

**FARM ENGINES AND HOW
TO RUN
THEM: THE YOUNG
ENGINEER'S GUIDE**

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Farm engines and how to run them: the young engineer's guide by James H. Stevenson

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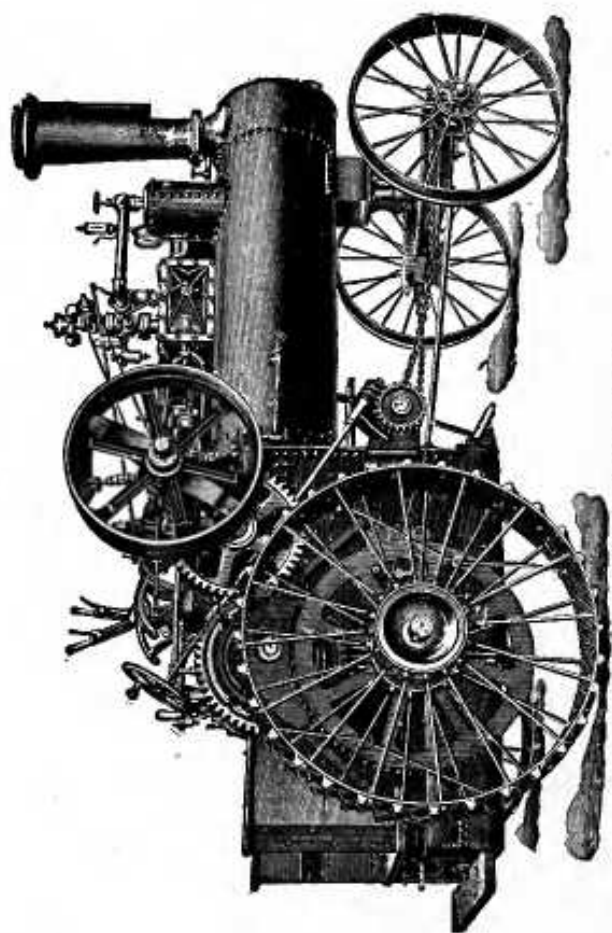
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JAMES H. STEVENSON

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TRACTION ENGINE.

FARM ENGINES AND HOW TO RUN THEM

THE YOUNG ENGINEER'S GUIDE

A SIMPLE, PRACTICAL HAND BOOK, FOR EXPERTS AS WELL AS FOR AMATEURS, FULLY DESCRIBING EVERY PART OF AN ENGINE AND BOILER, GIVING FULL DIRECTIONS FOR THE SAFE AND ECONOMICAL MANAGEMENT OF BOTH; ALSO, SEVERAL HUNDRED QUESTIONS AND ANSWERS OFTEN GIVEN IN EXAMINATIONS FOR AN ENGINEER'S LICENSE, AND CHAPTERS ON FARM ENGINE ECONOMY, WITH SPECIAL ATTENTION TO TRACTION AND GASOLINE FARM ENGINES, AND A CHAPTER ON

The Science of Successful Threshing

BY

JAMES H. STEPHENSON

And Other Expert Engineers

WITH NUMEROUS ILLUSTRATIONS SHOWING THE DIFFERENT PARTS OF A BOILER AND ENGINE, AND NEARLY EVERY MAKE OF TRACTION ENGINE, WITH A BRIEF DESCRIPTION OF THE DISTINCTIVE POINTS IN EACH MAKE.



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PREFACE

This book makes no pretensions to originality. It has taken the best from every source. The author believes the matter has been arranged in a more simple and effective manner, and that more information has been crowded into these pages than will be found within the pages of any similar book.

The professional engineer, in writing a book for young engineers, is likely to forget that the novice is unfamiliar with many terms which are like daily bread to him. The present writers have tried to avoid that pitfall, and to define each term as it naturally needs definition. Moreover, the description of parts and the definitions of terms have preceded any suggestions on operation, the authors believing that the young engineer should become thoroughly familiar with his engine and its manner of working, before he is told what is best to do and not to do. If he is forced on too fast he is likely to get mixed. The test questions at the end of Chapter III, will show how perfectly the preceding pages have been mastered, and the student is not ready to go on till he can answer all these questions readily.

The system of questions and answers has its uses and its limitations. The authors have tried to use that system where it would do most good, and employ the straight narrative discussion method where questions could not help and would only interrupt the progress of thought. Little technical matter has been introduced, and that only for practical purposes. The authors have had traction engines in mind for the most part, but the directions will apply equally well to any kind of steam engine.

The thanks of the publishers are due to the various traction engine and threshing machine manufacturers

for cuts and information, and especially to the *Threshermen's Review* for ideas contained in its "Farm Engine Economy," to the J. I. Case Threshing Machine Co. for the use of copyrighted matter in their "The Science of Successful Threshing," and to the manager of the Columbus Machine Co. for valuable personal information furnished the authors on gasoline engines and how to run them. The proof has been read and corrected by Mr. T. R. Butman, known in Chicago for 25 years as one of the leading experts on engines and boilers, especially boilers.

THE YOUNG ENGINEERS' GUIDE

CHAPTER I.

BUYING AN ENGINE.

There are a great many makes of good engines on the market to-day, and the competition is so keen that no engine maker can afford to turn out a very poor engine. This is especially true of traction engines. The different styles and types all have their advantages, and are good in their way. For all that, one good engine may be valueless for you, and there are many ways in which you may make a great mistake in purchasing an engine. The following points will help you to choose wisely:

1. Consider what you want an engine for. If it is a stationary engine, consider the work to be done, the space it is to occupy, and what conveniences will save your time. Remember, **TIME IS MONEY**, and that means that **SPACE IS ALSO MONEY**. Choose the kind of engine that will be most convenient for the position in which you wish to place it and the purpose or purposes for which you wish to use it. If buying a traction engine, consider also the roads and an engine's pulling qualities.

2. If you are buying a traction engine for threshing, the first thing to consider is **FUEL**. Which will be cheapest for you, wood, coal or straw? Is economy of fuel much of an object with you—one that will justify you in greater care and more scientific study of your engine? Other things being equal, the direct flue, firebox,

locomotive boiler and simple engine will be the best, since they are the easiest to operate. They are not the most economical under favorable conditions, but a return flue boiler and a compound engine will cost you far more than the possible saving of fuel unless you manage them in a scientific way. Indeed, if not rightly managed they will waste more fuel than the direct flue locomotive boiler and the simple engine.

3. Do not try to economize on the size of your boiler, and at the same time never get too large an engine. If a 6-horse power boiler will just do your work, an 8-horse power will do it better and more economically, because you won't be overworking it all the time. Engines should seldom be crowded. At the same time you never know when you may want a higher capacity than you have, or how much you may lose by not having it. Of course you don't want an engine and boiler that are too big, but you should always allow a fair margin above your anticipated requirements.

4. Do not try to economize on appliances. You should have a good pump, a good injector, a good heater, an extra steam gauge, an extra fusible plug ready to put in, a flue expander and a beader. You should also certainly have a good force pump and hose to clean the boiler, and the best oil and grease you can get. Never believe the man who tells you that something not quite the best is just as good. You will find it the most expensive thing you ever tried—if you have wit enough to find out how expensive it is.

5. If you want my personal advice on the proper engine to select for various purposes, I should say by all means get a gasoline engine for small powers about the farm, such as pumping, etc. It is the quickest to start, by far the most economical to operate, and the simplest to manage. The day of the small steam engine is past and will never return, and ten gasoline engines of this kind are sold for every steam engine put out. If you want a traction engine for threshing, etc., stick to steam. Gasoline engines are not very good hill climbers because the application of power is not steady enough; they are

not very good to get out of mud holes with for the same reason, and as yet they are not perfected for such purposes. You might use a portable gasoline engine, however, though the application of power is not as steady as with steam and the flywheels are heavy. In choosing a traction steam engine, the direct flue locomotive boiler and simple engine, though theoretically not so economical as the return flue boiler and compound engine, will in many cases prove so practically because they are so much simpler and there is not the chance to go wrong with them that there is with the others. If for any reason you want a very quick steamer, buy an upright. If economy of fuel is very important and you are prepared to make the necessary effort to secure it, a return flue boiler will be a good investment, and a really good compound engine may be. Where a large plant is to be operated and a high power constant and steady energy is demanded, stick to steam, since the gasoline engines of the larger size have not proved so successful, and are certainly by no means so steady; and in such a case the exhaust steam can be used for heating and for various other purposes that will work the greatest economy. For such a plant choose a horizontal tubular boiler, set in masonry, and a compound engine (the latter if you have a scientific engineer).

In general, in the traction engine, look to the convenience of arrangement of the throttle, reverse lever, steering wheel, friction clutch, independent pump and injector, all of which should be within easy reach of the footboard, as such an arrangement will save annoyance and often damage when quick action is required.

The boiler should be well set; the firebox large, with large grate surface if a locomotive type of boiler is used, and the number of flues should be sufficient to allow good combustion without forced draft. A return flue boiler should have a large main flue, material of the required 5-16-inch thickness, a mud drum, and four to six hand-holes suitably situated for cleaning the boiler. There should be a rather high average boiler pressure, as high pressure is more economical than low. For a simple en-