Contents

PREFACE TO THE SECOND EDITION	Page
PREFACE TO THE FIRST EDITION	vi
Section One	
LATHES	
CHAPTER I	
MODERN MACHINE-SHOP PRACTICE	3
Changes that have taken place in machining methods—Larger production at minimum cost—Selecting machine equipment— Methods and men.	
CHAPTER II	
ТНЕ LATHE	9
Lathe work between centers—Good and bad centers—Turning slender work—Keeping lathe centers in line—Faceplate work— Angle-plate work—Holding work against the live center.	
CHAPTER III	
CHUCKS AND CHUCKING. Special chucks—Holding thin work in the chuck—Care of chucks and faceplates—Turning large curved surfaces—Turning by templet—Boring and boring tools—Steady and follow rests.	23
CHAPTER IV	
TAPERS-TURNING AND BORING	20
Setting over the tail center—Measuring tapers in the lathe— Using the taper attachment—Boring taper holes—Use of boring bar—Cutting taper threads—Gage for setting lathe tools—Cutting taper threads—Setting compound rests—Points to remember.	90
CHAPTER V	
THREAD CUTTING	50
Figuring change gears—Compounding gears—Catching threads— Rapid thread cutting—Measuring the thread—Pitch and lead— vii	

CONTENTS

Cutting the thread—Take up lost motion—Angular feeding of tools—American standard threads—Multiple threads—Dimensions of threads—Square threads—Acme threads—Worm threads —Chasers and special tools—Cutting quick pitch threads— Threading slender work—Threading fiber—Cutting internal threads in tough metal. Testing the lead screw—Handy lathe kinks—Using the indicator—Finishing ends of work—Drilling in the lathe—Three types of centering mandrels—Direct length measurement—Milling the lathe—Care of the lathe.

CHAPTER VI

FUNDAMENTALS OF LATHE ACCURACY. . .

Checking squareness—Boring holes parallel—Utilizing a used lathe —V blocks must be accurate—Using an angle plate—A typical set-up.

CHAPTER VII

Section Two

TURRET AND SEMI-AUTOMATIC LATHES

CHAPTER VIII

CHAPTER IX

Universal Ram-type Turret Lathe: The headstock—Construction of bed—Carriage details—Ram-turret saddle, slide, and apron— Bar chuck and feed mechanism—Special tools. Warner & Swasey Machines: Types of chucks—Example of bar work—Universal equipment for bar work—Chucking work. Gisholt Turret Lathe: Cross-feeding turret—High-rate metal removal.

CHAPTER X



PAGE

81

viii

1.



Section Three AUTOMATIC SCREW MACHINES

CHAPTER XI

CHAPTER XII

SETTING UP AND OPERATING AUTOMATIC SCREW MACHINES . 154

Tools and collets—Handling material—Tool and other adjustments—Production—Manipulation of tools—Speeds and feeds for screw machines—Forming-tool speeds and feeds—Drilling and reaming data—Threading and counterboring.

CHAPTER XIII

BROWN AND SHARPE AUTOMATIC SCREW MACHINES . . . 165

Disk cams used—Vertical tool turret. Tools and Attachments: Screw-slotting attachment—Index drilling attachment—Countershaft drive. Camming the Brown and Sharpe Automatic: Order of operations—Determining spindle revolutions—Spindle revolutions and cross-slide movements—Indexing and stock-feeding allowance—Selecting change gears—Divisions of the cam circle— Turret and cross-slide cams—Tool layout—Turret-slide cam lobes—Cross-slide cam lobes—Stock stop, spindle reverse— Cams for high-speed machines.

CHAPTER XIV

MULTIPLE-SPINDLE AUTOMATIC SCREW MACHINES 200

National Acme Gridley Machine: High spindle speeds—A typical set-up. Six-spindle Gridley machine: The spindle carrier— The chronolog. New Britain-Gridley Automatic: General arrangement—Threading speeds—Production chart. Davenport Five-spindle Automatic—Work spindle head—Stock feed cam— Silent chain drive. Greenlee Four-spindle Machine: T-shaped tool slide—Four forming slides—Stock feed—Wide feed range.

.CHAPTER XV

Collets, Chucks, and Tools

Spring collets and feed chucks: Making collets—Holding while slitting—Collet interior—Preparing for hardening—Feed chucks— Grinding fixture for collets—Box and other tools—General 15

٠. ٠

.225

ix Page

CONTENTS

principles—Conditions of service—Types of box tools—Back rests —Tool position and lubrication—Long and short work—Irregular stock sections—Cast-iron work—Hollow mills—Back-rest construction—Box-tool cutters—"Tangent" cutter—Operation suggestions. Drills and counterbores: Starting drills—Spotting and facing tools—Twist and straight-flute drills—Serrated, fluted, and stepped lips—Back and land clearances—Flat drills and counterbores—Stepped counterbores—Machine reamers—Cutting edges —Reamer holders—Taper reamers—Recessing tools.

CHAPTER XVI

SCREW-MACHINE TAPS, DIES, AND FORMING TOOLS. . . . 249

Types of taps and dies—Spring dies—Tapping out the die— Hardening—Cutting edges—Making inserted chasers—Button dies—Application of die to work—Internal threading—Length and number of lands—Tap relief—Sizing work for threading— Testing threading action. Forming tools: Comparison of types —Diameters and clearances—Getting tool diameter at different points—Tool-making methods—The transfer scheme—Master tools and templets—Making dovetail tools—Testing outline of forming tools—Forming and turning—Supporting long work— Arrangement of circular tools.

CHAPTER XVII

Section Four

BORING MACHINES

CHAPTER XVIII

4

CONTENTS

Section Five

CUTTING TOOLS FOR DIFFERENT MATERIALS

CHAPTER XIX

CHAPTER XX.

Recommendations for Widia tools—Grinding cemented-carbide tools. How cemented-carbide tools are made: Attaching tips— Cutting-edge contour—Wear greatest at corners—Tip and shank shape—Tool angles—Tool setting. How Westinghouse uses carbide tools: Two advantages—Work-handling time is important-—Carbide tooling on present equipment—Size for tungstencarbide tip. Tool grinding: Side grinding—Carbide and diamond boring.

CHAPTER XXI

Machine speeds and feeds chart—Cutting-speed conversion table —Cutting-speed chart—Machineability of metals: Top range of hardness—Chatter in metal cutting. Boring-tool design: Facing cutters—Chip clearance—Hollow mills—Cutting speeds and feeds. —Some peculiarities of aluminum alloys: Top rake—Milling clearance—Reaming and tapping—Tapping—Tap grinding.

CHAPTER XXII

SUGGESTIONS FOR MACHINING VARIOUS METALS. 402

Drilling of Alleghany metal—Machining of aluminum. Magnesium base alloys (Dowmetal): Machining—Cutting tools—Turning, shaping, and planing—Parting—Milling and drilling— Reaming and threading—Sawing—Filing and grinding—Cutting lubricants—Fire hazards. Machining Duralumin. Machining Hy-ten-sl bronze. Machining Monel metal—Turning—Threading—Drilling—Reaming—Tapping—Milling. Machining Nickelchromium alloys (Inconel): Drilling and reaming—Milling— Lubrication. Machining nitrided steel (Nitraloy). Real or apparent finish—Quality of finishes: Poor finish—Remedies for poor finishes.

CHAPTER XXIII

MACHINING NONMETALLIC MATERIALS .

1 2

. 417

Formica-Micarta-Textolite-Hard rubber-Fiber. Machining cast plastics: Forming and stamping-Sanding and grinding-Ashing and polishing.

CONTRACTOR
CONTENTS

xii	CONTENTS	
	CHAPTER XXIV	PAGE
Fu	NCTIONS OF CUTTING OILS	429
Ini	DEX	445
w	ARTIME DATA SUPPLEMENT.	455
	Crankshaft operations—Large boring operations—Carbide tools on steel forgings—Cutting steel with carbide tools—Machining N.E. (National Emergency) steels—Machining armor plate— Boring deep holes—Boring and threading in a lathe—Three ways to turn contours—Recessing or undercutting—Holding straight cutoff under heavy feed—Spray-metal practice in building up worn parts—Turning and boring plastics—Machining aluminum.	; - 3 5

Index	то	WARTIME	Data	SUPPLEMENT.	•	•	•	•.	49	95
INDEX	то	WARTIME	DATA	SUPPLEMENT.	•	·	٠	•	43	

.

4) 4-13-1 history