

**GUIDE FOR TESTING STEAM  
ENGINES: INDICATORS AND  
BRAKES; FUELS, EVAPORATION  
AND COMBUSTION**

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Guide for Testing Steam Engines: Indicators and Brakes; Fuels, Evaporation and Combustion by  
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**J. BUCHETTI & GEORGE L. FLOWLER**

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GUIDE FOR TESTING STEAM ENGINES.

1886

Indicators and Brakes.

*Translated from the French*

OF  
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BY

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## P R E F A C E .

The questions relating to the testing of steam engines and the economical production of steam, are acquiring from day to day a greater importance both to the builder and the manufacturer. In the contracts for construction it is frequently stipulated that the consumption of fuel shall not exceed a stated quantity per horse power; but it seldom goes so far as to limit it to the effective or indicated power of the machine.

But after the tests for acceptance have been made, the manufacturer seldom bothers himself about the consumption in everyday work. These primary tests for consumption can only bring themselves to the level of commercial utility, by giving a thorough understanding of the various appliances that are designed to perform this work, and the several methods of using them.

The renowned Watt, who really invented the steam engine, also invented the indicator by which its action could be studied; and Richards, by improving the apparatus, has made it applicable to engines of high speed and great initial pressures. This has been followed by the construction of registering indicators giving the variations in the work performed during a longer or shorter period; and at last totalizers have been made that give by a reading and a simple calculation the total amount of work performed.

It is this class of apparatus that is so little known that will be taken up and described. In the first place, their construction and functions will be described; then an analysis of the diagrams will be made, and the amount of work indicated deduced. And in order that this analysis may be as complete as possible, the properties of steam will be considered.

Passing then to the mensuration of the effective work, the various constructions of the Prony brake will be described, as well



as the arrangements for automatic registration.

Dynamometers will be, to a great extent, neglected, because they cannot be applied directly to the motor and can be successfully used on small forces only.

The work will be continued by tests of the evaporative efficiency of boilers, which are frequently neglected in the specifications. And at this point, the subject of fuels will be considered.

And finally, there will be an examination of the proportions of the apparatus that is employed in evaporation, with a comparison of the various arrangements, and the whole will be concluded by the dimensions, in succession, of those types of boilers that are in most common use.



## INDICATORS AND BRAKES.

### THE WATT INDICATOR.

The apparatus illustrated in Figs. 1 and 2 from Tredgold is made of a small bronze cylinder from  $1\frac{1}{2}$ " to 2" in diameter, in which there is a piston also made of bronze, and which is surmounted by a steel spring.

The piston rod runs through a guide and is capped by a pencil holder that is furnished with an internal spring that holds the pencil against a light board that may be covered if desired, with a sheet of paper.

This board, placed in a fixed framework, receives, by means of a cord and a counterweight, a movement to and fro proportional to the stroke of the engine piston.

The cock, which connects the instrument to the cylinder, being closed, and the pencil accordingly fixed, it will draw upon the board a line *a c* corresponding to the atmospheric pressure which exists upon each side of the indicator piston.

If now, the cock is opened, the piston