

**PRACTICAL MECHANICS: AN  
ELEMENTARY MANUAL FOR THE  
USE OF STUDENTS IN SCIENCE  
AND TECHNICAL SCHOOLS AND  
CLASSES**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649677986

Practical Mechanics: An Elementary Manual for the Use of Students in Science and Technical Schools and Classes by Sidney H. Wells

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

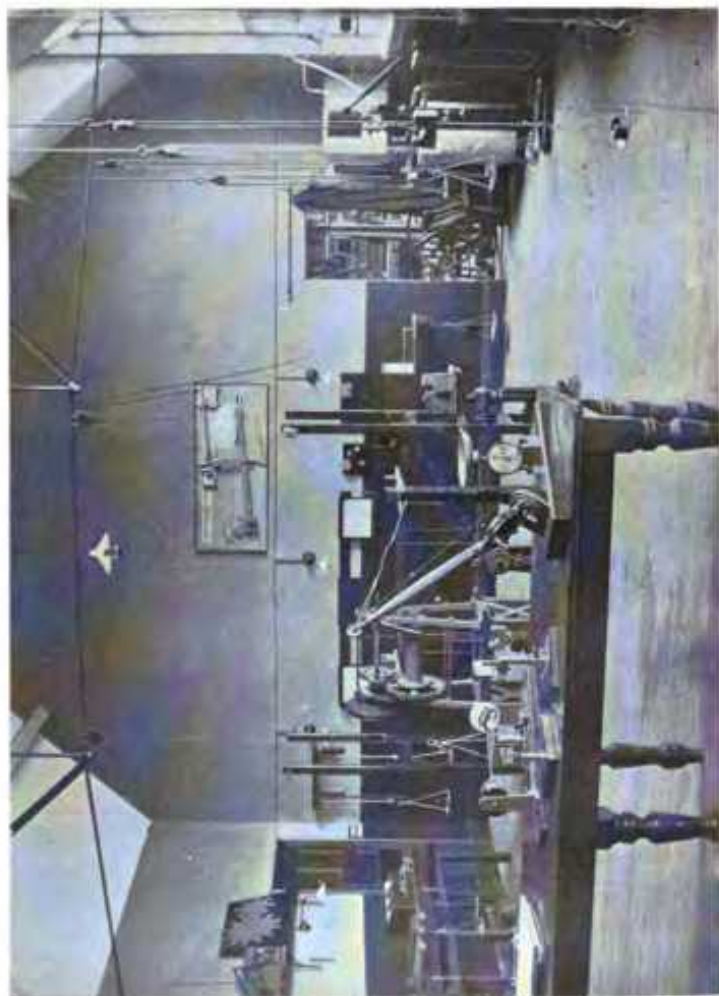
This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this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

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

**SIDNEY H. WELLS**

**PRACTICAL MECHANICS: AN  
ELEMENTARY MANUAL FOR THE  
USE OF STUDENTS IN SCIENCE  
AND TECHNICAL SCHOOLS AND  
CLASSES**





MECHANICS LABORATORY, BATTERSEA POLYTECHNIC.

# PRACTICAL MECHANICS

AN ELEMENTARY MANUAL  
FOR THE USE OF STUDENTS IN SCIENCE AND  
TECHNICAL SCHOOLS AND CLASSES

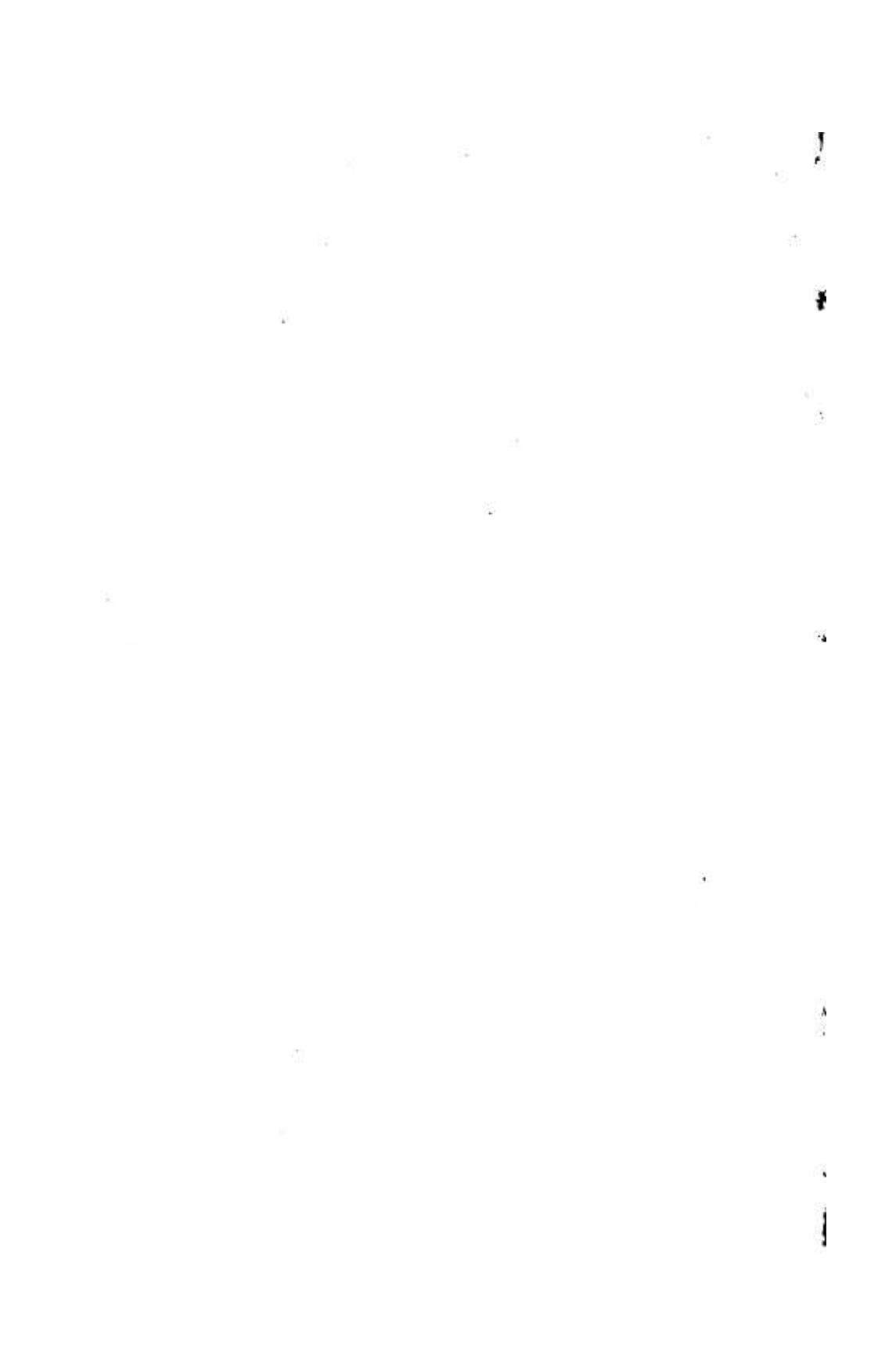
BY

SIDNEY H. WELLS, W.H.Sc.

A.M. INST. C.E. ; A.M. INST. MECH. E.  
PRINCIPAL OF THE BATTERSEA POLYTECHNIC, LONDON

WITH 75 ILLUSTRATIONS AND DIAGRAMS  
INCLUDING REPRODUCTIONS FROM PHOTOGRAPHS OF EXPERIMENTAL  
MACHINES AND APPARATUS AND NUMEROUS GRAPHICAL  
AND NUMERICAL EXERCISES

METHUEN & CO.  
36 ESSEX STREET, W.C.  
LONDON  
1898



6112813

49001

29 My '99

SD

## PREFACE

**T**HIS book is intended as a Laboratory hand-book for the use of students in Science and Technical Schools and Classes, and as a guide to teachers in arranging machines and apparatus, and courses of Laboratory work in Practical Mechanics.

For the past ten years I have given considerable attention to methods of teaching elementary mechanics in a practical way, and with such varied students as are to be found in a great public school, a university college, and a technical institute. My experience has shown that with large classes it is almost impossible to have all the students working at the same experiment, or even at the same kind of experiment, at the same time; and I have felt the need of some assistance to the teacher which should start the student on his work, describe the apparatus to be used, give him sufficient directions to carry out the experiment in the right spirit of inquiry, suggest to him how to analyse the result and what he should have learned from it, and then to provide a useful test of his work in the form of suitable exercises illustrating the experiment. With school classes of moderate size, where the theory and practical lessons run concurrently, the difficulty referred to is scarcely felt, except as



the work becomes advanced and the apparatus limited; but with older students, and especially with evening students where the conditions named are scarcely possible, where the classes are necessarily large and the number of teachers small, it has seemed to me impossible to do good work without such assistance as I have referred to. Then, again, teachers are desirous of conducting experimental classes in Mechanics, and are needing information as to the cost, construction, and use of the necessary machines and apparatus, and the results obtained by them. Add to this the facts that Laboratories for practical mechanics are rapidly increasing in number, and that students preparing for London Matriculation and for the Theoretical and Applied Mechanics examinations of the Science and Art Department are expected to *have carried out experiments for themselves*, and there exists, I think, more than sufficient reason for "yet another text-book."

At the outset I was met by the difficulty of choosing between the methods of "verification" and "discovery"—whether it was better to state a law and require the student to verify it by experiment, or to ask him to perform an experiment and deduce the law from it. Neither is universally applicable, but as a believer in the method of "learning by doing," whenever practicable I have unhesitatingly adopted the latter method. To be strictly true to this principle, the book should not, of course, tell the student what he should have learned from the experiment, and, indeed, my great difficulty all through has been how to avoid *telling the student too much*. Yet it would have been impracticable to omit any records of

results, or any discussions of the conclusions to be drawn from them, besides which I hope that the "records" and "discussions" may not be without real educative value.

For the benefit chiefly of teachers, I have included somewhat detailed descriptions of the machines and apparatus, together with reproductions from photographs, for which I am much indebted to the kindly assistance of Mr. Joseph Harwood, Secretary of the Polytechnic, and have added appendices showing the cost and other details, together with a suggested course of work for elementary students in Applied Mechanics. I am no believer in costly and elaborate apparatus, or in frictionless pulleys and toy models, preferring rather the actual machines as used in practical work, and such apparatus as can be easily adapted from commonly obtained things. My experience has shown that, with the kind of apparatus illustrated in this book, it is possible to obtain results quite within the ordinary experimental range of accuracy, in proof of which the results herein recorded will be evidence, although an exception must be made for the results in the chapter on "Beams."

The book contains all the Mechanics part of the Elementary Science syllabus of the Headmasters' Association, and all that is necessary for the London Matriculation examination and for the Elementary course in Applied Mechanics of the Science and Art Department. In many subjects it covers the Advanced Stage also. The exercises are selected from past papers set in these and other examinations, and it is hoped they may be found useful. The records of experiments are chiefly taken from students' note-books.

My thanks and acknowledgments are due to my students—Messrs. C. B. Cunnington, A. P. Morris, and F. J. Sharr—for working through the experiments, and to my late Assistant—Mr. W. F. Nixon, A.R.C.S.—for assistance in this and other work and for reading through the proofs, and especially to Mr. W. W. F. Pullen, Wh. Sc., Assoc. M. Inst. C.E., M. Inst. Mech. E., Head of the Engineering Department at the South-West London Polytechnic, for reading through the manuscript and proof sheets, and for many valuable suggestions.

SIDNEY H. WELLS.

BATTERSEA POLYTECHNIC, S.W.,  
*August, 1898.*