

**HEATING BY HOT WATER, WITH
INFORMATION AND SUGGESTIONS ON
THE BEST METHODS OF HEATING
PUBLIC, PRIVATE, AND HORTICULTURAL
BUILDINGS BY THE HIGH PRESSURE, AND
LOW PRESSURE SYSTEMS**

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Heating by Hot Water, with Information and Suggestions on the Best Methods of Heating Public, Private, and Horticultural Buildings by the High Pressure, and Low Pressure Systems by Walter Jones

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WALTER JONES

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BUILDINGS BY THE HIGH PRESSURE, AND
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HEATING BY HOT WATER

(SECOND EDITION),

WITH

INFORMATION & SUGGESTIONS ON THE BEST METHODS

OF

HEATING

PUBLIC, PRIVATE, AND HORTICULTURAL BUILDINGS.

Treating on the HIGH and LOW Pressure Systems,

BATH APPARATUS,

HOT WATER SUPPLY for Public Institutions,

DUPLICATE BOILERS, RADIATORS,

Laundry Drying Stoves, Swimming Baths, Turkish Baths,

CAUSES of, and hints to PREVENT FAILURE;

BY

WALTER JONES.

96 ILLUSTRATIONS.



LONDON :

CROSBY, LOCKWOOD, AND SON,

7, STATIONERS' HALL COURT, LUDGATE HILL.

1894.

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PREFACE TO SECOND EDITION.

The numerous applications, and the increased demand for this work have induced the Author to prepare a *Second* Edition, the *first* having been exhausted for several months, the ready sale and the unsolicited and complimentary testimonials, are ample proof that the *first* edition has been appreciated.

One hundred pages have been added, the tables revised, and many useful ones introduced, several articles on High and Low Pressure Heating, Radiators, Duplicate Boilers, Hot Water Supply, and other matters are new, and have not before been published in any book on this subject.

The demand for artificial heating for every conceivable purpose, is rapidly increasing, and the number of Merchants, Factors, Ironmongers, Contractors, Plumbers, and Horticultural Builders who are expected to perform the duties of Hot Water Engineers increases each year.

Architects are expected to be thoroughly conversant with all the arts and sciences of the building trade, well posted up in the various systems of lighting, heating, ventilation, sanitation, &c. With these multifarious duties their time for the study of each particular branch must necessarily be limited, to such the information contained herein is specially dedicated.

Public Bodies, Town Councillors, School Boards, Guardians, Churchwardens, and others are frequently at a loss to know what system of Artificial Heating to adopt.

The Author trusts that his readers will find this a handy and useful book of reference, and that it will be accepted as an earnest effort to help all those who may be directly or indirectly interested in the useful and important art of Artificial Heating; whatever the merits of the book may be, he trusts that its imperfections will be less apparent to his readers than they are to

The Author,
W. J.

STOURBRIDGE,
January, 1894.

CONTENTS.

- CHAPTER I.—The high pressure system, expansion of water, tests, forms and sizes of boilers, length of tube for different temperatures, size of expansion pipe, and advantages of the system.
- CHAPTER II.—High pressure, (medium) with cistern and relief valve, advantages of the system, stop cocks, pumping cocks, single, duplicate, branch, and crossed circulations, causes of failure, useful hints, and instructions for working.
- CHAPTER III.—Bread baking by hot water, illustrating oven, nature and cause of explosion, strength of tubes.
- CHAPTER IV.—The low pressure system, its advantages, cause of circulation, difference in weight of water, motive power, the best method, dips, and tests.
- CHAPTER V.—Head or pressure of water, hydraulic memoranda, avoirdupois weight, square measure, useful formulæ relating to the circle, measure of circles and angles, increased strain, risks.
- CHAPTER VI.—Velocity of flow of water, motive power, formula for ascertaining velocity, table of expansion and weight at different temperatures, explanation of table, and examples.
- CHAPTER VII.—Laws of heat, conduction, convection and radiation, table of conducting and radiating powers, Heat: What is it? Standard unit of heat, specific heat, thermometers, Fah., Reau., and Cent., comparative temperatures, specific gravity.
- CHAPTER VIII.—Causes of failure, air pipes, specific gravity, automatic air valves, antivacuum valves, and ball cocks.
- CHAPTER IX.—Boilers, heating powers of, wrought, welded, cast, chambered, Trentham, Excelsior, coil boilers and method of setting, independent boilers, vertical, sectional, Challenge, Titan, Finsbury, Star, Desideratum, Very, and water gas as a fuel.
- CHAPTER X.—Duplicate boilers, points to be observed, advantages, and for what purposes they are recommended, setting of boilers, gas boilers, and instructions to be observed.
- CHAPTER XI.—Chimneys, area of chimneys, fire bars and flues, rules and examples for ascertaining the velocity of air in chimneys or ventilating flues, size of flues, fuel.
- CHAPTER XII.—Joints, socket, flange, special, expansion, flanged joint for lofty buildings, &c.

CONTENTS—continued.

- CHAPTER XIII.—Main pipes, sizes of, illustration of for lofty buildings, branches off mains, how to prevent waste, non-conducting materials.
- CHAPTER XIV.—Pipes, quantity, size and value, Hood's rule, objections to same, table (compiled by the Author) to give various temperatures, area of pipes with quantity and weight of water, new rule (by the Author) to give 60° in glass or brick buildings, relative value of pipes of different sizes, rules and examples, diameter and circumference of circles, painting pipes, improperly fixed, obstructions in, effects of ice, &c.
- CHAPTER XV.—Stoking, instructions for working, supply cistern, cause of overflow, methods of fixing, tools, pipe cutter, &c.
- CHAPTER XVI.—Valves, throttle, screw-down, screw-slide, gun metal, full-way, &c.
- CHAPTER XVII.—Churches, public buildings, suggestions for heating, down draught, consumption of fuel, high *versus* low pressure, immunity of risk, and how to prevent fires.
- CHAPTER XVIII.—Coils: wrought, cast, socket, box end, expansion, rubber jointed and Coil cases; Radiators: various, when and by whom introduced, ventilating radiator, indirect, connections, sizes of same.
- CHAPTER XIX.—Waste of fuel, instances of, Dr. Richardson on the importance of heat.
- CHAPTER XX.—Hot water supply for public institutions, steam heater, steam jet, hot water circulating boilers *versus* steam boilers, fuel consumption, tests, effects of scale, illustration of large plant for supplying hot water, &c., advantages of system.
- CHAPTER XXI.—Bath apparatus, causes and results of failure, tank system, bath boilers, cylinder system and advantages of same, instructions for fixing.
- CHAPTER XXII.—Bath apparatus, indirect heat by high and low pressure combined, advantages of the system.
- CHAPTER XXIII.—Laundry drying rooms, methods of heating same, turkish baths, swimming baths, boiler power required for warming water, &c.
- CHAPTER XXIV.—Conclusion, cooking ranges, plumbers and plumbing, heat essential as light, ventilation inlet and exit, cooking, illness, high death rate, warming houses, money well spent, &c., various useful tables.

ERRATA.

- Page 25.—Foot-note, read “See Rules and Examples, pages 131,
132, and Table 16, page 133.”
- Page 29.—Foot-note, read “See Table 22, page 214.”
- Page 47.—Foot-note, 2nd line, read “*from* 50 deg. to 100 deg.”
3rd line, “*usual* working temperatures &c.”
- Page 117.—Foot-note, read “See Area of Pipes, Table 14, page
128.”



HEATING BY HOT WATER.

CHAPTER I.

THE HIGH PRESSURE SYSTEM.

THE system of heating known as the "hot-water system" is simply a ready and convenient method of conveying and distributing heat from a given point to any other point where it may be required. There are two distinct systems or methods of doing this, known as the "high pressure" and the "low pressure"; and, although there is a wide difference in the two systems, the principle and its application are similar. The heat is in both cases transmitted from the boiler or heating-chamber to the room or rooms where the heat is required.

The high-pressure system consists of a series of strong wrought-iron tubes, similar to hydraulic tubes, the boiler being coiled from the same material. The size or number of laps contained in the boiler depends on the length of pipes that require to be heated.

This system was introduced by Mr. A. M. Perkins, of London, and is commonly known as "*Perkin's system*;" his first invention, which included the Expansion tube, was protected by Royal Letters Patent, No. 6,146, in the year 1831.

His son, Mr. Loftus Perkins, succeeded him, and the business is still carried on under the title of A. M. Perkins and Son, Limited, the two sons of the late Mr. Loftus Perkins being members of the present firm. As pioneer of this system, Mr. Perkins had to contend with strong prejudices, and he must have possessed not only inventive power, but constructive skill of no ordinary ability, for although 60 years have elapsed since its introduction, the patterns of boilers and other accessories invented by him, have been closely followed by all other makers of high-pressure apparatus.

Comparatively few important improvements have been made, although there are some deserving of special mention as will appear further on; certainly the development has been trifling compared with the important strides made in low-pressure heating.

In confirmation of this statement it is only necessary to compare the appliances still in general use, with the illustrations, Fig. 1, 2, 3, and 4, which are reproduced from a book (kindly lent to me for this purpose) published in 1840, entitled "*A. M. Perkin's Improved Patent Apparatus for Warming and Ventilating Buildings.*"

The illustrations Fig. 5 and 6 are copied from a book (now in my possession) printed in 1837, entitled "*Warming and Ventilation by C. F. Richardson, Architect,*" wherein he shows some of the details of construction. I would point out that the arrangement of valves in Fig 5 is bad, a bye pass being necessary to allow of circulation when valves are closed, otherwise an explosion may happen, and, although Mr. Richardson's book shews this arrangement, it is improbable that a point of such importance would have been overlooked by the inventor.