

**PUMPS AND PUMPING: A HAND-
BOOK FOR PUMP USERS
BEING NOTES ON SELECTION,
CONSTRUCTION, AND
MANAGEMENT**

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Pumps and Pumping: A Hand-Book for Pump Users Being Notes on Selection, Construction, and Management by M. Powis Bale

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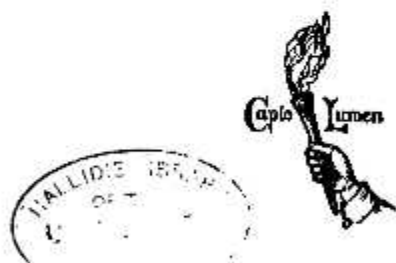
*BEING NOTES ON
SELECTION, CONSTRUCTION, AND MANAGEMENT*

BY

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'A HAND-BOOK FOR STEAM USERS, ETC., ETC.'

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PREFACE.



THE large measure of success attained by the author's "Hand-book for Steam Users" has induced him to write the following pages on similar lines. The literature likely to be of service to pump users hitherto published has been extremely scanty, and it is hoped, therefore, that the notes to be found herein may prove acceptable and useful. Within the scope of the work it has been impossible to notice all the varied pump combinations, and some of the remarks made must be considered general and not exhaustive.

Some notes on design will be found interspersed with the text, but the author wishes it to be understood that the book is not intended as a treatise on the construction of pumps.

The matter has been condensed as much as possible, and is arranged in the form of headed paragraphs for easy reference.

APPOLD STREET,

LONDON, E.C.

June, 1889.

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PUMPS AND PUMPING.

CHAPTER I.

STEAM PUMPS.

Classification of Pumps.—As we shall constantly have to refer to the different types of pumps it may be as well, to avoid confusion, to broadly classify them and briefly explain their action. They may be roughly divided into five classes—viz., (1) Lift Pumps; (2) Plunger or Force Pumps; (3) Centrifugal and Rotary Pumps; (4) Mechanical Water Lifters; (5) Injectors. These, again, may be subdivided into a multiplicity of types and combinations adapted for the varied duties they have to perform.

(1) *Lift Pumps.*—Are those in which the water is drawn through a suction pipe as the pump bucket ascends, is forced through the bucket valve as the pump descends, and is lifted again by the bucket as it re-ascends.

(2) *Plunger or Force Pumps.*—Are those in which the water is drawn through a suction-pipe and is displaced by the action of a plunger or piston which forces it through a delivery valve. A combination of Classes 1 and 2 is made

in which the lift pump bucket is combined with the plunger or piston of a force pump. Single and double acting force pumps are also used extensively; in the former the water enters the Pump during one stroke of the plunger or piston and is forced out at the next stroke, the delivery of water is therefore intermittent. In double acting force pumps, the discharge though fluctuating somewhat is practically continuous, the water being drawn in at one end of the plunger whilst it is being forced out at the other. Various other combinations of these two chief classes of pumps are constructed and modified in details, and arranged to work either vertically or horizontally as the nature of the duty or convenience may dictate.

(3) *Centrifugal and Rotary Pumps.*—Centrifugal pumps consist briefly of a fan or disc fitted with impellers revolving inside a casing or chamber which create a partial vacuum in the chamber sufficiently powerful to draw the water through it. Rotary pumps may be classed as revolving piston pumps in contra-distinction to direct acting pumps.

(4) *Mechanical Water Lifters.*—These include the different plans for raising water by means of buckets arranged on revolving chains and wheels, chain pumps, scoop wheels, &c.

(5) *Injectors.*—These include the different instruments by which water is raised or forced through the momentum obtained from a jet of steam acting directly on the water itself, which at the same time condenses it.

Selection of a Pump.—It need hardly be said that the selection of a pump, exactly adapted in type, size, and arrangement for the duty it has to perform, is a matter of