THE PRACTICAL GASOLINE ENGINE: A MANUAL OF GAS AND GASOLINE KNOWLEDGE

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PREFACE

The universal use of gas and gasoline engines is one of the remarkable features of the age. Automobiles, aeroplanes and motor boats are driven by them, in fact owe their very existence to them. Farm life has been largely revolutionized by them. Workshops of all kinds are run by them—pumps driven—irrigation carried on—wells dug—railway handcars propelled—vacuum sweepers operated—country electric light and water supply made possible—all by gasoline power. In fact there is hardly a purpose for which power is required, where efficiency, speed, economy, reliability and durability are chief considerations, that is not being successfully met with the gasoline engine.

This book is intended as a manual of gas and gasoline engine knowledge for those who want practical information in very condensed and convenient form. Technical language has been avoided wherever possible, so that those without previous experience with gas engines should have little difficulty in following the text. Convenient arrangement has been aimed at; the system of indexing paragraphs being one that will

be found extremely convenient for quick reference.

The book has been revised since publication and kept up-to-date so that it contains the latest and best in modern gas engine construction and practise.

Special care has been given to such questions as may arise in the minds of prospective purchasers as well as to those who desire to become fully informed on the management, care and operation of gas and gasoline engines. It is indispensable as a hand book to practical engine men.

The general principles set forth in this book may be applied to any of the engines now in use, known variously as gas, gasoline, oil, kerosene, explosive, internal combustion, stationary engines, etc., which are either different names for the same engine or of slight difference in detail of design or general management, the basic principles being the same.

If the reader will become thoroughly familiar with the contents of this book, he will find himself equal to most emergencies where the engine refuses to run smoothly or where the trouble is difficult to locate.

To the prospective purchaser, owner or operator, in fact to all who are in any way interested in gas or gasoline engines, this book is respectfully dedicated.

CHAPTER I

INTRODUCTORY

1. **A Gas Engine** may be defined as a Motor or Prime Mover which derives its power from the Combustion, within its cylinder, of a mixture of gas and air in the proper proportion to form an explosive.

2. The **Combustion** or burning of this charge of gas and air is occasioned under a close or heavy compression, a result of the inward movement of the piston after the charge is admitted. The result of igniting this mixture under the heavy compression is what is commonly called an "explosion."

3. This explosion causes suddenly a high degree of heat within the cylinder behind the piston, which heat results in a great **Expansive Force,** creating an enormous pressure against the piston. This drives the piston rapidly and forcibly on its downward movement. The piston is connected to a crank shaft by means of a connecting rod, which, aided by the fly wheel, transforms the power from the back and

forth motion of the piston to the revolving motion of the crank shaft, and brings the piston back to its initial position.

4. **Fuel**—A number of combustible products are adapted for use as fuel in explosive engines. The most commonly employed are Gasoline, Naphtha, Benzine, Kerosene, Distillate, Crude Oil, also Natural and Producer Gas.

5. **Gasoline,** or other fluid fuels are vaporized or carbureted by mixing with air, generally by means of a device known as a carbureter, to form the explosive mixture.

6. **Birth of the Gas Engine**—As early as 1680 Huyghens suggested the use of gunpowder in an explosive engine. This suggestion engaged the attention of other minds.

M. Beau de Rochas advocated a Four-Cycle idea in 1862. But the real practical demonstration which proved that the gas engine could be made a success was made by Lenoir in 1860, and Hugon, Siemens, Boulton, Crosley and Dr. Otto a few years later designed engines that proved the gas engine a success beyond a doubt.

7. **Four Cycle and Two Cycle**—All gas engines are divided into two general types—four cycle and two cycle. In both types there are four cardinal operations that must be accomplished in sequence to produce a power impulse.

1st, charge must be drawn into cylinder—

2nd, it must be compressed—

3rd, it must be ignited—

4th, the exploded mixture must be ejected.

8. **Four Cycle**—The four cycle type requires four strokes of the piston or two revolutions of the crank shaft to perform the complete cycle of operations necessary to give a power impulse.

1st,—On the downward or suction stroke of piston a charge of explosive mixture is drawn into the cylinder. In other words inhaled.

2nd.—On the return movement of piston the charge is compressed. This is termed the compression stroke.

3rd.—As the piston reaches top of second stroke the explosive mixture is ignited, forcing the piston downward on its third or power stroke.

4th.—On the next upward stroke which is called the exhaust stroke the burnt gases are ejected from the cylinder.

These operations are repeated in order.

9. In a four cycle engine the charge enters and leaves the cylinder through valves.

10. **Two Cycle**—Two cycle engines require two strokes of the piston or one revolution of the crank shaft to give a complete power impulse.