of the phase rule to the study of the constitution of steel. It is extremely interesting to see that such a very practical subject as the steel industry should be receiving so much attention from those interested only in a purely scientific way. There can be no doubt of the fact that the industry will profit by the attention. In this part are also dis-

cussed Roberts-Austen's determinations of the critical points in electrolytic iron; the study of the effect of various elements—carbon, manganese, silicon, etc.—upon the character of the equilibrium curves; the relation between the temperatures of hardening and tempering, and the critical points. The influence of work and heat treatment upon the size of the grain is illustrated by the work of Sauveur on steel rails; and the effect of work above and below the critical range is also discussed. The chapter on segregation contains many interesting facts upon the unequal distribution of the elements among which the author has properly included the occluded gases.

The second part is a compilation of facts in regard to the physical properties of pure iron; specific gravity, melting point, latent heat, thermoelectric behavior, conductivity for electricity and heat, magnetism; and the influence of carbon, manganese, nickel, silicon, etc., on these various properties.

The third part deals with the purely mechanical properties such as tenacity, ductility, elasticity, and hardness and the effect of carbon and other elements upon these properties. Much of the data in Parts II and III are taken from the record of experiments finished before the recent rapid development of microscopic analysis, and consequently there is little relation shown between the properties of particular steels and its microscopic appearance. Future research in these fields will probably demand that the internal structure or morphological constitution be studied in connection with the various physical properties.

Throughout the text, references are always given to the original articles, and at the end of the book under the heading of the three separate parts, is a classified list of authors and their various contributions to the subject.

The book will undoubtedly be read with enthusiasm by all who have anything to do with this very interesting subject. It is to be hoped that the English translation which is under way will be worthy of the original.

HENRY FAY.