

Build a Better Mousetrap

Make Classic Inventions,
Discover Your Problem-Solving Genius,
and Take the Inventor's Challenge

RUTH KASSINGER



John Wiley & Sons, Inc.

Build a Better Mousetrap

Build a Better Mousetrap

Make Classic Inventions,
Discover Your Problem-Solving Genius,
and Take the Inventor's Challenge

RUTH KASSINGER



John Wiley & Sons, Inc.

This book is printed on acid-free paper. ☺

Copyright © 2002 by Ruth Kassinger. All rights reserved
Illustrations copyright © 2002 by Jeff Cline

Published by John Wiley & Sons, Inc., Hoboken, New Jersey
Published simultaneously in Canada

Design and production by Navta Associates, Inc.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4470, or on the web at www.copyright.com. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, email: permcoordinator@wiley.com.

The publisher and the author have made every reasonable effort to ensure that the experiments and activities in the book are safe when conducted as instructed but assume no responsibility for any damage caused or sustained while performing the experiments or activities in this book. Parents, guardians, and/or teachers should supervise young readers who undertake the experiments and activities in this book.

Designations used by companies to distinguish their products are often claimed as trademarks. In all instances where John Wiley & Sons, Inc., is aware of a claim, the product names appear in Initial Capital or ALL CAPITAL letters. Readers, however, should contact the appropriate companies for more complete information regarding trademarks and registration.

For general information about our other products and services, please contact our Customer Care Department within the United States at (800) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

ISBN 0-471-39538-2

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

For my sister, Joan Good,
who is so generous in her enthusiasm

Contents

Acknowledgments	ix
Introduction	1
Part I Inventions That Use Light	3
1 Spectacles	5
2 Kaleidoscope	9
3 Phenakistiscope	13
4 Periscope	17
Part II Inventions That Move Through Air and Water	21
5 Hulled Sailboat	23
6 Parachute	27
7 Liquid-Fueled Rocket	32
8 Hovercraft	36
9 Aerobie	40
Part III Inventions of Bridges and Dams	45
10 Suspension Bridge	47
11 Arch Dam	51
Part IV Inventions That Use Sound	55
12 Stethoscope	57
13 Kazoo	60
14 Bottle Organ	63
Part V Inventions for Heating and Cooling	67
15 Solar Water Heater	69
16 Desert Refrigerator	74
Part VI Miscellaneous Inventions	79
17 Water Clock	81
18 Scytale	85
19 Gimbal	89
20 Pendulum Seismograph	94
21 Portable Solar Distiller	99
22 Mousetrap	103
Glossary	107
Index	111

Acknowledgments

Thanks are due, once again, to Dr. Burton Edelson and James Polk as consultants in science and engineering, as well as to Dr. Charles Bahn, the people at Peterson Electro-Musical Products and The Kazoo Company, and my editor, Kate Bradford. As always, I am grateful for the wholehearted support of my husband, Ted, and daughters, Anna, Austen, and Alice.

Introduction

Build a better mousetrap,” the American philosopher Ralph Waldo Emerson said in 1855, “and the world will beat a path to your door.” When Emerson spoke of mousetraps, he didn’t mean just mouse-traps. He meant any kind of invention that solves a problem. Emerson could have said, “Build a stronger bridge,” “Build a more accurate clock,” or “Build a better device for listening to the heart.”

When Emerson said, “and the world will beat a path to your door,” he meant that when people see a better design, they will hustle over to the inventor to buy it (trampling a path in the grass on the way). As you’ll see in this book, when an Italian invented spectacles in the thirteenth century, people no longer used the chunky “reading stones” to help them see. After French doctor René Laënnec invented the stethoscope in 1816, every doctor had to have one. And when Simon Lake invented the periscope in 1902, his submarine was suddenly in demand by the U.S. Navy. We are always on the lookout for devices that make our lives better, easier, or more fun, and we’re usually quick to drop the old for the new.

So, how do you go about making an invention that will bring the world to your door? The first step is to identify a problem. Sometimes the problem is obvious. When the young French balloonist Andre-Jacques Garnerin was imprisoned in a Hungarian castle in 1793, he quickly identified his problem: he needed a way to escape. He dreamed up the parachute as a result.

The next step in inventing is observing the world around you. In ancient Egypt, someone invented the water clock after noticing that water dripped at a steady rate from containers with a hole in the bottom. In 1891, American Clarence Kemp observed that metal painted black retains heat well, and he used his observation to invent the solar water heater.

After identifying a problem and making observations, it’s time to experiment . . . and experiment . . . and experiment. None of the inventions in this book worked out perfectly the first time. Christopher Cockerell,

Many Americans have taken Emerson literally in the last 150 years: The U.S. Patent Office has issued over 4,400 patents for original mouse-traps. (Thousands more applications have been rejected as unoriginal.) Mousetraps have been the most frequently invented device in U.S. history, although the old, familiar spring trap is still the most popular.