

**CHAPTERS ON PAPERMAKING, VOL. IV:  
CONTAINING DISCUSSIONS UPON  
WATER SUPPLIES AND  
THE MANAGEMENT OF THE PAPER  
MACHINE AND ITS INFLUENCE UPON THE  
QUALITIES OF PAPERS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649415977

Chapters on Papermaking, Vol. IV: Containing Discussions upon Water Supplies and the Management of the Paper Machine and Its Influence upon the Qualities of Papers by Clayton Beadle

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)

**CLAYTON BEADLE**

**CHAPTERS ON PAPERMAKING, VOL. IV:  
CONTAINING DISCUSSIONS UPON  
WATER SUPPLIES AND  
THE MANAGEMENT OF THE PAPER  
MACHINE AND ITS INFLUENCE UPON THE  
QUALITIES OF PAPERS**



# Chapters on Papermaking

VOL. IV.

CONTAINING DISCUSSIONS UPON WATER SUPPLIES AND THE  
MANAGEMENT OF THE PAPER MACHINE AND ITS  
INFLUENCE UPON THE QUALITIES OF PAPERS

BY

CLAYTON BEADLE

*Lecturer on Papermaking before the  
Society of Arts, 1898, 1901 and 1906; at the Papermakers'  
Exhibition, 1897; at the Dickinson Institute, on behalf of the  
Hertford County Council, 1902, and at the Battersea Polytechnic  
Institute, 1903; awarded the John Scott Legacy Medal and Premium of the Franklin  
Institute by the City of Philadelphia, the Gold Medal of "La Société pour  
l'encouragement de l'Industrie Nationale" of Paris, the Silver  
Medal by the Council of the Society of Arts in 1906,  
and other Medals and Awards.*



LONDON  
CROSBY LOCKWOOD AND SON  
7, STATIONERS' HALL COURT, LUDGATE HILL

1907

[All rights reserved.]

## PREFACE.

---

THIS volume is supplementary to Volume III., being a continuation of the discussions on the "test questions" set by the author in 1902-3, under the circumstances referred to in the introductory chapter of Volume III. They are for the most part more advanced than those contained in Volume III., and the number of answers to each question are more numerous in consequence of the system having become better known.

The author gives this to the paper trade in the hope that it will be used in conjunction with Volume III. by the aid of the index as a work of reference, and that it will be of service not only to papermakers and mill hands, but also to the vast number of users of paper.

The author wishes again to record his thanks to his colleague, Dr. H. P. Stevens, for many suggestions and for his valuable assistance in passing proofs for press.

*Laboratories: 15, The Boro',  
London Bridge, S.E.  
October, 1907.*

# CONTENTS.

---

GENERAL INTRODUCTION ... ..	Page 1
CHAPTER I.	
THE BULKING OF PAPERS ... ..	7
Effects of beating—Pressing—Calendering—Loading —Comparisons—Thickness of reams.	
CHAPTER II.	
SPECIAL QUALITIES OF "ART" PAPERS ... ..	16
Special qualities and uses—Enamelling—"Life"— Removal of wire mark—Disadvantages of—Opinions of users.	
CHAPTER III.	
THE "AGEING" AND STORAGE OF PAPERS ... ..	25
Improvement of drawing papers—Wrapping papers— Effects on fibres—Gelatine—Surface—Strength—Litho papers—Discoloration—Deterioration—Lowering of colour—Oxidation—Effects of rosin—Mellowness— Dulness—Time of keeping.	
CHAPTER IV.	
THE USE OF LIME IN BOILING ... ..	39
Action of—Comparison with soda—Comparative cost —Boiling of hempen rope—Preparation of milk of lime—Comparison of different limes.	

CHAPTER V.		Page
CONTROLLING THE MARK OF THE "DANDY" ... ..		53
The management of the "Dandy"—Heating of stuff— "Drag"—Lowering of brackets—Effects of beating— Cleaning "Dandy"—Appearance of sheet—Hints for management—Controlling of watermark.		
CHAPTER VI.		
"MACHINE" AND "HAND" CUT RAGS ... ..		61
Comparative merits and costs.		
CHAPTER VII.		
FROTH ON PAPER MACHINE ... ..		67
Effects of size—Colour—Loading—Agitation—Pump- ing—Modes of prevention—Defective plant—General explanation.		
CHAPTER VIII.		
SCUM SPOTS IN PAPER ... ..		77
"Belling"—"Nip"—Extra water—"Froth bells"— "Outweights"—"Broke"—"Retree."		
CHAPTER IX.		
CONSUMPTION OF WATER IN THE MANUFACTURE OF PAPER		80
Influence of locality—Quality of paper—Arrangement of plant—Consumption of water at different stages for rag, esparto, and wood papers.		
CHAPTER X.		
THE MANAGEMENT OF SUCTION-BOXES ... ..		100
Effects of removal of water—Wear of wire—Marks on surface—Control of "Dandy"—Number of boxes— Amount and distribution of suction—Appliances for vacuum.		



CHAPTER XI.		Page
THE SHRINKAGE OF PAPER ON THE MACHINE ... ..		109
Means of control—Adjustment on machine—"Cross" shrinkage—Wet stuff—Amount of water—Length of stuff.		
CHAPTER XII.		
PAPER THAT DOES NOT SHRINK OR EXPAND ... ..		117
Suggested methods—Effects of heating and moisture—Composition of fibres—Factors.		
CHAPTER XIII.		
THE PRODUCTION OF NON-STRETCHABLE PAPER ... ..		129
Machine tests—Suggested methods of manufacture—Composition of fibres.		
CHAPTER XIV.		
THE CONNECTION BETWEEN "STRETCH" AND "EXPANSION" OF PAPERS ... ..		135
Discussion—Table of results—Theories.		
CHAPTER XV.		
"STRETCH" AND "BREAKING STRAIN" ... ..		140
Their relationship to one another—Tables of results—Relative importance—Bursting strain.		
CHAPTER XVI.		
PAPER-TESTING MACHINES ... ..		145
Different types—Comparison of results.		
INDEX ... ..		151

## GENERAL INTRODUCTION TO VOL. IV.

---

THE work, the outcome of which has resulted in the production of this and the preceding volume, was started in 1902 as a result of a conversation which the author had with Mr. James Duguid, the then editor of PAPER AND PULP.

After taking the opinions of leading members of the paper trade who were found to be favourable to the scheme, an attempt was made to conduct correspondence classes. The scheme was not based upon correspondence tuition as generally understood; the author called his system "Test Questions," the object being to set a number of practical questions which should be a test as to the knowledge and capacity of those who answered them. The original object of these test questions was to assist paper-mill workmen to prepare themselves for the examination on paper manufacture by the City and Guilds of London Institute. As the work advanced it became evident that the various workers were far more interested in vying with one another in their answers than in seeking to prepare themselves for any after examination.

It was arranged that the names of the writers of the papers should not be made known, and that there should be no direct correspondence between the examiner and those who sent in their answers, the only medium of their correspondence being the columns of PAPER AND PULP, so that any comments and criticisms made by the examiner could be read by all readers of the journal. Marks were given to each of the answers, and the winner of the series was awarded a prize. On the award of the prizes, with the consent of the first three on the list, the first three names were published. The papers were freely quoted from, and some of special value and interest were published *in extenso*.

Many of those who entered were working men, without any experience of preparing an examination paper, some possessed very poor literary style, others showed some ability to express

their views, but, whether illiterate or not, the great bulk of the answers showed considerable labour and thought, and reflected the greatest credit on the workers' industry. As the examiner was conducting Test Questions with the primary object of helping lame dogs over stiles, in order that an illiterate working man might, if he possessed the knowledge, have as good a chance as an educated manager's son, he judged the answers entirely on their value as conveying, or seeking to convey, information. But education must tell in the long run, as it gives a man the power to think as well as to express his thoughts. Many of the writers undertook special researches for the purpose of throwing light upon the questions. The answers to the first questions were comparatively poor, due, no doubt, to the inability of the writers to express their views, but the majority gained some experience and profit by the general interchange of opinions resulting from the publication, and comments upon one another's answers. As a result the answers slowly but steadily improved. All were specially cautioned against divulging any trade secrets or stating anything that might be regarded as special information belonging to their firm. The author cannot recall a single instance in which such information was tendered in the answers. Furthermore, many employers expressed themselves in favour of the system, and in no case can the author recall a single instance in which the employer raised an objection to his workpeople making use of the system.

It has been urged that correspondence tuition tends to discourage class teaching, which latter is considered far more valuable, and consequently correspondence teaching should not be resorted to. As proof against this view, the author found that the greatest number of students, in any one locality, who availed themselves of the correspondence tuition, were, at the same time, attending lectures and classes conducted privately by their employers. It does not appear that correspondence tuition will in any way interfere with the lecture attendance, but it would appear, rather, that one will assist the other. There are many things to be said in favour of correspondence tuition; for instance, there are many difficulties to be contended with in classes, which do not occur in correspondence tuition. The classes are few and far between, and not accessible to many, whereas correspondence teaching is equally accessible to students in all parts of the country. Correspondence tuition is perhaps a misnomer; in so far as it relates to the scope of these volumes, the attempt has rather been to help and guide mill-workers by setting them