

**FILTERS AND FILTER  
PRESSES FOR  
THE SEPARATION OF  
LIQUIDS AND SOLIDS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649135967

Filters and filter presses for the separation of liquids and solids by F. A. Bühler & John Joseph Eastick

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)

**F. A. BÜHLER & JOHN JOSEPH EASTICK**

**FILTERS AND FILTER  
PRESSES FOR  
THE SEPARATION OF  
LIQUIDS AND SOLIDS**



FILTERS  
AND  
FILTER PRESSES



FILTERS  
AND  
FILTER PRESSES

FOR THE  
SEPARATION OF LIQUIDS AND SOLIDS

From the German of  
F. A. BÜHLER

---

With additional matter relating to  
THE THEORY OF FILTRATION AND FILTRATION IN SUGAR  
FACTORIES AND REFINERIES

BY  
JOHN JOSEPH EASTICK, F.I.C., A.R.S.M.

---

WITH 327 ILLUSTRATIONS

---

LONDON :  
NORMAN RODGER  
ST. DUNSTAN'S HILL, E.C.

1914

UNIVERSITY OF CALIFORNIA  
LIBRARY  
COLLEGE OF AGRICULTURE  
DAVIS





## PREFACE TO THE GERMAN EDITION

THE separation of solids from liquids is a frequent and regularly recurring problem in chemical factory practice. To describe and represent pictorially those forms of apparatus that up to the present have proved themselves the most useful is the object of this treatise. The author has avoided handling the subject historically, a method that comes more within the purview of a history of technology.

Looking to the exceedingly great variety of appliances for isolating solid materials from liquids, to the rapidly occurring changes that these undergo to accommodate themselves to the existing conditions in manufacture, and looking as well to the differently constructed apparatus and machinery employed in different countries to serve the same purposes, it is naturally impossible to make an exhaustive survey of this particular field. In general, the standpoint is here taken up that the description and representation of appliances in use to-day in German chemical factories must form the principal contents of this book. As a consequence, besides the private processes in chemical factories, the aids to practice found in the literature, experiments confirmed and refined by experience, are subject matters that must be included, matters that are designed for the technical aid of contractors who supply apparatus of this kind.

In addition, patent literature is drawn upon, for it can afford in some degree an indication of the correct lines upon which the technical development of existing appliances can be further advanced.

So as not to create the wrong impression that the importance of the historical aspect of the progress of chemical technology has been undervalued, its importance from the point of view of the chemical industry is here expressly recognized. A knowledge of the recorded facts in this history gives not only a clear understanding of the present, allows not only an outlook upon the future, but also safeguards the chemist or engineer, under the pressure of the active exercise of his craft, when solving questions arising out of time and money-robbing defects in already old methods of operation and apparatus. Practical men know that such facts are not seldom incorrectly quoted. A detailed historical account would, however, overstep by so much the limits of this treatise that it can best be made the subject of a special volume. An equivalent for it, advantageous also on other grounds, is the description of the inventions found in the patent literature.

As to the arrangement of the matter, the author may be allowed to remark at the very beginning that in the mechanical separation of liquids and solids only a single process, strictly speaking, is in question: namely, filtration.

A division into filters and centrifugals can only be made on exceptional grounds, since a centrifuge is essentially a rotating pressure filter. The forms

54581

of this special kind of filter are so manifold, and differ so much from the forms of other kinds of filter, that it appears permissible to leave the centrifuges for separate consideration.

Owing to the exceptionally great variety in characteristics shown by the mixtures to be separated, to the conditions of working to be satisfied, and to the fluctuating capacity for being resolved of a single mixture, any research to lay down at the outset calculations for standard measurements in the construction of filters and centrifuges suitable for each special case, appears hopeless.

We have hitherto been thrown back upon experience or special investigation in deciding upon the applicability of a particular apparatus for a particular purpose. Only those dimensions can be ascertained by calculation that apply to parts of filters or centrifuges, the mechanical demands on which require estimation.

## PREFACE TO THE ENGLISH EDITION

IN offering to a world-wide circle of English readers a translation of this German work of F. A. Bühler, the compilers have thought it advisable to include a new section so as to enable them to give a full description of the various kinds of filters suitable for and applicable to a given industry, and also incidentally to incorporate some general observations on the Theory and Practice of Filtration. For this purpose the Sugar Industry has been selected because of, first, the magnitude of its operations; second, the large variety of filters employed in its various stages; third, the special precautions needed; and, fourth, the Aids to Filtration found useful.

This addition, it is hoped, will make the volume serviceable to a much larger number of readers than would otherwise have been the case, and will render the work so much the more comprehensive in its character.

It was thought advisable to substitute for the list of German Patents found in the original a list of British Patents covering the same subjects. And in the section covering "Specifications of Sundry Filter Press Patents" the text of the British specification has been followed where available. Otherwise the German version is reproduced in full.

The illustrations in Parts I. and II. being reproductions of those found in the original edition, it has not always been possible to eliminate the German wording and substitute English equivalents. But where this is the case, a glossary has been added below the figure to make the meaning clear.

*June, 1914*

# CONTENTS

## PART I. FILTERS.

	PAGE
INTRODUCTION . . . . .	I
FILTERS WITH LOOSE FILTERING LAYER.	
I. OPEN FILTERS . . . . .	3
(1) Filter-Beds without Regulation of the Flow . . . . .	3
(2) Filter-Beds with Regulation of the Flow . . . . .	5
(3) Contrivances for cleansing the Sand . . . . .	8
(4) Acid-Resistant Filtering Apparatus . . . . .	9
(5) Reisert's Cleansable Filter . . . . .	9
(6) Open Filters with Stirring Devices . . . . .	11
II. CLOSED FILTERS . . . . .	12
(1) Gutmann's Drum Filter . . . . .	12
(2) Filtration combined with Chemical Purification . . . . .	14
(3) Gutmann's Pressure-Filter . . . . .	16
(4) Reisert's Pressure-Filter . . . . .	18
(5) Special Filter for Sugar Juice . . . . .	21
(6) Pressure-Filters with Stirring Devices . . . . .	22
III. IRON REDUCTION APPARATUS . . . . .	23
(1) Gutmann's Smaller Iron Reduction Apparatus . . . . .	24
(2) Gutmann's Iron Reduction Apparatus, combined with Drum Filter . . . . .	24
(3) Apparatus yielding 4,400 Gallons per Hour . . . . .	26
(4) Apparatus yielding 13,200 Gallons per Hour . . . . .	28
(5) Open Iron Reduction Apparatus . . . . .	28
IV. THE WATER SOFTENER . . . . .	29
(1) Gutmann's Water Softener . . . . .	29
(2) Halvor Breda's Water Softener . . . . .	30
(3) Gutmann's Water Softening Plant . . . . .	33
V. THE SPIRIT FILTER . . . . .	33
FILTERS WITH WOVEN OR FELTED FILTERING MEDIUMS.	
I. OPEN FILTERS . . . . .	36
(1) Funnel or Bag Filters . . . . .	36
(2) Open Drainer . . . . .	37
(3) Simple Drainers enclosed below . . . . .	37
(4) Drainers with Strengthened False Bottoms . . . . .	37
(5) Drainers with Mechanical Stirring Appliances . . . . .	38
(6) Air-Pumps for working with Drainers . . . . .	40
(7) Batteries of Drainers . . . . .	46
(8) Mechanically-emptied Drainers . . . . .	48
(9) Fesca's Storied Drainer . . . . .	50
II. CONTINUOUS-ACTION DRAINER-FILTER . . . . .	52
III. BAG OF FRAME FILTERS . . . . .	57
IV. EHRENSTEIN'S PRESSURE CHAMBER-FILTER . . . . .	59