

I. C. S.

REFERENCE LIBRARY

A SERIES OF TEXTBOOKS PREPARED FOR THE STUDENTS OF THE
INTERNATIONAL CORRESPONDENCE SCHOOLS AND CONTAINING
IN PERMANENT FORM THE INSTRUCTION PAPERS,
EXAMINATION QUESTIONS, AND KEYS USED
IN THEIR VARIOUS COURSES



LINK MECHANISMS
GEARING

GEAR TRAINS AND CAMS
PULLEYS AND BELTING
MATERIALS OF CONSTRUCTION
STRENGTH OF MATERIALS
THE TESTING OF MATERIALS
MACHINE DESIGN

SCRANTON

INTERNATIONAL TEXTBOOK COMPANY

Entered at Stationers' Hall, London.

Link Mechanisms: Copyright, 1906, by INTERNATIONAL TEXTBOOK COMPANY.

Entered at Stationers' Hall, London.

Gearing: Copyright, 1906, by INTERNATIONAL TEXTBOOK COMPANY. Entered at

Stationers' Hall, London.

Gear Trains and Cams: Copyright, 1906, by INTERNATIONAL TEXTBOOK COMPANY.

Entered at Stationers' Hall, London.

Pulleys and Belting: Copyright, 1906, by INTERNATIONAL TEXTBOOK COMPANY.

Entered at Stationers' Hall, London.

Materials of Construction: Copyright, 1906, by INTERNATIONAL TEXTBOOK COM-

PANY. Entered at Stationers' Hall, London.

Strength of Materials: Copyright, 1906, by INTERNATIONAL TEXTBOOK COMPANY.

Entered at Stationers' Hall, London.

The Testing of Materials: Copyright, 1906, by INTERNATIONAL TEXTBOOK COMPANY.

Entered at Stationers' Hall, London.

Machine Design: Copyright, 1907, by INTERNATIONAL TEXTBOOK COMPANY.

Entered at Stationers' Hall, London.

All rights reserved

PRINTED IN THE UNITED STATES

BURR PRINTING HOUSE
FRANKFORT AND JACOB STREETS
NEW YORK



CONTENTS

LINK MECHANISMS	Section	Page
Relative Motions of Links	11	1
General Kinematic Principles	11	3
Levers	11	9
Steam-Engine Mechanism	11	17
Quick-Return Motions	11	24
Straight-Line Motions	11	29
Universal Joints	11	31
GEARING		
Toothed Gearing	12	1
Spur Gearing	12	5
Proportions of Gear-Teeth	12	21
Construction of Tooth Profiles	12	27
Bevel Gearing	12	33
Spiral and Worm-Gearing	12	41
GEAR TRAINS AND CAMS		
Gear Trains	13	1
Engine-Lathe Gear Trains	13	6
Epicyclic Trains	13	15
Revolving-Gear Trains	13	24
Reversing Mechanisms	13	26
Cams and Cam Trains	13	30
Rotary Cams	13	31
Sliding and Cylindrical Cams	13	40
Ratchet Mechanisms	13	42
PULLEYS AND BELTING		
Belt Gearing	14	1
Lengths of Open and Crossed Belts	14	6

PULLEYS AND BELTING— <i>Continued</i>	<i>Section</i>	<i>Page</i>
Cone Pulleys	14	10
Power Transmission by Belt	14	18
Care and Use of Belting	14	23
Belt Connections for Non-Parallel Shafts	14	27
 MATERIALS OF CONSTRUCTION		
Properties of Iron	15	1
Production of Iron	15	2
Cast Iron	15	7
Wrought Iron	15	14
Steel	15	20
Crucible Steel	15	23
Blister Steel and Shear Steel	15	25
Alloy Steel	15	26
Steel Castings	15	29
Spring Steel	15	31
Metal Alloys	15	31
Selection of Materials	15	36
 STRENGTH OF MATERIALS		
Stress and Deformation	16	1
Elasticity	16	3
Tension	16	6
Shear	16	9
Factors of Safety	16	11
Pipes and Cylinders	16	14
Elementary Graphic Statics	16	19
Composition of Moments	16	22
Graphic Expressions for Moments	16	24
Beams	16	27
Simple Beams	16	28
Overhung Beams and Cantilevers	16	44
Strength of Beams	17	1
Deflection of Beams	17	11
Comparison of Strength and Stiffness of Beams	17	14
Columns	17	16

STRENGTH OF MATERIALS— <i>Continued</i>	Section	Page
Torsion and Shafts	17	23
Ropes and Chains	17	29

THE TESTING OF MATERIALS

Purpose of Testing Materials	18	1
Test Pieces	18	2
Apparatus for Testing Materials	18	5
Tension Test	18	15
Records of the Test	18	18
Compression Test	18	25
Transverse Test	18	28
Shearing and Torsion Tests	18	32
Miscellaneous Tests	18	32
Characteristics of Materials	18	37

MACHINE DESIGN

Design of Machine Details	19	1
General Design of a Machine	19	3
Properties of Materials	19	5
Screws and Screw Threads	19	10
Bolts and Nuts	19	28
Wrenches	19	32
Keys	20	1
Cotters	20	11
Riveted Joints	20	19
Classification of Riveted Joints	20	24
Strength of Riveted Joints	20	30
Structural Riveting	20	45
Design of Journals and Bearings	21	1
Journals	21	1
Bearings With Sliding Friction	21	15
Pedestals	21	19
Wall Brackets and Hangers	21	32
Roller Bearings	21	36
Ball Bearings	21	46
Shafts	22	1
Shaft Couplings	22	21

MACHINE DESIGN— <i>Continued</i>	<i>Section</i>	<i>Page</i>
Friction Clutches	22	27
Springs	22	35
Belt Gearing	23	1
Pulleys	23	7
Band Brake	23	28
Rope Belting	23	30
Chain Gearing	23	42
Sprocket Wheels	23	48
Friction Gearing	23	63
Spur Gears	23	68
Strength of Gear-Teeth	23	68
Proportions of Spur Gear-Teeth	23	81
Proportions of Spur Wheels	23	82
Bevel Gears	23	92
Worm-Gearing	23	102
Spiral Gears	23	112

