

# **PRINCIPLES AND PRACTICE OF PLUMBING**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649112081

Principles and practice of plumbing by J. J. Cosgrove

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.  
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

[www.triestepublishing.com](http://www.triestepublishing.com)

**J. J. COSGROVE**

**PRINCIPLES AND  
PRACTICE  
OF PLUMBING**



# Principles and Practice of Plumbing

By J. J. COSGROVE



UNIV. OF  
CALIFORNIA

Published by

**Standard Sanitary Mfg. Co.**

PITTSBURGH, U. S. A.

714 612th  
CPT

GENERAL

Copyright 1906 by

**Standard Sanitary Mfg. Co.**

Pittsburgh, U. S. A.

70 Army  
ADDRESS

## Publisher's Note

So unusual is it for a manufacturer to become a publisher, that a few words explaining our connection with "Principles and Practice of Plumbing" will probably not be amiss.

An explanation leads us back to the announcement made in the initial number of our monthly magazine, MODERN SANITATION (JUNE, 1904). The announcement set forth the fact that in publishing MODERN SANITATION there was no intention to interfere with the established trade papers on sanitation and plumbing materials, and that we would endeavor to make it attractive and valuable by incorporating items and articles of general interest to all of our readers.

In addition to the trade papers, there are numerous worthy works on plumbing and sanitation, each of which when published represented a distinct advancing step, and we feel that the authors of these works will be in hearty accord with "Principles and Practice of Plumbing."

When "Principles and Practice of Plumbing" was first published in MODERN SANITATION, we had no thought of this volume, but as the succeeding chapters of the work appeared, we were frequently requested by prominent architects, plumbers and sanitary engineers to publish the entire work in book form. It is wholly due to these repeated requests that we are now the publishers of this book.

When the idea of our publishing the book was suggested we held back, fearing perhaps that some might gain the impression that it was done as a disguised advertisement to exploit "Standard" Porcelain Enameled Plumbing Fixtures. We can plainly state, however, that such is not the case—we are publishing the work solely for the good it may accomplish and we hope that it will completely fulfill its mission.

**Standard Sanitary Mfg. Co.**

Pittsburgh, U. S. A.

## Preface

In preparing the manuscript for this book, the author's sole object has been to systematize and reduce to an exact basis, the principles that underlie the practice of plumbing. The necessity for accurate rules and formulas, instead of the empirical methods formerly employed, was often and forcibly brought home to the author when designing plumbing installations for large buildings. The scarcity of scientific information on this important branch of sanitation was quite marked. No book had ever been published that indicated the best kind of material to use for a given purpose, that told how work should be designed and installed to be perfectly sanitary, and that showed how to proportion the various parts with relation to the whole, so that a plumbing system designed and installed according to the text would give perfect service.

Rules and formulas for proportioning hot and cold water supply pipes were entirely lacking and no literature was available that would be of assistance in determining this most important feature of a building. Neither could anything be had that would indicate the size of piping required to supply a given number of flushing valves for closets, nor that mentioned the numerous other conditions requiring consideration when designing a plumbing installation.

Realizing this, the author gathered much valuable data and worked out many rules and formulas from his private practice, and the gist of the rules, formulas and data have been incorporated in "Principles and Practice of Plumbing" where, for the first time, they were offered to the public.

In planning the scope of the book, it was assumed that the reader knew but little of the subject of plumbing, and had no source of information outside of the book. With this premise in mind an effort was made to prepare the subject matter so clearly and concisely that a person of average intelligence, by following the text, could design and proportion any plumbing installation. That this object has in a measure been realized is evidenced by the interest of architects, engineers and plumbers in the articles when they first appeared in serial form in *MODERN SANITATION*, and by the large domestic and foreign advance subscription for the work in book form.

It is the intention of the author and publishers to keep "Principles and Practice of Plumbing" the standard work on plumbing and sanitation, and to this end the book will be subject to revision when found necessary. Criticism of the subject matter will be welcome, as by fair and intelligent comment its value will be enhanced.

J. J. COSGROVE

SCRANTON, PENNSYLVANIA  
December 15, 1906



## Table of Contents

PRINCIPLES AND PRACTICE OF PLUMBING . . . . .	1
INTRODUCTORY . . . . .	1
GENERAL CONSTRUCTION . . . . .	1
REQUIREMENTS OF A PERFECT SYSTEM OF PLUMBING . . . . .	2
PLUMBING SYSTEMS . . . . .	3
THE DRAINAGE SYSTEM . . . . .	3
THE HOUSE SEWER . . . . .	3
THE HOUSE DRAIN . . . . .	10
FRESH AIR INLETS . . . . .	25
RAIN LEADERS . . . . .	27
YARD AND AREA DRAINS . . . . .	29
STACKS AND BRANCHES . . . . .	30
FIXTURE TRAPS . . . . .	41
TRAP VENTILATION . . . . .	44
BLOW-OFF TANKS FOR BOILERS . . . . .	53
REFRIGERATOR WASTES . . . . .	55
MECHANICAL DISCHARGE SYSTEMS . . . . .	57
SUB-SOIL DRAINAGE . . . . .	63
TESTING DRAINAGE SYSTEMS . . . . .	64
WATER SUPPLY SYSTEMS . . . . .	71
COLD WATER SUPPLY . . . . .	71
SOLVENT POWER OF WATER . . . . .	75
HYDRODYNAMICS . . . . .	84
HYDROSTATICS . . . . .	84
LAWS OF HYDRAULIC PRESSURE . . . . .	84
HYDRAULICS . . . . .	89
FLOW OF WATER THROUGH PIPES . . . . .	89
FRICTION IN PIPES . . . . .	89
MEASUREMENT OF WATER . . . . .	100
WATER HAMMER . . . . .	103
MATERIALS . . . . .	112
WROUGHT IRON AND STEEL PIPES . . . . .	117

BRASS PIPES . . . . .	118
COCKS AND VALVES . . . . .	120
PUMPS . . . . .	136
FIRE LINES . . . . .	152
PURIFICATION OF WATER . . . . .	155
FILTRATION . . . . .	155
SOFTENING OF WATER . . . . .	161
HOT WATER SUPPLY . . . . .	167
WATER HEATING APPARATUS . . . . .	167
PROPERTIES OF HEAT . . . . .	167
TANKS FOR STORING HOT WATER . . . . .	199
PLUMBING FIXTURES . . . . .	221
SOIL FIXTURES . . . . .	221
SCULLERY FIXTURES . . . . .	237
LAVING FIXTURES . . . . .	240
APPENDIX . . . . .	245
TESTS OF NON-SIPHON TRAPS . . . . .	251
WROUGHT IRON AND STEEL PIPES . . . . .	255



# Principles and Practice of Plumbing

## INTRODUCTORY

### GENERAL CONSTRUCTION

**S**ANITATION in modern building is given far more consideration than at any time in the history of architecture. Not only is this true in regard to the increased size of living rooms, the provision made for light and air, and the introduction of ventilation in connection with heating systems, but more particularly in the wonderful improvements in plumbing, both as regards the drainage systems, the water supply and the fixtures. The improvements in workmanship, materials and the systems of installation have so changed the character of plumbing that new standards of comparison are required to determine the quality of work. For instance, while formerly plumbing fixtures were hidden in illy-ventilated, poorly-lighted, out-of-the-way places, and used only as necessities, they now occupy a prominent place in the household of the intelligent, and have become a luxury as well as a necessity.

<The improvements in fixtures consist chiefly in substituting porcelain enameled ware for the plain iron, copper, earthenware and wood formerly used; the prohibition of all mechanical closets, with their large fouling chambers, and adopting instead closet bowls with traps combined that are vitreous, non-corrosive and non-absorbent both inside and outside; the connecting of all waste pipes from fixtures with a trap placed as close to the fixture as possible, and, not least in importance, the setting of all fixtures open instead of boxing them in wood, thus doing away with the old incubators for vermin and catch-alls for filth.>

The improvements in the systems of drainage within