



Dr. Remington (*seated right*) reading galley proof. Galley proofs of USP monographs hang on the far wall, and USP Circulars are being collated on the billiard table.

7
il
a
e
d
of
s.

2 0 T H E D I T I O N

Remington: The Science and Practice of Pharmacy

Volume I

ALFONSO R GENNARO

Chairman of the Editorial Board
and Editor

INTERNATIONAL STUDENT EDITION



LIPPINCOTT WILLIAMS & WILKINS
A Wolters Kluwer Company

**DOCKET
ALARM**

Find authenticated court documents without watermarks at docketalarm.com.

Editor: Daniel Limmer
Managing Editor: Matthew J. Hauber
Marketing Manager: Anne Smith

Lippincott Williams & Wilkins

351 West Camden Street
Baltimore, Maryland 21201-2436 USA

227 East Washington Square
Philadelphia, PA 19106

All rights reserved. This book is protected by copyright. No part of this book may be reproduced in any form or by any means, including photocopying, or utilized by any information storage and retrieval system without written permission from the copyright owner.

The publisher is not responsible (as a matter of product liability, negligence or otherwise) for any injury resulting from any material contained herein. This publication contains information relating to general principles of medical care which should not be construed as specific instructions for individual patients. Manufacturers' product information and package inserts should be reviewed for current information, including contraindications, dosages and precautions.

Printed in India at Gopsons Papers Ltd., Noida
Reprinted, 2001

Entered according to Act of Congress, in the year 1885 by Joseph P Remington, in the Office of the Librarian of Congress, at Washington DC

Copyright 1889, 1894, 1905, 1907, 1917, by Joseph P Remington

Copyright 1926, 1936, by the Joseph P Remington Estate

Copyright 1948, 1951, by the Philadelphia College of Pharmacy and Science

Copyright 1956, 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995, by the Philadelphia College of Pharmacy and Science

Copyright 2000, by the University of the Sciences in Philadelphia

All Rights Reserved
Library of Congress Catalog Card Information is available
ISBN 0-7817-200X-4

The publishers have made every effort to trace the copyright holders for borrowed material. If they have inadvertently overlooked any, they will be pleased to make the necessary arrangements at the first opportunity.

The use of structural formulas from USAN and the USP Dictionary of Drug Names is by permission of The USP Convention. The Convention is not responsible for any inaccuracy contained herein.

Notice—This text is not intended to represent, nor shall it be interpreted to be, the equivalent of or a substitute for the official United States Pharmacopeia (USP) and/or the National Formulary (NF). In the event of any difference or discrepancy between the current official USP or NF standards of strength, quality, purity, packaging and labeling for drugs and representations of them herein, the context and effect of the official compendia shall prevail.

To purchase additional copies of this book call our customer service department at (800) 638-3030 or fax orders to (301) 824-7390. International customers should call (301) 714-2324.

00 01 02 03 04
1 2 3 4 5 6 7 8 9 10

This edition is manufactured in India and is authorized for sale

Remington: The Science and Practice of Pharmacy . . . *A treatise on the theory and practice of the pharmaceutical sciences, with essential information about pharmaceutical and medicinal agents; also, a guide to the professional responsibilities of the pharmacist as the drug information specialist of the health team . . . A textbook and reference work for pharmacists, physicians, and other practitioners of the pharmaceutical and medical sciences.*

EDITORS

Alfonso R Gennaro, Chair	Nicholas G Popovich
Ara H Der Marderosian	Roger L Schnaare
Glen R Hanson	Joseph B Schwartz
Thomas Medwick	H Steve White

AUTHORS

The 119 chapters of this edition of *Remington* were written by the editors, by members of the Editorial Board, and by the authors listed on pages viii to x.

Managing Editor

John E Hoover, BSc (Pharm)

Editorial Assistant

Bonnie Brigham Packer, RNC, BA

Director

Philip P Gerbino 1995–2000

Twentieth Edition—2000

Published in the 180th year of the
PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE

Remington Historical/Biographical Data

The following is a record of the editors and the dates of publication of successive editions of this book, prior to the 13th Edition known as *Remington's Practice of Pharmacy* and subsequently as *Remington's Pharmaceutical Sciences* through the 19th Edition.

First Edition, 1886
Second Edition, 1889
Third Edition, 1897
Fourth Edition, 1905

Joseph P Remington

Fifth Edition, 1907
Sixth Edition, 1917

Joseph P Remington
Assisted by
E Fullerton Cook

Seventh Edition, 1926

Editors

E Fullerton Cook
Charles H LaWall

Eighth Edition, 1936

Editors

E Fullerton Cook
Charles H LaWall

Ninth Edition, 1948
Tenth Edition, 1951

Associate Editors
Ivor Griffith
Adley B Nichols
Arthur Osol

Editors

E Fullerton Cook
Eric W Martin

Eleventh Edition, 1956

Editors

Eric W Martin
E Fullerton Cook

Associate Editors
E Emerson Leuallen
Arthur Osol
Linwood F Tice
Clarence T Van Merer

Twelfth Edition, 1961

Editors

Eric W Martin
E Fullerton Cook
E Emerson Leuallen
Arthur Osol
Linwood F Tice
Clarence T Van Merer

Assistant to the Editors
John Hoover

Thirteenth Edition, 1965

Editor-in-Chief

Eric W Martin

Editors

Grafton D Chase
Herald R Cox
Richard A Deno
Alfonso R Gennaro
Stewart C Harvey

Managing Editor

John E Hoover

Robert E King
E Emerson Leuallen
Arthur Osol
Ewart A Swinyard
Clarence T Van Merer

Fourteenth Edition, 1970

Chairman, Editorial Board

Arthur Osol

Editors

Grafton D Chase
Richard A Deno
Alfonso R Gennaro
Melvin R Gibson
Stewart C Harvey

Managing Editor

John E Hoover

Robert E King
Alfred N Martin
Ewart A Swinyard
Clarence T Van Merer

Fifteenth Edition, 1975

Chairman, Editorial Board

Arthur Osol

Editors

John T Anderson
Cecil L Bendush
Grafton D Chase
Alfonso R Gennaro
Melvin R Gibson

Managing Editor

John E Hoover

C Boyd Granberg
Stewart C Harvey
Robert E King
Alfred N Martin
Ewart A Swinyard

Sixteenth Edition, 1980

Chairman, Editorial Board

Arthur Osol

Editors

Grafton D Chase
Alfonso R Gennaro
Melvin R Gibson

C Boyd Granberg

Stewart C Harvey
Robert E King
Alfred N Martin
Ewart A Swinyard
Gilbert L Zink

Seventeenth Edition, 1985

Chairman, Editorial Board

Alfonso R Gennaro

Editors

Grafton D Chase
Ara H Der Marderosian
Stewart C Harvey
Daniel A Hussar
Thomas Medwick

Managing Editor

John E Hoover

Edward G Rippie
Joseph D Schwartz
Ewart A Swinyard
Gilbert L Zink

Eighteenth Edition, 1990

Chairman, Editorial Board

Alfonso R Gennaro

Editors

Grafton D Chase
Ara H Der Marderosian
Stewart C Harvey
Daniel A Hussar
Thomas Medwick

Managing Editor

John E Hoover

Editorial Assistant

Bonnie Packer

Edward G Rippie
Joseph D Schwartz
Ewart A Swinyard
Gilbert L Zink

Nineteenth Edition, 1995

Chairman, Editorial Board

Alfonso R Gennaro

Editors

Grafton D Chase
Ara H Der Marderosian
Glen R Hanson
Daniel A Hussar
Thomas Medwick

Managing Editor

John E Hoover

Editorial Assistant

Bonnie Packer

Edward G Rippie
Joseph D Schwartz
H Steve White
Gilbert L Zink

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.