COMPRESSED AIR: THEORY AND COMPUTATIONS

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Trieste

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THEORY AND COMPUTATIONS

BY

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SECOND EDITION
REVISED AND ENLARGED

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PREFACE TO SECOND EDITION

After five years trying-out of the first edition the second has been prepared with the view to eliminate all errors and ambiguities and to add matter of value where possible without burdening the text with illustrations and descriptions of matter of only temporary value, such as machines and devices that are in use today but may be succeeded by better ones in a few years. It is the author's opinion that current practice, in the general form of machines and their details, can best be studied in trade circulars, of which there are many very creditable productions illustrating and describing a greater variety of machines than can possibly be shown in a text-book.

A new chapter has been added on centrifugal fans and turbine compressors. The author has found a need for a clear, concise presentation of the theory underlying such machines, and believes that a more general knowledge of the technicalities of the subject will lead to material betterment of the cheaper forms of fans that make up the greater portion of the total in use.

Appendix B, on design of Logarithmic charts, should be welcome to most students since such matter has not appeared in text-books in common use.

Compressed air has long held the field for rock drilling underground, though electricity has several times attempted to get into that business. At one time it seemed that compressed air would prove the best motive power for underground pumps, but in more recent years the improvements in centrifugal pumps seem to give electricity the advantage.

In general, it may be assumed that where rotation is desired electricity will have the advantage, while where rapid reciprocating motion is desired air will have the advantage. In the latter class are all kinds of pneumatic hammers, which have revolutionized several industries since they have been introduced.

It is not the intention to enumerate here the applications of compressed air. It is a very versatile, willing and good-natured servant. It offers a fascinating field for the inventor and its usefulness and already numerous applications will surely increase.

Rolla, Mo.,
April, 1917.

E. G. Harris.

PREFACE TO FIRST EDITION

THIS volume is designed to present the mathematical treatment of the problems in the production and application of compressed air.

It is the author's opinion that prerequisite to a successful study of compressed air is a thorough training in mathematics, including calculus, and the mathematical sciences, such as physics, mechanics, hydraulics and thermodynamics.

Therefore no attempt has been made to adapt this volume to the use of the self-made mechanic except in the insertion of more complete tables than usually accompany such work. Many phases of the subject are elusive and difficult to see clearly even by the thoroughly trained; and serious blunders are liable to occur when an installation is designed by one not well versed in the technicalities of the subject.

As one advocating the increased application of compressed air and the more efficient use where at present applied, the author has prepared this volume for college-bred men, believing that such only, and only the best of such, should be entrusted with the designing of compressed-air installations.

The author claims originality in the matter in, and the use of, Tables I, II, III, V, VI, VII and IX, in the chapter on friction in air pipes and in the chapter on the air-lift pump.

Special effort has been made to give examples of a practical nature illustrating some important points in the use of air or bringing out some principles or facts not usually appreciated.

Acknowledgment is herewith made to Mr. E. P. Seaver for tables of Common Logarithms of Numbers taken from his Handbook.