



# Precision tools

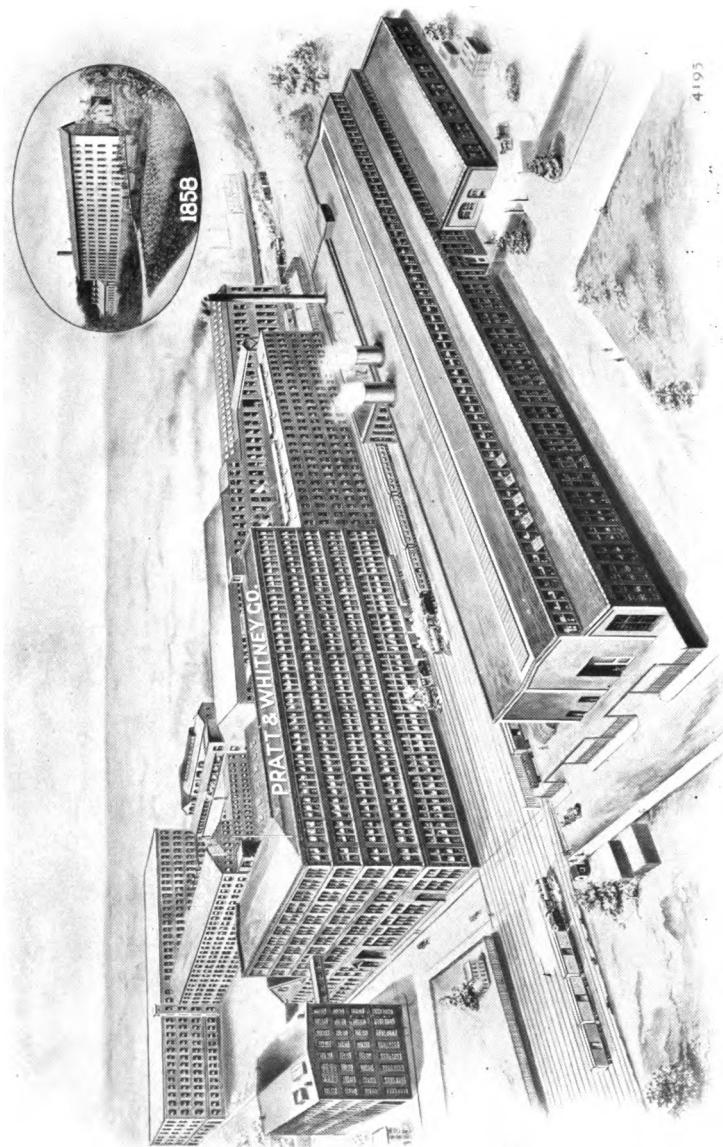
Pratt & Whitney Company

# PRECISION TOOLS

PRATT & WHITNEY COMPANY  
HARTFORD, CONNECTICUT

TO VINA  
CALIFORNIA

Pratt & Whitney Company



Machinery Department



226969









Small Tool Department

# AMERICAN INDUSTRIAL

## PRATT & WHITNEY COMPANY

HARTFORD, CONNECTICUT

### SALES OFFICES

New York . . . . .	Trinity Building, 111 Broadway
Boston . . . . .	Oliver Building, 141 Milk Street
Chicago . . . . .	Commercial National Bank Building
Philadelphia . . . . .	Twenty-first and Callowhill Streets
Pittsburg . . . . .	Frick Building
St. Louis . . . . .	516 North Third Street
Hamilton, Ohio . . . . .	Care Niles Tool Works Company
Detroit . . . . .	Majestic Building
Cleveland . . . . .	Rockefeller Building

### DOMESTIC AGENTS

Le Sourd & Walpole . . . . .	Brown-Marx Building, Birmingham, Ala.
Hendrie & Bolthoff Mfg. and Supply Company . . . . .	1639 17th Street, Denver
Harron, Rickard & McCone . . . . .	139 Townsend Street, San Francisco
Harron, Rickard & McCone . . . . .	164 N. Los Angeles Street, Los Angeles
Portland Machinery Company . . . . .	Portland, Oregon
Hallidie Machinery Company . . . . .	Seattle, Washington
The Hallidie Company, Inc. . . . .	Spokane, Washington

### FOREIGN AGENTS

Great Britain . . . . .	Buck & Hickman, Ltd., 2 Whitechapel Road, London, E.
Great Britain	Pratt & Whitney Co., Exchange Bldgs., New St., Birmingham
Great Britain	Niles-Bement-Pond Company, 25 Victoria Street, London, S. W.
France, Belgium and Switzerland . . . . .	Fenwick Freres & Company, 8 Rue de Rocroy, Paris
Germany . . . . .	F. G. Kretschmer & Company, Gutleutstr. 2, Frankfurt, aM.
Argentine . . . . .	F. H. Bagge, 121 San Martin, Buenos Aires
Austria . . . . .	Ernst Krause & Company, Engerthstrasse 165, Vienna XX/2
Brazil . . . . .	A. Cazzani, Boite Postale 802, Rio de Janeiro
Canada . . . . .	The Canadian Fairbanks Company, Ltd., Montreal, Toronto, Winnipeg and Vancouver
Mexico . . . . .	R. M. Wiggin, Apartado 97-B, Mexico City
Denmark and Norway . . . . .	V. Lowener, Copenhagen, B.
Italy . . . . .	Ing. Ercole Vaghi, Corso Porta Nuova 34, Milan
Japan . . . . .	F. W. Horne, 70-C. Yokohama
Russia . . . . .	O. R. San Galli, Nikolajewskaja 17, St Petersburg
Sweden . . . . .	Aktiebolaget V. Lowener, Stockholm

## INTRODUCTION

**T**HE Pratt & Whitney Company invites attention to the Precision Machinery illustrated and described herein. A broad experience, unexcelled facilities and unfaltering determination, this Company believes, have solved the essentials of modern machinery requirements in a manner which will appeal to the discriminating judgment of the Mechanical World.

**Design** In the design of these machines every known necessary requirement as regards stability, power, accuracy, convenience and rapidity of operation have been carefully considered. In their solution every opportunity for improvement has been accepted, many new features and refinements having been incorporated resulting in the production of machinery which, for its adaptation to the end sought, has an enviable reputation the world over. Separate departments and engineering forces devoted to the various types of machines are maintained at the Works; thus the several lines are under constant observation and improvements are made from time to time to meet the changing conditions and to increase their efficiency.

**Material** The very best, so proven by experience and careful investigation, is always used, regardless of cost.

**Workmanship** The mechanics employed by the Pratt & Whitney Company are of an exceptionally high order. The best devices and methods known for the accurate and rapid production of machinery are freely made use of. The inspection system covers material, detail parts, constant attention during process of construction, as well as a most thorough test of the finished machine for alignment, operation, etc. No work except of the highest possible order is tolerated.

**Standard Equipments** The tool equipments and appliances as furnished for the various machines fully cover the general requirements. The aim is to make these tools distinctive for their simplicity and ease of operation combined with the necessary rigidity.

**Special Equipments** For work out of the ordinary the Pratt & Whitney Company is in a position, due to the separate manufacturing and engineering departments maintained for the various lines, to design and equip the machines with special tools and appliances of the most modern approved type.

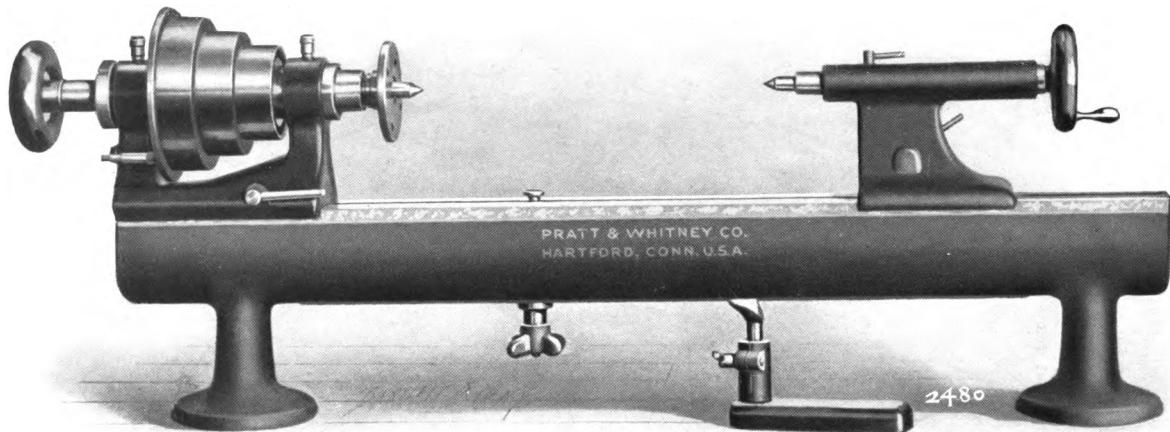
**Inquiries** All inquiries should be accompanied with detailed information regarding the matter in question, and where there is any doubt full dimensioned blue prints or samples should be furnished. Blue prints and samples will be returned when desired. If these suggestions are adhered to, the solution of the matter involved is very often simplified and invariably considerable time is saved.

**Selling** A list of branch offices and agents is printed on opposite page. The representatives in these offices are experts and are kept in close touch with the Works regarding improvements, deliveries, prices, etc., and are pleased to be of service.

**Visitors** The Works are always open to visitors who are interested in machinery manufactured by the Pratt & Whitney Company.

**Catalogues** This catalogue contains in a concise form specifications and general information concerning the line of machinery manufactured by the Pratt & Whitney Company. Separate catalogues giving more explicit and detailed information concerning the various types of machines are also published, as well as a separate catalogue devoted to Gauges and Standards; also one for Small Tools. Catalogues are furnished upon request.

**Code** Attention is called to telegraphic code, page 265.



7 x 32-inch Bench Lathe

## BENCH LATHE

The Bench Lathe properly equipped and understood undoubtedly presents the widest field for usefulness of any machine tool in use at the present time. For the toolmaker it is an indispensable tool; its convenience of operation, accuracy and universal features making possible an unlimited variety of work. Extreme care is exercised in the manufacture of the Lathes and the various attachments, all parts being made to master standards to insure their being interchangeable with one another.

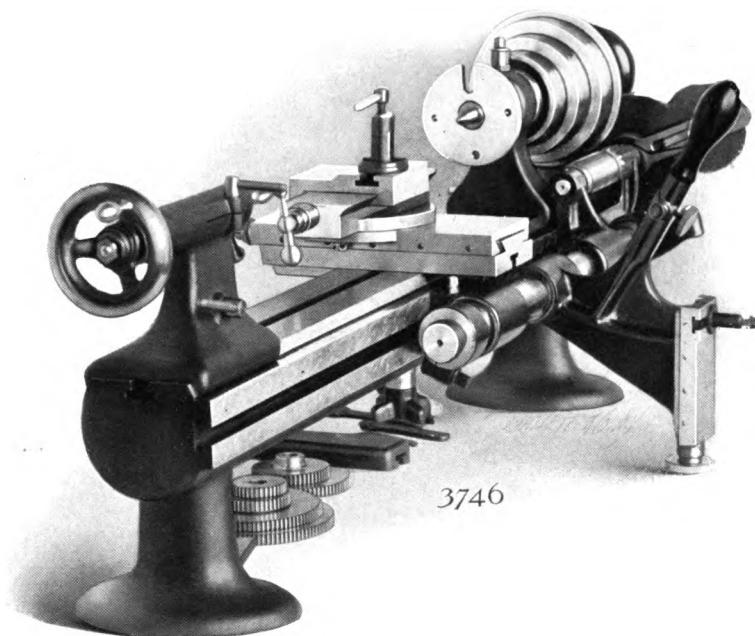
## SPECIFICATIONS

RANGE . . .	Length of Bed . . . . .	32"
	Center Distance, maximum . . . . .	16"
	Swing over Bed . . . . .	7"
	Swing over Bed, with Raising Blocks . . . . .	13"
	Back-rests, capacity . . . . .	3", 4", 5", and 6"
	Tool Post takes Tool . . . . .	1/2" x 1/4"
	Collet Capacity . . . . .	1/2"
HEADSTOCK SPINDLE	Tool Steel (H. & G.); Front Bearing, double taper; Rear Bearing, cylindrical. Boxes, Tool Steel (H. & G.), adjustable for wear. Hole through Chuck Seat . . . . .	.650"
	*Taper Hole in Spindle Collet, No. 4 Jarno. Front End, conical.	
TAILSTOCK SPINDLE	Diameter . . . . .	.750"
	Travel . . . . .	3"
	*Taper Hole, No. 4 Jarno.	
SPEEDS . . .	Spindle Speeds (6), R. P. M. . . . .	144 to 1208
	†Cone (Spindle), diameter (3 steps) . . . . .	3", 3 7/8", 4 3/4"
	Cone (Counter.), diameter (3 steps) . . . . .	5 1/2", 6 3/8", 7 1/4"
	Countershaft Pulley (tight and loose) diameter . . . . .	5"
	Countershaft V-Grinding Pulley, 10" diameter, R. P. M. . . . .	413 and 1667
	Belt Width (Cone) . . . . .	1"
	Belt Width (Countershaft Pulleys) . . . . .	1 1/4"
	Countershaft Speed, R. P. M. . . . .	125 and 500
BENCH SPACE	Bench Space . . . . .	6" x 35"
WEIGHTS . . .	Machine Regular Equipment, net pounds . . . . .	100
	Boxing Material, approximate pounds . . . . .	50
	Box, cubic feet . . . . .	5

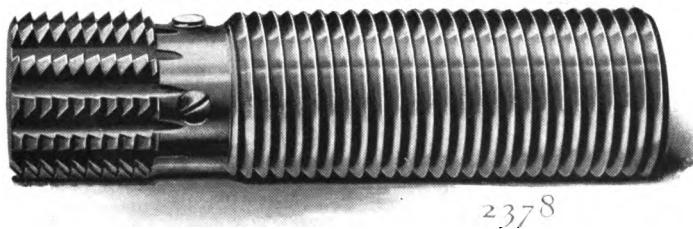
\*For detailed information, see "Tapers", page 247.

† Index Holes in Cone Flange, 48 and 60.

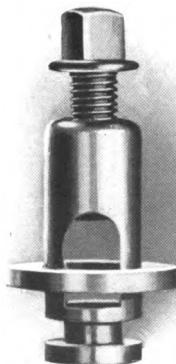
Code words, page 265.



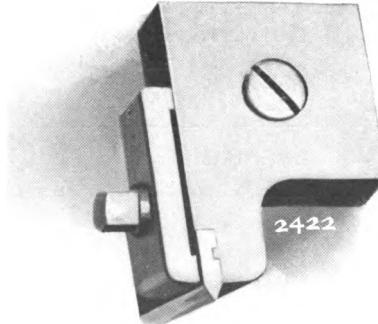
Rear View with Thread Cutting Attachment Thrown Back



Hob Screw



Regular Tool Post



Special Threading Tool

## BENCH LATHE EQUIPMENT

**Important Notice** In ordering attachments state explicitly whether for old or new model, as some of the attachments will not interchange. All Bench Lathes with "Pratt & Whitney" cast on bed are new model.

Attachments applied to the bed work equally well on either old or new model, with exception of the Threading Attachment. Special brackets and spindle gear are furnished to order, which enables the old model Threading Attachment to be used on the new model lathe.

Attachments which fit the headstock or tailstock will not interchange, as there is a difference in the size of collets and in taper of centers. Special spindle to accommodate old style collets can be furnished to order.

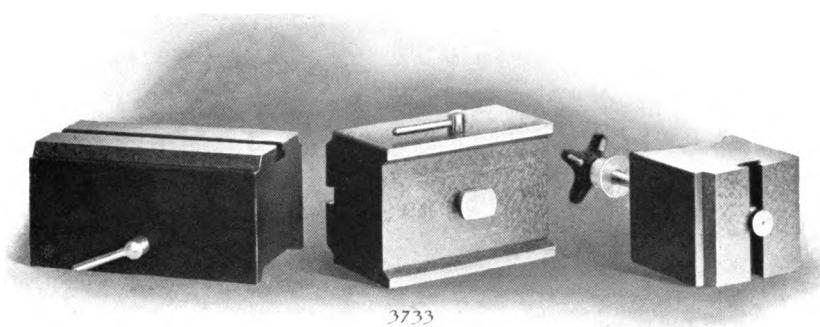
**Regular Equipment** Comprises: Bed with Rear Slide planed for Threading Attachment; Headstock with Face Plate, Center Collet and Center; Tailstock with Center; T-Rest with Binder.

**Threading Attachment** Consists of: Chasing Bar and Brackets; One Spindle Gear; One Intermediate Gear; 6-Change Gears (permitting any multiple of Hob Screw from 1 to 6 to be cut); One Hob Screw any standard pitch as specified below; Hand Lever and Arm for carrying Threading Tool; Plain Tool Post with either English or Metric Micrometer Adjustment and Stop-plate attached to bed.

**Hob Screws with Hob for chasing nut, standard pitches:** 10, 11, 12, 13, 14, 15, 16, 17, 18 and 20.

**Special Threading Tool and Holder** for Threading Attachment, furnished to order.

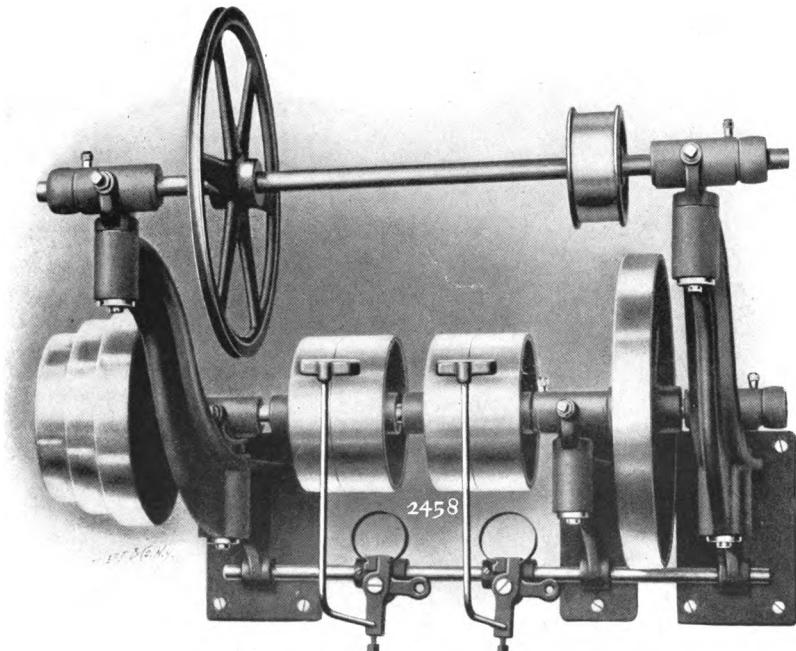
**Brackets, Long and Short,** also Spindle Gear to enable old model Threading Attachments to be used on new model lathes, furnished to order.



3733

Raising Blocks

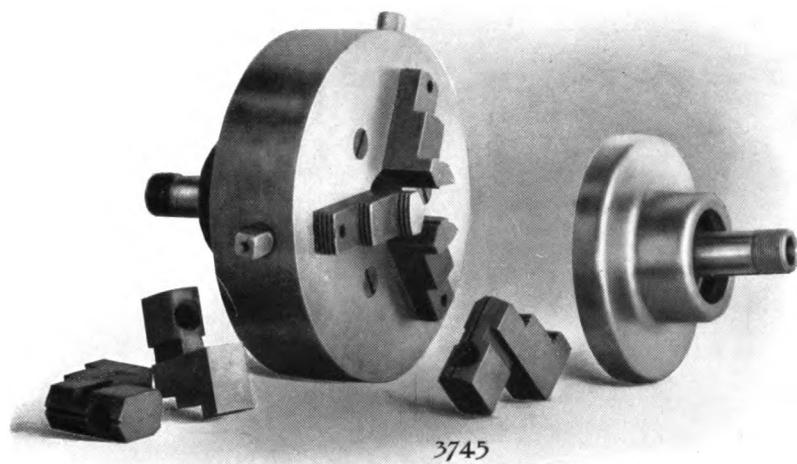
**Raising Blocks** 3 inches high, increasing swing of lathe to 13 inches; 3 in set: one each for Head, Tailstock and one for Compound Rest or other attachments.



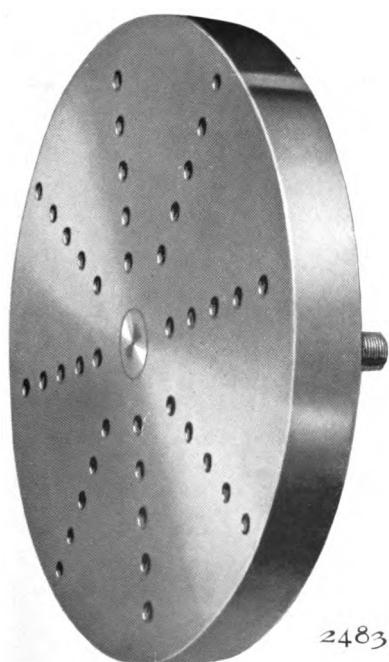
Two-speed Wall Countershaft with Grinding Attachment

**Countershafts** Two-speed Wall with or without grinding attachment; Two-speed Wall-rod with or without grinding attachment.

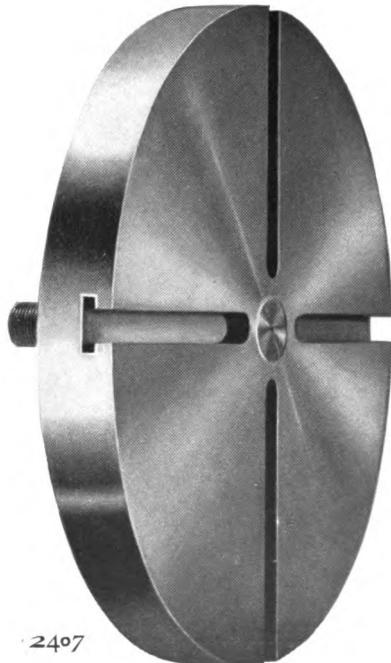
Wall Countershafts bolt directly to the wall; Wall-rod Countershafts are bolted to Wall-rods, which is preferable when a number of lathes are used together or are placed in front of windows. Wall-rod Brackets and Wall-rods 1 inch diameter, are carried in stock and furnished to order.



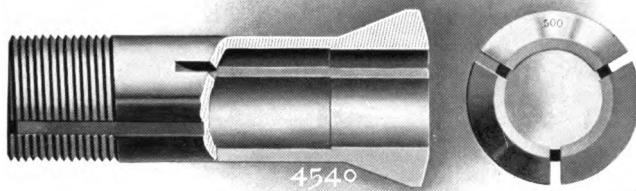
Combination Chucks: 4 and 6-inch with 2 sets of Jaws and Chuck-plate



7-inch Face-plate Chuck with Tapped Holes

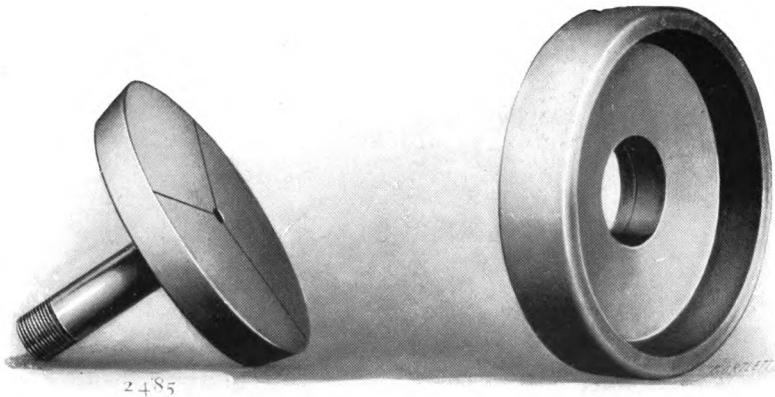


7-inch Face-plate Chuck with T-slots



Collet

**Collets** English sizes,  $\frac{1}{4}$ " to  $\frac{1}{2}$ " varying by 64th or .025" to .5" varying by .005. Metric sizes, .5 to 12 m/m varying by .5 m/m.

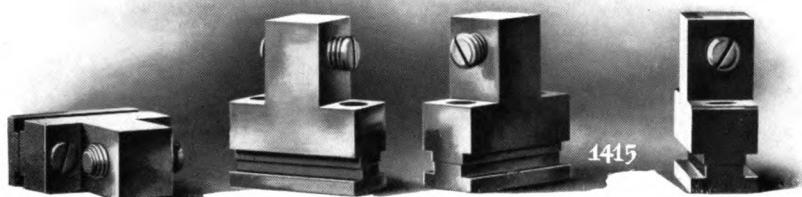


Blank Split Step-chuck and Closer

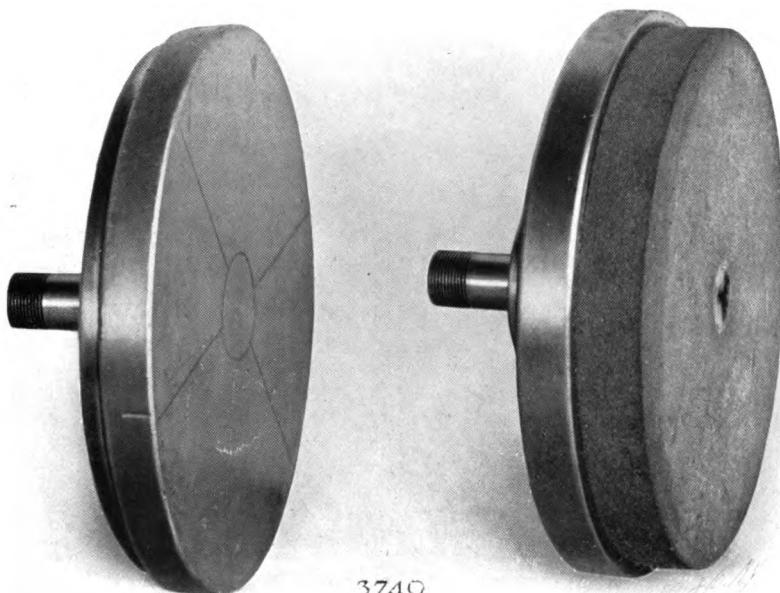
### Step-chucks and Closers Made in five sizes.

Chuck A (C. I.)	Maximum	Recess	1.25"	Diameter x .125" Deep
Chuck B (C. I.)	Maximum	Recess	1.75"	Diameter x .125" Deep
Chuck C (C. I.)	Maximum	Recess	2.25"	Diameter x .125" Deep
Chuck D (C. I.)	Maximum	Recess	2.75"	Diameter x .125" Deep
Chuck E (C. I.)	Maximum	Recess	3.25"	Diameter x .125" Deep

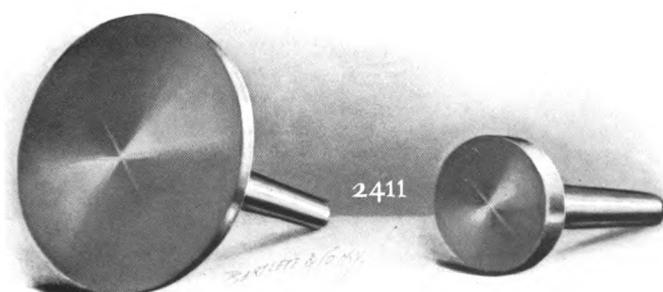
Closers A, B, C, D, E for above Chucks.



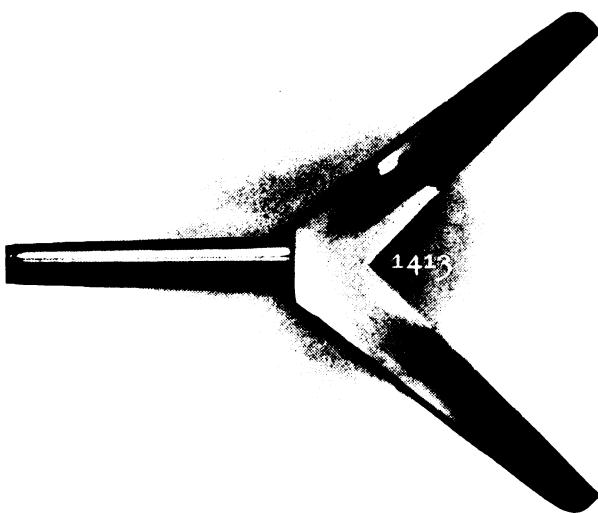
Chuck Jaws: For Face-plate Chucks with T-slots. Also used for Face-plate Quills with T-slots



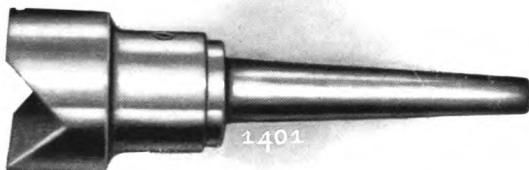
Face Emery Wheel and Face Lead Lap



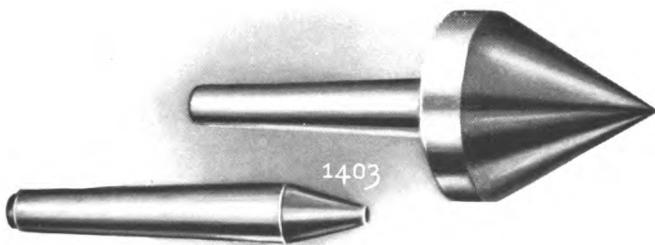
Drill Pads: 1, 2, 4 and 6-inch Diameter



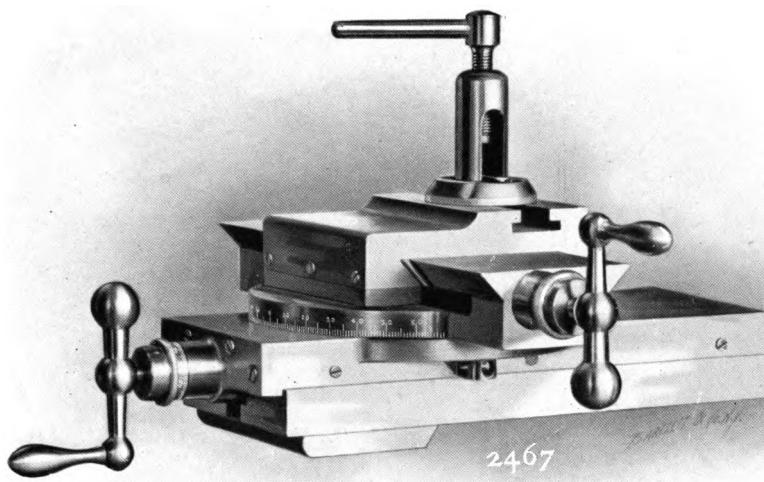
Plain V-center



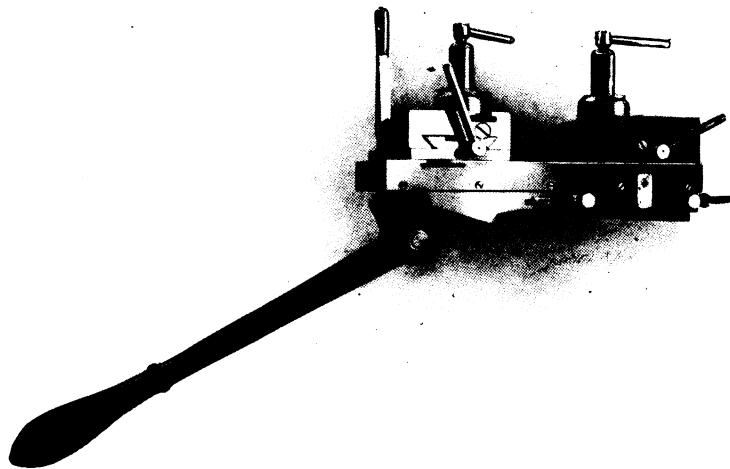
Swiveling V-center



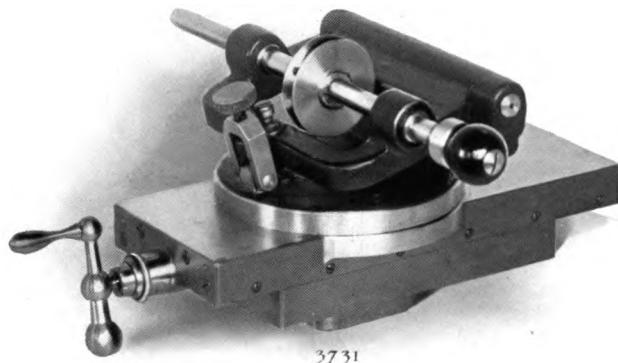
Large Plain Center and Female Center



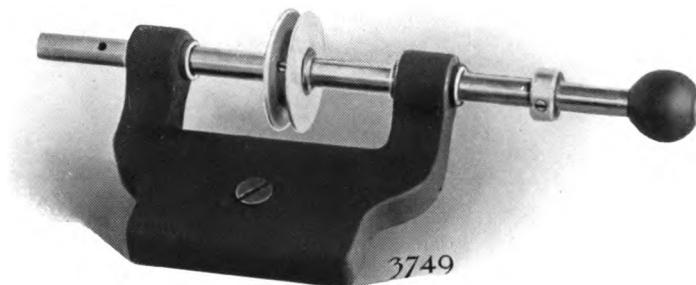
Compound Slide-rest: Graduated in Degrees for Angles and Provided with Micrometer Dials  
either English or Metric



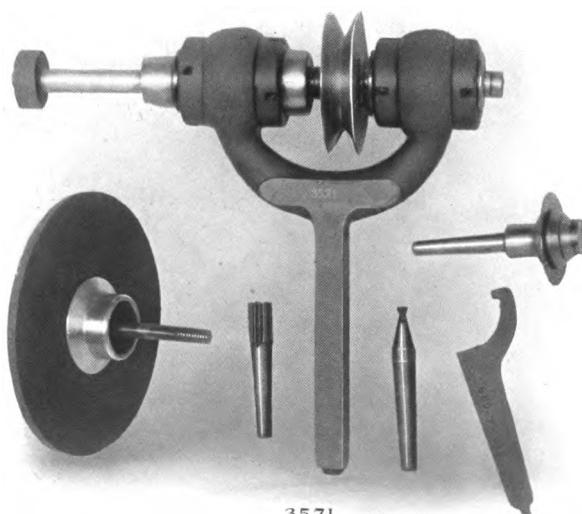
Double Slide-rest with Lever, Rack and Pinion Movement. Also made with Screw Movement



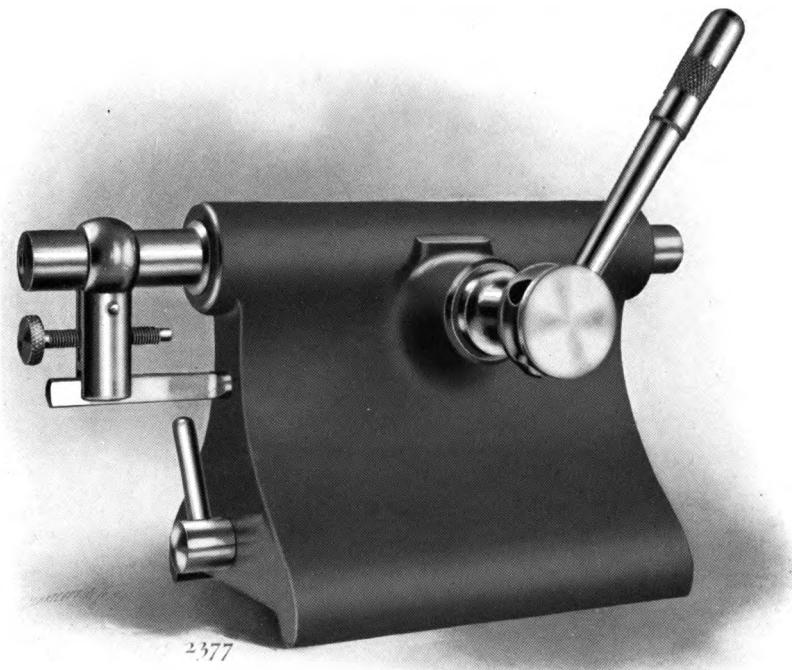
**Grinding Rest with Traversing Spindle:** Graduated in Degrees for Angles and Provided with Micrometer Dials



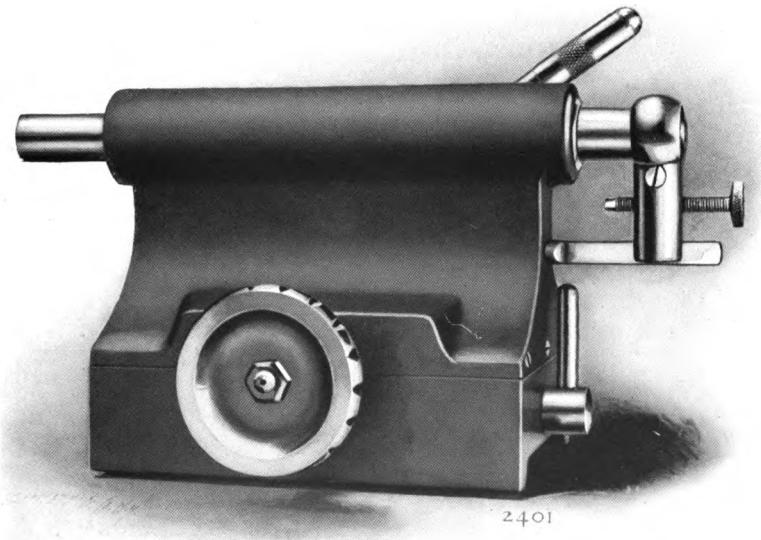
**Slide-rest Traverse-spindle Grinder**



**Tool-post Grinder and Appliances**



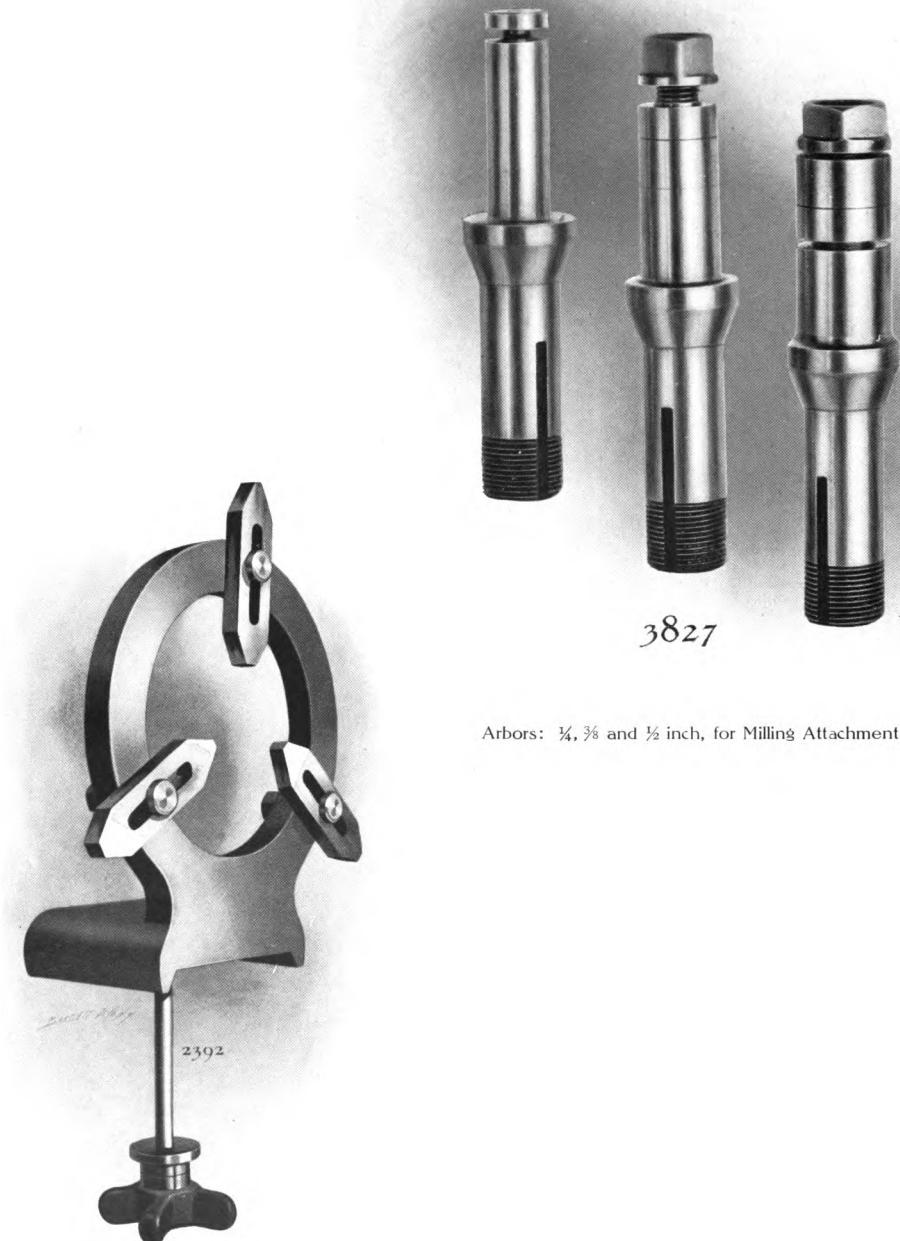
Plain Lever Tailstock



Lever Tailstock with Cross Slide

P R E C I S I O N  
P R E C I S I O N

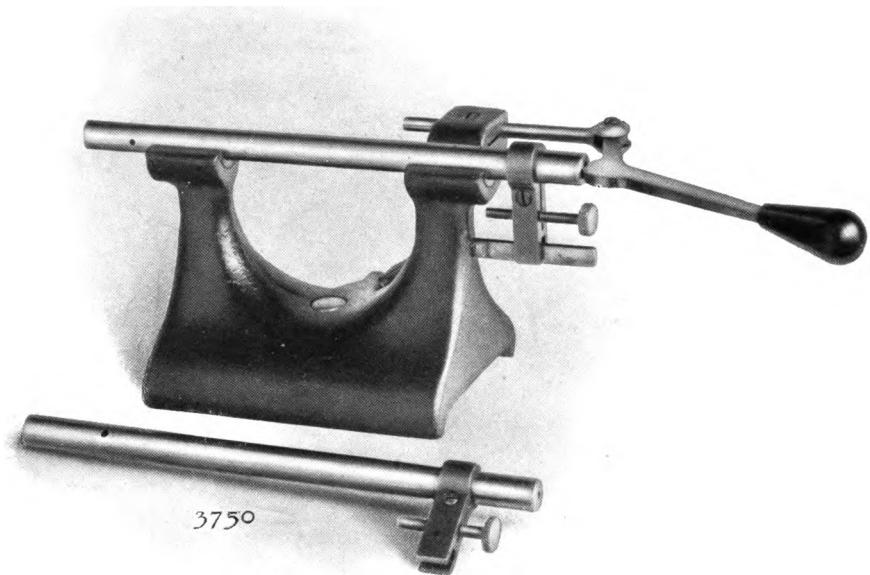
---



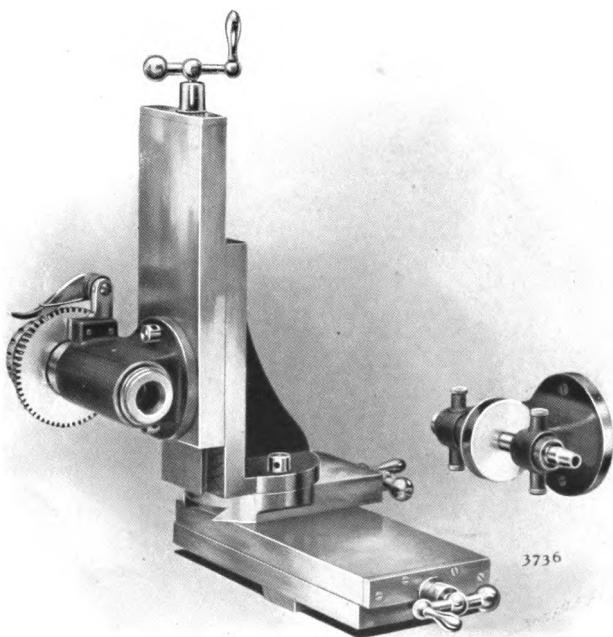
Arbors:  $\frac{1}{4}$ ,  $\frac{3}{8}$  and  $\frac{1}{2}$  inch, for Milling Attachment

2392

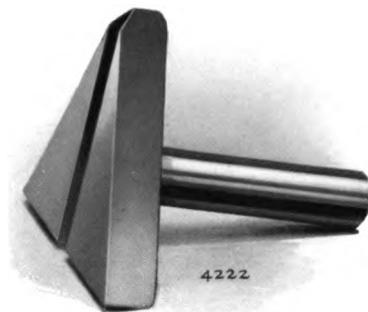
Back-rests: 3, 4, 5 and 6-inch Capacity



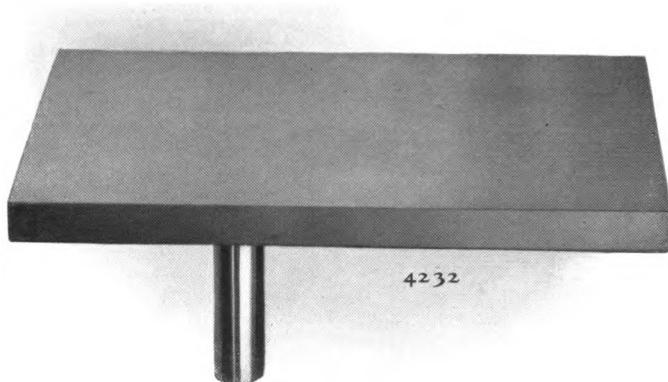
Open Tailstock with Extra Spindle and Dog. Also made with Full Bearings and Pulley on Spindle



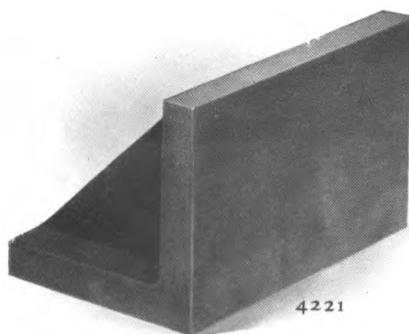
Milling Attachment with Extra Cutter Head



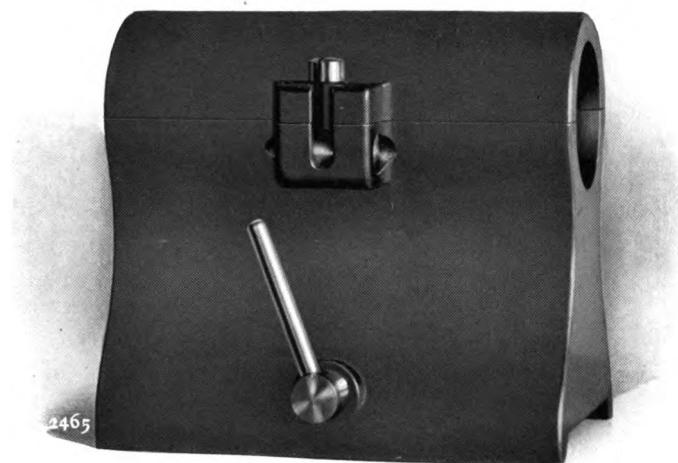
Triangular Table-rest, 2 $\frac{3}{8}$ -inch



Rectangular Table-rest, 4 x 6-inch



Angle Plate, 2 x 3 $\frac{1}{4}$ -inch



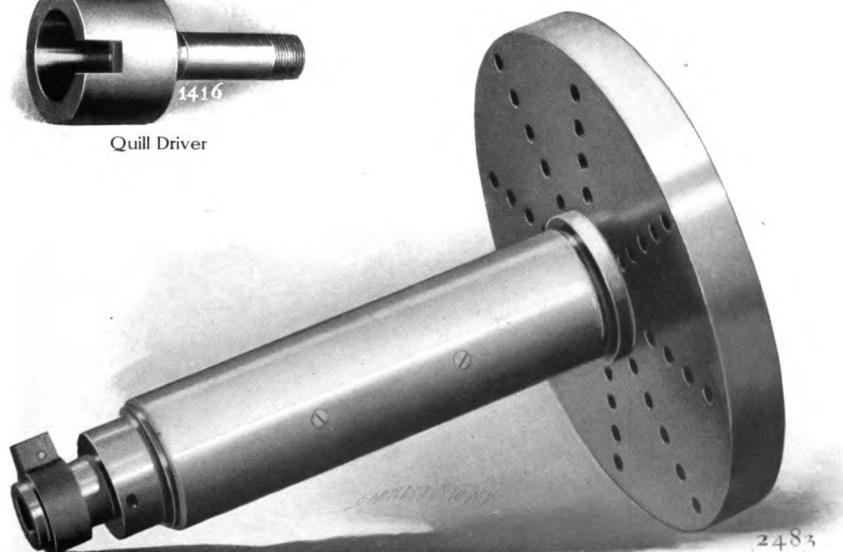
Quill-rest



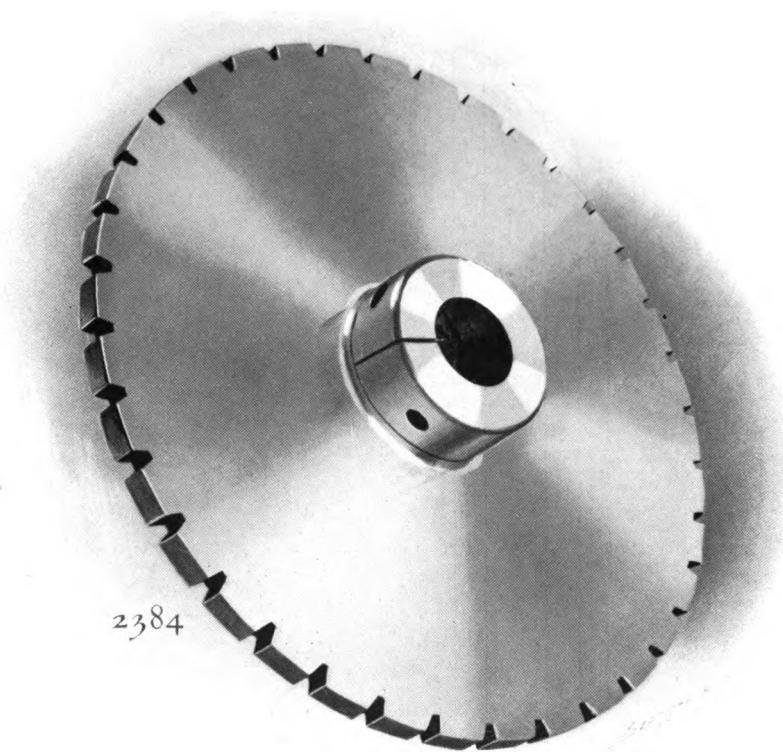
Chuck Quill



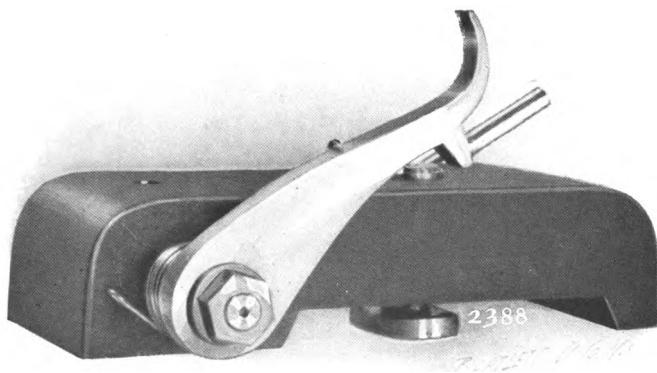
Quill Driver



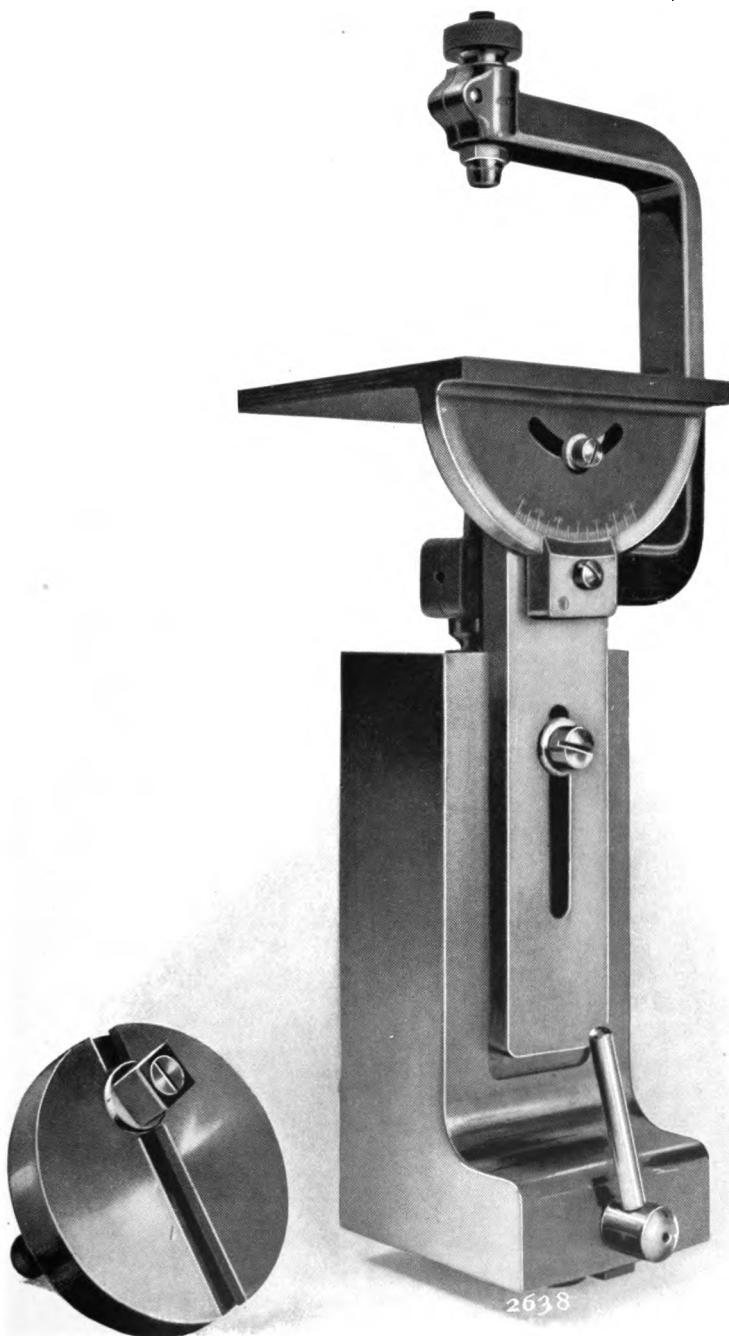
Face-plate Quill with Tapped Holes in Face-plate. Also made with T-slots in Face-plate



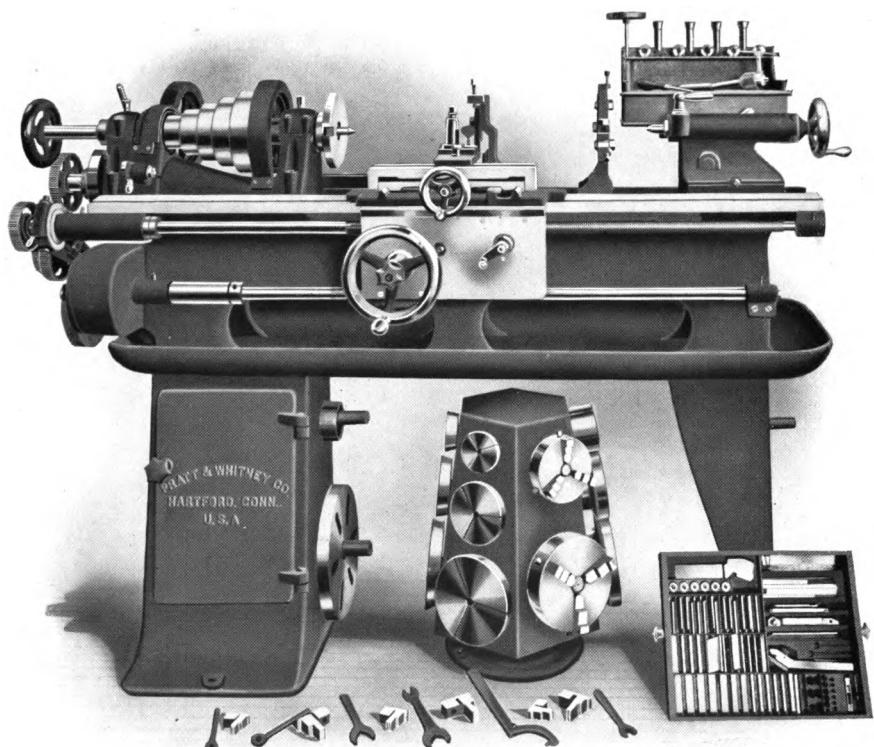
Index Plate: Number of Notches as Ordered



Index Pawl and Block



Filing Attachment and Driver  
Files of various shapes furnished to order



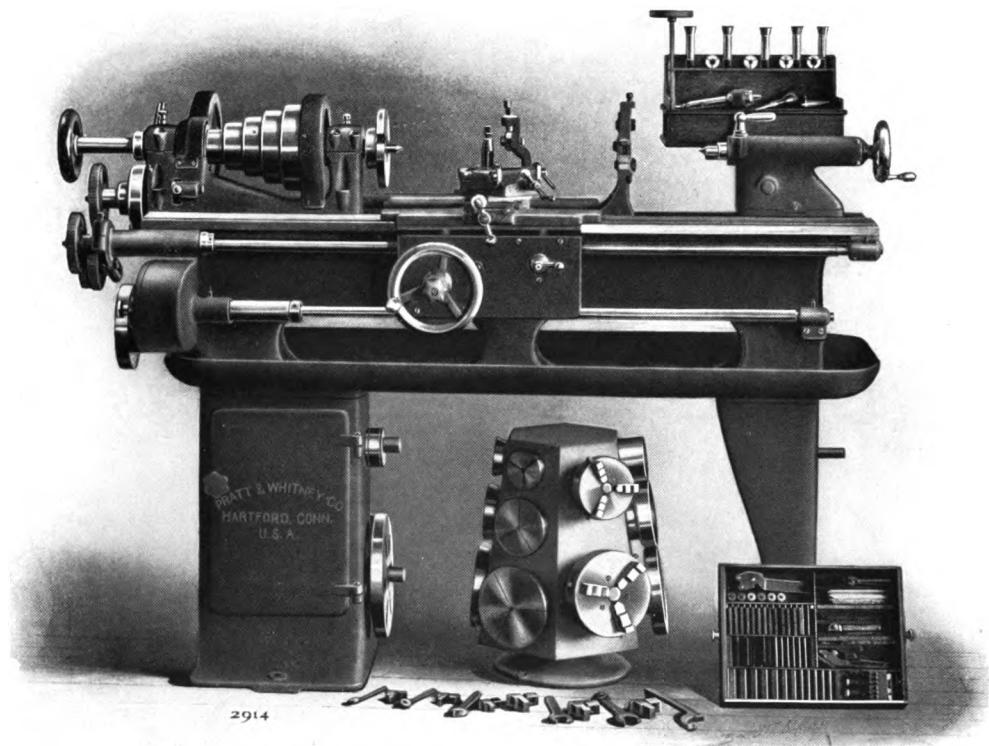
10-inch Toolmakers' Lathe with Plain Elevating Rest and Tool Equipment

## 10-INCH LATHE—SPECIFICATIONS

RANGE . . .	Length of Bed . . . . .	5'
	Center Distance, maximum . . . . .	29"
	Swing over Bed, with Plain Elevating Rest . . . . .	10 3/4"
	Swing over Bed, with Compound Elevating Rest . . . . .	11 3/4"
	Swing over Carriage, with Plain Elevating Rest . . . . .	4 1/6"
	Swing over Carriage, with Compound Elevating Rest . . . . .	7 1/2"
	Steady Rest Capacity . . . . .	2 1/2"
	Follow Rest Capacity . . . . .	2 1/2"
	Tool Post takes Tool . . . . .	1/2" x 1"
	Collet Capacity . . . . .	7/8" to 1 3/8"
	Taper Attachment, graduated in both degrees and inches, will turn taper 20 degrees including angle 12" long, in any position on bed.	
HEADSTOCK SPINDLE . . .	Special Steel ; Bearings, cylindrical ; Front . . . . .	1 1/8" x 3"
	Rear Bearings . . . . .	1 1/8" x 2 1/2"
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through . . . . .	1 5/8"
	*Taper Hole in Spindle Collet, No. 6 Jarno.	
	Front End, conical (H. & G.) ; Thread, 2 3/4" diameter ; 6 Pi., U. S. F.	
TAILSTOCK SPINDLE . . .	Diameter . . . . .	1 3/8"
	Travel . . . . .	5"
	*Taper Hole, No. 6 Jarno.	
SPEEDS . . .	Spindle Speeds, back gears in (5), R. P. M. . . . .	10 to 59
	Spindle Speeds, back gears out (5), R. P. M. . . . .	78 to 460
	Back Gear Ratio . . . . .	7 1/6 to 1
	Cone Diameters (5), large and small . . . . .	7 1/8" and 2 7/8"
	Pulley (Counter, Friction) . . . . .	8" x 3 1/4"
	Belt Width (Cone) . . . . .	1 1/2"
	Belt Width (Counter, Friction Pulley) . . . . .	3"
	Countershaft Speed, R. P. M. . . . .	180
FEEDS . . .	Carriage Longitudinal (6), P. R. Sp. . . . .	.002" to .0154"
	Transverse Feed, hand only.	
	Micrometer Dials, graduated in thousandths.	
THREADING . . .	English Lead Screw, 6 Pi., Acme, will cut English Threads 1 1/2 to 156 Pi., inc. 11 1/2 Pi. Metric Threads, 18 to 25 m/m P., inc. 75 and 90 m/m P.	
	Metric Lead Screw, 4 m/m P., will cut Metric Threads 13 to 25 m/m P., inc. 75 and 90 m/m P. English Threads, 1 1/2 to 39 Pi., inc. 11 1/2 Pi.	
FLOOR SPACE	Floor space . . . . .	31" x 6' 2"
WEIGHTS . . .	Machine, with Regular Equipment, net pounds . . . . .	1300
	Tool Equipment, net pounds . . . . .	180
	Crating Material (domestic), approximate pounds . . . . .	200
	Boxing Material (foreign), approximate pounds . . . . .	500
	Box, cubic feet . . . . .	71

\*For detailed information, see "Tapers", page 247.

Code words, page 265.



(Patented)

10-inch Toolmakers' Lathe with Compound Elevating Rest and Tool Equipment

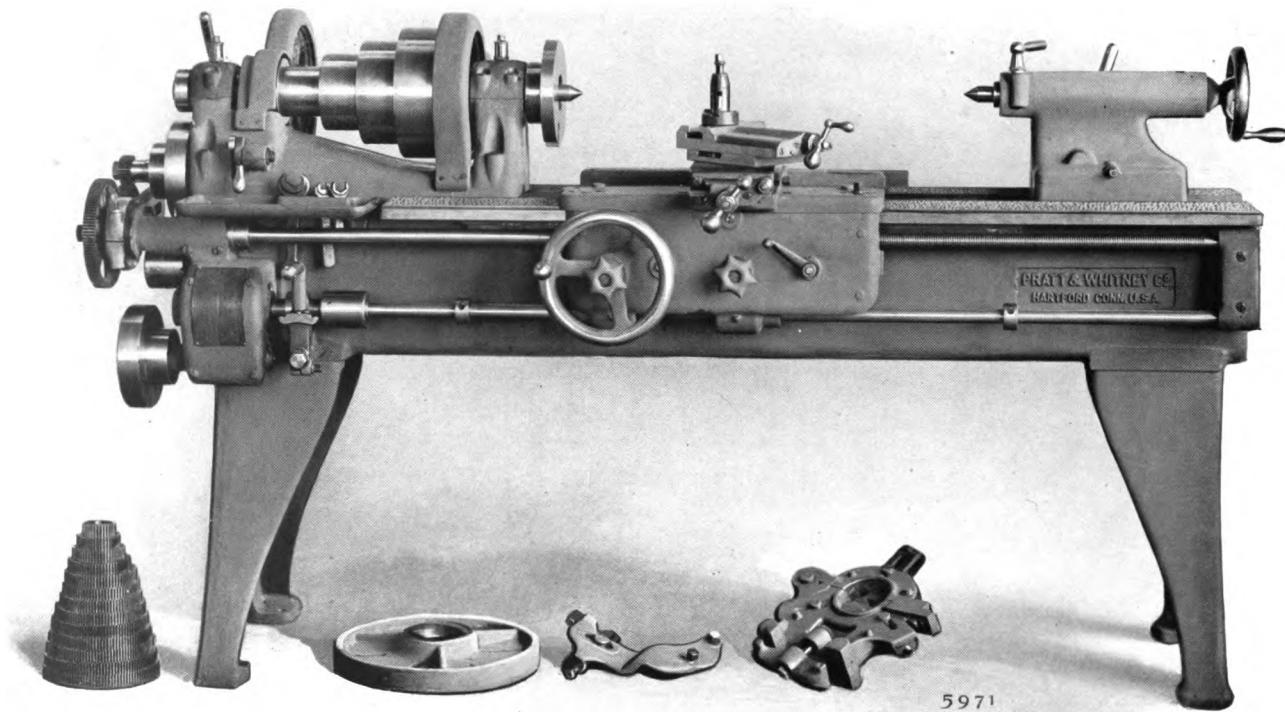
## 10-INCH LATHE EQUIPMENT

REGULAR EQUIPMENT	The machine with English Lead, Cross Feed Screws and Dials; Rise and Fall Elevating Rest; Taper Attachment; Collet Attachment, with 9 Collets, $\frac{1}{16}$ to $\frac{5}{8}$ by 16ths; 2 Centers; Spindle Cap; Face Plates, $10\frac{1}{2}$ " and $6\frac{1}{2}$ " diameter; Stationary Rest; Follow Rest; 23 Change Gears; Gear Cabinet; Screw Driver; Set of Wrenches; Countershaft (double friction). (The Collet Attachment, with exception of Collets, is a part of the machine proper and cannot be sold separate).
METRIC EQUIPMENT	Differs from the above in that Metric Lead, Cross Feed Screws and Dials are furnished; also Metric Collets, 3, 4, 5, 6, 8, 10, 12, 14 and 16 m/m.
COMPOUND ELEVATING REST	Can be furnished in place of Rise and Fall Rest. (See cut on page 32).
QUICK WITHDRAWING ATTACHMENT	Can be furnished for Compound Elevating Rest. (Same as 16" Lathe on page 38).
CHUCK-PLATES . . .	3" or $3\frac{1}{2}$ " diameter, ready to receive Chuck, are carried in stock.

## TOOL EQUIPMENT

CHUCKS . . .	<ul style="list-style-type: none"> <li>1 4", 3-Jaw Combination, with 2 sets of Jaws.</li> <li>1 6", 3-Jaw Combination, with 2 sets of Jaws.</li> <li>1 Spanner Wrench, for above Chucks.</li> <li>1 <math>\frac{5}{16}</math>" Drill Chuck, with stem.</li> <li>1 <math>\frac{5}{16}</math>" Drill Holder, size "A", No. 60 to <math>\frac{5}{16}</math>" capacity.</li> </ul>
STEP-CHUCK AND CLOSERS	<ul style="list-style-type: none"> <li>2 Step-chucks, <math>\frac{5}{8}</math>" to 2" capacity (steel, blank).</li> <li>2 Step-chucks, 2" to 4" capacity (steel, blank).</li> <li>2 Step-chucks, 4" to 6" capacity (steel, blank).</li> <li>1 Closer for 2" Step-chucks.</li> <li>1 Closer for 4" Step-chucks.</li> <li>1 Closer for 6" Step-chucks.</li> </ul>
TOOL HOLDERS	<ul style="list-style-type: none"> <li>1 Threading Tool Holder, No. 2 P. &amp; W., with 1 Cutter, Sharp "V" single.</li> <li>1 Cutter, Sharp "V" double off-set.</li> <li>1 Cutter for Center Turning.</li> <li>12 Cutters, U. S. S., from 6 to 20 Pi. (English Equipment).</li> <li>12 Cutters, Int. Std., from 1 to 5.5 m/m P. (Metric Equipment).</li> <li>12 Cutters, Whitworth Std., 5 to 20 Pi. (to order only).</li> <li>1 Knurling Tool Holder, with 3 pairs of knurls; fine, medium and coarse.</li> <li>1 Combination Tool Holder, with 13 High-speed Cutters; 2 Small Boring Bars and Holder; 1 Centering Tool; 1 Wrench.</li> <li>1 Cutting-off Tool Holder, No. o Johnson, with 12 blades.</li> <li>18 Center Reamers, 6 each <math>\frac{1}{4}</math>", <math>\frac{3}{8}</math>", and <math>\frac{1}{2}</math>".</li> <li>1 Screw Pitch Gauge.</li> <li>1 Center Gauge.</li> <li>1 Female Center.</li> <li>1 Cabinet for Tools.</li> <li>1 Pyramid for Chucks, etc.</li> </ul>

Code words, page 265.



14-inch Engine Lathe

## 14-INCH LATHE—SPECIFICATIONS

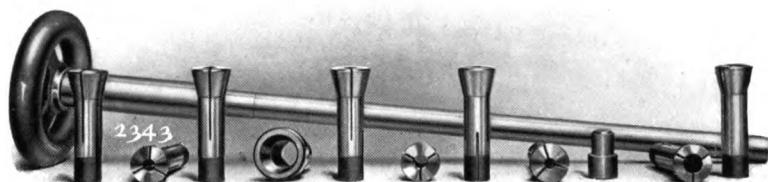
RANGE . . .	Length of Bed . . . . .	6', 8', 10'
	Center Distance, maximum . . . . .	36", 60", 84"
	Swing over Bed . . . . .	15 $\frac{1}{8}$ "
	Swing over Carriage . . . . .	9 $\frac{1}{2}$ "
	Steady Rest Capacity . . . . .	4"
	Follow Rest Capacity . . . . .	3"
	Tool Post takes Tool . . . . .	56" x 1 $\frac{1}{4}$ "
	Attachments (see description)	
HEADSTOCK SPINDLE	Special Steel ; Bearings, cylindrical ; Front . . . . .	2 $\frac{7}{8}$ " x 4"
	Rear Bearings . . . . .	2 $\frac{1}{2}$ " x 3 $\frac{5}{8}$ "
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through . . . . .	1 $\frac{3}{10}$ "
	*Taper Hole in Spindle, No. 13 Jarno.	
	*Taper Hole in Spindle Collet, No. 10 Jarno.	
	Front End, cylindrical, 2 $\frac{5}{8}$ " diameter ; Thread 3 $\frac{3}{4}$ " diameter ; 6 Pi., U. S. F.	
TAILSTOCK SPINDLE	Diameter . . . . .	2"
	Travel . . . . .	6"
	*Taper Hole, No. 10 Jarno.	
SPEEDS . . .	Spindle Speeds, back gears in (4) . . . . .	8 to 43
	Spindle Speeds, back gears out (4) . . . . .	77 to 400
	Back Gear Ratio . . . . .	9 $\frac{3}{8}$ to 1
	Cone Diameters (4), large and small . . . . .	9 $\frac{3}{4}$ and 3 $\frac{3}{4}$ "
	Countershaft Pulley, diameter . . . . .	12" x 4 $\frac{1}{4}$ "
	Belt Width (Cone) . . . . .	3"
	Belt Width (Countershaft Pulley) . . . . .	4"
	Countershaft Speed, R. P. M. . . . .	125
FEEDS . . .	Carriage Longitudinal (6), P. R. Sp. . . . .	.0064" to .0456"
	Carriage Transverse Feed (6), P. R. Sp. . . . .	.0057" to .0408"
	Micrometer Dials graduated in thousandths.	
THREADING . . .	English Lead Screw, 6 Pi., Acme, will cut English Threads 2 to 92 Pi., inc. 11 $\frac{1}{2}$ Pi. Metric Threads, 12 to .5 m/m P., inc. .75 and .9 m/m P. (Extra Gears 127 and 85-T necessary for Metric Threads).	
	Metric Lead Screw, 4 m/m P., Acme, will cut Metric Threads 12 to .5 m/m P., .75 and .9 m/m P. English Threads, 2 to 22 Pi., inc. 11 $\frac{1}{2}$ Pi. (Translating Gear 127-T necessary for English Threads).	
FLOOR SPACE	Length : length of Bed plus 2 feet in all cases.	
	Width : 39" in all cases, Taper Attachment included.	
WEIGHTS . . .	†Machine, with Regular Equipment (6' Bed), net pounds . . . . .	2200
	†Pan and Oiling Attachment (6' Bed), net pounds . . . . .	400
	Crating Material (domestic), approximate pounds . . . . .	250
	Boxing Material (foreign), approximate pounds . . . . .	650
	Box, cubic feet . . . . .	61 and 14

\*For detailed information, see "Tapers", page 247.

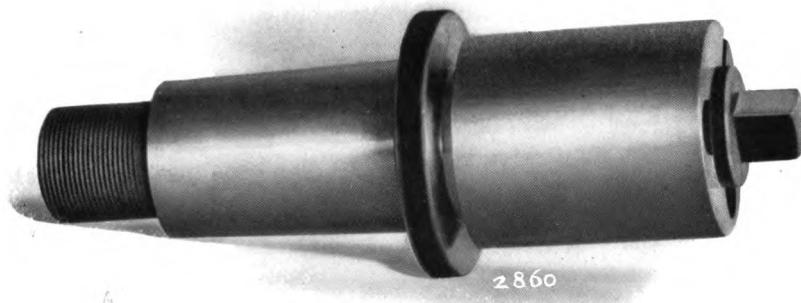
†For each additional 2' of bed add 200 pounds.

‡For each additional 2' of pan add 150 pounds.

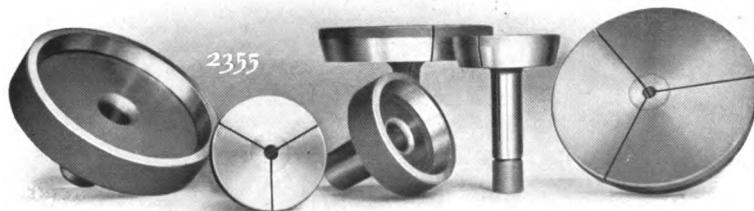
Code words, page 265.



**Draw-back Collet Attachment**



**Expanding Arbor**

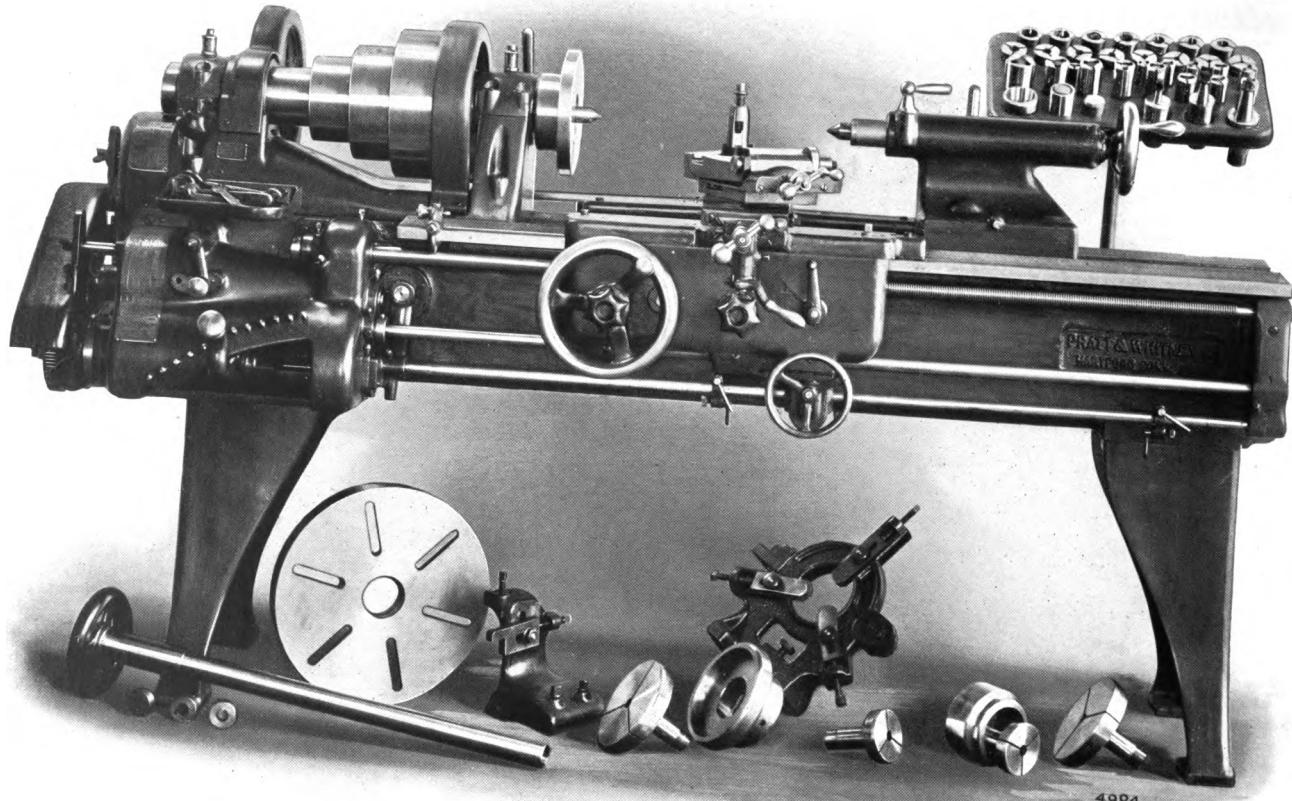


**Step-chucks and Closers**

## 14-INCH LATHE EQUIPMENT

<b>REGULAR EQUIPMENT</b>	The Machine with English Lead, Cross Feed Screws and Dials (metric if ordered); Taper Attachment; Plain Compound Rest; Stationary Rest; Follow Rest; Face Plates, 14" diameter (not finished on face) and 9" diameter; 17 Change Gears; Countershaft (double friction); Set of Wrenches.
<b>PAN AND OIL PUMP EQUIPMENT</b>	Furnished for all lengths of Beds. (Similar to 16" Lathe shown on page 40).
<b>COMPOUND ELEVATING REST</b>	Furnished in place of Plain Compound Rest. (Similar to 16" Lathe shown on page 38).
<b>PLAIN TURNING REST</b>	Furnished in place of Plain Compound Rest.
<b>QUICK WITHDRAWING ATTACHMENT</b>	For threading, furnished to order. (Similar to 16" Lathe shown on page 38).
<b>TAPER ATTACHMENT</b>	Is graduated in both degrees and inches; it will turn taper to 15 degrees including angle, 22' long, in any position on Bed. It is part of the Regular Equipment, but if not wanted suitable allowance will be made. (Similar to 16" Lathe shown on page 47).
<b>RELIEVING ATTACHMENTS</b>	See pages 47, 48 and 49.
<b>COLLET ATTACHMENT</b>	Consists of Draw-in Spindle; Closer; Drift Plug; 9 Collets, $\frac{3}{8}$ " to $\frac{7}{8}$ " by 16ths; or 9 Collets 8, 9, 10, 12, 14, 16, 18, 20 and 22 m/m. (Collets and Closer are hardened and ground, special treatment and care being used to insure accuracy).
<b>TOOL RACK</b>	For Collets and arbors (furnished to order).
<b>EXPANSION ARBORS AND BUSHINGS</b>	Consists of: 1 Arbor each, No. 1, No. 2 and No. 3. 4 Bushings (for No. 1 Arbor), $\frac{3}{4}$ ", $\frac{13}{16}$ ", $\frac{7}{8}$ ", $\frac{15}{16}$ ". 8 Bushings (for No. 2 Arbor), 1" to $1\frac{7}{16}$ " by 16ths. 5 Bushings (for No. 3 Arbor), $1\frac{1}{2}$ " to 2" by 8ths. 1 Draw-in Spindle. (Same as Collet Attachment. Specify if not wanted).
<b>METRIC BUSHINGS</b>	5 Bushings (for No. 1 Arbor), 19, 20, 22, 24 and 26 m/m. 6 Bushings (for No. 2 Arbor), 28, 30, 32, 34, 36 and 38 m/m. 6 Bushings (for No. 3 Arbor), 40, 42, 44, 46, 48 and 50 m/m. (Arbors and Bushings are hardened and ground, special treatment and care being used to insure accuracy).
<b>STEP-CHUCK AND CLOSER ATTACHMENT</b>	Consists of: 2 Step-chucks, $\frac{7}{8}$ " to 3" capacity. 2 Step-chucks, 3" to 6" capacity. 1 Closer for 3" Chuck. 1 Closer for 6" Chuck. 1 Draw-in Spindle. (Same as Collet Attachment. Specify if not wanted). (Closers are hardened and ground; Step-chucks are made of cast iron).
<b>CHUCK-PLATES</b>	$3\frac{1}{2}$ " and 7" diameter, blank, ready to receive Chuck.
<b>TRANSLATING GEARS</b>	127-T (English Threads from Metric Screw). 85 and 127-T (Metric Threads from English Screw).

Code words, page 265.



(Patented)  
16-inch Engine Lathe, Cone Drive

## 16-INCH LATHE—SPECIFICATIONS

RANGE . . .	Length of Bed . . . . . Center Distance, maximum . . . . . Swing over Bed . . . . . Swing over Carriage . . . . . Steady Rest Capacity . . . . . Follow Rest Capacity . . . . . Tool Post takes Tool . . . . . Attachments (see description).	6', 8', 10' 36", 60", 84" 16 $\frac{3}{4}$ " 10" 5" 4" $\frac{5}{8}'' \times 1\frac{1}{4}''$ .
HEADSTOCK SPINDLE	Special Steel ; Bearings, cylindrical ; Front . . . . . Rear Bearings . . . . . Boxes (Cone Head), C. I., lined with Babbitt, adjustable for wear. Boxes (Geared Head), Bronze, adjustable for wear. Hole through . . . . . *Taper Hole in Spindle, No. 16 Jarno. *Taper Hole in Spindle Collet, No. 10 Jarno. Front End, conical (H. & G.); Thread $4\frac{1}{4}$ " diameter; $\frac{3}{8}$ Pi., $\frac{3}{8}$ Lead.	$2\frac{7}{8}'' \times 4\frac{1}{4}''$ $2\frac{7}{8}'' \times 3\frac{7}{8}''$ .
TAILSTOCK SPINDLE	Diameter . . . . . Travel . . . . . *Taper Hole, No. 10 Jarno.	2" 6" .
SPEEDS CONE HEAD	Spindle Speeds, back gears in (8) . . . . . Spindle Speeds, back gears out (8) . . . . . Back Gear Ratio . . . . . Cone Diameters (4), large and small . . . . . Countershaft Pulley, diameter . . . . . Belt Width (Cone) . . . . . Belt Width (Countershaft Pulley) . . . . . Countershaft Speed, R. P. M. . . . . (For further information, see Lathe Catalogue).	7 to $48\frac{1}{2}$ $63\frac{1}{2}$ to 440 $9\frac{1}{2}$ to 1 $10\frac{3}{4}$ " to $4\frac{1}{4}$ " $14 \times 4\frac{1}{4}''$ 3" 4" 114 and 150 .
SPEEDS GEARED HEAD	Spindle Speeds (16) . . . . . Ratio of Driving Pulley to slow Sp. Speed . . . . . Diameter of Driving Pulley . . . . . Belt Width (Driving Pulley) . . . . . Belt Width (Countershaft Pulley) . . . . . Countershaft Speed, R. P. M. . . . . (For further information, see Lathe Catalogue).	8 to 450 45 to 1 $10'' \times 3\frac{1}{4}''$ 3" 4" 250 and 315 .
FEEDS . . .	Carriage Longitudinal, P. R. Sp. . . . . Carriage Cross Feed, P. R. Sp. . . . . Micrometer Dials graduated in thousandths (For further information, see Lathe Catalogue).	.0015" to .092" .0014" to .082" .
THREADING . . .	English Gear Box and Lead Screw, 3 Pi., Acme, will cut English Threads $1\frac{1}{2}$ to 88 Pi. Metric Gear Box and Lead Screw 8 m/m P., Acme, will cut Metric Threads .5 to 15 m/m Lead. (For further information, see Lathe Catalogue).	.
FLOOR SPACE	Length : length of Bed plus 2 feet in all cases. Width : 3' 6" in all cases, Taper Attachment included.	.
WEIGHTS . . .	†Machine with Regular Equipment (6' Bed), net pounds . . . . . †Pan and Oiling Attachment (6' Bed), net pounds . . . . . Crating Material (domestic), approximate pounds . . . . . Boxing Material (foreign), approximate pounds . . . . . Box, cubic feet . . . . .	2700 700 300 700 115 .

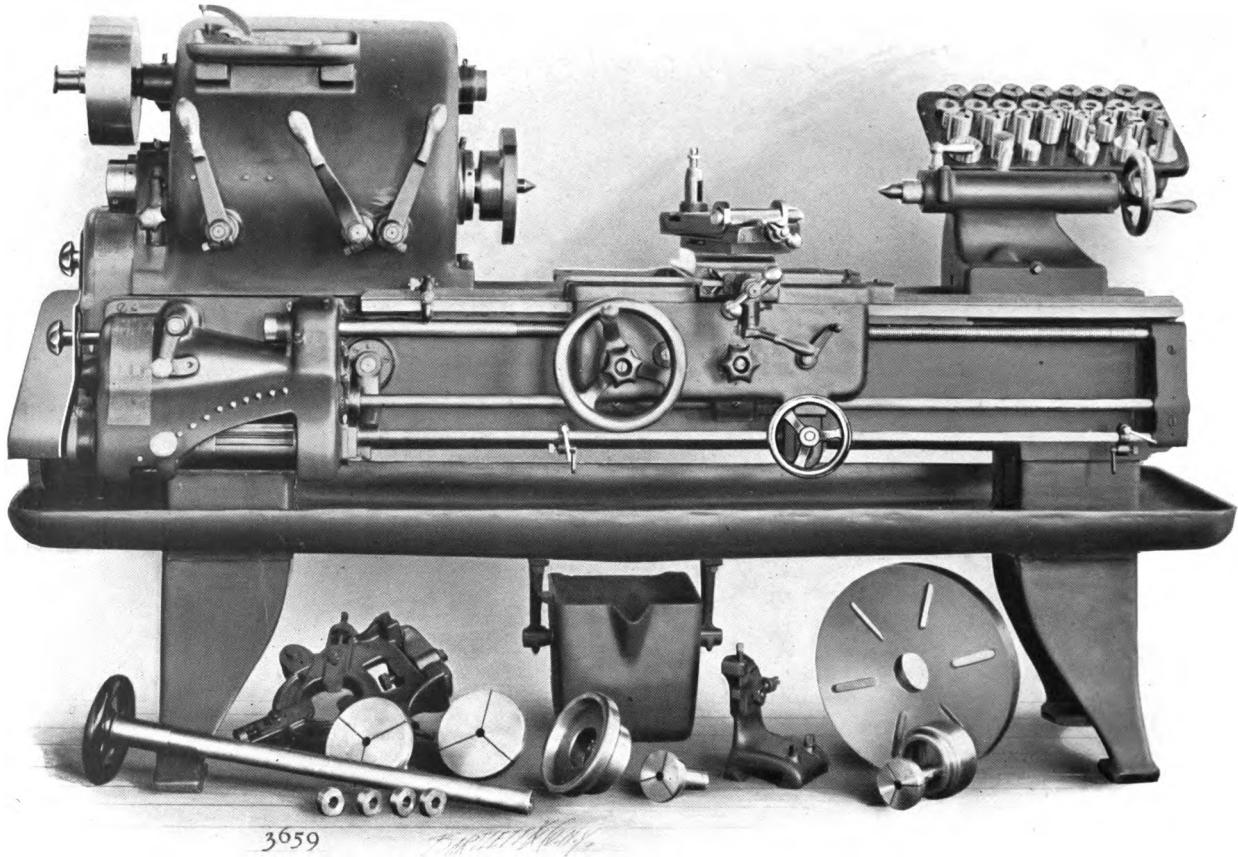
NOTE—Geared Head Machine with 6' Bed weighs 3500 pounds net.

\*For detailed information, see "Tapers", page 247.

Code words, page 265.

†For each additional 2' of bed add 200 pounds.

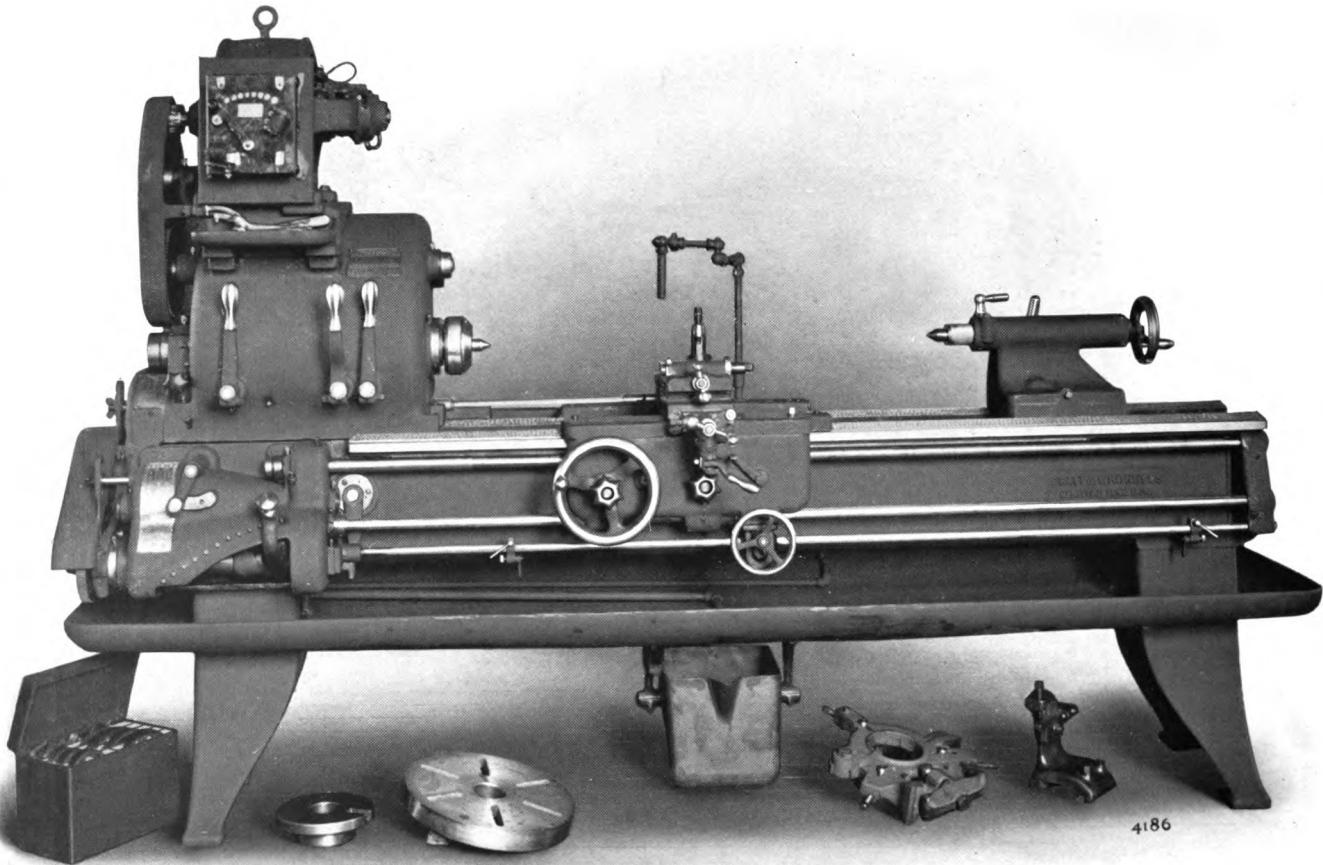
†For each additional 2' of pan add 150 pounds.



(Patented)  
16-inch Engine Lathe, Single Pulley Drive, All Geared Head and Pan Bed

## 16-INCH LATHE EQUIPMENT

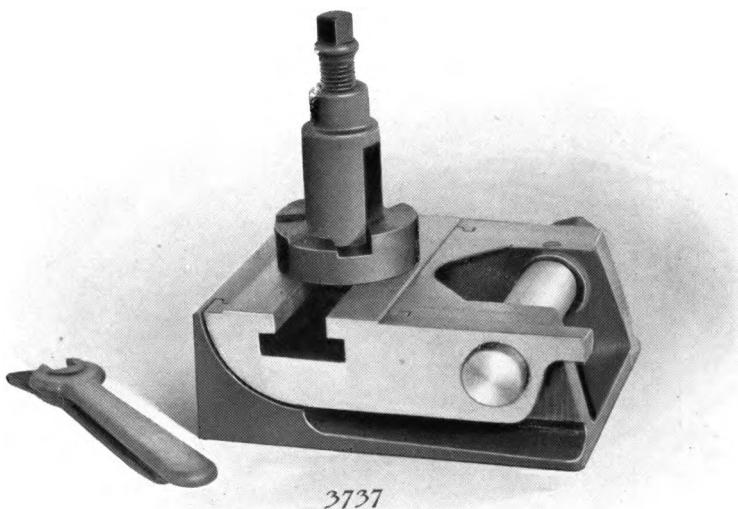
<b>REGULAR EQUIPMENT</b>	The machine with Cone Head; Compound Elevating Rest; English Lead, Cross Feed Screws, Dials and Gear Box (metric if ordered); Quick Withdrawing Attachment; Taper Attachment; Spindle Bushing; 2 Centers; Stationary Rest; Follow Rest; Face Plates, 16" and 9" diameter; 5-Change Gears; Countershaft (double friction); Set of Wrenches.
<b>GEARED HEAD</b>	Can be furnished in place of Cone Head.
<b>PAN, OIL PUMP</b>	Can be furnished for all lengths of Beds.
<b>COMPOUND REST, PLAIN</b>	Can be furnished in place of Compound Elevating Rest. (Same as 14" Lathe illustrated on page 34).
<b>ELEVATING REST, PLAIN</b>	Can be furnished in place of Compound Elevating Rest. (Cut on page 43).
<b>BALL TURNING REST</b>	With hand and power feeds in both directions. Adjustments both for diameter of work and of circle are easily obtained, micrometer dial being provided. (Cut on page 43).
<b>ROLLER BACK-REST</b>	For high speed turning. Furnished in place of regular.
<b>TAPER ATTACHMENT</b>	Is graduated in both degrees and inches; it will turn taper to 15 degrees including angle, 22 inches long, in any position on Bed. It is a part of the Regular Equipment, but if not wanted suitable allowance will be made. (Illustrated on page 47).
<b>RELIEVING ATTACHMENTS</b>	(See pages 47, 48 and 49).
<b>COLLET ATTACHMENT</b>	Consists of Draw-in Spindle; Collet Closer; Drift Plug; 15 Collets, $\frac{3}{8}$ " to $1\frac{1}{4}$ " by 16ths; or 15 Collets, 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32 m/m. (Collets and Closer are hardened and ground, special treatment and care being used to insure accuracy). Cut on page 44.
<b>TOOL RACK</b>	For Collets and Arbors. (Furnished to order).
<b>EXPANSION ARBORS AND BUSHINGS</b>	Consists of: 1 Arbor each, No. 1, No. 2 and No. 3. 4 Bushings (for No. 1 Arbor), $\frac{3}{4}$ ", $1\frac{1}{8}$ ", $\frac{7}{8}$ ", $1\frac{5}{16}$ ". 8 Bushings (for No. 2 Arbor), $1\frac{1}{2}$ " to $1\frac{7}{8}$ " by 16ths. 5 Bushings (for No. 3 Arbor), $1\frac{1}{2}$ " to 2" by 8ths. 1 Draw-in Spindle (same as Collet Attachment. Specify if not wanted). Cut on page 44.  5 Bushings (for No. 1 Arbor), 19, 20, 22, 24 and 26 m/m. 6 Bushings (for No. 2 Arbor), 28, 30, 32, 34, 36 and 38 m/m. 6 Bushings (for No. 3 Arbor), 40, 42, 44, 46, 48 and 50 m/m. (Arbors and Bushings are hardened and ground, special care and treatment being used to insure accuracy). Cut on page 44.
<b>METRIC BUSHINGS</b>	Consists of: 2 Step-chucks, $\frac{7}{8}$ " to $3\frac{3}{4}$ " capacity. 1 Step-chuck, $3\frac{3}{4}$ " to 7" capacity. 1 Step-chuck, with 4 Adjustable Jaws, $4\frac{1}{2}$ " capacity. 1 Closer for $3\frac{3}{4}$ " Chucks 1 Closer for 7" and $4\frac{1}{2}$ " Chucks. 1 Spindle Bushing for Step-chucks. 1 Draw-in Spindle (same as Collet Attachment. Specify if not wanted). (Step-chucks are made of steel, and Closers of cast iron). Cut on page 45.
<b>STEP-CHUCK AND CLOSER ATTACHMENT</b>	3 $\frac{1}{2}$ " and 7" diameter, blank, ready to receive Chuck.
<b>CHUCK PLATES</b>	For the cutting of Multiple Threads, as on Hobs, Taps, etc. Cut on page 46.
<b>MULTIPLE INDEXING FACE PLATE</b>	For accurately governing longitudinal movement of carriage. Cut on page 46.
<b>MICROMETER CLAMP</b>	Code words, page 265.



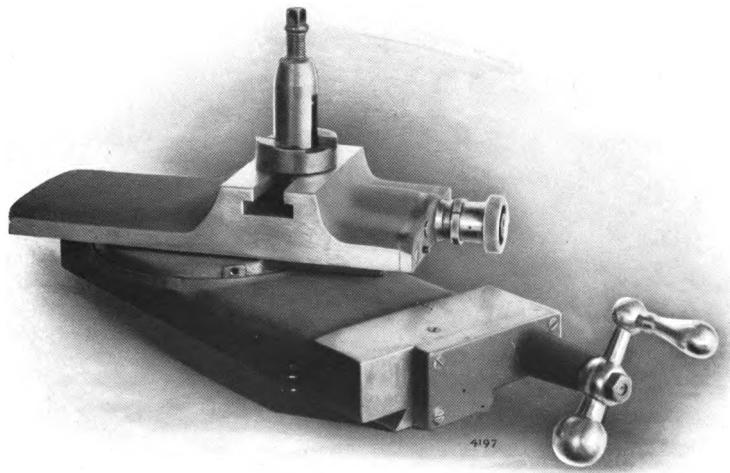
(Patented)  
16-inch Lathe, All Geared Head, Motor Drive

MOTOR DRIVE

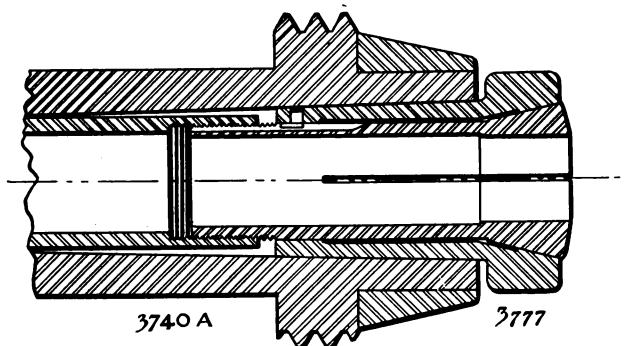
The Geared Head can be furnished with a Motor Base, as shown, suitable gears and guard in place of countershaft. Motor should be 3 to 5 horse-power (according to requirements), constant speed, with starting box, any standard make. If motor is furnished by customer, full specifications are required.



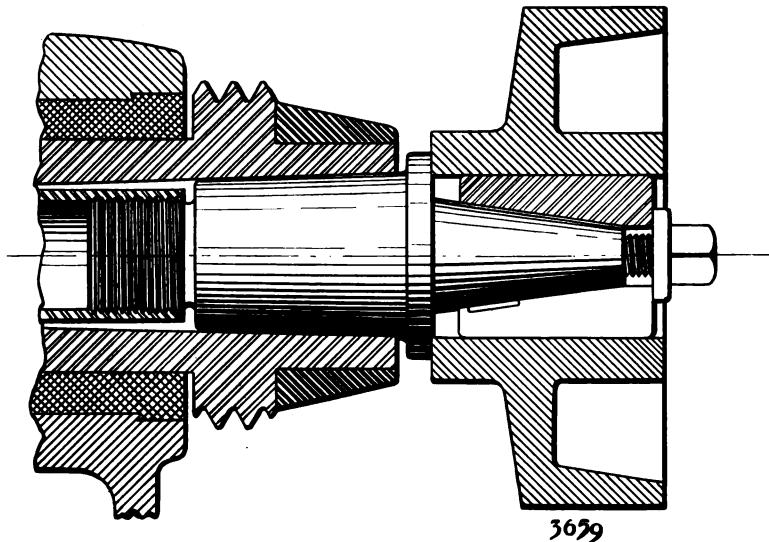
(Patented)  
Plain Elevating Rest



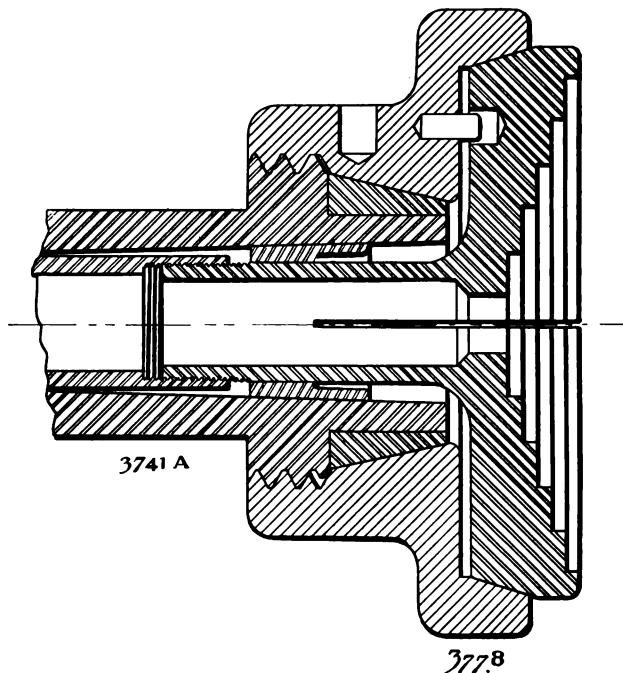
Ball-turning Rest for 16-inch Lathe



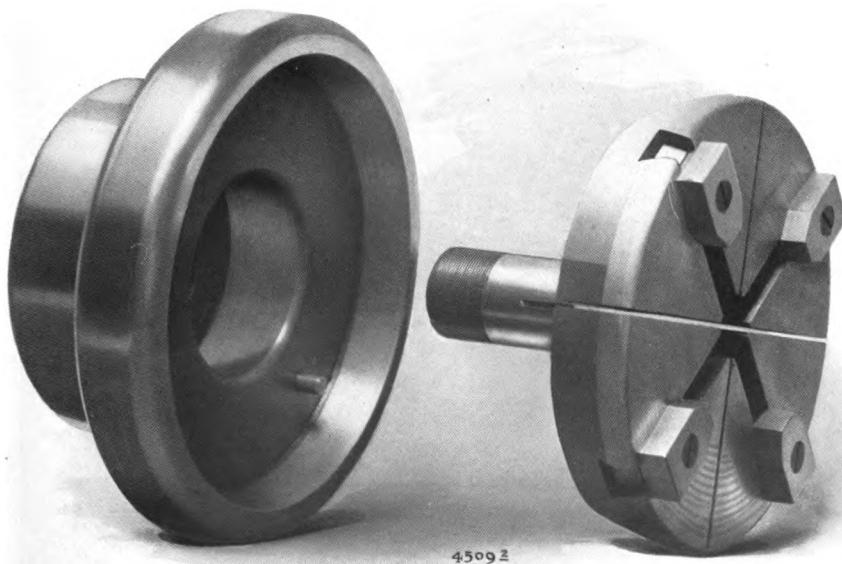
Section of Draw-back Collet Mechanism



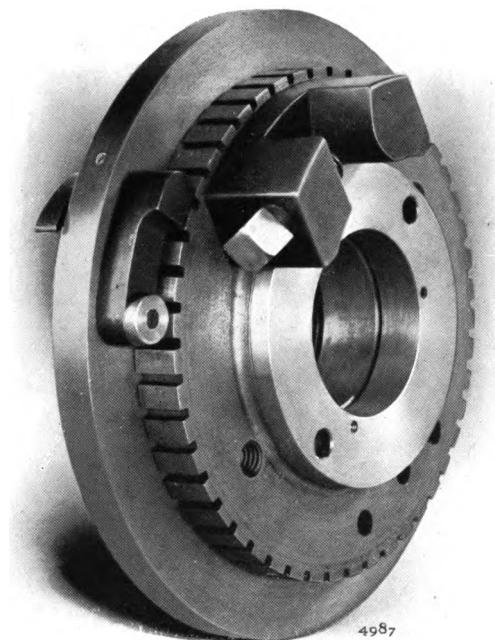
Expanding Arbor with Work in Position



Section of Step-chuck and Closer

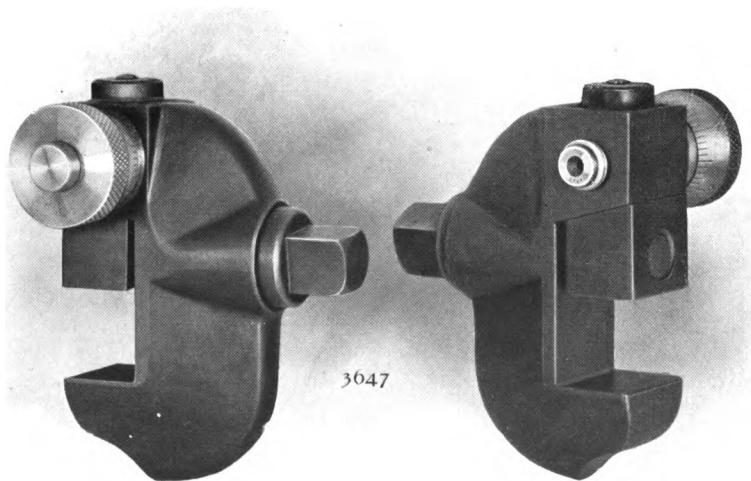


Step-chuck with Adjustable Jaws and Closer



4987

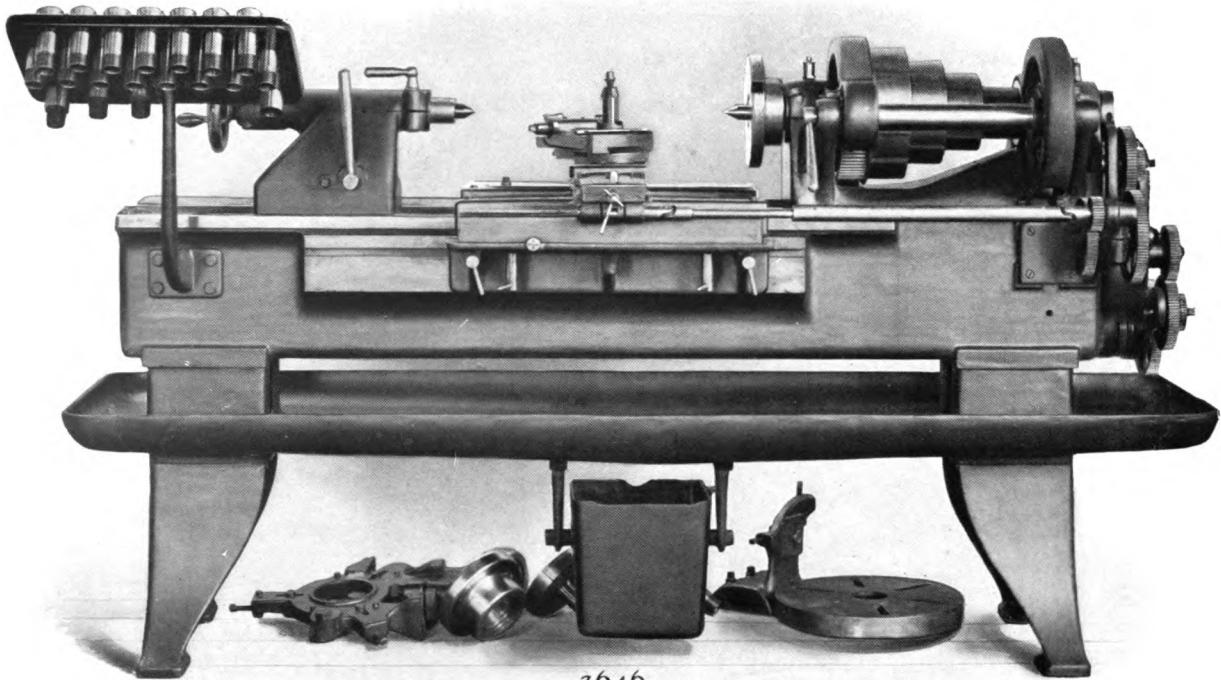
**Indexing Face-plate for Cutting Multiple Threads**



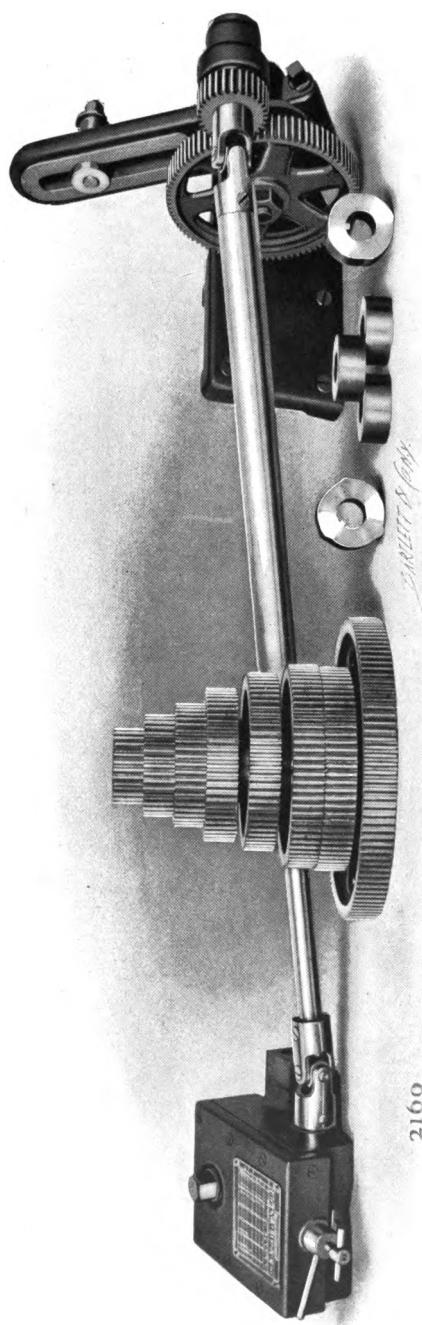
3647

(Patented)

**Micrometer Clamp**



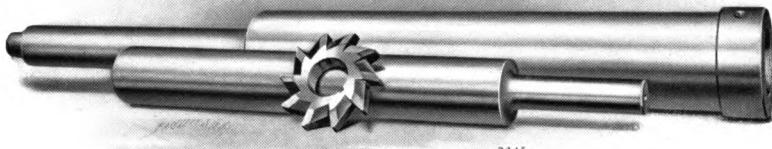
(Patented)  
Relieving Attachment as applied to 14 and 16-inch Lathes



(Patented)

**Regular Relieving Attachment**

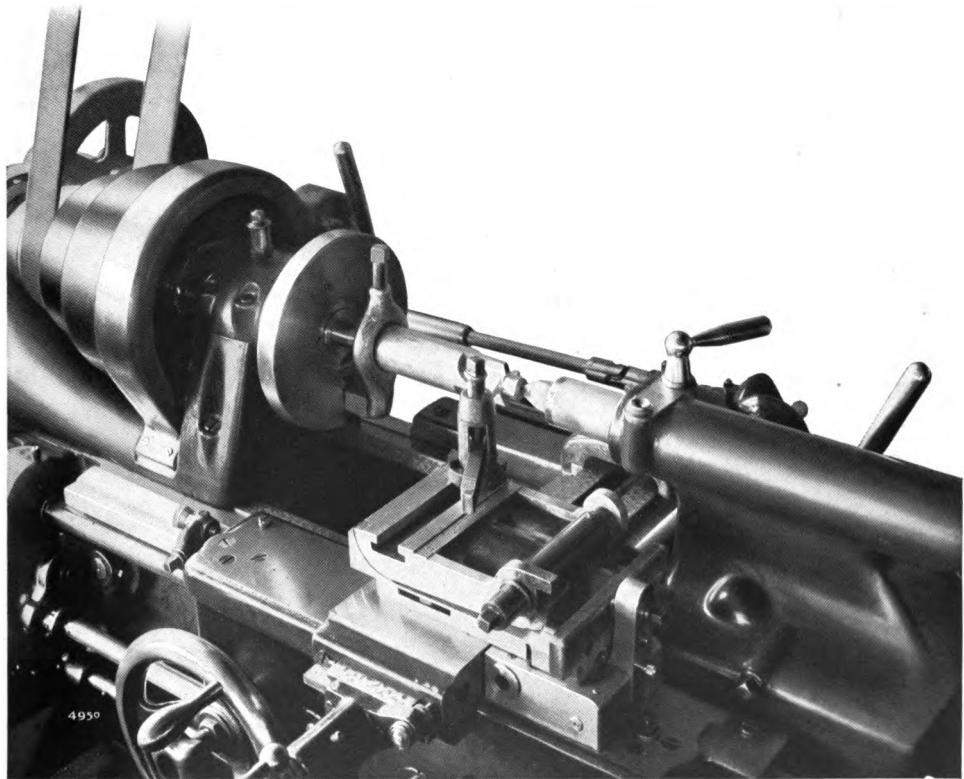
For radial relieving of any description, such as Hobs, Cutters, Taps, etc. It is furnished with 5 Cams; one each, single, double, triple, quadruple and one for Taps; also set of Change Gears, giving 19 changes, from 2 to 32 reliefs to revolution of the spindle



(Patented)

**Spiral Relieving Attachment**

For spiral relieving, and works in conjunction with the regular attachment. It consists of a sleeve, blank shaft and key, also cutter for milling required spiral grooves

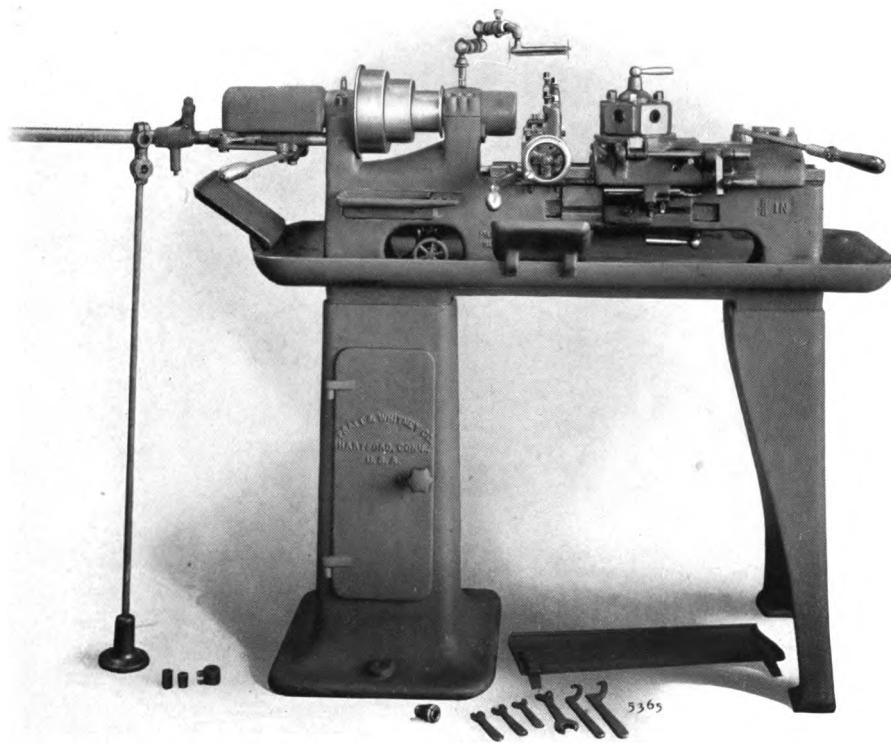


(Patented)

**Side Relieving Attachment**

For side or relieving parallel to the axis such as counterbores, sides of cutters, etc. This attachment, while separate, requires the same driving parts and Change Gears as used on the regular attachment. (Furnished for the 16-inch Lathe only)

Cams for Relieving Attachments for special purposes furnished to order



(Patented)  
5/8 x 4 1/2-inch Turret Lathe: Equipment "A"

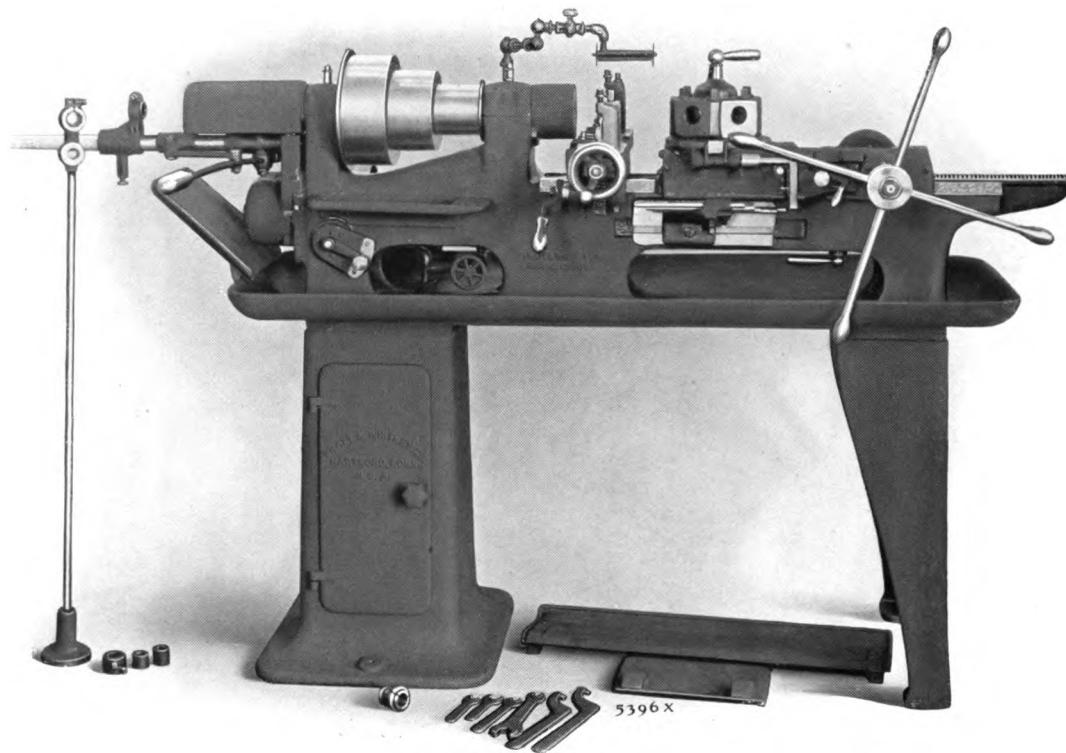
## TURRET LATHE, $\frac{5}{8}$ X $4\frac{1}{2}$ -INCH

These machines mark a distinct advance in Turret Lathe construction. The introduction of many new features and refinements have made possible the production of a class of work which for accuracy is beyond that which has been supposed or known to be obtainable on Turret Lathes. The machines have an exceptionally wide range and readily accommodate themselves to special tools for work out of the ordinary.

### SPECIFICATIONS

RANGE . . .	Chuck Capacity (round) . . . . .	$\frac{5}{8}''$
	Chuck Capacity (square across flats) . . . . .	$\frac{7}{16}''$
	Chuck Capacity (hexagonal across flats) . . . . .	$\frac{3}{8}''$
	Length ; maximum turning . . . . .	$4\frac{1}{2}''$
	Swing over Bed . . . . .	$8\frac{3}{4}''$
	Swing over Cross Slide . . . . .	$4\frac{1}{8}''$
	Threading Capacity . . . . .	$\frac{1}{2}''$
TURRET . . .	Hexagon, Flat Face ; 6 holes, $1\frac{1}{8}$ diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide . . . . .	$2\frac{1}{16}''$
	Turret Hole Center to Top of Cross Slide . . . . .	$1\frac{3}{4}''$
	Turret Face to Spindle End, maximum . . . . .	$10\frac{5}{8}''$
SPINDLE . . .	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear.	$1\frac{3}{4}'' \times 3\frac{1}{8}''$
	Hole through Plunger . . . . .	$\frac{11}{16}''$
	Hole through Spindle . . . . .	$\frac{1}{4}''$
	Front End, $2\frac{1}{2}''$ diameter ; Thread, $2\frac{3}{4}''$ diameter ; 10 Pi., U. S. F.	
SPEEDS . . .	Spindle Speed Changes (9), R. P. M. . . . .	193 to 1235
	Cone on Machine (3 steps), diameter . . . . .	$3\frac{1}{2}''$ , $5\frac{1}{4}''$ , $7''$
	Pulleys (Countershaft) . . . . .	$8 \times 3\frac{1}{4}''$
	Belt Width (Cone) . . . . .	$2''$
	Belt Width (Counter. Pulleys) . . . . .	$3''$
	Countershaft Speeds, R. P. M. . . . .	300, 400, 540
FEEDS . . . .	Turret Slide, Hand Feed, Lever Type. Cross Slide, Hand Feed, Combination Screw and Lever Type. Stock Feed, Improved Lever Type.	
STOPS . . . .	Stock Stop in Turret. Turret Stops, Independent Adjustable Stop for each Turret Face. Cross Slide Stops, adjustable, governing forward and backward movement of Slide.	
FLOOR SPACE	Without Rod Feed . . . . .	$55'' \times 26\frac{1}{4}''$
	With Rod Feed . . . . .	$85\frac{1}{2}'' \times 26\frac{1}{2}''$
WEIGHTS . . .	Machine Equipment "A", net pounds . . . . .	925
	Crating Material (domestic), approximate pounds . . . . .	200
	Boxing Material (foreign), approximate pounds . . . . .	400
	Box, cubic feet . . . . .	43

Code words, page 265.



(Patented)

1 x 15-inch Turret Lathe with Power Feed to Turret Slide; Equipment "A". Also made without power feed

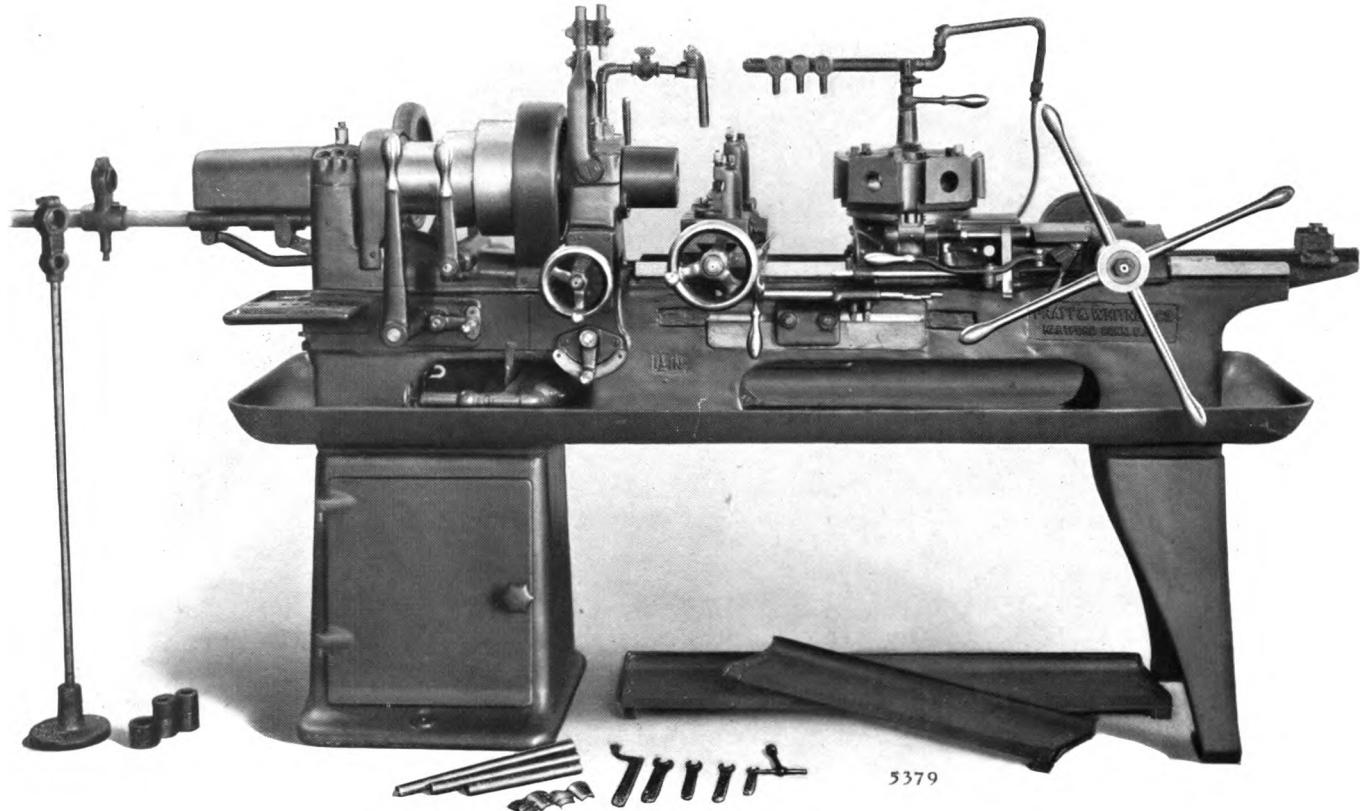
**TURRET LATHE, 1 X 15-INCH**

MADE WITH OR WITHOUT POWER FEED TO TURRET SLIDE

**SPECIFICATIONS**

RANGE . . . . .	Chuck Capacity (round) . . . . .	1"
	Chuck Capacity (square across flats) . . . . .	¾"
	Chuck Capacity (hexagonal across flats) . . . . .	⅝"
	Length ; maximum turning . . . . .	15"
	Swing over Bed . . . . .	10 ¾"
	Swing over Cross Slide . . . . .	5 ½"
	Threading Capacity . . . . .	¾"
TURRET . . . . .	Hexagon, Faces Flat ; 6 holes, 1 ½" diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide . . . . .	2 ½"
	Turret Hole Center to Top of Cross Slide. . . . .	2 ¼"
	Turret Face to Spindle End, maximum . . . . .	18"
SPINDLE . . . . .	Special Steel ; Cylindrical Bearings ; Front . . . . . Boxes, C. I., lined with Babbitt, adjustable for wear Hole through Plunger . . . . . Hole through Spindle . . . . . Front End, 3 ½" diameter ; Thread, 3 ¾" diameter ; 8 Pi., U. S. F.	2 ¼" x 4" 1 ½" 1 ½"
SPEEDS . . . . .	Spindle Speed Changes (9), R. P. M. . . . . Cone on Machine (3 steps), diameter . . . . . Pulleys (Countershaft) . . . . . Belt Width (Cone) . . . . . Belt Width (Counter. Pulleys) . . . . . Countershaft Speeds, R. P. M. . . . .	112 to 1000 4", 6 ½" and 9" 12" x 4 ½" 3 ¼" 4 ¼" 200, 300, 400
FEEDS . . . . .	Turret Slide, Hand Feed through rack, pinion and turnstile. Power Feed Variations (3), P. R. Sp. . . . . Cross Slide, Hand Feed, Combination Screw and Lever Type. Stock Feed, improved Lever Type.	.005" to .0119"
STOPS . . . . .	Stock Stop in Turret. Turret Stops, Independent Adjustable Stop for each Turret Face. Cross Slide Stops, adjustable, governing forward and backward movement of Slide.	
FLOOR SPACE . . . . .	Without Rod Feed . . . . . With Rod Feed . . . . .	66" x 24" 98" x 24"
WEIGHTS . . . . .	Machine Equipment "A", net pounds . . . . . Crating Material (domestic), approximate pounds . . . . . Boxing Material (foreign), approximate pounds . . . . . Box, cubic feet . . . . .	1300 250 500 59

Code words, page 265.



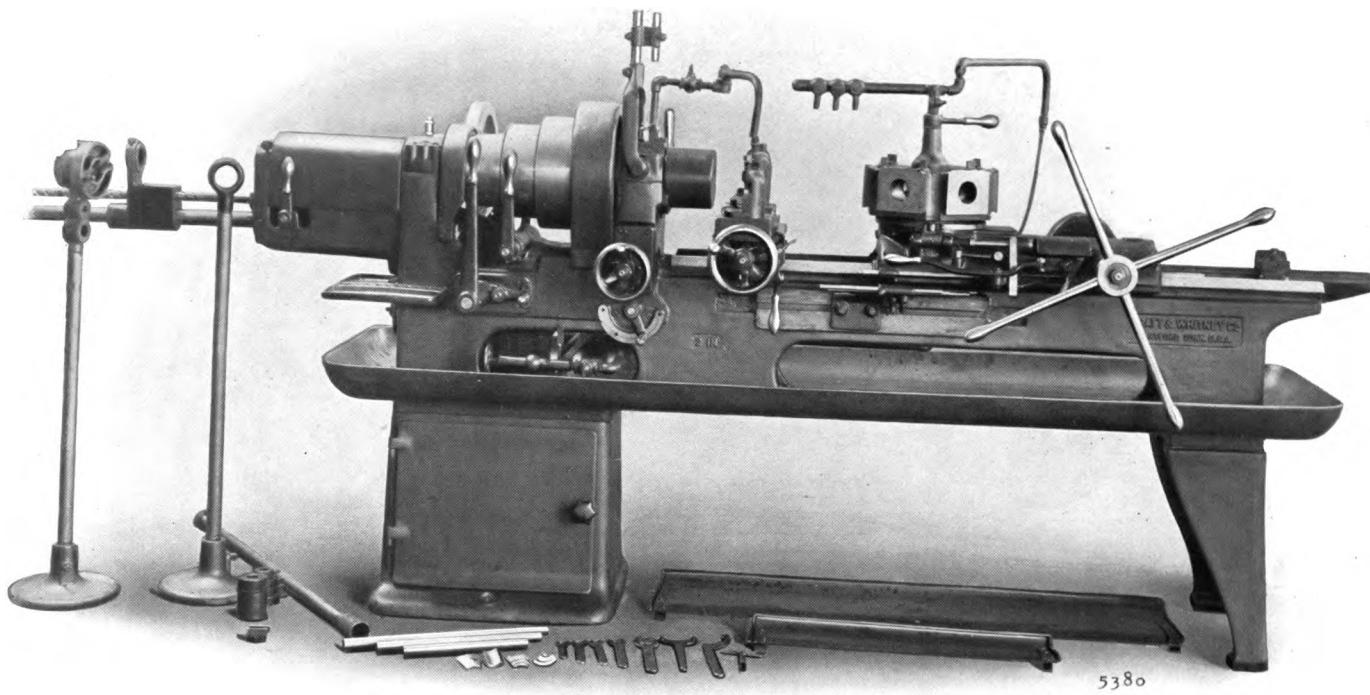
(Patented)

1 1/2 x 18-inch Turret Lathe: Equipment "A"

## TURRET LATHE, 1½ X 18-INCH—SPECIFICATIONS

RANGE . . . . .	Chuck Capacity (round) . . . . .	1½"
	Chuck Capacity (square across flats) . . . . .	1"
	Chuck Capacity (hexagonal across flats) . . . . .	1¼"
	Length ; maximum turning . . . . .	18"
	Swing over Bed . . . . .	14"
	Swing over Cross Slide . . . . .	7¼"
	Threading Capacity . . . . .	1½"
TURRET . . . . .	Hexagon, Faces Dovetailed ; 6 holes, 1¾" diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide . . . . .	3¼"
	Turret Hole Center to Top of Cross Slide . . . . .	2½"
	Turret Face to Spindle End, maximum . . . . .	25⅛"
SPINDLE . . . . .	Special Steel ; Cylindrical Bearings ; Front . . . . .	2⅓" x 4½"
	Boxes, C. I., lined with Babbitt, adjustable for wear	
	Hole through Plunger . . . . .	1¾"
	Hole through Spindle . . . . .	1⅓"
	Front End, 3⅓" diameter; Thread, 4" diameter; 8 Pi., U. S. F.	
SPEEDS . . . . .	Spindle Speed Changes (27), R. P. M. . . . .	20 to 800
	Back Gear Ratio . . . . .	2.38 and 7 to 1
	Cone on Machine (3 steps), diameter . . . . .	6⅛", 7⅜", 9⅝"
	Pulleys (Countershaft) . . . . .	12" x 4½"
	Belt Width (Cone) . . . . .	3"
	Belt Width (Counter. Pulleys) . . . . .	4¾"
	Countershaft Speeds, R. P. M. . . . .	150, 250, 400
FEEDS . . . . .	Turret Slide, Power Feed Variations (3), P. R. Sp. . . . .	.007" to .016"
	Hand Feed through rack, pinion and turnstile.	
	Cross Slide, Transverse Power Feed Variations (3), P. R. Sp. . . . .	.001" to .0026"
	Hand Feed through screw and hand-wheel.	
	Cross Slide, Longitudinal, adjustable by hand through screw and hand-wheel.	
	Stock Feed, Improved Lever Type.	
STOPS . . . . .	Stock Stop on Head, independent of Turret or Turret Slide.	
	Turret Stops, Independent Adjustable Stop for each Turret Face.	
	Cross Slide Stops, adjustable, governing both forward and backward movement of Slide.	
FLOOR SPACE	Without Rod Feed . . . . .	7' 9" x 2' 11"
	With Rod Feed . . . . .	11' 3" x 2' 11"
WEIGHTS . . . . .	Machine Equipment "A", net pounds . . . . .	2300
	Crating Material (domestic), approximate pounds . . . . .	300
	Boxing Material (foreign), approximate pounds . . . . .	600
	Box, cubic feet . . . . .	116

Code words, page 265.

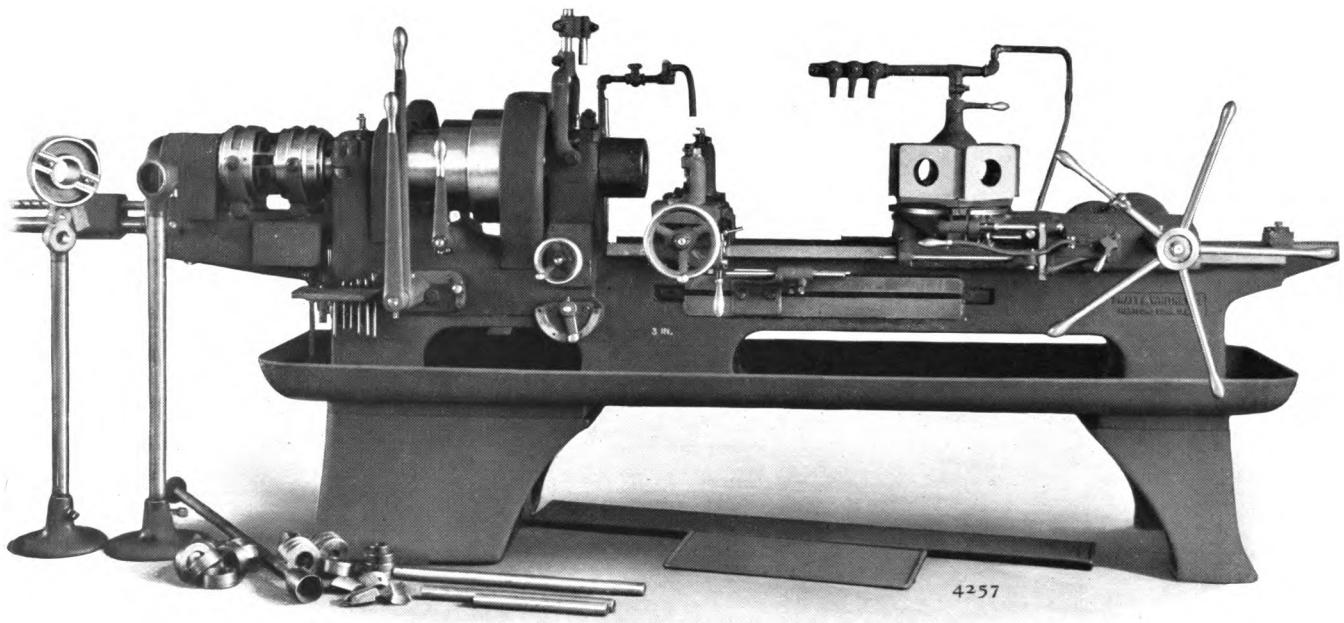


(Patented)  
2 x 26-inch Turret Lathe: Equipment "A"

## TURRET LATHE, 2 X 26-INCH—SPECIFICATIONS

RANGE . . .	Chuck Capacity (round) . . . . .	2"
	Chuck Capacity (square across flats) . . . . .	1 $\frac{3}{8}$ "
	Chuck Capacity (hexagonal across flats) . . . . .	1 $\frac{3}{4}$ "
	Length ; maximum turning . . . . .	26"
	Swing over Bed . . . . .	16"
	Swing over Cross Slide . . . . .	8 $\frac{3}{4}$ "
	Threading Capacity . . . . .	2"
TURRET . . .	Hexagon, Faces Dovetailed ; 6 holes, 2 $\frac{1}{4}$ " diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide . . . . .	3 $\frac{3}{4}$ "
	Turret Hole Center to Top of Cross Slide . . . . .	3"
	Turret Face to Spindle End, maximum . . . . .	33 $\frac{3}{8}$ "
SPINDLE . . .	Special Steel ; Cylindrical Bearings ; Front . . . . .	3 $\frac{3}{8}$ " x 5"
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through Plunger . . . . .	2 $\frac{1}{8}$ "
	Hole through Spindle . . . . .	2 $\frac{1}{8}$ "
	Front End, 4 $\frac{3}{4}$ " diameter ; Thread, 5" diameter ; 6 Pi., U. S. F.	
SPEEDS . . .	Spindle Speed Changes (27), R. P. M. . . . .	14 to 694
	Back Gear Ratio . . . . .	2.57 and 7 to 1
	Cone on Machine (3 steps), diameter . . . . .	7 $\frac{1}{2}$ ", 9 $\frac{1}{2}$ ", 11 $\frac{1}{2}$ "
	Pulleys (Countershaft) . . . . .	14" x 4 $\frac{1}{2}$ "
	Belt Width (Cone) . . . . .	3 $\frac{1}{2}$ "
	Belt Width (Counter. Pulleys) . . . . .	4 $\frac{1}{4}$ "
	Countershaft Speeds, R. P. M. . . . .	120, 235, 385
FEEDS . . .	Turret Slide, Power Feed Variations (4), P. R. Sp. . . . .	.007" to .02"
	Hand Feed through rack, pinion and turnstile.	
	Cross Slide, Transverse Power Feed Variations (4), P. R. Sp. . . . .	.0012" to .0035"
	Hand Feed through screw and hand-wheel.	
	Cross Slide, Longitudinal, adjustable by hand through screw and hand-wheel.	
	Stock Feed, Automatic Positive Power Type.	
	Stock Feed, maximum Travel without returning . . . . .	46 $\frac{3}{4}$ "
STOPS . . .	Stock Stop on Head, independent of Turret or Turret Slide.	
	Turret Stops, Independent Adjustable Stop for each Turret Face.	
	Cross Slide Stops, adjustable, governing forward and backward movement of Slide	
FLOOR SPACE	Without Rod Feed . . . . .	9' 4" x 3'
	With Rod Feed . . . . .	14" x 3'
WEIGHTS . . .	Machine Equipment "A", net pounds . . . . .	3600
	Crating Material (domestic), approximate pounds . . . . .	500
	Boxing Material (foreign), approximate pounds . . . . .	1100
	Box, cubic feet . . . . .	179

Code words, page 265.



(Patented)  
3 x 36-inch Turret Lathe: Equipment "A"

## TURRET LATHE, 3 X 36-INCH — SPECIFICATIONS

RANGE . . .	Chuck Capacity (round) . . . . .	3"
	Chuck Capacity (square across flats) . . . . .	2 $\frac{1}{8}$ "
	Chuck Capacity (hexagonal across flats) . . . . .	2 $\frac{9}{16}$ "
	Length ; maximum turning . . . . .	36"
	Swing over Bed . . . . .	19 $\frac{1}{2}$ "
	Swing over Cross Slide . . . . .	10 $\frac{1}{4}$ "
	Threading Capacity . . . . .	3"
TURRET . . .	Hexagon, Faces Dovetailed ; 6 holes, 3 $\frac{3}{8}$ " diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide . . . . .	5 $\frac{1}{8}$ "
	Turret Hole Center to Top of Cross Slide . . . . .	3 $\frac{3}{4}$ "
	Turret Face to Spindle End, maximum . . . . .	46"
SPINDLE . . .	Special Steel ; Cylindrical Bearings ; Front Boxes, C. I., lined with Babbitt, adjustable for wear. Hole through Plunger . . . . .	4 $\frac{7}{8}$ " x 6 $\frac{1}{4}$ "
	Hole through Spindle . . . . .	3 $\frac{3}{8}$ "
	Front End, 6 $\frac{3}{8}$ " diameter ; Thread, 6 $\frac{3}{4}$ " diameter; 4 Pi., U. S. F.	3 $\frac{1}{8}$ "
SPEEDS . . .	Spindle Speed Changes (27), R. P. M . . . . .	9 to 550
	Back Gear Ratio . . . . .	3.01 and 8.4 to 1
	Cone on Machine (3 steps), diameter . . . . .	9", 11 $\frac{1}{2}$ ", 14"
	Pulleys (Countershaft) . . . . .	16" x 4 $\frac{3}{4}$ "
	Belt Width (Cone) . . . . .	4"
	Belt Width (Counter. Pulleys) . . . . .	4 $\frac{1}{2}$ "
	Countershaft Speed, R. P. M. . . . .	95, 170, 300
FEEDS . . .	Turret Slide, Power Feed Variations (4), P. R. Sp. . . . .	.007" to .023"
	Hand Feed through rack, pinion and turnstile.	
	Cross Slide, Transverse Power Feed Variations (4), P. R. Sp. . . . .	.0013" to .0042"
	Hand Feed through screw and hand-wheel.	
	Cross Slide, Longitudinal, adjustable by hand through screw and hand-wheel.	
	Stock Feed, Automatic Positive Power Type, with Compensating device which will automatically grip stock $\frac{1}{8}$ " plus or minus of given size with the same uniform pressure.	
	Stock Feed, Follower Travel without returning . . . . .	.50"
STOPS . . .	Stock Stop on Head, independent of Turret or Turret Slide.	
	Turret Stops, Independent Adjustable Stop for each Turret Face.	
	Cross Slide Stops, adjustable, governing forward and backward movement of slide.	
FLOOR SPACE	Without Rod Feed . . . . .	12' x 3' 7"
	With Rod Feed . . . . .	17' 3" x 3' 7"
WEIGHTS . . .	Machine Equipment "A", net pounds . . . . .	6200
	Crating Material (domestic), approximate pounds . . . . .	400
	Boxing Material (foreign), approximate pounds . . . . .	1500
	Box, cubic feet . . . . .	222

Code words, page 265.



(Patented)  
Equipment "B" Tools:  $\frac{5}{8} \times 4\frac{1}{2}$ -inch Turret Lathe

TURRET LATHE,  $\frac{5}{8}$  X 4½-INCH—EQUIPMENTS

"A" MACHINE  
ARRANGED  
FOR ROD WORK  
WITHOUT  
TOOLS

- 1  $\frac{5}{8}$ " x 4½" Turret Lathe, with  
Oil Pump, Tank and Piping.
- 3 Oil Guards.
- Countershaft (Three-speed friction).
- Set of Wrenches.
- Cross Slide, with Back and Front Tool Posts.
- Automatic Rod Chuck, with
- 1 Collet, any size within capacity ( $\frac{5}{8}$ " Round if not specified).
- Rod Feed, Improved Lever Type, with
  - 1 Rod Support.
  - 2 Stock Collars.
  - 4 Stock Bushings.

METRIC  
EQUIPMENT "A"

Differs from the above only in that a Metric Collet is substituted. (See Equipment "B" for sizes).

"B" MACHINE  
ARRANGED  
FOR ROD WORK  
WITH TOOLS

- Includes Equipment "A" (minus Collets), and
  - Collets (round),  $\frac{1}{16}$ ",  $\frac{1}{8}$ ",  $\frac{3}{16}$ ",  $\frac{1}{4}$ ",  $\frac{5}{16}$ ",  $\frac{3}{8}$ ",  $\frac{7}{16}$ " and  $\frac{1}{2}$ ".
  - 3 Collets hexagonal,  $\frac{3}{16}$ ",  $\frac{1}{4}$ " and  $\frac{5}{16}$ " across flats.
  - 2 Collets square,  $\frac{3}{16}$ " and  $\frac{1}{4}$ " across flats.
- Turret Rod Set,
- 1 Single Turner, with Tangent Cutter.
- 1 Single Turner, with Radial Cutter.
- 1 Multiple Turner, with two Tangent Cutters.
- 1 Multiple Turner, with two Radial Cutters.
- 1 End Forming and Polishing Tool.
- 1  $\frac{1}{4}$ " Style "D" Self-opening Die-head, with
- 7 Sets of Chasers  $\frac{1}{4}$ ",  $\frac{5}{16}$ ",  $\frac{3}{8}$ ",  $\frac{7}{16}$ ",  $\frac{1}{2}$ ",  $\frac{9}{16}$ " and  $\frac{5}{8}$ " U. S. S.
- 1 Box for Chasers and Chasers.

METRIC  
EQUIPMENT "B"

- Includes Regular Equipment "B", with these modifications:
  - Collets round, 6, 8, 10, 12, 14 and 16  $\pm \frac{1}{16}$ " diameter.
  - 3 Collets hexagonal, 8, 10 and 12  $\pm \frac{1}{16}$ " across flats.
  - 2 Collets square, 8 and 10  $\pm \frac{1}{16}$ " across flats.
  - Sets of Chasers, 8, 10, 12, 14 and 16  $\pm \frac{1}{16}$ " International Standard.

W.H.W. 1972  
EQUIPMENT "C"

- Includes Regular Equipment "B", with these modifications:
  - 3 Collets hexagonal, 12, 14 and 16  $\pm \frac{1}{16}$ " diameter with flat  
bottom for self-opening die-head. 16  $\pm \frac{1}{16}$ " diameter.



(Patented)

Equipment "B" Tools: 1 x 15-inch Turret Lathe

## TURRET LATHE, 1 X 15-INCH—EQUIPMENTS

<p><b>"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS</b></p>	<ul style="list-style-type: none"> <li>1 1" x 15" Turret Lathe with or without power feed to Turret Slide.</li> <li>Oil Pump, Tank and Piping.</li> <li>3 Oil Guards.</li> <li>Countershaft (Three-speed friction).</li> <li>Set of Wrenches.</li> <li>Cross Slide, with Back and Front Tool Posts.</li> <li>Automatic Rod Chuck, with           <ul style="list-style-type: none"> <li>1 Collet, any size within capacity (1" Round if not specified).</li> </ul> </li> <li>Rod Feed, Improved Lever Type, with           <ul style="list-style-type: none"> <li>1 Rod Support.</li> <li>2 Stock Collars.</li> <li>4 Stock Bushings.</li> </ul> </li> </ul>
---	--

**METRIC EQUIPMENT "A"** Differs from the above only in that a Metric Collet is substituted. (See Equipment "B" for sizes).

<p><b>"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS</b></p>	<ul style="list-style-type: none"> <li>Includes Equipment "A" (minus Collet) and           <ul style="list-style-type: none"> <li>11 Collets (round), <math>\frac{3}{8}</math>" to 1" inclusive by 16ths.</li> <li>4 Collets (hexagon), <math>\frac{1}{2}</math>", <math>\frac{1}{8}</math>", <math>\frac{3}{8}</math>" and <math>\frac{5}{8}</math>" across flats.</li> <li>3 Collets (square), <math>\frac{1}{2}</math>", <math>\frac{5}{8}</math>" and <math>\frac{3}{4}</math>" across flats.</li> </ul> </li> <li>Turret Rod Stop.</li> <li>1 Single Turner, with Tangent Cutter.</li> <li>1 Single Turner, with Radial Cutter.</li> <li>1 Multiple Turner, with two Tangent Cutters.</li> <li>1 Multiple Turner, with two Radial Cutters.</li> <li>1 End Forming and Pointing Tool.</li> <li>1 <math>\frac{3}{4}</math>", Self-opening Die-head, with roughing and finishing attachments and           <ul style="list-style-type: none"> <li>8 Sets of Chasers, <math>\frac{1}{4}</math>", <math>\frac{5}{16}</math>", <math>\frac{3}{8}</math>", <math>\frac{7}{16}</math>", <math>\frac{1}{2}</math>", <math>\frac{9}{16}</math>", <math>\frac{5}{8}</math>" and <math>\frac{3}{4}</math>", U. S. S.</li> </ul> </li> <li>1 Box for Collets and Chasers.</li> </ul>
--	--

**METRIC EQUIPMENT "B"** Includes Regular Equipment "B", with these modifications:  
 11 Collets (round), 8, 9, 10, 12, 14, 16, 18, 20, 22, 24 and 26 m/m.  
 4 Collets (hexagon), 12, 16, 20 and 24 m/m across corners.  
 3 Collets (square), 12, 16 and 18 m/m across flats.  
 8 Sets of Chasers for Self-opening Die-head, 6, 7, 8, 9, 10, 12, 14 and 16 m/m, International Standard.

**WHITWORTH EQUIPMENT "B"** Includes Regular Equipment "B", with these modifications:  
 4 Collets (hexagon) .525", .601", .709", .820" diameter across flats.  
 Chasers for Self-opening Die-head, Whitworth Standard.

Code words, page 265.



(Patented)  
Equipment "B" Tools: 1½ x 18-inch Turret Lathe

## TURRET LATHE, 1½ X 18-INCH—EQUIPMENTS

<b>"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS</b>	<p><b>1</b> 1½" x 18" Turret Lathe, with Oil Pump, Tank and Piping. <b>2</b> Oil Guards. Countershaft (Three-speed friction). Set of Wrenches. Cross Slide, with Back and Front Tool Posts. Automatic Rod Chuck, with <b>1</b> Set of Chuck Jaws, any size within capacity (1½" Round if not specified). Rod Feed, Improved Lever Type, with <b>1</b> Rod Support. <b>3</b> Stock Collars. <b>6</b> Stock Bushings. Rod Stop on Headstock, with 3 Rods.</p>
<b>METRIC EQUIPMENT "A"</b>	<p>Differs from the above only in that Metric Chuck Jaws are substituted. (See Equipment "B" for sizes).</p>
<b>"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS</b>	<p>Includes Equipment "A" (minus set of Chuck Jaws), and  <b>15</b> Sets of Chuck Jaws (round), <math>\frac{5}{8}</math>" to 1½" inclusive by 16ths.  <b>4</b> Sets of Chuck Jaws (hexagon), <math>\frac{7}{8}</math>", <math>\frac{31}{32}</math>", <math>1\frac{1}{16}</math>" and <math>1\frac{1}{4}</math>" across flats.  <b>3</b> Sets of Chuck Jaws (square), <math>\frac{3}{4}</math>", <math>\frac{7}{8}</math>" and 1" across flats.  <b>2</b> Universal Turners, with "V" Back-rests.  <b>1</b> Universal Turner, with Roller Back-rests.  <b>1</b> Open-side Turner.  <b>1</b> End Forming and Pointing Tool.  <b>1</b> Bell-mouth Pointing Tool.  <b>1</b> <math>1\frac{1}{4}</math>" Self-opening Die-head, with roughing and finishing attachment, and 8 Sets of Chasers, <math>\frac{1}{2}</math>", <math>\frac{9}{16}</math>", <math>\frac{5}{8}</math>", <math>\frac{3}{4}</math>", <math>\frac{7}{8}</math>", 1", <math>1\frac{1}{8}</math>" and <math>1\frac{1}{4}</math>", U. S. S.  <b>1</b> Box for Chuck Jaws and Chasers.</p>
<b>METRIC EQUIPMENT "B"</b>	<p>Includes Regular Equipment "B", with these modifications:  <b>15</b> Sets of Chuck Jaws (round), 14, 15, 16, 17, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36 and 38 m/m.  <b>4</b> Sets of Chuck Jaws (hexagon), 20, 24, 28 and 32 m/m across corners.  <b>3</b> Sets of Chuck Jaws (square), 16, 20 and 24 m/m across flats.  <b>8</b> Sets of Chasers for Self-opening Die-head, 12, 14, 16, 18, 20, 22, 24 and 28 m/m, International Standard.</p>
<b>WHITWORTH EQUIPMENT "B"</b>	<p>Includes Regular Equipment "B", with these modifications:  <b>4</b> Sets of Chuck Jaws (hexagon), .919", 1.011", 1.101", 1.301" diameter across flats. Chasers for Self-opening Die-head, Whitworth Standard.</p>

Code words, page 265.



(Patented)

Equipment "B" Tools: 2 x 26-inch Turret Lathe

**TURRET LATHE, 2 X 26-INCH—EQUIPMENTS**

<b>"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS</b>	<p>1 2" x 26" Turret Lathe, with Oil Pump, Tank and Piping. 2 Oil Guards. Countershaft (Three-speed friction). Set of Wrenches. Cross Slide, with Back and Front Tool Posts. Automatic Rod Chuck, with 1 Set of Chuck Jaws, any size within capacity (2" Round if not specified). Rod Feed, Automatic Positive Screw Type, with 1 Rod Support (plain). 1 Rod Support (revolving), with 2 sets of Jaws. 1 Rod Follower Bar. 4 Stock Collars. 4 Stock Bushings. Rod Stop on Headstock, with 4 Rods.</p>
<b>METRIC EQUIPMENT "A"</b>	Differs from the above only in that Metric Chuck Jaws are substituted. (See Equipment "B" for sizes).
<b>"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS</b>	<p>Includes Equipment "A" (minus set of Chuck Jaws), and 17 Sets of Chuck Jaws (round), <math>\frac{3}{4}</math>" to <math>1\frac{7}{16}</math>" by 16ths, and <math>1\frac{1}{2}</math>" to 2" by 8ths. 5 Sets of Chuck Jaws (hexagon), <math>\frac{3}{2}</math>", <math>1\frac{1}{16}</math>", <math>1\frac{1}{4}</math>", <math>1\frac{7}{16}</math>" and <math>1\frac{5}{8}</math>" across flats. 4 Sets of Chuck Jaws (square), <math>\frac{7}{8}</math>", 1", <math>1\frac{1}{8}</math>" and <math>1\frac{1}{4}</math>" across flats. 2 Universal Turners, with "V" Back-rests. 1 Universal Turner, with Roller Back-rests. 1 Open-side Turner. 1 End Forming and Pointing Tool. 1 Bell-mouth Pointing Tool. 1 <math>1\frac{1}{2}</math>", Self-opening Die-head, with roughing and finishing attachment, and 8 Sets of Chasers, <math>\frac{5}{8}</math>", <math>\frac{3}{4}</math>", <math>\frac{7}{8}</math>", 1", <math>1\frac{1}{8}</math>", <math>1\frac{1}{4}</math>", <math>1\frac{3}{8}</math>" and <math>1\frac{1}{2}</math>", U. S. S. 1 Box for Chuck Jaws and Chasers.</p>
<b>METRIC EQUIPMENT "B"</b>	<p>Includes Regular Equipment "B", with these modifications: 17 Sets of Chuck Jaws (round), 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 m/m. 5 Sets of Chuck Jaws (hexagon), 24, 28, 32, 40 and 48 m/m across corners. 4 Sets of Chuck Jaws (square), 20, 24, 28 and 32 m/m across flats. 8 Sets of Chasers for Self-opening Die-head, 16, 18, 20, 24, 28, 32, 36 and 38 m/m, International Standard.</p>
<b>WHITWORTH EQUIPMENT "B"</b>	<p>Includes Regular Equipment "B", with these modifications: 5 Sets of Chuck Jaws (hexagon), <math>1.011</math>", <math>1.101</math>", <math>1.301</math>", <math>1.479</math>", <math>1.670</math>" diameter across flats. Chasers for Self-opening Die-head, Whitworth Standard.</p>

Code words, page 265.



(Patented)  
Locomotive Equipment "C" Tools: 2 x 26-inch Turret Lathe

**TURRET LATHE, 2 X 26-INCH—EQUIPMENTS (Continued)**

<b>"C" 2 X 26-INCH LOCOMOTIVE EQUIPMENT</b>	<p>Includes Equipment "A" (minus Chuck Jaws and Power Feed to Cross Slide), and</p> <ul style="list-style-type: none"> <li>11 Sets of Chuck Jaws (round), <math>\frac{3}{4}''</math> to <math>2''</math> inclusive, by 8ths.</li> <li>3 Sets of Chuck Jaws (hexagon), <math>1\frac{1}{8}''</math>, <math>1\frac{1}{4}''</math> and <math>1\frac{7}{8}''</math> across flats.</li> <li>3 Sets of Chuck Jaws (square), <math>1''</math>, <math>1\frac{1}{8}''</math> and <math>1\frac{1}{4}''</math> across flats.</li> <li>1 <math>12''</math>, 3-Jaw, Geared Scroll Chuck, with 2 sets of Jaws, for inside and outside gripping.</li> <li>1 Forging Chuck, with <math>2''</math> Shank.</li> <li>1 <math>6''</math> Lever Scroll Chuck, fitted to Turret.</li> <li>2 Universal Turners, with "V" Back-rests.</li> <li>1 Universal Turner, with Roller Back-rests.</li> <li>1 Open-side Turner.</li> <li>1 Taper Turner (Bar <math>\frac{1}{8}''</math> Taper to foot. Specify if otherwise).</li> <li>1 Bell-mouth Pointing Tool.</li> <li>1 <math>1\frac{1}{4}''</math> Self-opening Die, with roughing and finishing attachment, and</li> <li>8 Sets of Chasers, <math>\frac{1}{2}''</math>, <math>\frac{9}{16}''</math>, <math>\frac{5}{8}''</math>, <math>\frac{3}{4}''</math>, <math>\frac{7}{8}''</math>, <math>1''</math>, <math>1\frac{1}{8}''</math>, <math>1\frac{1}{4}''</math>, U. S. S.</li> <li>1 Box for Chuck Jaws and Chasers.</li> </ul>
<b>METRIC EQUIPMENT "C"</b>	<p>Includes Regular Equipment "C", with these modifications :</p> <ul style="list-style-type: none"> <li>11 Sets of Chuck Jaws (round), 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 m/m.</li> <li>3 Sets of Chuck Jaws (hexagon), 32, 40 and 48 m/m across flats.</li> <li>3 Sets of Chuck Jaws (square), 24, 28 and 32 m/m across flats.</li> <li>8 Sets of Chasers, 12, 14, 16, 18, 20, 22, 24 and 28 m/m, International Standard.</li> </ul>
<b>WHITWORTH EQUIPMENT "C"</b>	<p>Includes Regular Equipment "C", with these modifications :</p> <ul style="list-style-type: none"> <li>3 Sets of Chuck Jaws (hexagon), <math>1.301''</math>, <math>1.479''</math>, <math>1.670''</math> diameter across flats.</li> <li>Chasers for Self-opening Die-head, Whitworth Standard.</li> </ul>

Code words, page 265.



(Patented)  
Equipment "B" Tools: 3 x 36-inch Turret Lathe

**TURRET LATHES, 3 X 36-INCH—EQUIPMENTS****"A" MACHINE  
ARRANGED  
FOR ROD WORK  
WITHOUT  
TOOLS**

- 1 3" x 36" Turret Lathe, with Oil Pump, Tank and Piping.
- 2 Oil Guards.
- Countershaft (Three-speed friction).
- Set of Wrenches.
- Cross Slide with Back and Front Tool Posts.
- Automatic Rod Chuck, with
  - 1 Set of Chuck Jaws, any size within capacity (3" Round if not specified).
- Rod Feed, Automatic Positive Power Screw Type, with Compensating Device.
- 1 Rod Support (plain).
- 1 Rod Support (revolving), with two sets of Jaws.
- 1 Rod Follower Bar.
- 4 Stock Collars.
- 7 Stock Bushings.
- Rod Stop on Headstock, with 4 Rods.

**METRIC  
EQUIPMENT "A"**

Differs from the above only in that Metric Chuck Jaws are substituted. (See Equipment "B" for sizes).

**"B" MACHINE  
ARRANGED  
FOR ROD WORK  
WITH TOOLS**

- Includes Equipment "A" (minus set of Chuck Jaws), and
- 9 Sets of Chuck Jaws (round), 2" to 3" inclusive, by 8ths.
- 5 Sets of Chuck Jaws (hexagon),  $1\frac{1}{8}$ ", 2",  $2\frac{1}{8}$ ",  $2\frac{3}{8}$ " and  $2\frac{7}{8}$ " across flats.
- 6 Sets of Chuck Jaws (square),  $1\frac{1}{2}$ ",  $1\frac{5}{8}$ ",  $1\frac{3}{4}$ ",  $1\frac{7}{8}$ ", 2" and  $2\frac{1}{8}$ " across flats.
- 2 Universal Turners, with "V" Back-rests.
- 1 Universal Turner, with Roller Back-rests.
- 1 End Forming and Pointing Tool.
- 1 Bell-mouth Pointing Tool.
- 1 2", Self-opening Die-head, with roughing and finishing attachment, and 1 set of Chasers, any standard size within capacity of Tool, U. S. S.
- 1 3" Tool Holder for Round Shanks.
- 1 Box of Chuck Jaws and Chasers.

**METRIC  
EQUIPMENT "B"**

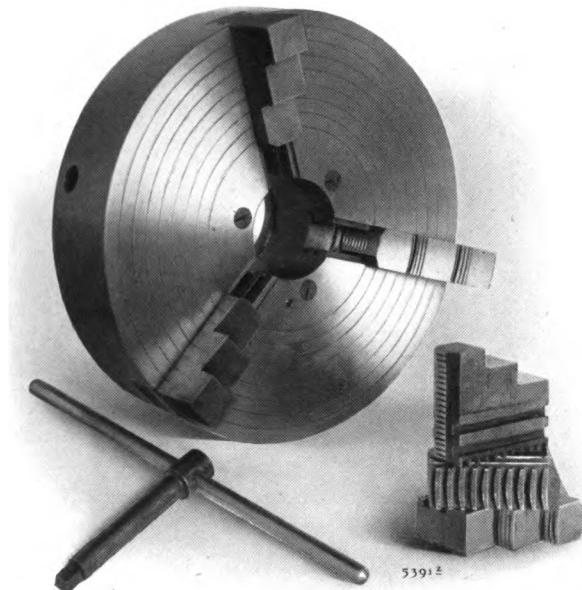
- Includes Regular Equipment "B", with these modifications :
- 9 Sets of Chuck Jaws (round), 44, 46, 48, 50, 55, 60, 65, 70, 75 m/m.
- 5 Sets of Chuck Jaws (hexagon), 52, 56, 64, 68 and 72 m/m across corners.
- 6 Sets of Chuck Jaws (square), 40, 42, 44, 46, 48 and 52 m/m across flats.
- 1 Set of Chasers for Open Die-head, any size from 18 to 48 m/m, International Standard.

**WHITWORTH  
EQUIPMENT "B"**

- Includes Regular Equipment "B", with these modifications :
- 5 Sets of Chuck Jaws (hexagon), 1.860", 2.048", 2.215", 2.413", 2.576" diameter across flats.
- Chasers for Self-opening Die-head, Whitworth Standard.

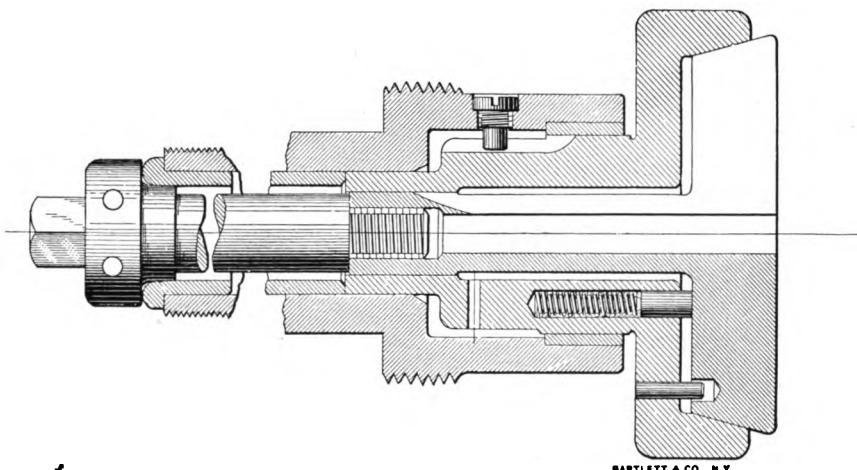
## TURRET LATHE TOOLS AND APPLIANCES

**Geared Scroll Chucks** Are recommended for use in connection with casting and forging work. The 12-inch chuck is suitable for either the 1½ or 2-inch machine and the 15-inch for the 3-inch machine; 7½ and 9-inch chucks may also be used on either of these machines. Chucks are regularly furnished with chuck-plate fitted to the spindle, also with two sets of jaws for outside and inside gripping. Jaws can also be furnished to accommodate special forms if desired.



Geared Scroll Chuck

## TURRET LATHE TOOLS AND APPLIANCES—Continued



Step-chuck and Closer

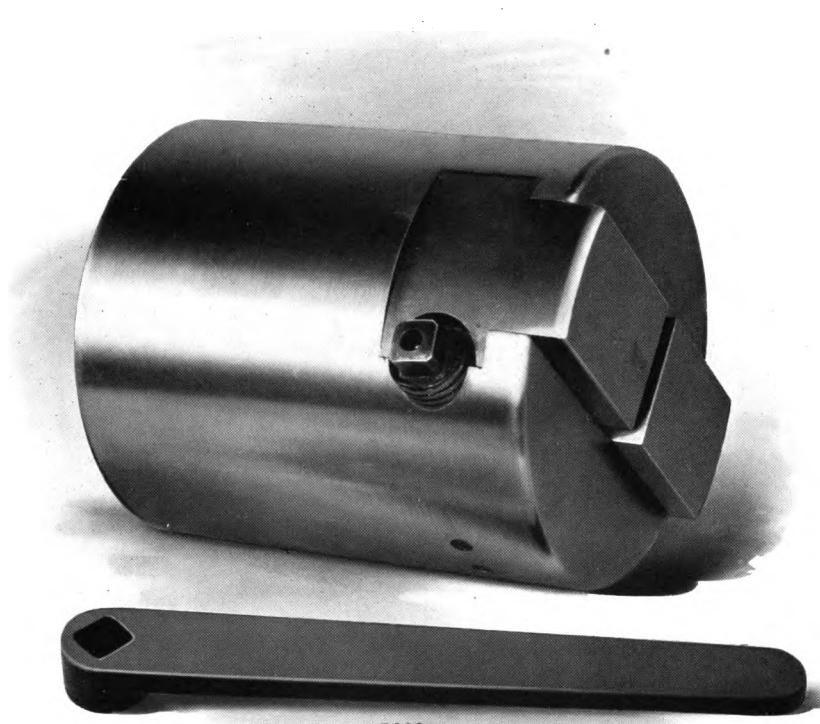
BARTLETT & CO., N.Y.

## CAPACITY OF STEP-CHUCK REGULARLY FURNISHED

$\frac{5}{8} \times 4\frac{1}{2}$ -inch Machine;	$\frac{5}{8}$ to 3 inches	$2 \times 26$ -inch Machine;	$2$ to $6\frac{1}{2}$ inches
$1 \times 15$ -inch Machine;	$1$ to $3\frac{3}{4}$ inches	$3 \times 36$ -inch Machine;	$3$ to $7$ inches
$1\frac{1}{2} \times 18$ -inch Machine;	$1\frac{1}{2}$ to 5 inches		

**Drill Chucks** Are recommended for holding straight shank tools in the three largest size machines. Chucks are fitted to turret and may be furnished to order with taper split sleeves to accommodate standard taper shanks. Chuck furnished for the  $1\frac{1}{2}$ -inch machine has a capacity of 1 inch; for the 2-inch machine,  $1\frac{1}{2}$  inches; and for the 3-inch machine, 2 inches.

**Drill and Counterbore Holders** (See page 82).



5333

Two-jaw Chuck, Solid Flat Jaws  
**TWO-JAW CHUCKS**

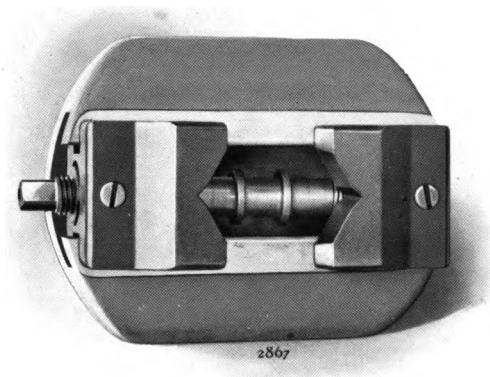
These chucks are made in the most substantial manner possible, steel forgings being used in their construction throughout, with the exception of the jaw screw, which is made of tool-steel. They are furnished either with solid jaws flat or grooved, or with inserted jaws flat or grooved. Jaws are also fitted to accommodate special forms as desired.

**SIZES**

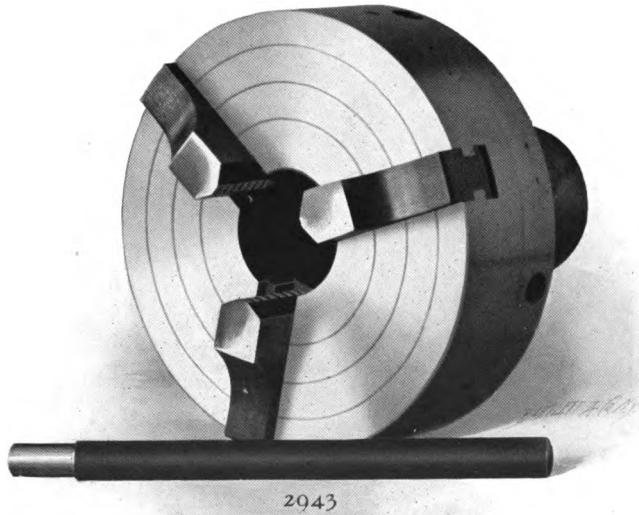
Machine used on	$\frac{5}{8} \times 4\frac{1}{2}$ -inch Inches	$1 \times 15$ -inch Inches	$1\frac{1}{2} \times 18$ -inch Inches	$2 \times 26$ -inch $2\frac{1}{2} \times 26$ -inch Inches	$3 \times 36$ -inch $2\frac{1}{2} \times 26$ -inch Inches
Diameter of Body or Hub	$3\frac{1}{2}$	$4\frac{1}{4}$	$5\frac{1}{8}$	$6\frac{1}{4}$	$8\frac{3}{4}$
Length over all . . . .	4	$4\frac{3}{4}$	$6\frac{1}{8}$	$7\frac{1}{4}$	10
Depth of Jaws . . . .	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{1}{2}$	$4\frac{1}{8}$
Width of Jaws . . . .	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{5}{8}$	$2\frac{1}{8}$	$3\frac{1}{2}$
Swing . . . . .	4	5	$6\frac{3}{4}$	$8\frac{1}{2}$	$10\frac{1}{8}$
Hole through . . . . .	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{5}{8}$	$2\frac{1}{8}$	$3\frac{1}{8}$

## TURRET LATHE TOOLS AND APPLIANCES—Continued

**Forging Chuck and Lever Scroll Chuck** Used in combination for centering and turning forged bolts, the heads of which are more or less eccentric. These chucks are especially recommended for use in railroad shops and are included with locomotive equipment "C" for the 2-inch machine, also furnished to order for the 3-inch machine.

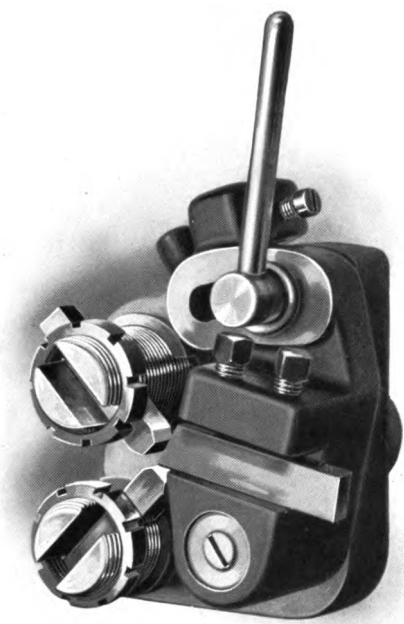


Forging Chuck



Lever Scroll Chuck

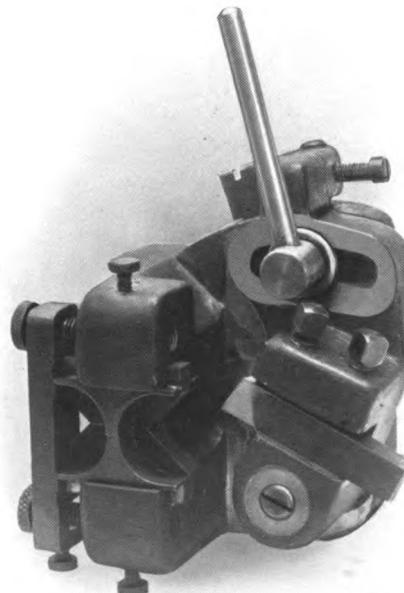
## TURRET LATHE TOOLS AND APPLIANCES—Continued



(Patented)

Single Turner with Tangent Cutter,  $\frac{5}{8} \times 4\frac{1}{2}$  Turret Lathe

**Single Turner with Tangent Cutter** Although very rigid this tool is still sensitive and very easily adjusted. Cutter of high-speed steel is located over-shot or tangent to the work. Back-rests are of high-speed steel, wedge shaped. Made for the  $\frac{5}{8}$ -inch machine only.



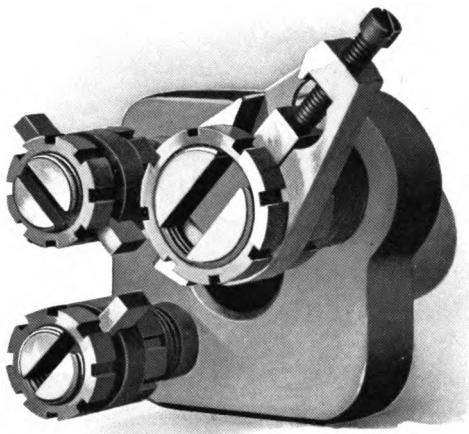
4375

(Patented)

76

## TURRET LATHE TOOLS AND APPLIANCES—Continued

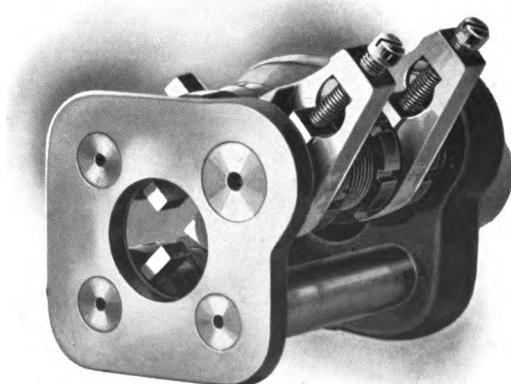
**Single Turner with Radial Cutter** A sizing or finishing tool in which the cutter is located radially, and both cutter and back-rests are capable of very fine adjustment. Made for the  $\frac{5}{8}$  and 1-inch machines only.



(Patented)

Single Turner with Radial Cutter,  $\frac{5}{8} \times 4\frac{1}{2}$  and 1 x 15 Turret Lathes

**Multiple Turners** Are essentially manufacturing tools, found very useful for the production of a large number of duplicate pieces and also on complicated work where the necessary tool equipment exceeds the capacity of the turret. Regularly made with two cutter holders and two back-rests, a third cutter holder may be added if necessary. Made in two styles, with tangent cutters and with radial cutters, for the  $\frac{5}{8}$  and 1-inch machines only.



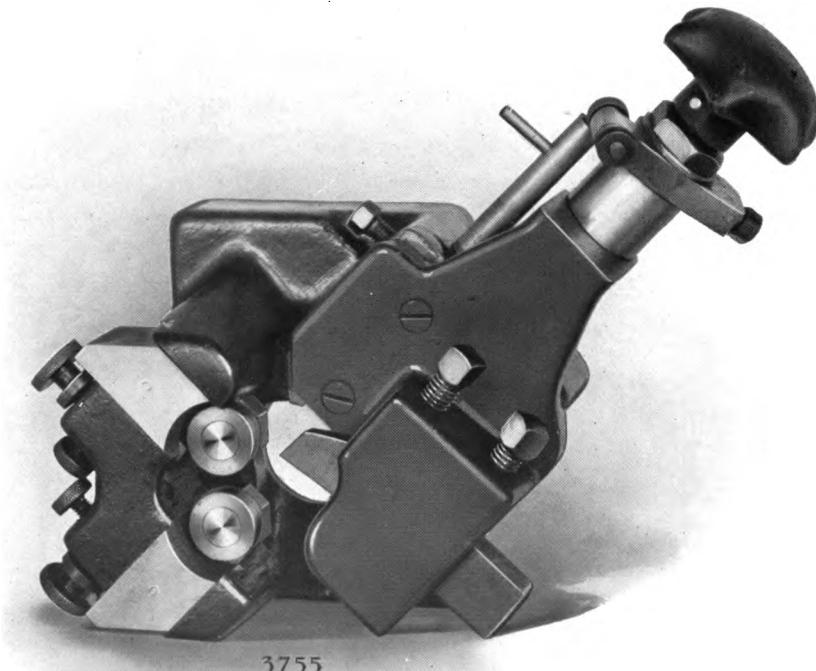
(Patented)

Multiple Turner with Radial Cutters,  $\frac{5}{8} \times 4\frac{1}{2}$  and 1 x 15 Turret Lathes

**TURRET LATHE TOOLS AND APPLIANCES—Continued**

**Universal Turner with "V" Back-rests** Suitable for bar work and is equally effective for turning toward the spindle as is usually the custom on short work, or away from the spindle which is frequently desirable on long, slender work. Cutter is made of high-speed steel and mounted in a slide provided with liberal radial adjustment, which is governed by efficient stops. Back-rest jaws are made of high-speed steel and can be easily reversed to accommodate different diameters by swinging away the strap which takes the backward thrust of the jaws. Made for the  $1\frac{1}{2}$ , 2 and 3-inch machines only.

**Universal Turner with Roller Back-rests** Similar in construction to the universal turner with "V" back-rests, with the exception that roller back-rests are furnished. Rollers are made of high-speed steel, hardened and ground and run on hardened and ground tool steel studs. Jaws are reversible for either leading or following the work as desired. Made for the  $1\frac{1}{2}$ , 2 and 3-inch machines only.



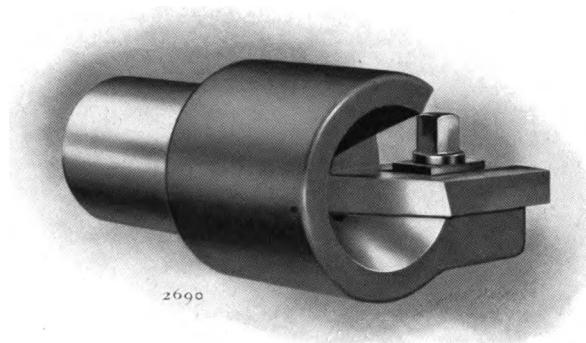
(Patented)

**Universal Turner with Roller Back-rests, for  $1\frac{1}{2} \times 18$ , 2 x 26 and 3 x 36 Turret Lathes.** This tool is particularly adapted for quick turning

## TURRET LATHE TOOLS AND APPLIANCES—Continued

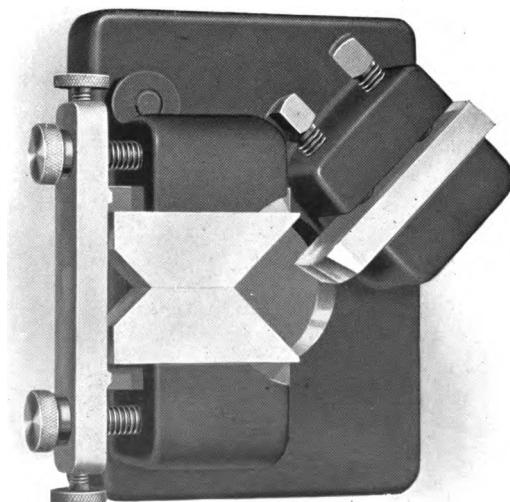
**Open Side Turner** Recommended for turning short work beyond the capacity of the universal turner. It is similar in construction to the universal turner previously described, with the exception that no provision is made for back-resting the work. Made for the  $1\frac{1}{2}$ , 2 and 3-inch turret lathes.

**Bell-mouth Pointing Tool** Used for chamfering the ends of rough work preparatory to turning. The  $1\frac{1}{2}$  and 2-inch are made with round shank to fit the turret hole; the 3-inch being made in a slightly modified form to fit the turret face.



Bell-mouth Pointing Tool,  $1\frac{1}{2} \times 18$  and  $2 \times 26$  Turret Lathes

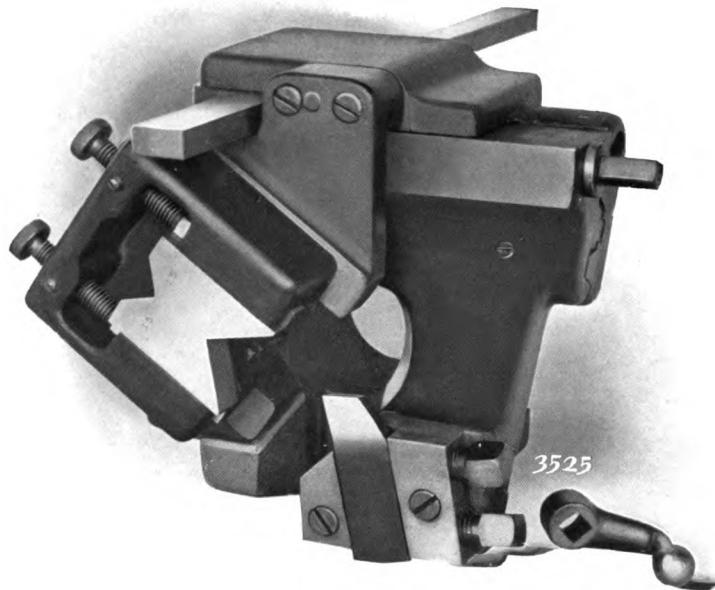
**End Forming and Pointing Tool** Adapted for general end forming and pointing work on finished bars, and for this purpose it is provided with adjustable back-rests. Both jaws and cutters are made of high-speed steel. Made for all size machines.



(Patented)

End Forming and Pointing Tool,  $1\frac{1}{2} \times 18$ ,  $2 \times 26$  and  $3 \times 36$  Turret Lathes

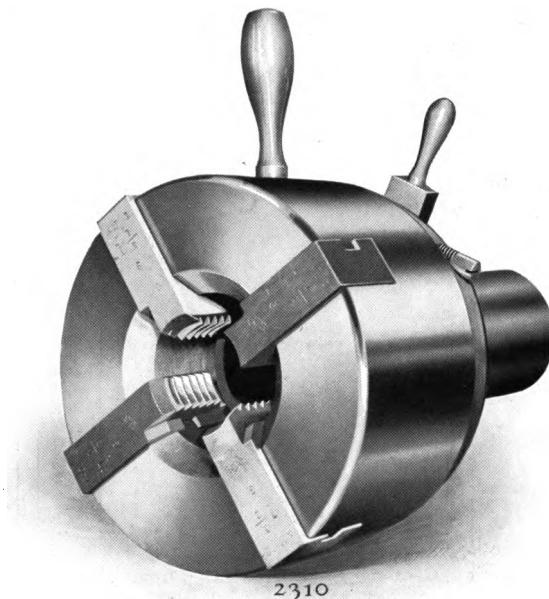
## TURRET LATHE TOOLS AND APPLIANCES—Continued



(Patented)

## TAPER TURNING TOOL

Suitable for turning tapers from either bar stock or forgings. Back-rest jaws may be set to follow or lead the tool as occasion may demand. The cutting tool is directly controlled by an accurate taper bar for angle, the work produced, therefore, is of a superior order and is fully equal to that obtained from an engine lathe. The radial adjustment of the tool slide which permits roughing and finishing cuts is accomplished through the taper bar-block screw, accurate adjustments being possible by means of the micrometer dial. In order to produce the required taper it is only necessary to plane a bar to a taper one-half of that required on the piece to be turned; thus, if the desired taper is  $\frac{1}{2}$  inch to the foot the bar should be planed to  $\frac{1}{4}$  inch to the foot. One taper bar planed to produce tapers  $\frac{1}{8}$  inch to the foot (unless otherwise specified) is furnished with each tool. Made for the 1,  $1\frac{1}{2}$ , 2 and 3-inch machines.



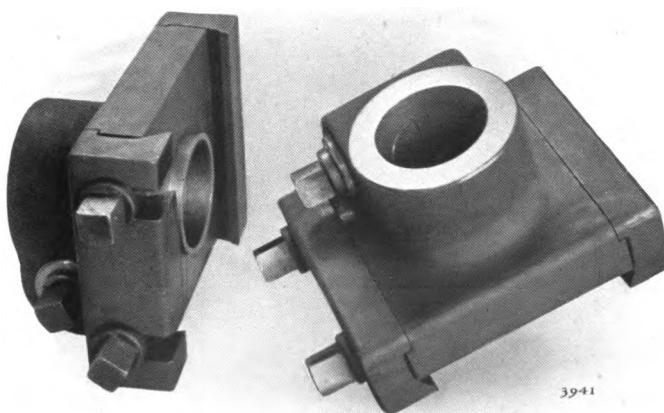
2310

### SELF-OPENING DIE—SPECIFICATIONS

Size Inches	Used on Turret Lathe Inches	Capacity Inches	Shank, Diameter Inches
$\frac{9}{16}$ $\frac{3}{4}$	$\frac{5}{8}$	$\frac{1}{8}$ to $\frac{1}{2}$	$1\frac{1}{8}$
1	1	$\frac{1}{4}$ to $\frac{3}{4}$	$1\frac{1}{2}$
$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{3}{8}$ to 1	$1\frac{3}{4}$
$1\frac{1}{2}$	$1\frac{1}{2}$ and 2	$\frac{1}{2}$ to $1\frac{1}{4}$	$1\frac{3}{4}$
$\frac{7}{8}$	* $1\frac{1}{2}$ , 2 and 3	$\frac{3}{8}$ to $1\frac{1}{2}$	$2\frac{1}{4}$
2	*2 and 3	$\frac{3}{4}$ to 2	3
3	3	$1\frac{1}{2}$ to 3	4

\*Special Holders required.

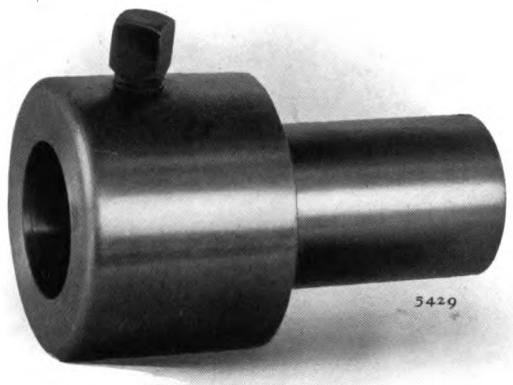
† Also used on Turntable Lathe.



39-41

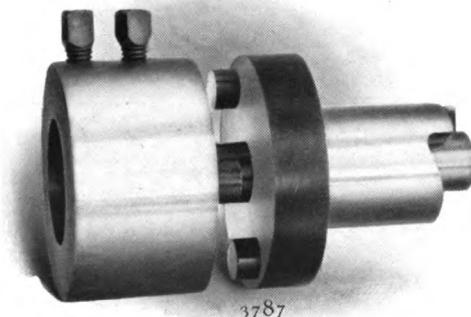
**Round Tool Holder** Is used for holding round shank tools in the 3 x 36-inch machine, also for holding 1 1/2-in. die-head to the 1 1/2 x 18-inch machine, and the 2-inch die-head to the 2 x 26-inch machine.

## TURRET LATHE TOOLS AND APPLIANCES—Continued



## DRILL AND COUNTERBORE HOLDERS

Turret Lathe Inches	Bushing Hole Diameter Inches	Shank	
		Diameter Inches	Hole Inches
5/8 x 4 1/2	1	1 1/8	3/4
1 x 15	1 3/8	1 1/2	1
1 1/2 x 18	1 1/2	1 3/4	1

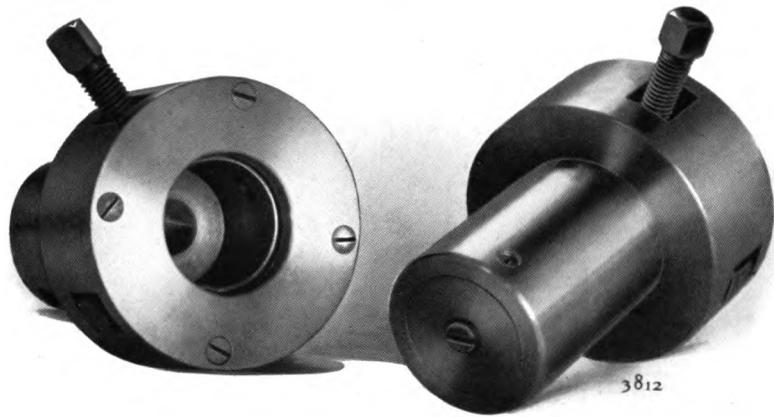


## RELEASED TAP AND DIE HOLDER—SPECIFICATIONS

Turret Lathe, Inches	Shank, Diameter, Inches	Hole, Diameter, Inches
5/8 x 4 1/2	1 1/8	1 1/8
1 x 15	1 1/2	1 3/8 or 1 5/8
1 1/2 x 18	1 3/4	2
*2 x 26	2 1/4	2 1/4
*3 x 36	3	†2

\* Also used on Turntable Lathe

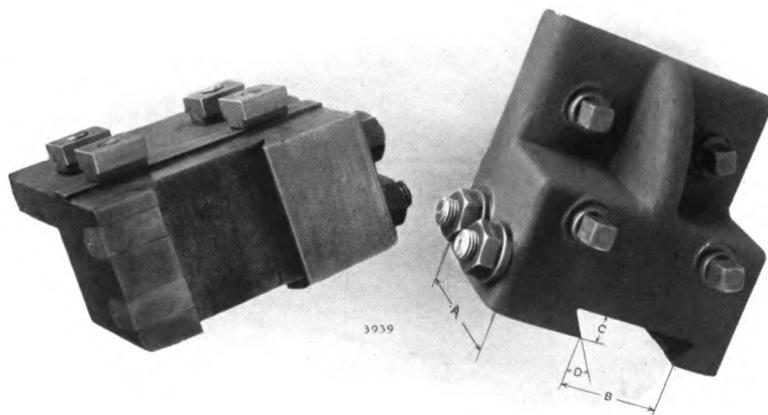
† May be enlarged to 3 inches



### FLOATING REAMER HOLDER—SPECIFICATIONS

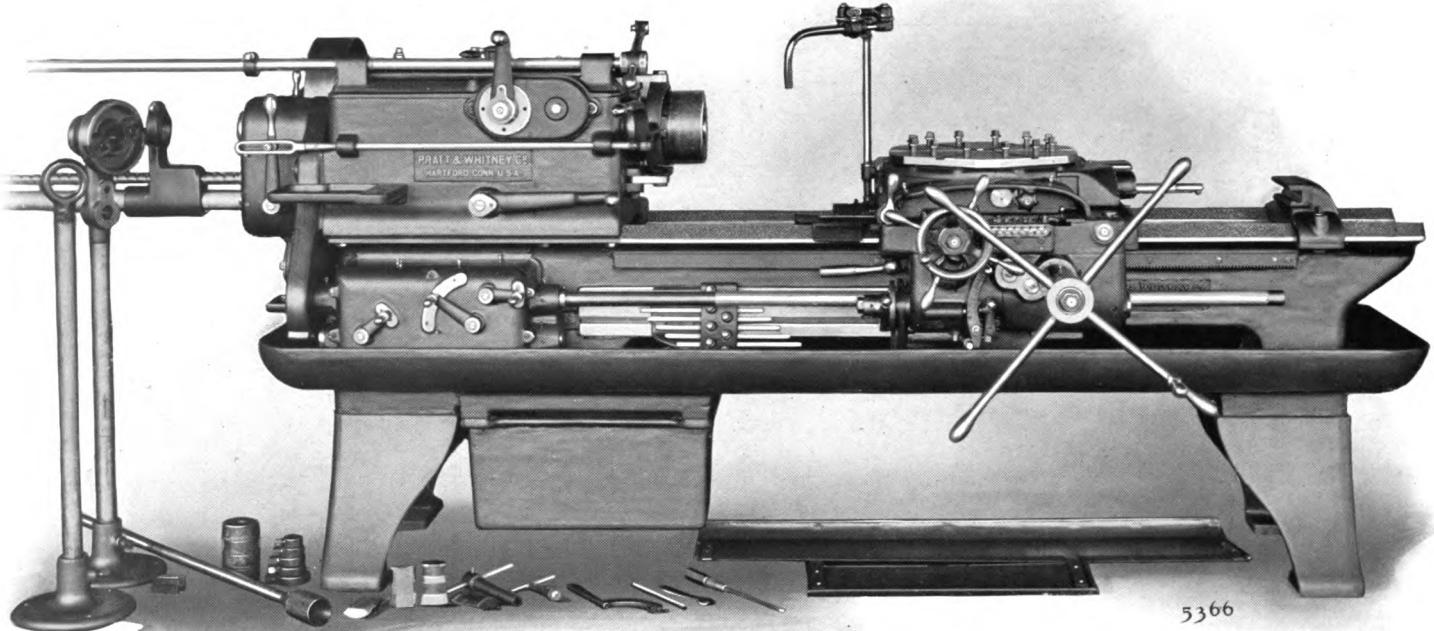
Turret Lathe, Inches	Shank, Diameter, Inches	Driving Ring Hole, Inches
$\frac{5}{8} \times 4\frac{1}{2}$	$1\frac{1}{8}$	$1\frac{3}{8}$
$1 \times 15$	$1\frac{1}{2}$	$1\frac{1}{8}$
$1\frac{1}{2} \times 18$	$1\frac{3}{4}$	$1\frac{3}{8}$
* $2 \times 26$	$2\frac{1}{4}$	$1\frac{5}{8}$
* $3 \times 36$	3	$2\frac{1}{8}$

\* Also used on Turntable Lathe



### DOVETAIL FORMING TOOL HOLDER—FOR ALL SIZE MACHINES

$\frac{5}{8} \times 4\frac{1}{2}$ inches	A $1\frac{3}{4}$ inches	B $1\frac{1}{8}$ inches	C $\frac{5}{8}$ inch	D 350
$1 \times 15$ inches	A $2\frac{1}{4}$ inches	B $1\frac{1}{8}$ inches	C $\frac{5}{8}$ inch	D 350
$1\frac{1}{2} \times 18$ inches	A $2\frac{1}{2}$ inches	B 3 inches	C $\frac{3}{4}$ inch	D 350
$2 \times 26$ inches	A 3 inches	B 3 inches	C $\frac{3}{4}$ inch	D 350
$3 \times 36$ inches	A $3\frac{1}{2}$ inches	B 3 inches	C $\frac{3}{4}$ inch	D 350



(Patented)

2½ x 26-inch Turntable Lathe: Equipment "A"

## TURNTABLE LATHE, 2½ X 26-INCH

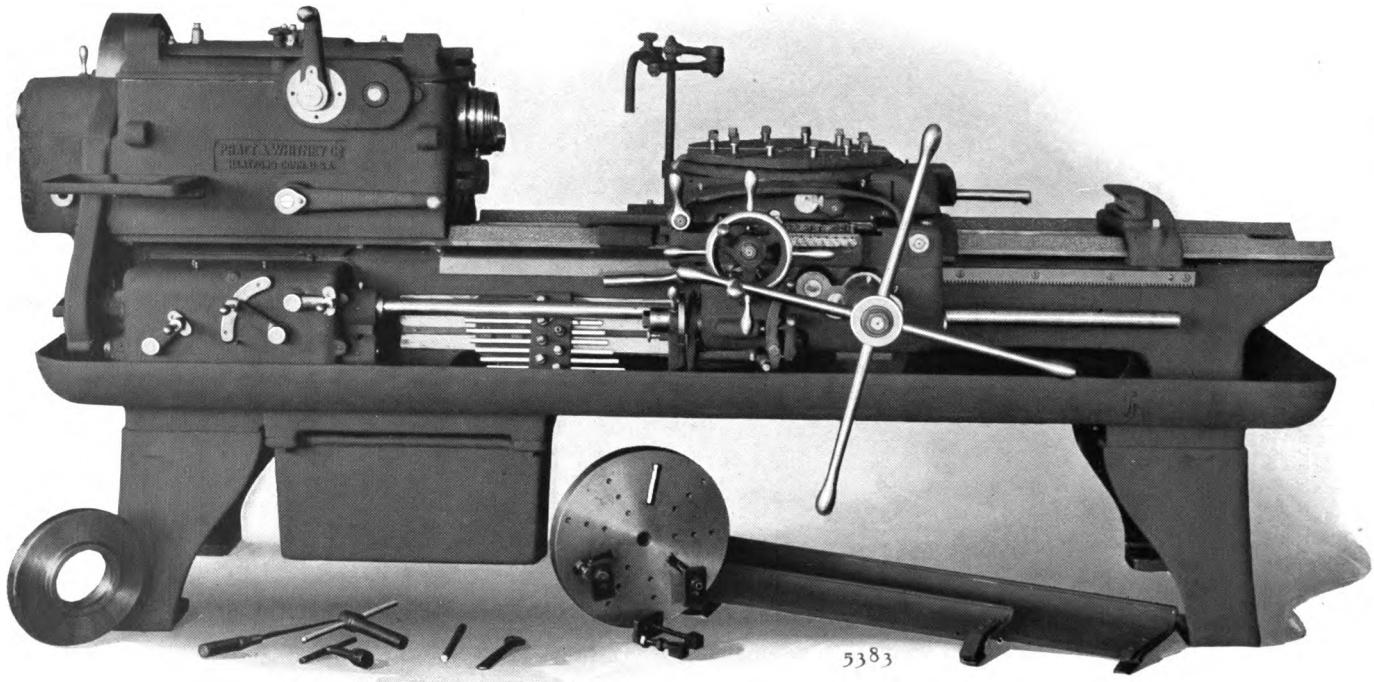
A new machine in which is embodied every required refinement known for easy, convenient, rapid and accurate operation. It is provided with a Constant-Speed, All-Geared Head and a Cross-Feeding Turntable. It is practically universal in adaptability and is suitable for an endless variety of work on castings, forgings and from the bar with the simplest tool equipment.

## SPECIFICATIONS

RANGE . . .	*Rod Chuck Capacity (round) . . . . .	¾" to 2½"
	*Rod Chuck Capacity (square across flats) . . . . .	¾" to 1¾"
	*Rod Chuck Capacity (hexagonal across flats) . . . . .	¾" to 2 $\frac{3}{8}$ "
	Length ; maximum turning . . . . .	26"
	Swing over Bed . . . . .	20"
	Swing over Special Forming Slide . . . . .	11"
TURNTABLE . . .	Hexagon, 18" across flats, 6 Tool Seats.	
	Turntable Top to Center of Spindle . . . . .	2½"
	Turntable Top to Top of Cross Slide . . . . .	1¾"
	Turntable Edge to Spindle End, maximum . . . . .	38"
SPINDLE . . .	Bearings (3), all cylindrical, diameter . . . . .	3 $\frac{5}{8}$ "
	Boxes, Bronze ; conical on O. D., adjustable for wear.	
	Front End, 4 $\frac{3}{8}$ " diameter ; Thread, 4 $\frac{1}{8}$ " diameter ; 4 Pi., U. S. F.	
	Hole through . . . . .	2 $\frac{5}{8}$ "
SPEEDS . . .	Spindle Speeds (8), R. P. M. . . . .	10 to 251
	Pulley, Driving on Head . . . . .	14" x 4"
	Pulley, Driving on Countershaft . . . . .	18" x 4"
	Pulleys, Friction on Countershaft . . . . .	14" x 4 $\frac{5}{8}$ "
	Belt Width (Driving Pulley) . . . . .	3 $\frac{1}{4}$ "
	Belt Width (Counter. Friction Pulleys) . . . . .	4 $\frac{1}{2}$ "
	Countershaft Speed, R. P. M. . . . .	310
FEEDS . . .	Carriage Longitudinal (6), P. R. Sp. . . . .	.0081 to .0559
	Turntable Transverse (6), P. R. Sp. . . . .	.0111 to .0767
	Micrometer Dials graduated in thousandths.	
STOPS . . .	Carriage Longitudinal (9), 6 regular, 3 supplementary.	
	Turntable Transverse (8).	
	Stock Stop (1) on Head, adjustable to any desired length.	
FLOOR SPACE	Machine, without Rod Feed . . . . .	48 $\frac{1}{2}$ " x 9' 6 $\frac{1}{2}$ "
	Machine, with Rod Feed . . . . .	48 $\frac{1}{2}$ " x 15'
WEIGHTS . . .	Machine, with Countershaft (no tools), net pounds . . . . .	5500
	Crating Material (domestic), approximate pounds . . . . .	600
	Boxing Material (foreign), approximate pounds . . . . .	1200
	Box, cubic feet . . . . .	160

\*For detailed information see table on page 103.

Code words, page 265.



(Patented)  
2½ x 26-inch Turntable Lathe: Equipment "C"

## TURNTABLE LATHE, 2½" X 26-INCH—EQUIPMENTS

**"A" MACHINE  
ARRANGED FOR  
ROD WORK  
WITHOUT  
TOOLS**

- 1 2½" x 26", 20" Swing Turntable Lathe, with  
Oil Pump, Tank and Piping.
- 2 Oil Guards.
- Countershaft (double friction).
- Set of Wrenches.
- Automatic Rod Chuck, with  
\*1 Set of Jaws, any size within capacity.
- Automatic Power Rod Feed Device, with  
1 Rod Support (plain).
- 1 Rod Support (revolving), with 2 Sets of Jaws.
- 1 Rod Follower Bar.
- 5 Rod Collars.
- 5 Rod Bushings.
- Rod Stop on Headstock.

**"B" MACHINE  
ARRANGED FOR  
ROD WORK  
WITH  
TOOLS**

- Includes Equipment "A" (minus Chuck Jaws), and
- \*15 Sets of Jaws, suitable for  
Round Rod, ¾" to 2½" (19 to 64 m/m) across flats.  
Square Rod, ¾" to 1¾" (19 to 44 m/m) across flats.  
Hexagon Rod, ¾" to 2½" (19 to 55 m/m) across flats.
- 1 Set of Jaw Spreaders for Hexagon Rods.
- 3 Universal Turners (2 regular, 1 with open-side slide), with  
2 Pairs of Roller Back-rests (following).  
1 Pair of Roller Back-rests (leading).  
1 Pair of "V" Back-rest Holders.  
1 Pair of "V" Back-rests (small).  
1 Pair of "V" Back-rests (large).
- 1 Bell-mouth Pointing Tool.
- 1 End Forming and Pointing Tool.
- 1 Turntable Cut-off and Forming Tool.
- 1 3" Round Tool Holder, with 2½" Bushing.
- 1 2¼" Round Tool Holder.
- 1 1½", Self-opening Die-head, with roughing and finishing attachment, and  
8 Sets of Chasers ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅜" and 1½", U. S. S.  
(Specify if otherwise than U. S. S.).
- 1 Box for Chuck Jaws.

**METRIC  
EQUIPMENT "B"**

Differs from the above only in Chasers substituted for the 1½" Die-head as follows:

16, 18, 20, 24, 28, 32, 36 and 38 m/m, International Standard.

**"C" MACHINE  
ARRANGED FOR  
CASTING AND  
FORGING WORK  
WITHOUT  
TOOLS**

- 1 2½" x 26", 20" Swing Turntable Lathe, with  
Oil Pump, Tank and Piping.
- 2 Oil Guards.
- Countershaft (double friction).
- Set of Wrenches.
- 1 16" Face Plate Equipment.
- 1 Chuck Plate (blank).

\*For detailed information, see table, page 103.

Code words, page 265.



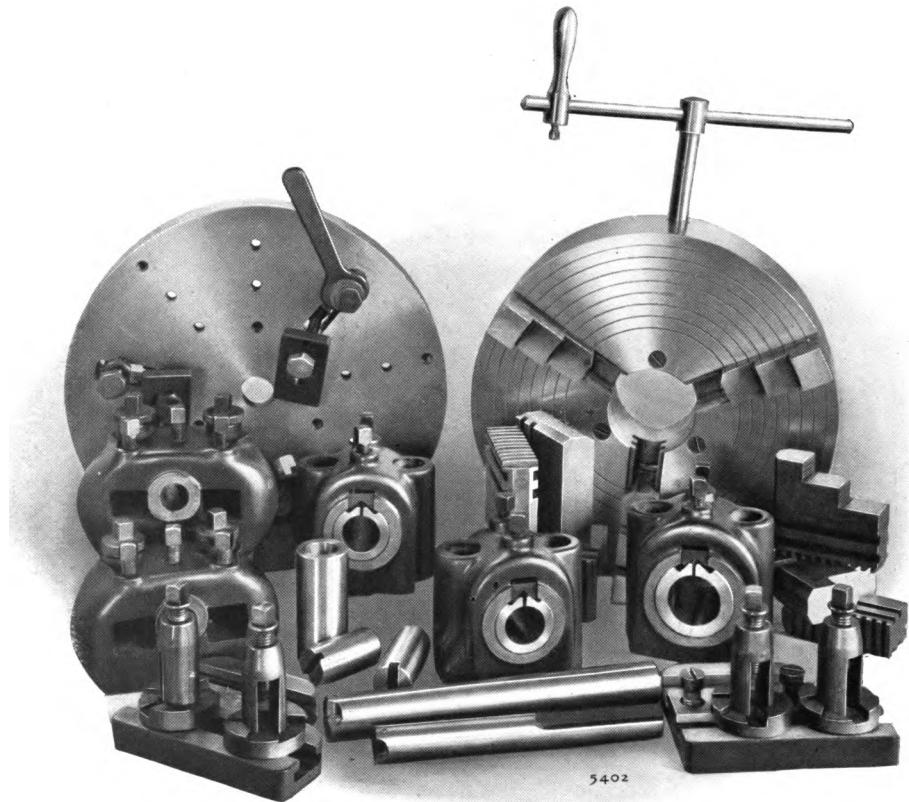
(Patented)  
Equipment "B" Tools:  $2\frac{1}{2}$  x 26-inch Turntable Lathe

## TURNTABLE LATHE, 2½ X 26-INCH—EQUIPMENTS (Continued)

<p><b>"D" MACHINE ARRANGED FOR CASTING AND FORGING WORK WITH TOOLS</b></p>	<p>Includes Equipment "C" (minus Blank Chuck Plate), and</p> <ul style="list-style-type: none"> <li>1 15", 3-Jaw, Geared Scroll Chuck (extra heavy), with           <ul style="list-style-type: none"> <li>2 Sets of Jaws for outside and inside gripping.</li> <li>1 Set of Jaws (soft, blank), for special work.</li> </ul> </li> <li>2 Triple Tool Holders.</li> <li>2 Tool Post Holders, with 2 Tool Posts each.</li> <li>1 3" Round Tool Holder, with 2" Bushing.</li> <li>2 2¼" Round Tool Holders, with 1½" Bushing.</li> <li>1 1½" x 10" Boring Bar, with Adjustable Cutter.</li> <li>1 1½" x 12" Boring Bar, with Adjustable Cutter.</li> <li>3 Taper Adapters.</li> </ul>
<p><b>"E" MACHINE ARRANGED FOR ROD WORK, CASTINGS AND FORGINGS WITH TOOLS</b></p>	<p>Includes Equipment "A" (minus Chuck Jaws), and</p> <ul style="list-style-type: none"> <li>*15 Sets of Jaws, suitable for           <ul style="list-style-type: none"> <li>Round Rod, ¾" to 2½" (19 to 64 m/m).</li> <li>Square Rod, ¾" to 1¾" (19 to 44 m/m) across flats.</li> <li>Hexagon Rod, ¾" to 2½" (19 to 55 m/m) across flats.</li> </ul> </li> <li>1 15", 3-Jaw, Geared Scroll Chuck (extra heavy), with           <ul style="list-style-type: none"> <li>2 Sets of Jaws, for outside and inside gripping.</li> <li>1 Set of Jaws (soft, blank), for special work.</li> </ul> </li> <li>1 16" Face Plate Equipment.</li> <li>3 Universal Turners (2 regular, 1 with open-side slide), and           <ul style="list-style-type: none"> <li>2 Pairs of Roller Back-rests (following).</li> <li>1 Pair of Roller Back-rests (leading).</li> <li>1 Pair of "V" Back-rest Holders.</li> <li>1 Pair of "V" Back-rests (small).</li> <li>1 Pair of "V" Back-rests (large).</li> </ul> </li> <li>1 End Forming and Pointing Tool.</li> <li>1 Bell-mouth Pointing Tool.</li> <li>1 Turntable Cut-off and Forming Tool.</li> <li>2 Triple Tool Holders.</li> <li>2 Tool Post Holders, with 2 Tool Posts each.</li> <li>1 3" Round Tool Holder, with 1 each 2" and 2½" Bushings.</li> <li>2 2¼" Round Tool Holders, with 1½" Bushings each.</li> <li>1 1½" x 10" Boring Bar, with Adjustable Cutter.</li> <li>1 1½" x 12" Boring Bar, with Adjustable Cutter.</li> <li>3 Taper Adapters (1 each No. 2, 3, 4, Morse Taper).</li> <li>1 1½", Self-opening Die-head, with roughing and finishing attachment, and           <ul style="list-style-type: none"> <li>1 Set of Chasers each, ½", ¾", ¾", 1", 1½", 1¼", 1¾" and 1½", U. S. S. (Specify if otherwise than U. S. S.).</li> </ul> </li> <li>1 Box for Collet Jaws and Chasers.</li> </ul>
<p><b>METRIC EQUIPMENT "E"</b></p>	<p>Differs from the above only in Chasers furnished for the 1½" Die-head. (See Equipment "B").</p>

\*For detailed information, see table, page 103.

Code words, page 265.



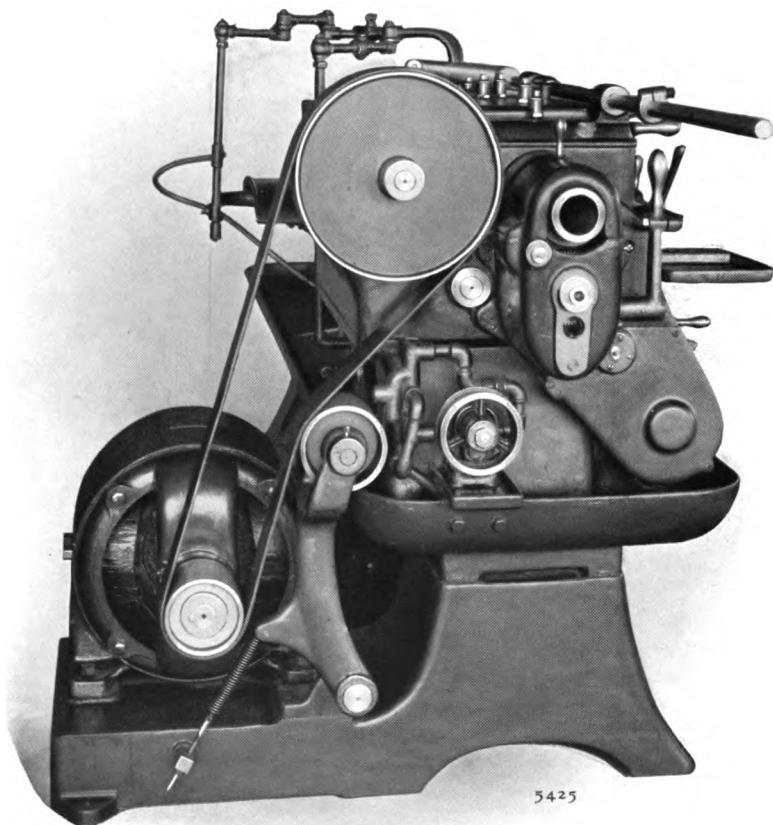
5402

(Patented)

Equipment "D" Tools: 2½ x 26-inch Turntable Lathe



(Patented)  
Equipment "E" Tools: 2½ x 26-inch Turntable Lathe



5425

Turntable Lathe Arranged with Motor Drive

## TURNTABLE LATHE APPLIANCES AND TOOLS

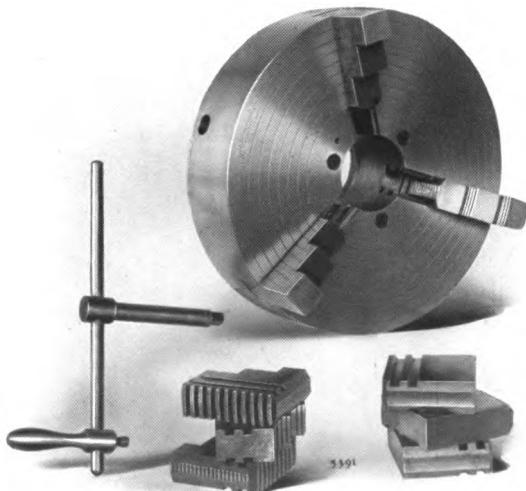
**Motor Drive** Motor base is cast integral with front pedestal. It is provided with an automatic belt tightener and will accommodate any standard motor. Motor should be  $7\frac{1}{2}$  horse-power, constant speed not over 1200 revolutions per minute. If motor is furnished by customer full specifications are required. (Furnished to order).

**Special Forming Slide** For heavy forming operations. It is mounted on bed and provided with six power transverse feed changes. Longitudinal adjustment is by hand through rack and pinion. Front and rear tool posts of improved type are provided. (Furnished to order).

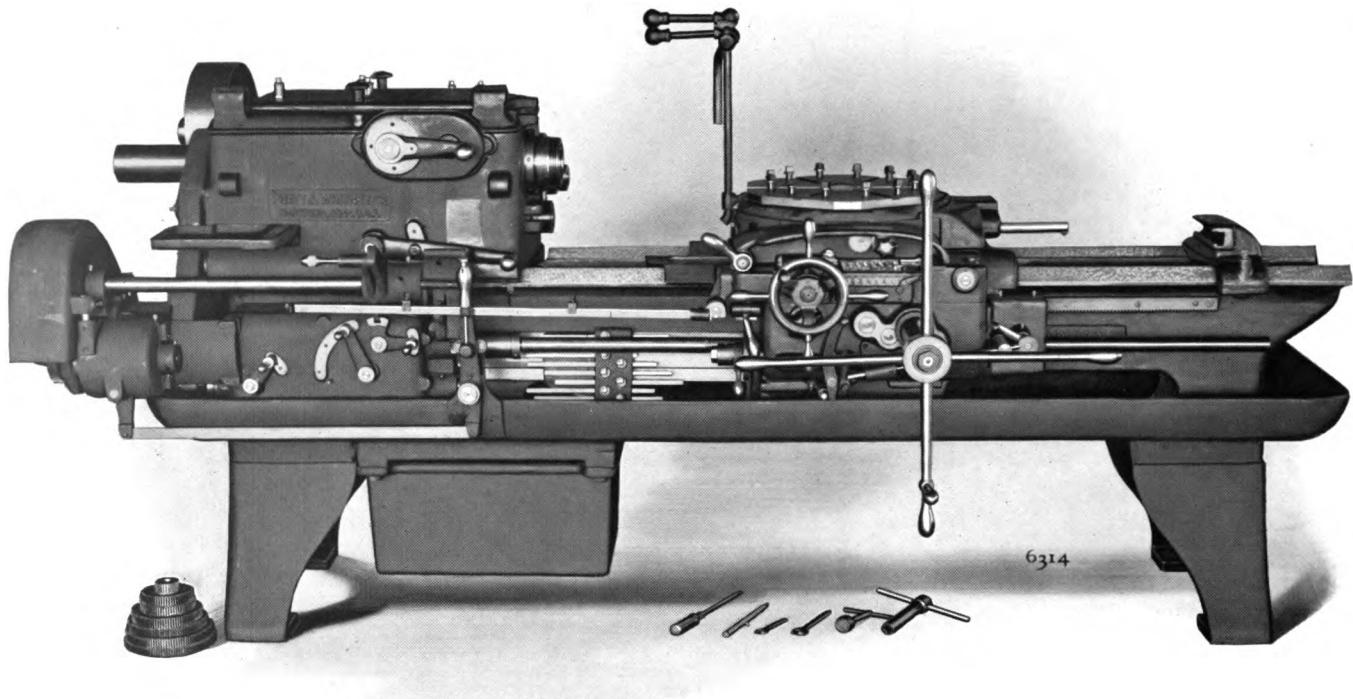
**Threading Attachment** An attachment extremely simple in design, attached to the machine proper in a most convenient manner. It is equally well suited and efficient on either long or short, external or internal work. Longitudinal travel of carriage is automatically controlled in either direction by means of conveniently located adjustable stops. Carriage return is accomplished through threading attachment, entirely independent of countershaft. As regularly furnished, it will cut threads from  $1\frac{1}{2}$  to 20 pi., including  $4\frac{1}{2}$ ,  $5\frac{1}{2}$  and  $11\frac{1}{2}$  pi. Special gears may be furnished to order to practically meet any requirement.

**Threading Tool Holder** A threading tool holder is made which permits the withdrawing and accurate returning of the tool to the previous depth independent of the cross slide. While this tool is not necessary for the satisfactory working of the attachment it has been found very convenient on certain classes of work.

**15-inch Three-jaw Geared Scroll Chuck** Is of an extra heavy type and is regularly furnished with two sets of jaws for outside and inside gripping, and one set of soft blank jaws that can be turned to suit special work.



15-inch Three-jaw Geared Scroll Chuck



Turntable Lathe showing Threading Attachment and Threading Tool Holder described on previous page

## TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

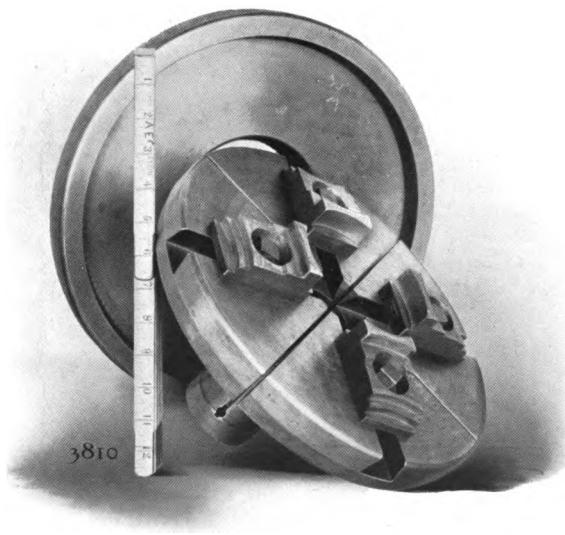
**Two-jaw Chuck** (See Two-jaw Chucks, page 74).

**Forging and Lever Scroll Chucks** Used in combination for the centering and turning of forged bolts, the heads of which are more or less eccentric. These chucks are especially recommended for use in railroad shops. (Furnished to order).

See page 75 for illustration.

**Chuck-plate (Blank)** These plates are finished to fit the spindle and are of sufficient diameter to accommodate any desired chuck.

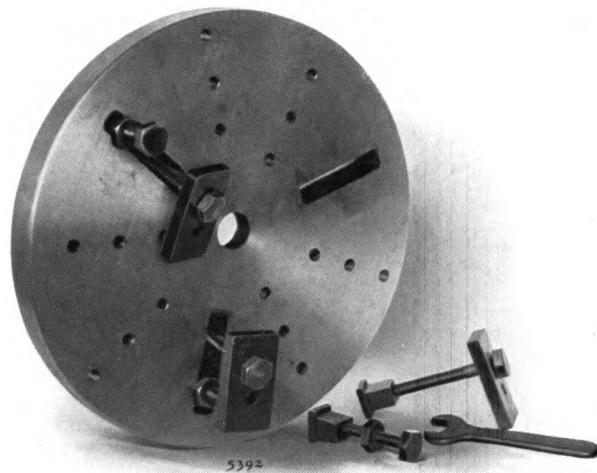
**Step-chuck with Adjustable Jaws and Closer** Closer is made of gun iron; step-chuck is made of steel and provided with four adjustable jaws with a maximum capacity of 12 inches. The closing mechanism is controlled by means of an eccentric, which is operated by a crank wrench. For second operation work, such as gear blanks, and for other work which must be finished absolutely true, this step-chuck has no equal. (Furnished to order).



Step-chuck, with Adjustable Jaws and Closer

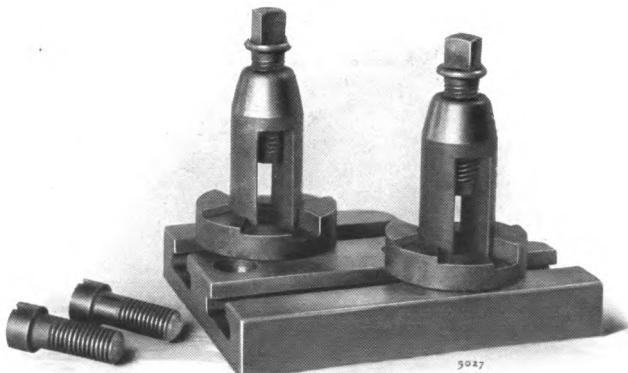
**TURNTABLE LATHE APPLIANCES AND TOOLS—Continued**

**16-inch Face-plate with Equipment** Consists of a face-plate fitted to the spindle with suitable straps, bolts, bunters, etc. It is found very convenient for rigidly holding a variety of work especially on second operations.



Face-plate with Equipment

**Tool Post Holder** Is of low construction, made of steel and is provided with T-slots which permit the use of the same reliable type of tool posts as used on the engine lathe. Two tool posts are furnished with each holder.



Tool Post Holder

## TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

**Off-set Tool Post Holder** Similiar in design to the regular tool post holder, the off-set tool carrying surface, however, particularly adapting it for outside turning. Two tool posts are furnished with each holder. (Furnished to order).



Off-set Tool Post Holder

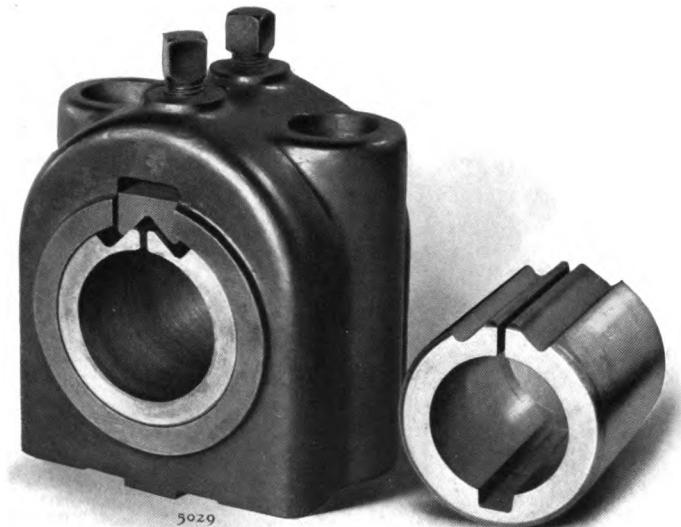
**Triple Tool Holder** For holding two rectangular and one round shank tool simultaneously. Round hole is  $1\frac{1}{8}$ -inch diameter to accommodate the regular boring bar.



Triple Tool Holder

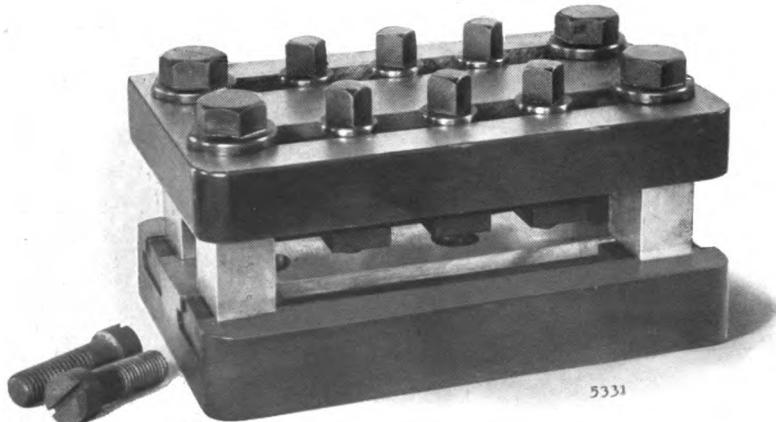
**TURNTABLE LATHE APPLIANCES AND TOOLS—Continued**

**Round Tool Holders** Made in two sizes,  $2\frac{1}{4}$  and 3-inch for holding round shank tools to the turntable, such as die-head, bell-mouth pointing tool, etc. Bushings are furnished as ordered. The  $1\frac{1}{2}$ -inch bushing is carried in stock for the  $2\frac{1}{4}$ -inch holder, and the 2 and  $2\frac{1}{2}$ -inch for the 3-inch holder.



**Round Tool Holder**

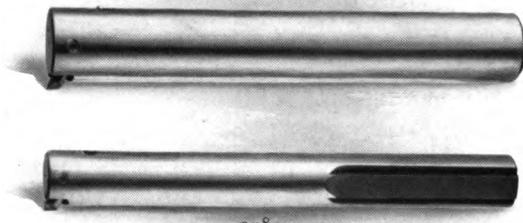
**Multiple Tool Holder** For the accommodation of several tools at once which may be freely adjusted latterly in any desired relation to one another and still be rigidly held in their adjusted positions. Tool accommodating space is  $6\frac{1}{2} \times 1\frac{1}{4}$ -inch. (Furnished to order).



(Patented)  
**Multiple Tool Holder**

## TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

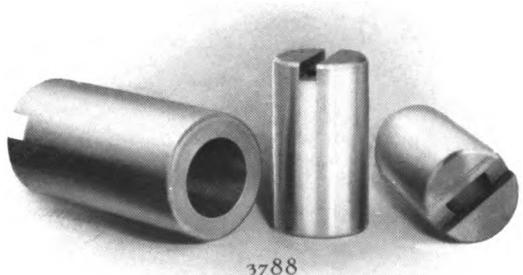
**Boring Bars with Adjustable Cutter** Made of steel, hardened and ground in two sizes,  $1\frac{1}{8}$  x 10 and  $1\frac{1}{2}$  x 12-inch.



3789

Boring Bars with Adjustable Cutters

**Taper Drill and Reamer Adapters** Are regularly made with Nos. 2, 3 and 4 Morse taper holes. Nos. 2 and 3 are  $1\frac{1}{2}$ -inch diameter, and the No. 4, 2-inch diameter.



3788

Taper Drill and Reamer Adapters

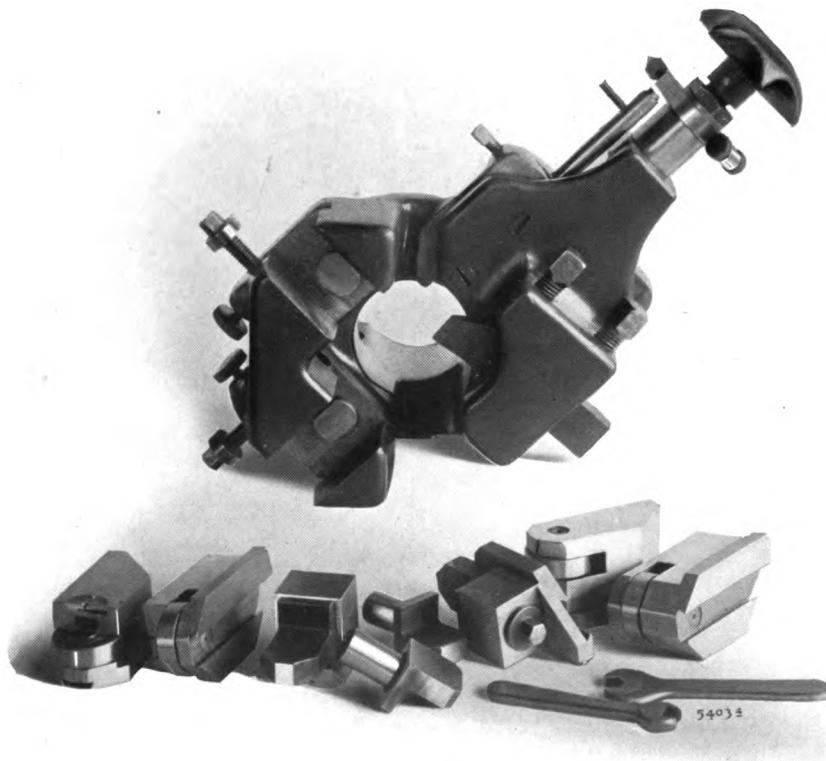
**Floating Reamer Holder** (See specifications on page 83).

**Double End Cutter Bar** Is sometimes found desirable for special boring and turning operations. It consists of a bar 3 inches in diameter, 30 inches long, with two high-speed steel cutters and suitable holding blocks. (Furnished to order).

## TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

**Universal Turner** For bar work up to  $2\frac{1}{2}$ -inch diameter. It is designed to permit the use of roller or "V" back-rests as desired. The back-rests are made to interchange and can be readily removed for the substitution of others. Roller back-rests are made in two styles, either following or leading, with hardened and ground rolls running on hardened and ground tool steel studs. The "V" back-rests are made in two sizes, large and small, and are mounted in holders which permit the easy reversing of the jaws from leading to following.

**NOTE**—In ordering this tool care should be taken to specify the equipment of back-rest required.



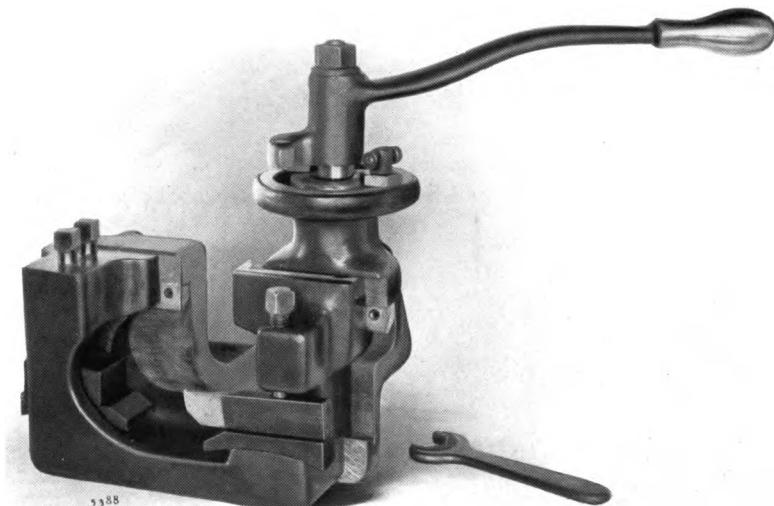
(Patented)

Universal Turner with full equipment of Jaws

**Universal Turner with Open Side Slide** Is similar in construction to the regular universal turner, with the exception that the cutter seat on the tool slide is extended and open, which is found very convenient on certain classes of work where it is necessary to turn very close to the chuck-jaws without interference. One set of "V" back-rest holders with two sets of jaws, one large and one small, are regularly furnished.

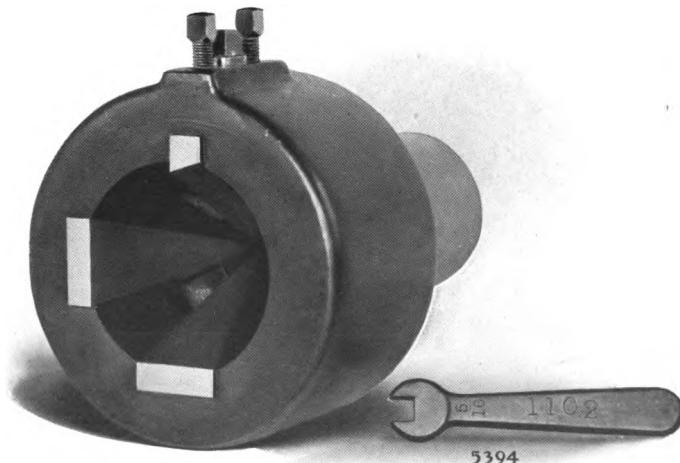
## TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

**Turntable Cut-off and Forming Tool** Tool slide is operated by means of a rack and pinion actuated by long lever which may be clamped to the pinion stud in any desired position to afford convenience in operation. Adjustable stops determine the movement of the tool slide. Tools rest on rockers and can be adjusted vertically. The construction permits the inverting of the rear tool if desired, thus it can be used without reversing the machine.



Turntable Cut-off and Forming Tool

**Bell-mouth Pointing Tool** For chamfering the ends of rough rods preparatory to turning. It is provided with a round shank  $2\frac{1}{2}$  inches in diameter. Back-rests, jaws and cutter are of high-speed steel.



Bell-mouth Pointing Tool

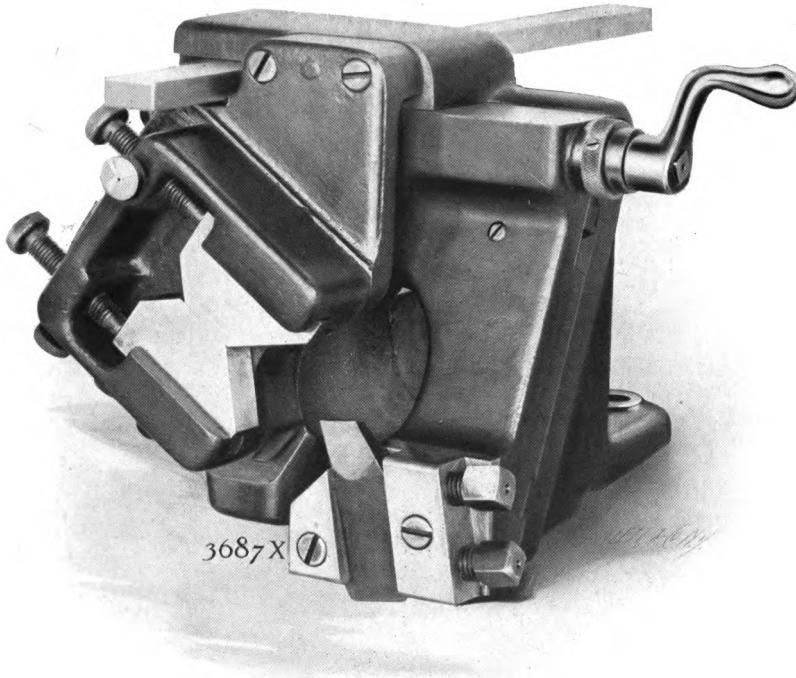
**TURNTABLE LATHE APPLIANCES AND TOOLS—Continued**

**End Forming and Pointing Tool** For pointing and forming the ends of finished bars. Back-rests are provided which can be easily reversed for different diameters. Jaws and cutter are made of high-speed steel.

**Self-opening Die** This die has a roughing and finishing attachment which insures threads of superior accuracy and finish. The  $1\frac{1}{2}$ -inch capacity is recommended with this machine, but die-heads with 2-inch capacity may be furnished if desired.

See page 79 for illustration.

**Taper Turning Tool** Suitable for turning tapers from either bar stock or forgings. Back-rest jaws may be set to follow or lead the tool as occasion may demand. Taper is governed by an accurate taper bar and the work produced, therefore, is of a superior order and is fully equal to that obtained from an engine lathe. One taper bar, planed to produce tapers  $\frac{1}{16}$  inch to the foot (unless otherwise specified), is furnished with each tool.



(Patented)  
Taper Turning Tool, with Following and Leading Back-rests

**Open Side Turner** Is recommended for turning short work above  $2\frac{1}{2}$  inches diameter when back-rest jaws are not required. It is similar in construction to the universal turner, with the exception that no provision is made for back-resting the work. (Furnished to order).

**Releasing Tap and Die Holder** (See specifications on page 82).

## 2½ X 26 TURNTABLE LATHE

## LIST OF COLLET JAWS AND SIZES OF STOCK THAT CAN BE HELD

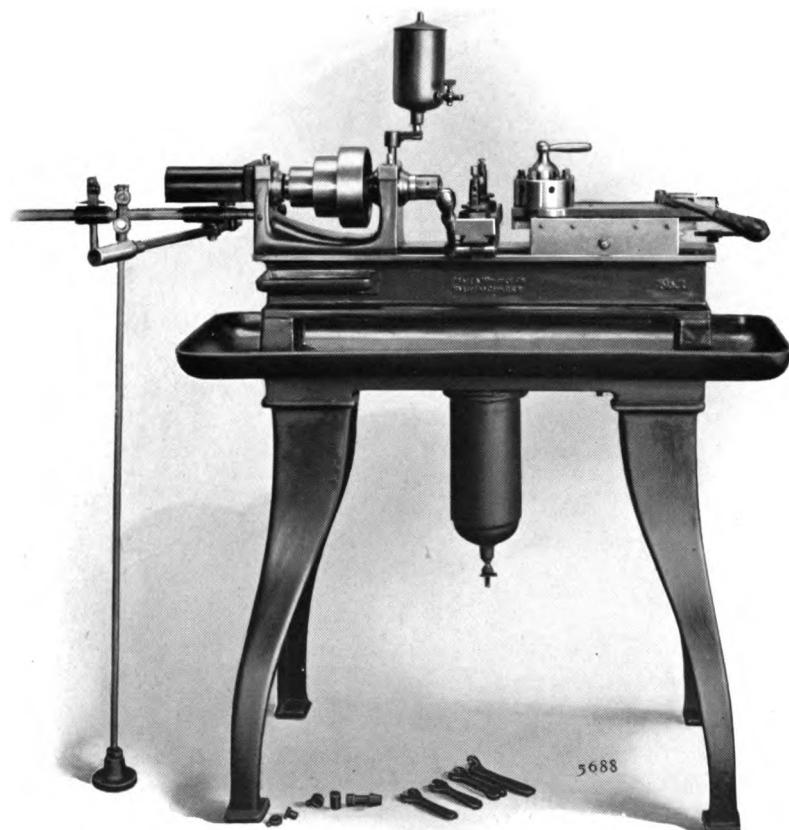
## English Sizes

Nominal Sizes	Will Take Stock		
	Round	Hexagon	Square
3/4	1 1/8 to 1 3/8	1 1/8 to 1 3/8	1 1/8 to 1 3/8
7/8	5/8 to 1 5/8	5/8 to 1 5/8	5/8 to 1 5/8
1	6 1/4 to 1 1/16	6 1/4 to 1 1/16	6 1/4 to 1 1/16
1 1/8	1 5/8 to 1 3/16	1 5/8 to 1 3/16	1 5/8 to 1 3/16
1 1/4	1 1/8 to 1 5/16	1 1/8 to 1 5/16	1 1/8 to 1 5/16
1 3/8	1 1/4 to 1 7/16	1 1/4 to 1 7/16	1 1/4 to 1 7/16
1 1/2	1 3/4 to 1 9/16	1 3/4 to 1 9/16	1 3/4 to 1 9/16
1 5/8	1 3/4 to 1 11/16	1 3/4 to 1 11/16	1 3/4 to 1 11/16
1 3/4	1 3/4 to 1 13/16	1 3/4 to 1 13/16	1 3/4 to 1 13/16
1 7/8	1 5/4 to 1 15/16	1 5/4 to 1 15/16	1 5/4 to 1 15/16
2	1 6/4 to 2 1/16	1 6/4 to 2 1/16	1 6/4 to 2 1/16
2 1/8	2 5/4 to 2 3/16	2 5/4 to 2 3/16	2 5/4 to 2 3/16
2 1/4	2 3/4 to 2 7/16	• • •	• • •
2 3/8	2 3/4 to 2 7/16	• • •	• • •
2 1/2	2 2/4 to 2 9/16	• • •	• • •

## Metric Sizes

Nominal Sizes	Will Take Stock			
	Round	Hex. (Flats)	Hex. (Corners)	Square
19	17.5 to 20.5	17.5 to 20.5	20.0 to 24.0	17.5 to 20.5
22	21.0 to 24.0	21.0 to 24.0	24.5 to 27.5	21.0 to 24.0
25	24.5 to 27.0	24.5 to 27.0	28.0 to 31.0	24.5 to 27.0
29	27.5 to 30.0	27.5 to 30.0	31.5 to 35.0	27.5 to 30.0
32	30.5 to 33.5	30.5 to 33.5	35.5 to 38.5	30.5 to 33.5
35	34.0 to 36.5	34.0 to 36.5	39.0 to 42.0	34.0 to 36.5
38	37.0 to 39.5	37.0 to 39.5	42.5 to 46.0	37.0 to 39.5
41	40.0 to 43.0	40.0 to 43.0	46.5 to 49.5	40.0 to 43.0
44	43.5 to 46.0	43.5 to 46.0	50.0 to 53.0	43.5 to 46.0
48	46.5 to 49.0	46.5 to 49.0	53.5 to 57.0	• • •
51	49.5 to 52.5	49.5 to 52.5	57.5 to 60.5	• • •
54	53.0 to 55.5	53.0 to 55.5	61.0 to 64.0	• • •
57	56.0 to 58.5	• • •	• • •	• • •
60	59.0 to 62.0	• • •	• • •	• • •
64	62.5 to 65.0	• • •	• • •	• • •

NOTE—When holding Hexagon Stock use but Three Jaws.

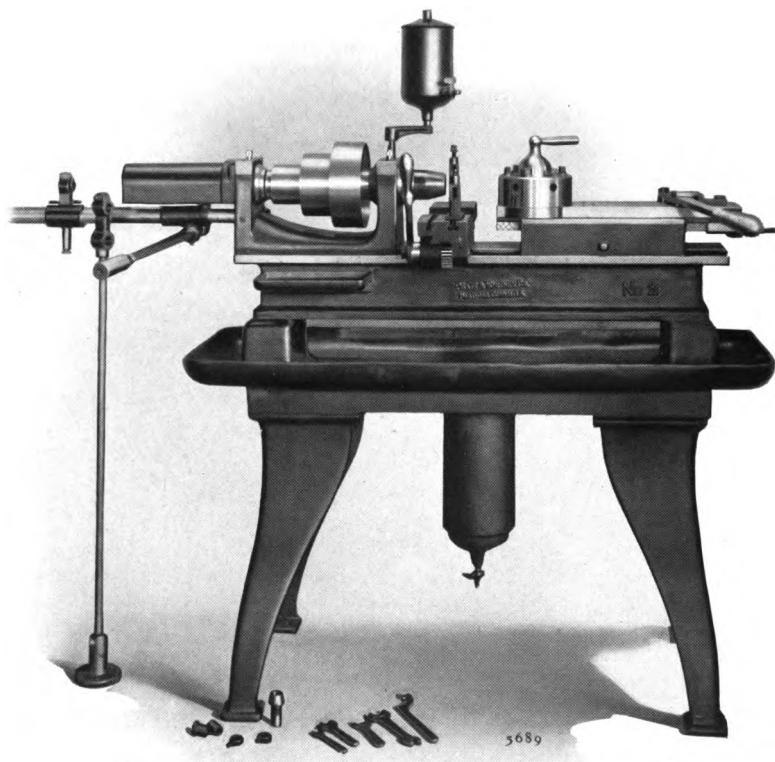


No. 1 Hand Screw Machine

## NO. 1 HAND SCREW MACHINE—SPECIFICATIONS

RANGE . . .	Collet Capacity (round) . . . . . Collet Capacity (square across flats) . . . . . Collet Capacity (hexagonal across flats) . . . . . Length, maximum turning . . . . . Swing over Bed . . . . . Swing over Cut-off Slide . . . . . Threading Capacity . . . . .	7/8" 3 1/8" 3 1/8" 2 1/2" 8 1/8" 3 1/2" 3/8"
TURRET . . .	Diameter (round) . . . . . Holes (6), 3/8" diameter (4 or 8 holes to order). Turret Hole Center to Top of Turret Slide . . . . .	4 3/8" 1 5/16"
SPINDLE . . .	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear. Hole through Plunger . . . . . Hole through Spindle . . . . . Front End, 1 7/8" diameter; Thread, 1 1/4"; 14 Pi., U. S. F.	1 3/8" x 2 3/4" 1 1/2" 3/4" 1 3/8" x 2 3/4"
SPEEDS . . .	Spindle Speeds (3), R. P. M. . . . . Cone Diameters (3), large diameter . . . . . Pulleys (Friction on Counter.) . . . . . Belt Width (Cone) . . . . . Belt Width (Counter. Pulleys) . . . . . Countershaft Speed, R. P. M. . . . .	310 to 865 6" 8" x 2 3/4" 1 3/4" 2 1/2" 310
FEEDS . . .	Turret Slide, Hand Lever Feed. Cross Slide, Hand Lever Feed. Rod Feed, Lever Type.	
FLOOR SPACE	With Rod Feed . . . . . Without Rod Feed . . . . .	30" x 6' 30" x 4'
WEIGHTS . . .	Machine, with Regular Equipment, net pounds . . . . . Crating Material (domestic), approximate pounds . . . . . Boxing Material (foreign), approximate pounds . . . . . Box, cubic feet . . . . .	500 150 300 36
REGULAR EQUIPMENT	Machine, with Wire Feed Mechanism (push type). Lever Cut-off, with 2 Tool Posts. Hand Feed Lever, for Turret Slide. Stock Stand, with 4 Bushings and 2 Collars. 2 Oil Pots. Set of Wrenches. Countershaft (double friction).	
DRAW-BACK TYPE OF WIRE FEED	Furnished to order.	
RACK AND PINION HAND FEED TO TURRET SLIDE	Furnished to order in place of Lever Feed.	
SCREW FEED CUT-OFF	Furnished to order in place of Lever Cut-off.	
OIL PUMP AND PIPING	Furnished to order.	

Code words, page 265.

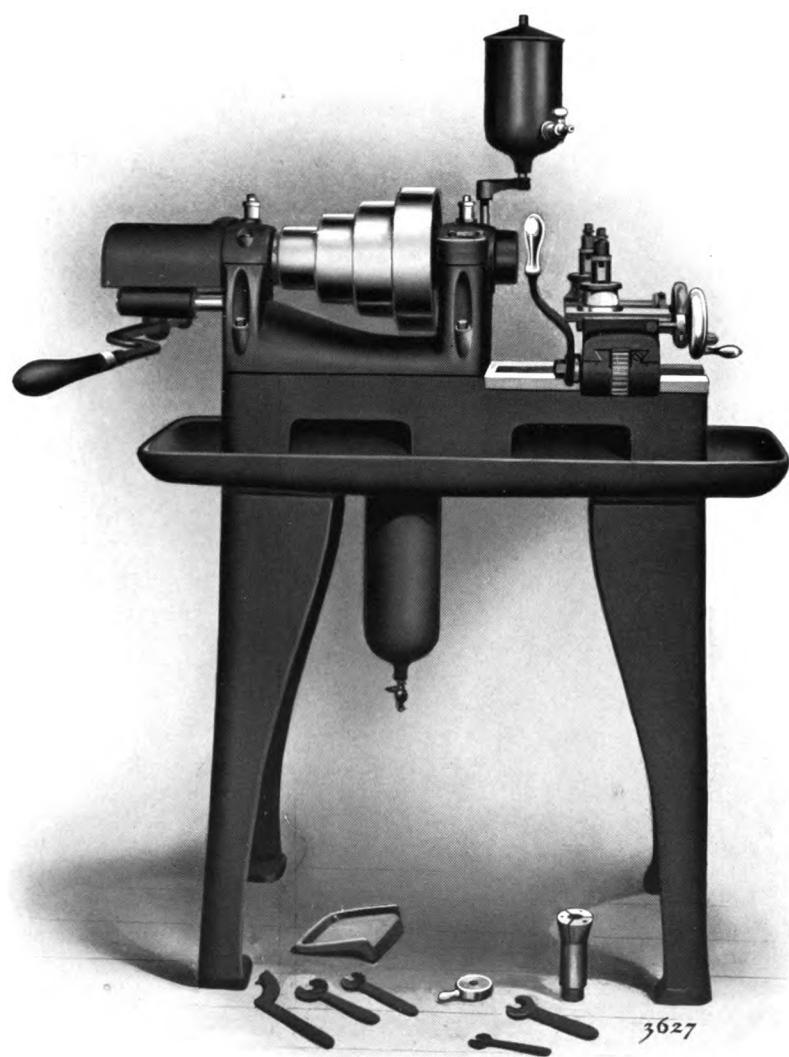


No. 2 Hand Screw Machine

## NO. 2 HAND SCREW MACHINE—SPECIFICATIONS

		Regular	No. 2 Head
RANGE . . .	Collet Capacity (round) . . . . . Collet Capacity (square across flats) . . . . . Collet Capacity (hexagon across flats) . . . . . Length ; maximum turning . . . . . Swing over Bed . . . . . Swing over Cut-off Slide . . . . . Threading Capacity . . . . .	5 $\frac{1}{8}$ " 7" 8 $\frac{1}{2}$ " 4 $\frac{1}{2}$ " 10 $\frac{1}{2}$ " 6" 5 $\frac{1}{8}$ "	1" 4 $\frac{1}{4}$ " 8 $\frac{1}{2}$ " 4 $\frac{1}{2}$ " 10 $\frac{1}{2}$ " 6" 5 $\frac{1}{8}$ "
TURRET . . .	Diameter (round) . . . . . Holes (6), size (4 or 8 holes to order) . . . . . Turret Hole center to top of Turret Slide . . . . .	6 $\frac{1}{4}$ " 1 $\frac{1}{8}$ " 1 $\frac{1}{8}$ "	6 $\frac{1}{4}$ " 1 $\frac{1}{8}$ " 1 $\frac{1}{8}$ "
SPINDLE . . .	Special Steel ; Cylindrical Bearings ; Front . . . . . Boxes, C. I., lined with Babbitt, adjustable for wear. Hole through Plunger . . . . . Hole through Spindle . . . . . Front End, diameter . . . . . Thread Diameter and Pi., U. S. F. . . . .	1 $\frac{3}{4}$ " x 3 $\frac{1}{4}$ " 2 $\frac{1}{4}$ " x 3 $\frac{1}{2}$ " 2 $\frac{1}{2}$ " 1 $\frac{5}{8}$ " 1 $\frac{1}{8}$ " 1 $\frac{5}{8}$ ", 12 Pi.	2 $\frac{1}{4}$ " x 3 $\frac{1}{2}$ " 1 $\frac{3}{2}$ " 1 $\frac{5}{8}$ " 2 $\frac{1}{8}$ " 2 $\frac{1}{2}$ ", 12 Pi.
SPEEDS . . .	Spindle Speeds (3), R. P. M. . . . . Cone Diameters (3), large . . . . . Pulleys (Friction on Counter.) . . . . . Belt Width (Cone) . . . . . Belt Width (Counter. Pulleys) . . . . . Countershaft Speed, R. P. M. . . . .	241 to 754 7 $\frac{1}{2}$ " 9" x 3 $\frac{1}{4}$ " 2 $\frac{1}{2}$ " 3" 220	241 to 754 7 $\frac{1}{2}$ " 9" x 3 $\frac{1}{4}$ " 2 $\frac{1}{2}$ " 3" 220
FEEDS . . .	Turret Slide, Hand Lever Feed. Cross Slide, Hand Lever. Rod Feed, Lever Type.		
FLOOR SPACE	With Rod Feed . . . . . Without Rod Feed . . . . .	3 $\frac{1}{2}$ " x 7' 9" 3 $\frac{1}{2}$ " x 4' 9"	3 $\frac{1}{2}$ " x 7' 9" 3 $\frac{1}{2}$ " x 4' 9"
WEIGHTS . . .	Machine, with Regular Equipment, net pounds . . . Crating Material (domestic), approximate pounds . . Boxing Material (foreign), approximate pounds . . Box, cubic feet . . . . .	875 200 350 45	875 200 350 45
REGULAR EQUIPMENT	Machine, with Wire Feed Mechanism (push type). Lever Cut-off, with 2 Tool Posts. Hand Feed Lever, for Turret Slide. Stock Stand, with 4 Bushings and 2 Collars. 2 Oil Pots. Set of Wrenches. Countershaft (double friction).		
DRAW-BACK TYPE OF WIRE FEED	Furnished to order.		
RACK AND PINION HAND FEED TO TURRET SLIDE	Furnished to order in place of Lever Feed.		
SCREW FEED CUT-OFF	Furnished to order in place of Lever Cut-off.		
OIL PUMP AND PIPING	Furnished to order.		

Code words, page 265.



No. 2 Shaving Machine

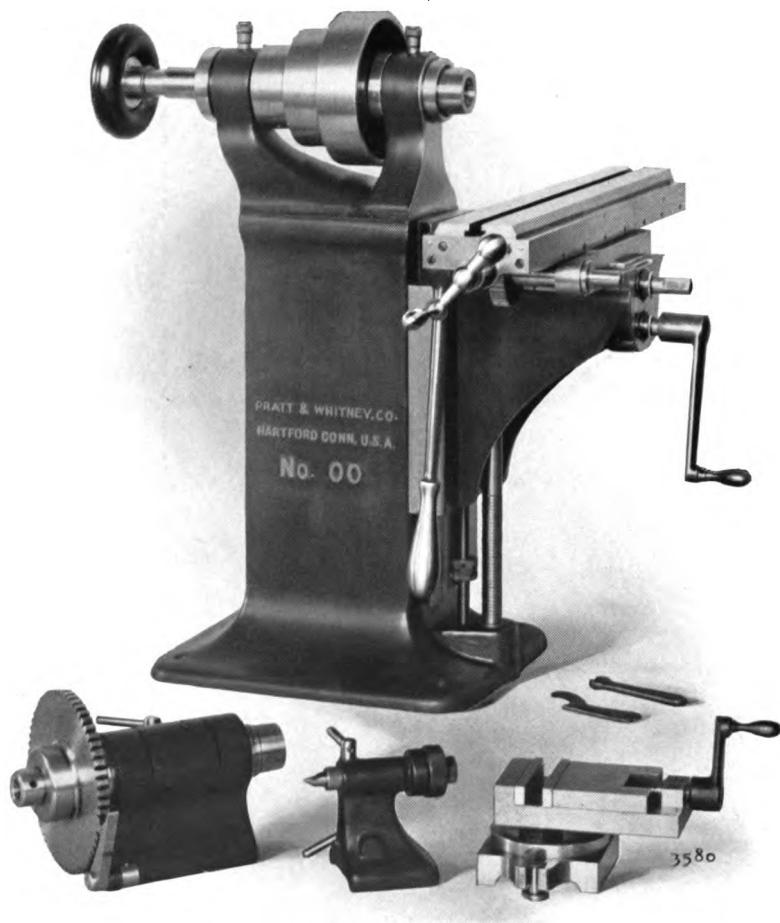
## NO. 2 SHAVING MACHINE

This machine is designed for shaving and forming the ends of bar work such as screws, studs, etc. It is also extensively used for facing washers and collars when equipped with step-chucks. For work of this character it is far more efficient than any other tool in use.

## SPECIFICATIONS

RANGE . . .	Longitudinal Movement of Tool Post Slide . . . . .	$1\frac{1}{2}''$
	Longitudinal Movement of Base . . . . .	$10''$
	Transverse Movement of Tool Slide . . . . .	$5\frac{1}{2}''$
	Collet Capacity (Drawback Type) . . . . .	$1\frac{3}{8}''$
	Step-chuck Capacity . . . . .	$6''$
SPINDLE . . .	Special Steel; Bearing Portion, cylindrical; $2\frac{7}{16}''$ diameter. Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through Plunger . . . . .	$1\frac{3}{8}''$
	Hole through Spindle . . . . .	$1\frac{3}{4}''$
SPEEDS . . .	Spindle Speeds (8), R. P. M. . . . .	97 to 569
	Cone Diameters (4), large diameter . . . . .	$9\frac{5}{8}''$
	Pulleys (Counter, Friction) . . . . .	$10'' \times 3\frac{3}{8}''$
	Belt Width (Cone) . . . . .	$2\frac{1}{2}''$
	Belt Width (Counter, Friction Pulleys) . . . . .	$3\frac{1}{4}''$
	Countershaft Speeds, R. P. M. . . . .	150 and 200
FLOOR SPACE	Floor Space . . . . .	$46'' \times 37''$
WEIGHTS . . .	Machine, Regular Equipment, net pounds . . . . .	800
	Crating Material (domestic), approximate pounds . . . . .	100
	Boxing Material (foreign), approximate pounds . . . . .	350
	Box, cubic feet . . . . .	44
REGULAR EQUIPMENT	The Machine, with 1 Regular Collet. (Specify size). Tool Slide, with Lever Transverse Feed. 2 Tool Posts. Swinging Oil Pot and Oil Reservoir. Countershaft (2-speed double friction). Set of Wrenches.	
STEP-CHUCK AND CLOSERS	Consisting of Closer mechanism, and 3 C. I. Step-chucks (blank). (Furnished to order).	
EXPANSION ARBORS AND BUSHING	Consisting of 3 Arbors, $1''$ , $1\frac{1}{2}''$ and $2''$ , and parts for holding the regular $14''$ Lathe Expansion Bushing. (Furnished to order).	
TOOL SLIDE WITH SCREW TRANSVERSE FEED	Furnished in place of Lever Feed to order.	
REGULAR COLLETS	Regular Collets, $\frac{7}{16}''$ to $\frac{5}{8}''$ by 16ths, $\frac{5}{8}''$ to $1\frac{3}{8}''$ by 8ths; or 12, 13, 14, 15, 16, $18, 20, 22, 24$ and $30$ m/m.	

Code words, page 265.



No. 00 Hand Bench Milling Machine

## NO. 00 BENCH MILLING MACHINE

This machine is a precision tool, made in the very best manner possible and is largely used on a class of work where accuracy and convenience of operation are important factors.

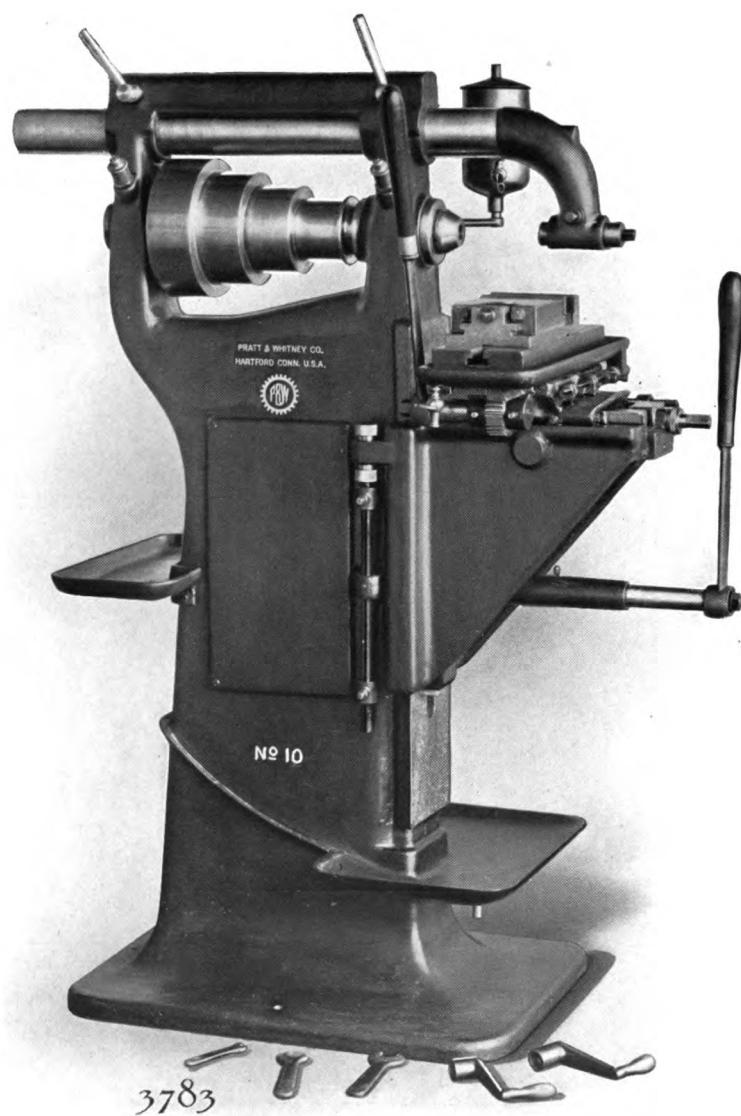
## SPECIFICATIONS

RANGE . . .	Table — Working Surface (Sides, 30 degrees angle) . . . . .	$14\frac{1}{2}'' \times 2''$
	," Longitudinal Travel (combination lever and screw) . . . . .	$7''$
	," Center to End of Spindle, maximum . . . . .	$3\frac{5}{8}''$
	," Transverse Adjustment (by screw) . . . . .	$2\frac{1}{2}''$
	," Top to Center of Spindle, maximum . . . . .	$5\frac{1}{2}''$
	," Vertical Adjustment (by screw) . . . . .	$5''$
	," T-slot, .35" wide.	
MICROMETER DIALS	Graduated in thousandths.	
VISE . . . .	(Swivel graduated in degrees), total height . . . . .	$2\frac{5}{8}''$
	Width, depth and opening of Jaws . . . . .	$2\frac{1}{2}''$ , $\frac{1}{2}''$ , $1\frac{1}{4}''$
INDEX QUILL CENTERS	Swing . . . . .	$5''$
*SPINDLE . . .	Tool Steel (H. & G.); Front Bearings, Double Taper. Boxes, Tool Steel (H. & G.), adjustable for wear. Hole through Chuck Seat . . . . .	$.650''$
	Front End, conical.	
SPEEDS . . .	Spindle Speeds (6), R. P. M. . . . .	113 to 1228
	Cone Diameters (3) . . . . .	$2\frac{1}{2}''$ , $3\frac{1}{2}''$ , $4\frac{1}{2}''$
	Pulleys (Countershaft, tight and loose), diameter . . . . .	$5''$
	Belt Width (Cone) . . . . .	$1\frac{1}{8}''$
	Belt Width (Counter. Pulley) . . . . .	$1\frac{1}{4}''$
	Countershaft Speed, R. P. M. . . . .	128 and 512
BENCH SPACE	Bench Space . . . . .	$17\frac{5}{8}'' \times 24\frac{1}{8}''$
WEIGHTS . .	Machine, with Regular Equipment, net pounds . . . . .	175
	Boxing Material, approximate pounds . . . . .	50
REGULAR EQUIPMENT	Includes the Machine, with Set of Wrenches and Countershaft (2-speed Wall).	
INDEX QUILL CENTERS	Consists of Quill-rest with Quill (Spindle Nose same as Head Spindle) and 60-notch Index Plate; Tailstock with Center. (Furnished to order).	
SWIVEL VISE . .	Graduated with H. & G. Jaws. (Furnished to order).	

Right angle piece. (Furnished to order).

\*Spindle is same as on Bench Lathe and all spindle attachments will interchange. Table is of suitable form for the accurate and convenient accommodation of attachments.

Code words, page 265.



No. 10 Hand Milling Machine with Overhanging Arm  
Also made without Arm, similar to No. 2, on page 116

## NO. 10 HAND MILLING MACHINE

MADE WITH OR WITHOUT OVERHANGING ARM

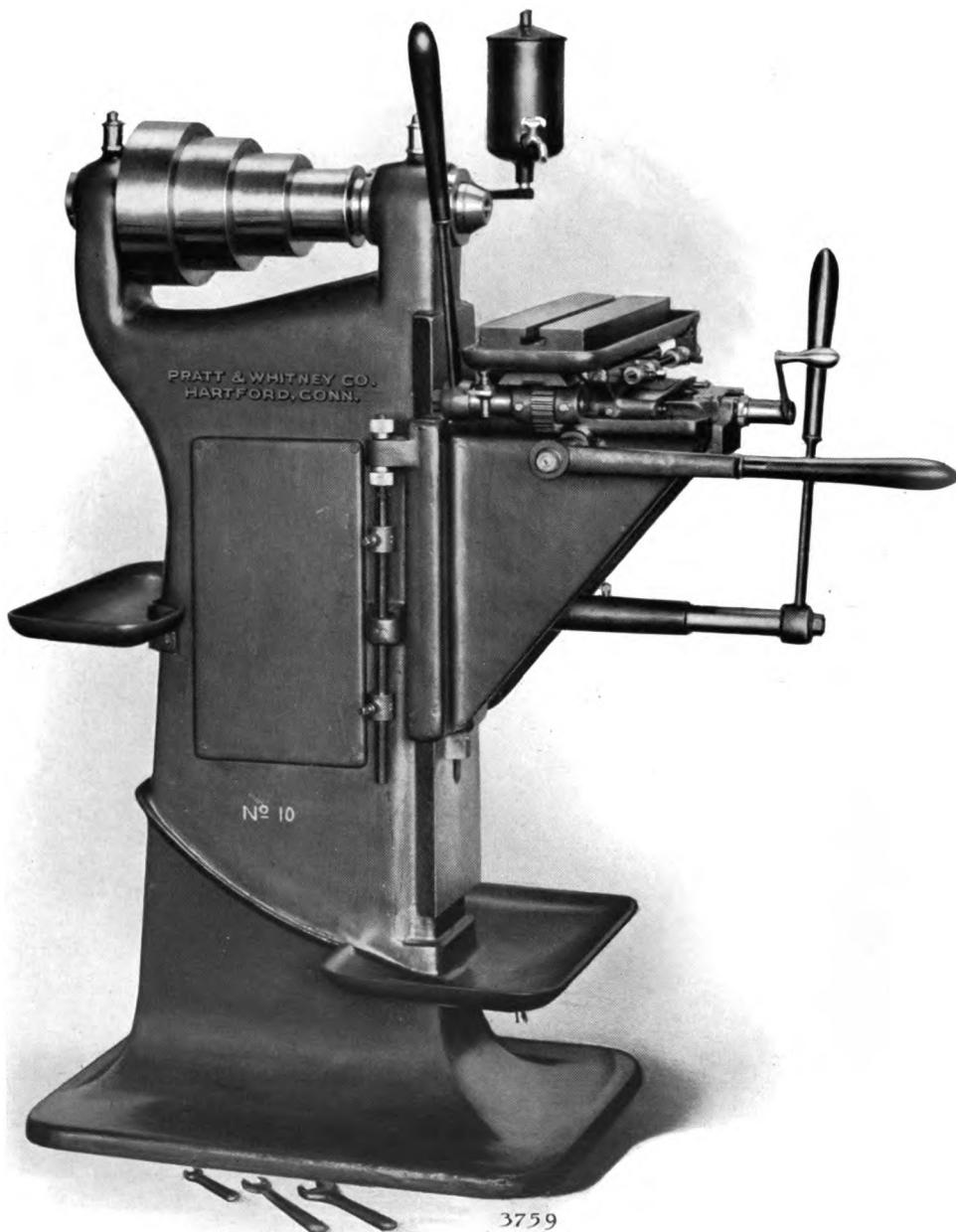
These machines are modern tools in every respect and are peculiarly adapted for milling small parts of guns, sewing machines, typewriters, automobiles, etc. Knees and slides are all mounted upon long dovetailed bearings and are provided with taper gibbs for maintaining proper relation between bearing surfaces. Stops are provided by which various movements of knees and slides can be very accurately governed.

## SPECIFICATIONS

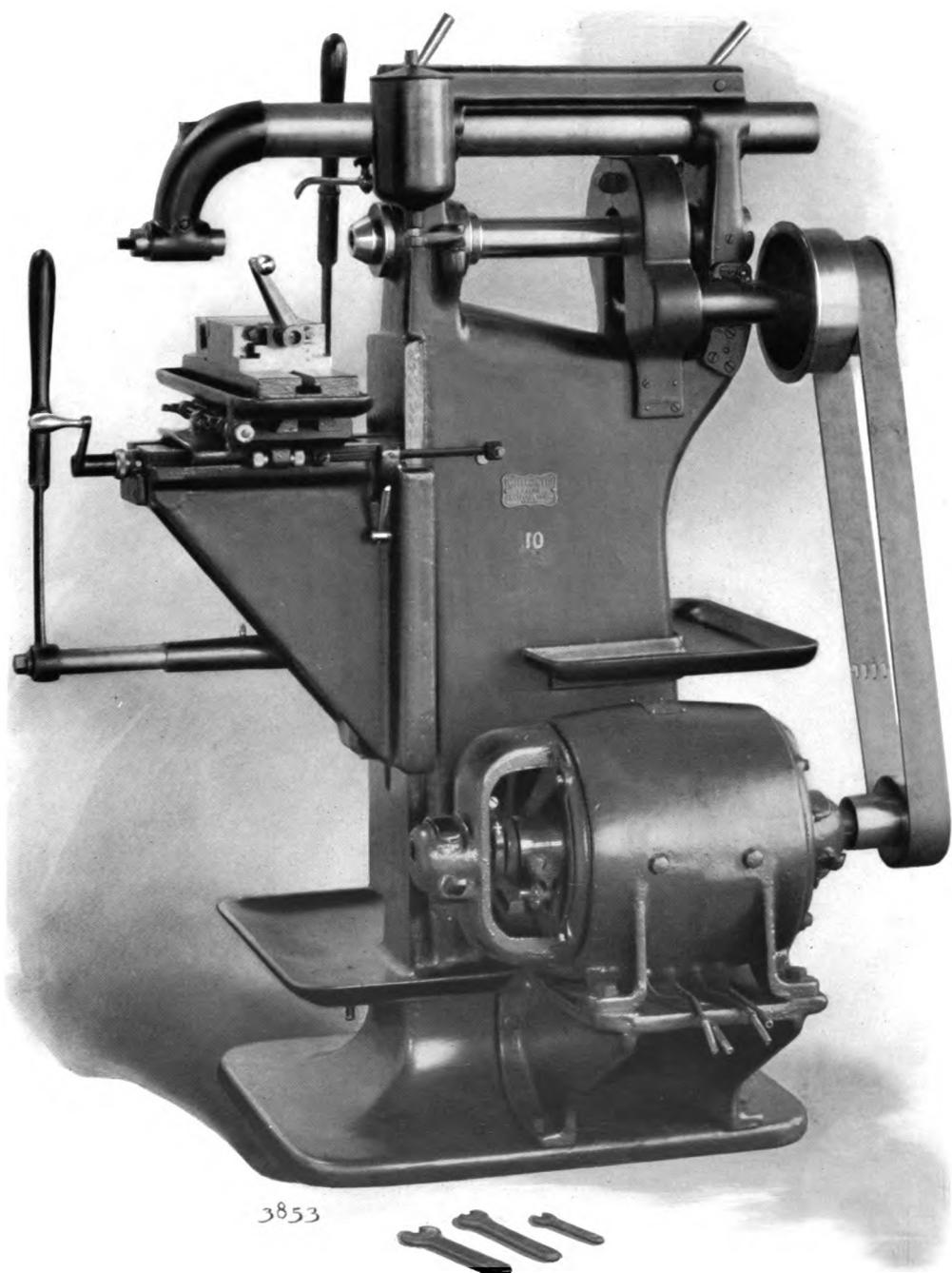
RANGE . . . .	Table — Working Surface . . . . .	$4\frac{3}{4}'' \times 16''$
	" Longitudinal Travel (by lever) . . . . .	$4''$
	" Center to End of Spindle, maximum . . . . .	$6\frac{3}{8}''$
	" Transverse Adjustment (by screw) . . . . .	$5''$
	" Top to Centre of Spindle, maximum . . . . .	$9''$
	" Vertical Adjustment (by lever) . . . . .	$8''$
	" Top to Underside of Arm, minimum . . . . .	$5\frac{1}{8}''$
	" T-slot (1), width . . . . .	$\frac{5}{8}''$
VISE . . . . .	Size, No. $2\frac{1}{2}$ .	
	Width, depth and opening of Jaws . . . . .	$4\frac{5}{8}''$ , $\frac{7}{8}''$ , $2\frac{5}{8}''$
MICROMETER DIALS	Graduated in thousandths.	
SPINDLE . . . .	Special Steel ; Bearings, cylindrical ; Front Boxes, Bronze ; O. D., conical, adjustable for wear.	$1\frac{5}{8}'' \times 4\frac{7}{8}''$
	Hole through . . . . .	$\frac{3}{8}''$
	*Taper Hole, No. 0 Power m/m.	
SPEEDS . . . .	Spindle Speeds (4), R. P. M. . . . .	$76$ to $400$
	Cone Diameters (4), large . . . . .	$8''$
	Pulley (Counter.) . . . . .	$10'' \times 3''$
	Belt Width (Cone) . . . . .	$2\frac{1}{2}''$
	Belt Width (Countershaft Pulley) . . . . .	$2\frac{7}{8}''$
	Countershaft Speed, R. P. M. . . . .	$175$
FLOOR SPACE	Floor Space . . . . .	$27'' \times 36''$
WEIGHTS . . . .	Machine, with Regular Equipment, net pounds . . . . .	$975$
	Crating Material (domestic), approximate pounds . . . . .	$125$
	Boxing Material (foreign), approximate pounds . . . . .	$250$
	Box, cubic feet . . . . .	$31$
REGULAR EQUIPMENT	The Machine, with Oil Pot; Set of Wrenches; Countershaft (tight and loose Pulley).	
COMBINATION LEVER AND SCREW TRANSVERSE MOVEMENT	Can be furnished in place of Regular Screw Movement. (Illustrated on page 114).	
VERTICAL MILLING ATTACHMENT	(See page 135).	
VISES AND ARBORS	(See pages 132-133).	

\*For detailed information, see "Tapers", page 247.

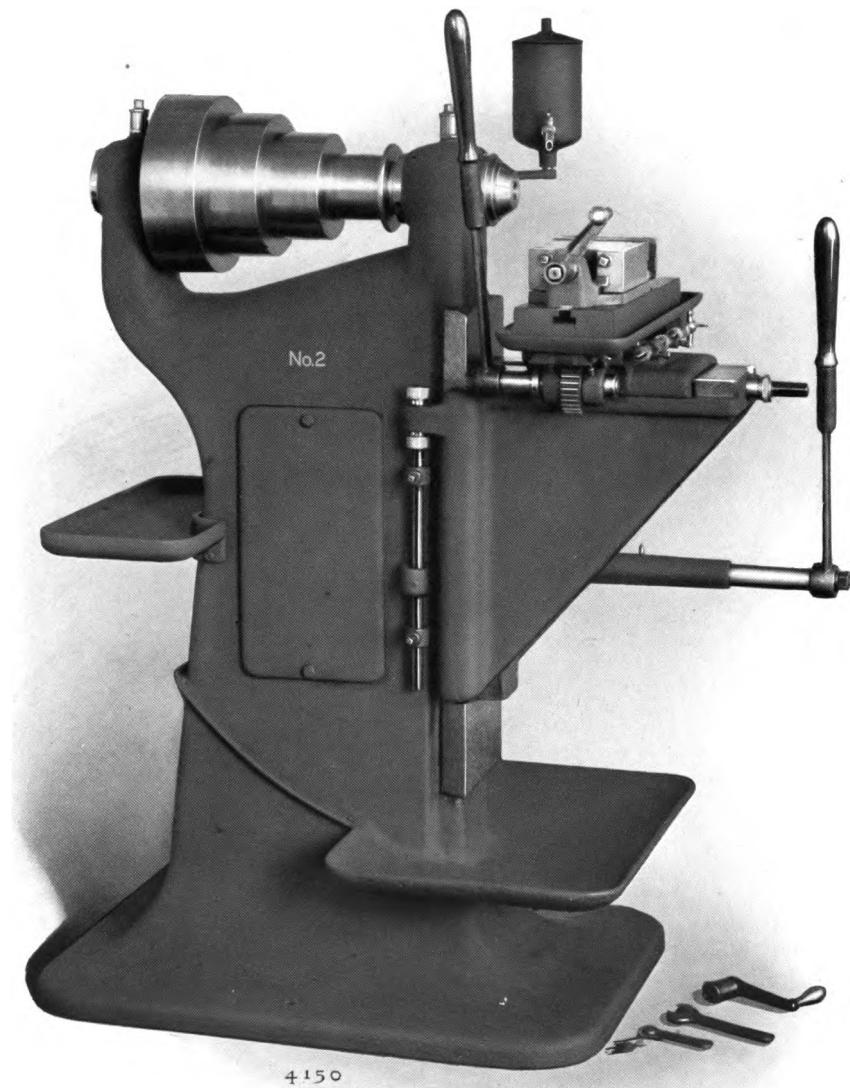
Code words, page 265.



No. 10 Hand Milling Machine with Combination Lever and Screw, Transverse Movement



Hand Milling Machine — Motor Driven



No. 2 Hand Milling Machine without Overhanging Arm  
Also made with Arm, similar to No. 10, on page 112

## NO. 2 HAND MILLING MACHINE

MADE WITH OR WITHOUT OVERHANGING ARM

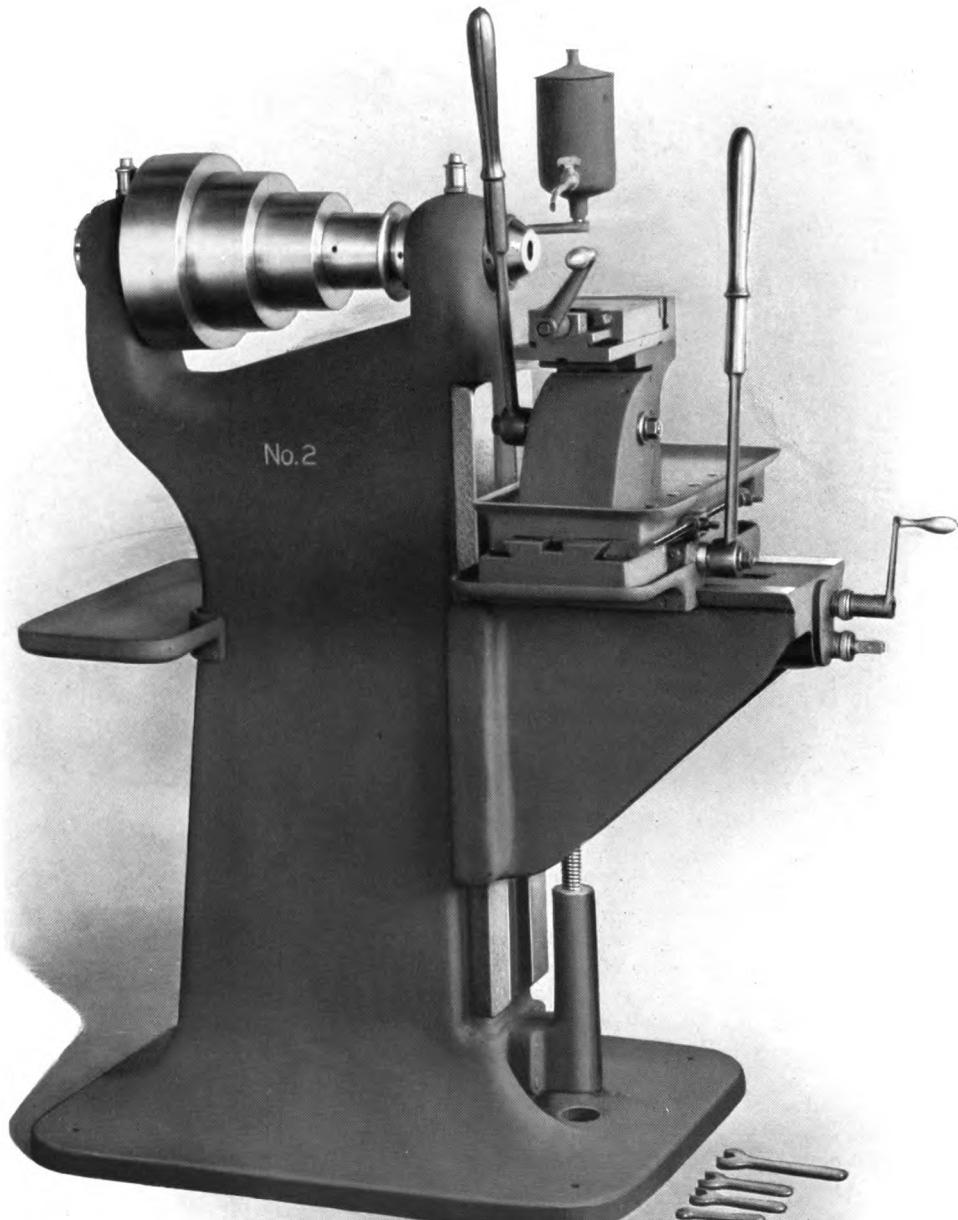
This machine is similar in design to the No. 10, its wider range, however, making it suitable for a class of work beyond the capacity of the smaller machine.

## SPECIFICATIONS

RANGE . . .	Table—Working Surface . . . . .	$5\frac{1}{8}'' \times 17\frac{1}{8}''$
	" Longitudinal Travel (by lever) . . . . .	$5''$
	" Center to End of Spindle, maximum . . . . .	$7''$
	" Transverse Adjustment (by screw) . . . . .	$5''$
	" Top to Center of Spindle, maximum . . . . .	$10''$
	" Vertical Adjustment (by lever) . . . . .	$9''$
	" Top to Underside of Arm, minimum . . . . .	$6\frac{5}{8}''$
	" T-slot (1), width . . . . .	$\frac{5}{8}''$
VISE . . . .	Size, No. 11	
	Width, depth and opening of Jaws . . . . .	$5'', 1'', 3''$
MICROMETER DIALS	Graduated in thousandths.	
SPINDLE . . . .	Special Steel ; Bearings, cylindrical ; Front . . . . .	$2'' \times 5\frac{3}{8}''$
	Boxes, Bronze ; O. D., conical, adjustable for wear.	
	Hole through . . . . .	$\frac{5}{8}''$
	*Taper Hole, No. 1 Power m/m.	
SPEEDS . . . .	Spindle Speeds (4), R. P. M. . . . .	75 to 375
	Cone Diameters (4), large . . . . .	$10''$
	Pulley (Countershaft) . . . . .	$12'' \times 3\frac{1}{4}''$
	Belt Width (Cone) . . . . .	$3''$
	Belt Width (Countershaft Pulley) . . . . .	$3\frac{1}{8}''$
	Countershaft Speed, R. P. M. . . . .	125
FLOOR SPACE	Floor Space . . . . .	$36'' \times 40''$
WEIGHTS . . . .	Machine, with Regular Equipment, net pounds . . . . .	1150
	Crating Material (domestic), approximate pounds . . . . .	150
	Boxing Material (foreign), approximate pounds . . . . .	300
	Box, cubic feet . . . . .	40
REGULAR EQUIPMENT	The Machine, with Oil Pot ; Set of Wrenches and Countershaft (tight and loose Pulley).	
VERTICAL MILLING ATTACHMENT	(See page 135).	
VISE AND ARBORS	(See pages 132-133).	

\*For detailed information, see "Tapers", page 247.

Code words, page 265.



No. 2 Hand Milling Machine with Vertical Vise Slide

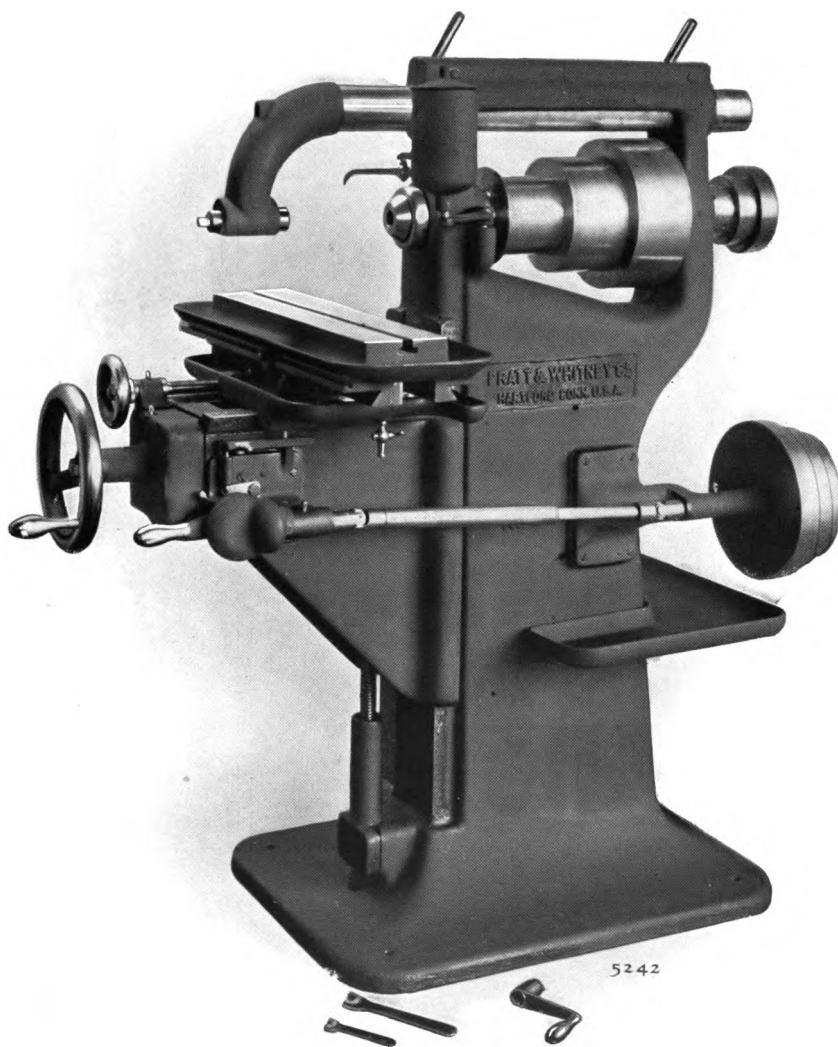
## NO. 2 HAND MILLING MACHINE WITH VERTICAL VISE SLIDE SPECIFICATIONS

RANGE . . .	Table — Working Surface . . . . . " Longitudinal Travel (by lever) . . . . . " Center to End of Spindle, maximum . . . . . " Transverse Adjustment (by screw) . . . . . " Top to Center of Spindle, maximum . . . . . " Vertical Adjustment by Lever . . . . . " Vertical Adjustment by Screw . . . . . " T-slot (1), width . . . . .	4 $\frac{3}{4}$ " x 6" 6" 8 $\frac{1}{4}$ " 5" 11" 2" 11" 58"
VISE . . . .	Size, No. 2 $\frac{1}{2}$ . Width, depth and opening of Jaws . . . . .	4 $\frac{5}{8}$ ", $\frac{7}{8}$ ", $\frac{25}{32}$ "
MICROMETER DIALS	Graduated in thousandths.	
SPINDLE . . .	Special Steel ; Bearings, cylindrical ; Front . . . . . Boxes, Bronze ; O. D., conical, adjustable for wear. Hole through . . . . . †Taper Hole, No. 1 Power m/m.	2" x 5 $\frac{3}{8}$ " — 58"
SPEEDS . . .	Spindle Speeds (4), R. P. M. . . . . Cone Diameters (4), large . . . . . Pulley (Counter) . . . . . Belt Width (Cone) . . . . . Belt Width (Countershaft Pulley) . . . . . Countershaft Speed, R. P. M. . . . .	75 to 375 10" 12" x 3 $\frac{1}{4}$ " 3" 3 $\frac{1}{8}$ " 125
FLOOR SPACE	Floor Space . . . . .	36" x 40"
WEIGHTS . . .	Machine, with Regular Equipment, net pounds . . . . . Crating Material (domestic), approximate pounds . . . . . Boxing Material (foreign), approximate pounds . . . . . Box, cubic feet . . . . .	1150 150 300 40
REGULAR EQUIPMENT	Includes the Machine, with Oil Pot; Set of Wrenches and Countershaft (tight and loose Pulley).	
VISE AND ARBORS	(See pages 132-133).	

NOTE — This Machine is also made with Overhanging Arm which will accommodate the No. 2 Vertical Milling Attachment.

† For detailed information, see "Tapers", page 247.

Code words, page 265.



No. 2 Column Power Milling Machine

## NO. 2 COLUMN POWER MILLING MACHINE

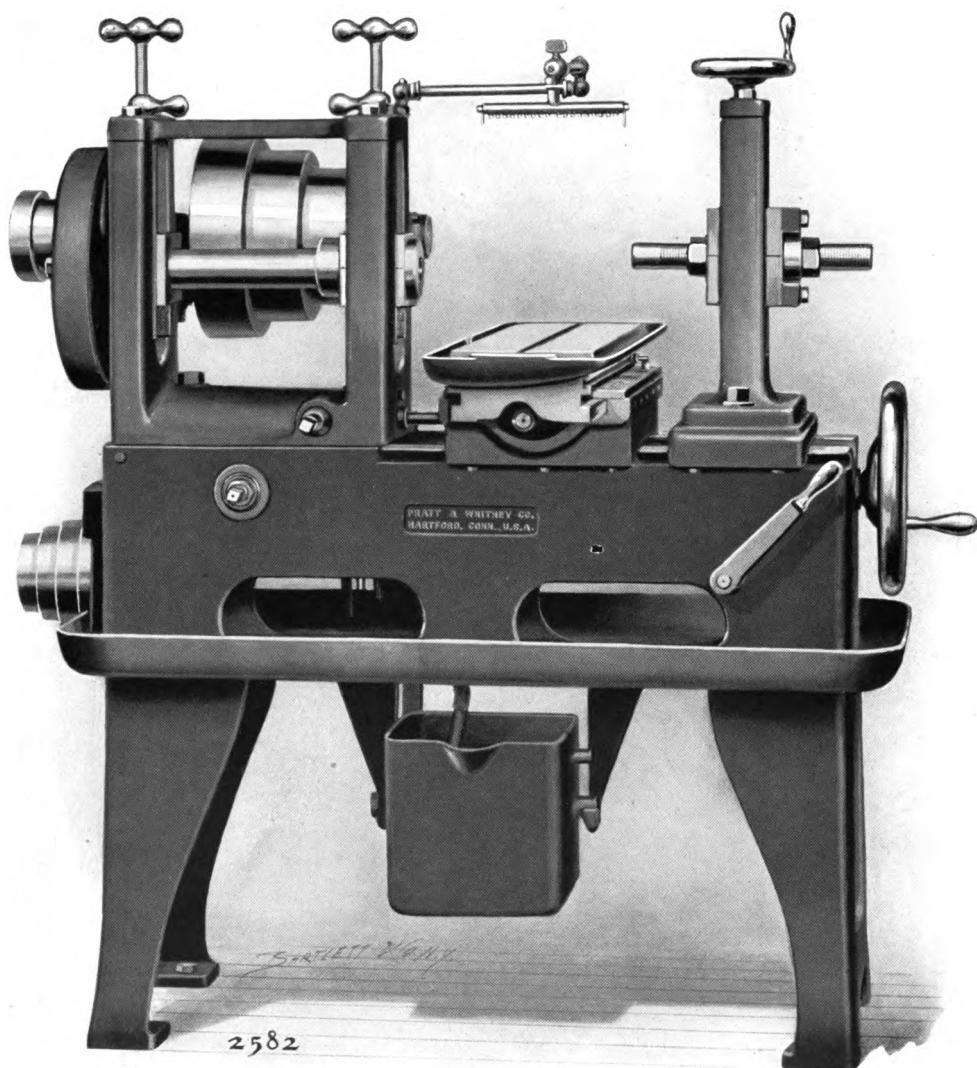
This machine is particularly adapted for various milling operations on guns, typewriters, sewing machines, automobiles, etc. The quick return of table by hand, coupled with the simple construction and convenient arrangement of the other operating requirements, enables one operator to take care of several machines.

## SPECIFICATIONS

RANGE . . . . .	Table — Working Surface . . . . .	5" x 24"
	" Longitudinal Travel (by rack and pinion) . . . . .	18"
	" Center to End of Spindle, maximum . . . . .	7½"
	" Transverse Adjustment (by screw) . . . . .	4"
	" Top to Center of Spindle, maximum . . . . .	12½"
	" Vertical Adjustment (by screw) . . . . .	12¾"
	" Top to Underside of Arm, minimum . . . . .	5⅓"
	" T-slot (1), 5/8" wide.	
VISE . . . . .	Size, No. 11.	
	Width, depth and opening of Jaws . . . . .	5", 1", 3"
SPINDLE . . . . .	Special Steel ; Cylindrical Bearings ; Front . . . . .	2" x 5 3/8"
	Boxes, Bronze ; conical on O. D., adjustable for wear.	
	*Taper Hole, No. 1 Power m/m.	
	Hole through . . . . .	5/8"
SPEEDS . . . . .	Spindle Speeds (3), R. P. M. . . . .	94 to 300
	Cone Diameters (3) . . . . .	5", 7 3/8", 9 3/4"
	Pulley (Counter., tight and loose) . . . . .	14" x 4 1/2"
	Belt Width (Cone) . . . . .	4"
	Belt Width (Counter. Pulleys) . . . . .	4 1/4"
	Countershaft Speed, R. P. M. . . . .	125
FEEDS . . . . .	Power to Table (5), P. R. Sp. . . . .	.004" to .0193"
FLOOR SPACE . . . . .	Floor Space . . . . .	48" x 53"
WEIGHTS . . . . .	Machine, with Regular Equipment, net pounds . . . . .	1500
	Crating Material (domestic), approximate pounds . . . . .	150
	Boxing Material (foreign), approximate pounds . . . . .	350
	Box, cubic feet . . . . .	63
REGULAR EQUIPMENT . . . . .	The Machine, with Overhanging Arm. Oil Pot. Tool Pan (attached to column). Set of Wrenches. Countershaft (tight and loose Pulley).	
VERTICAL MILLING ATTACHMENT . . . . .	(See page 135).	
VICE AND ARBORS . . . . .	(Same as No. 2 Hand. See pages 132-133).	

\* For detailed information, see "Tapers", page 247.

Code words, page 265.



No. 12 Lincoln Milling Machine

## NO. 12 LINCOLN MILLING MACHINE

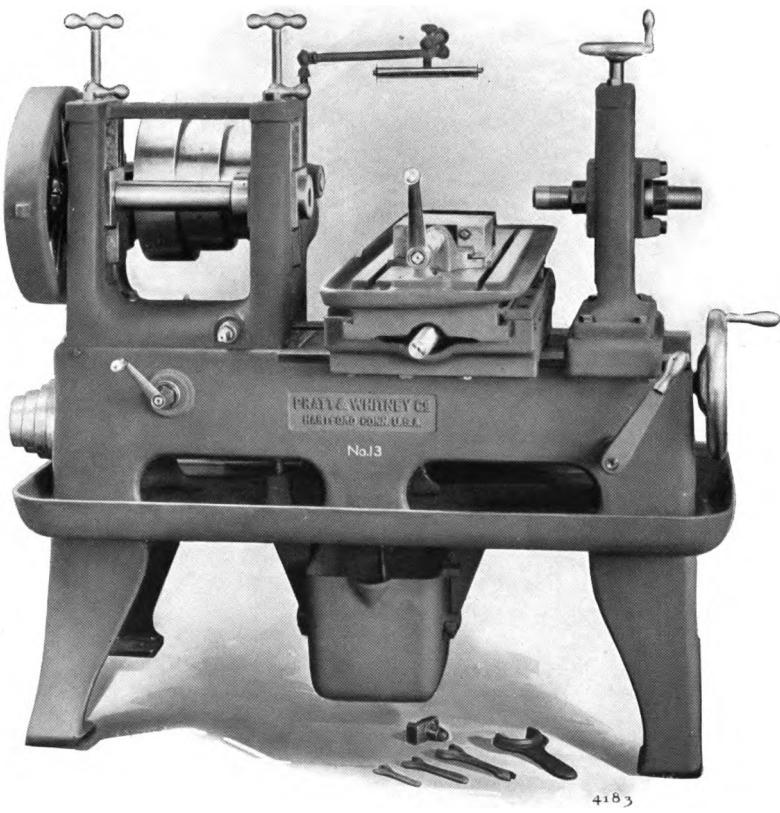
These machines have recently been re-designed and, while retaining the general characteristics of the Lincoln Type, differ from the original in the following manner : Machines are far more rigid and powerful ; Oil Pans surround and are cast integral with the bed and table ; Tables are provided with T-slots ; Spindles are hollow and are provided with draw-back rods ; Adjustments, vertical of spindle and transverse of tables, are through bevel gears actuated by crank at front of machine.

## SPECIFICATIONS

RANGE . . .	Table—Working Surface . . . . .	$7\frac{1}{2}'' \times 32''$
	" Longitudinal Travel . . . . .	$15''$
	" Center to End of Spindle, minimum . . . . .	$4\frac{1}{2}''$
	" Transverse Adjustment . . . . .	$6\frac{1}{2}''$
	" Top to Center of Spindle, maximum . . . . .	$8\frac{1}{2}''$
	Vertical Adjustment of Spindle . . . . .	$7''$
	Table Top to Top of Bed . . . . .	$6\frac{1}{4}''$
	Head Spindle to Tailstock Spindle, maximum . . . . .	$15\frac{1}{2}''$
	T-slots; number, size, distance apart . . . . .	$3'', \frac{5}{8}'', 2\frac{1}{2}''$
VISE . . . .	Size, No. 12	
	Width, depth and opening of Jaws . . . . .	$7'', 1\frac{1}{4}'', 3\frac{3}{8}''$
SPINDLE . . .	Special Steel; Bearings, cylindrical; Front . . . . .	$2\frac{3}{8}'' \times 3\frac{3}{4}''$
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through . . . . .	$\frac{9}{16}''$
	*Taper Hole, No. 11 Jarno.	
SPEEDS . . .	Spindle Speeds (3), R. P. M. . . . .	22 to 50
	Gearing Ratio . . . . .	$4\frac{1}{2}\text{ to }1$
	Cone Diameters (3), large . . . . .	$12''$
	Pulleys (Countershaft) . . . . .	$12'' \times 3\frac{1}{4}''$
	Belt Width (Cone) . . . . .	$3''$
	Belt Width (Countershaft Pulley) . . . . .	$3''$
	Countershaft Speeds, R. P. M. . . . .	150
FEEDS . . . .	Table Longitudinal (4), by Feed Cones, P. R. Sp. . . . .	.0123" to .046"
FLOOR SPACE	Floor Space . . . . .	$54'' \times 57''$
WEIGHTS . . .	Machine, with Regular Equipment, net pounds . . . . .	1720
	Crating Material (domestic), approximate pounds . . . . .	275
	Boxing Material (foreign), approximate pounds . . . . .	550
	Box, cubic feet . . . . .	62
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and Piping ; Set of Wrenches ; Countershaft (tight and loose Pulley). (Vise and Arbors furnished to order, see pages 132-133).	

\*For detailed information, see "Tapers", page 247.

Code words, page 265.



No. 13 Lincoln Milling Machine

## NO. 13 LINCOLN MILLING MACHINE

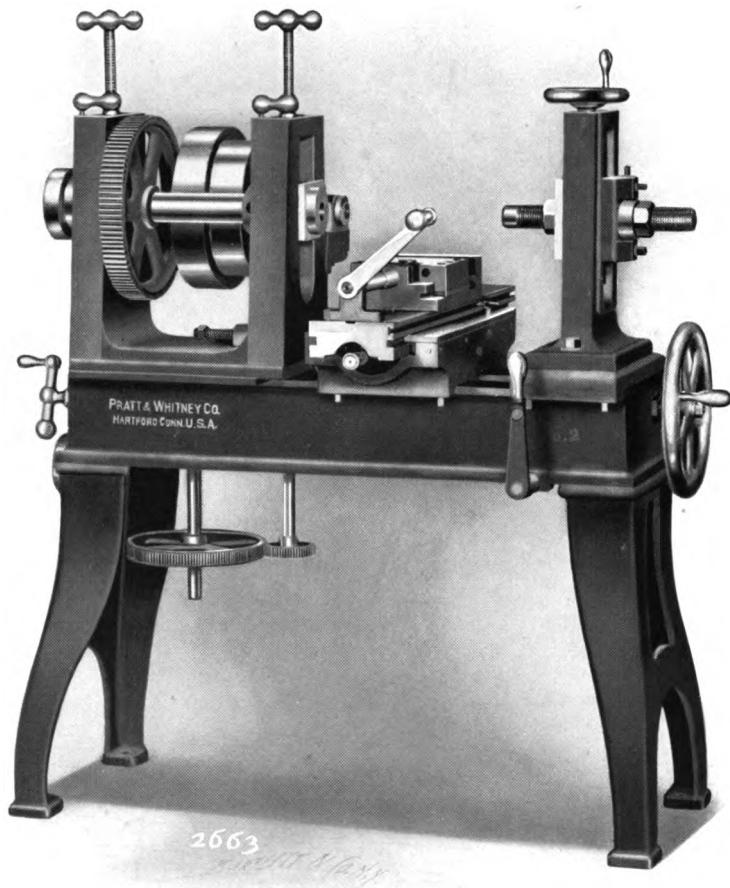
The machine is similar in design to the No. 12, its wider range making it suitable for the heavier class of work beyond the capacity of the smaller machines.

## SPECIFICATIONS

RANGE . . . . .	Table—Working Surface . . . . .	11" x 36"
	" Longitudinal Travel . . . . .	20"
	" Center to End of Spindle, minimum . . . . .	7 $\frac{1}{4}$ "
	" Transverse Adjustment . . . . .	6 $\frac{1}{4}$ "
	" Top to Center of Spindle, maximum . . . . .	9"
	Vertical Adjustment of Spindle . . . . .	8"
	Table Top to Top of Bed . . . . .	7"
	Head Spindle to Tailstock Spindle, maximum . . . . .	20 $\frac{1}{2}$ "
	T-slots; number, size, distance apart . . . . .	3, $\frac{5}{8}$ ", 4"
VISE . . . . .	Size, No. 12.	
	Width, depth and opening of Jaws . . . . .	7", 1 $\frac{1}{4}$ ", 3 $\frac{3}{8}$ "
SPINDLE . . . . .	Special Steel; Bearings, cylindrical; Front . . . . .	2 $\frac{5}{8}$ " x 4 $\frac{1}{8}$ "
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through . . . . .	1 $\frac{1}{8}$ "
	*Taper Hole, No. 12 Jarno.	
SPEEDS . . . . .	Spindle Speeds (3), R. P. M. . . . .	23 to 43
	Gearing Ratio . . . . .	5 $\frac{1}{8}$ to 1
	Cone Diameters (3), large . . . . .	14"
	Pulleys (Countershaft) . . . . .	14" x 4 $\frac{1}{4}$ "
	Belt Width (Cone) . . . . .	3 $\frac{1}{4}$ "
	Belt Width (Countershaft Pulley) . . . . .	4"
	Countershaft Speeds, R. P. M. . . . .	150
FEEDS . . . . .	Table Longitudinal (4), by Feed Cones, P. R. Sp. . . . .	.0142" to .0534"
FLOOR SPACE	Floor Space . . . . .	66" x 64"
WEIGHTS . . . . .	Machine, with Regular Equipment, net pounds . . . . .	2600
	Crating Material (domestic), approximate pounds . . . . .	300
	Boxing Material (foreign), approximate pounds . . . . .	650
	Box, cubic feet . . . . .	110
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and Piping. Set of Wrenches. Countershaft (tight and loose Pulley). (Vise and Arbors furnished to order. See pages 132-133).	

\*For detailed information, see "Tapers", page 247.

Code words, page 265.



No. 2 Lincoln Milling Machine

## NO. 2 LINCOLN MILLING MACHINE

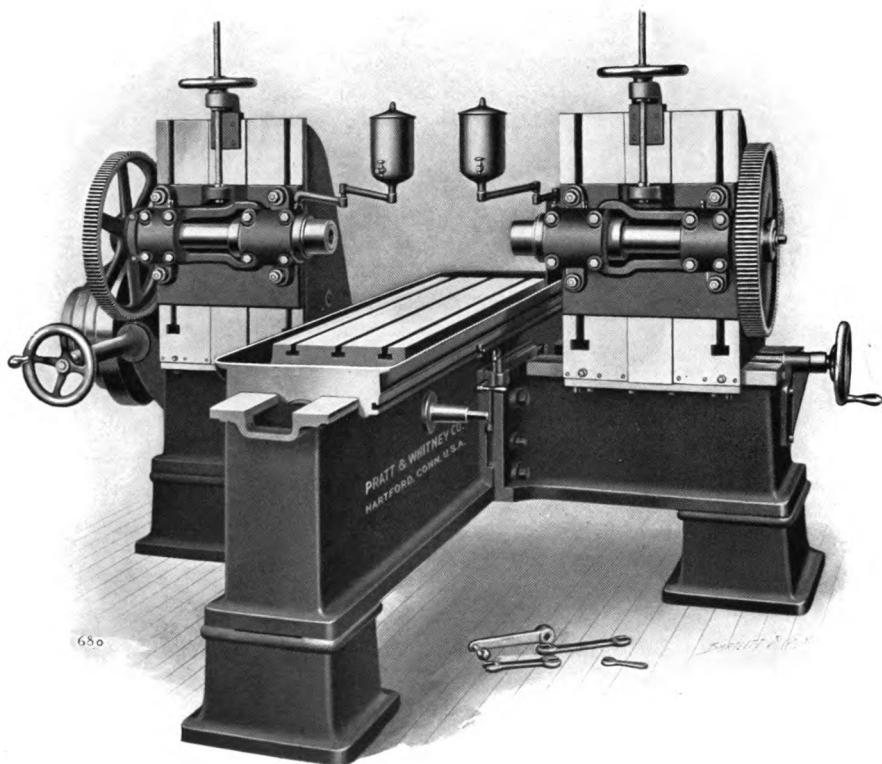
These machines are peculiarly adapted and extensively used in the manufacture of small arms sewing machines, automobiles, typewriters and on a large variety of other duplicate milling work.

## SPECIFICATIONS

RANGE . . . .	Table — Working Surface . . . . .	6" x 32"
	" Longitudinal Travel . . . . .	12"
	" Center to End of Spindle, minimum . . . . .	3½"
	" Transverse Adjustment . . . . .	6"
	" Top to Center of Spindle, maximum . . . . .	9¾"
	Vertical Adjustment of Spindle . . . . .	7"
	Table Top to Top of Bed . . . . .	5½"
	Head Spindle to Tailstock Spindle, maximum . . . . .	16"
VISE . . . .	Size, No. 4.	
	Width, depth and opening of Jaws . . . . .	7", 1¼", 3¼"
SPINDLE . . . .	Special Steel; Bearings, cylindrical; Front Boxes, C. I., lined with Babbitt, adjustable for wear. *Taper Hole, No. 2 Power m/m.	2¼" x 3¾"
SPEEDS . . . .	Spindle Speeds (3), R. P. M. . . . .	18 to 40
	Gearing Ratio . . . . .	4½ to 1
	Cone Diameters (3), large . . . . .	12"
	Pulleys (Countershaft) . . . . .	11" x 3½"
	Belt Width (Cone) . . . . .	2½"
	Belt Width (Countershaft Pulley) . . . . .	3¼"
	Countershaft Speeds, R. P. M. . . . .	125
FEEDS . . . .	Table Longitudinal (4), by Feed Cones, P. R. Sp. . . . .	.0119" to .0446"
FLOOR SPACE	Floor Space . . . . .	48" x 58"
WEIGHTS . . . .	Machine, with Regular Equipment, net pounds . . . . .	1425
	Crating Material (domestic), approximate pounds . . . . .	100
	Boxing Material (foreign), approximate pounds . . . . .	400
	Box, cubic feet . . . . .	52
REGULAR EQUIPMENT	The Machine, with Set of Wrenches and Countershaft (tight and loose Pulley). (Vise and Arbors furnished to order. See pages 132-133.)	

\*For detailed information, see "Tapers", page 247.

Code words, page 265.



No. 3½ Double Horizontal Milling Machine

# NO. 3½ POWER MILLING MACHINE

MADE TO ORDER ONLY

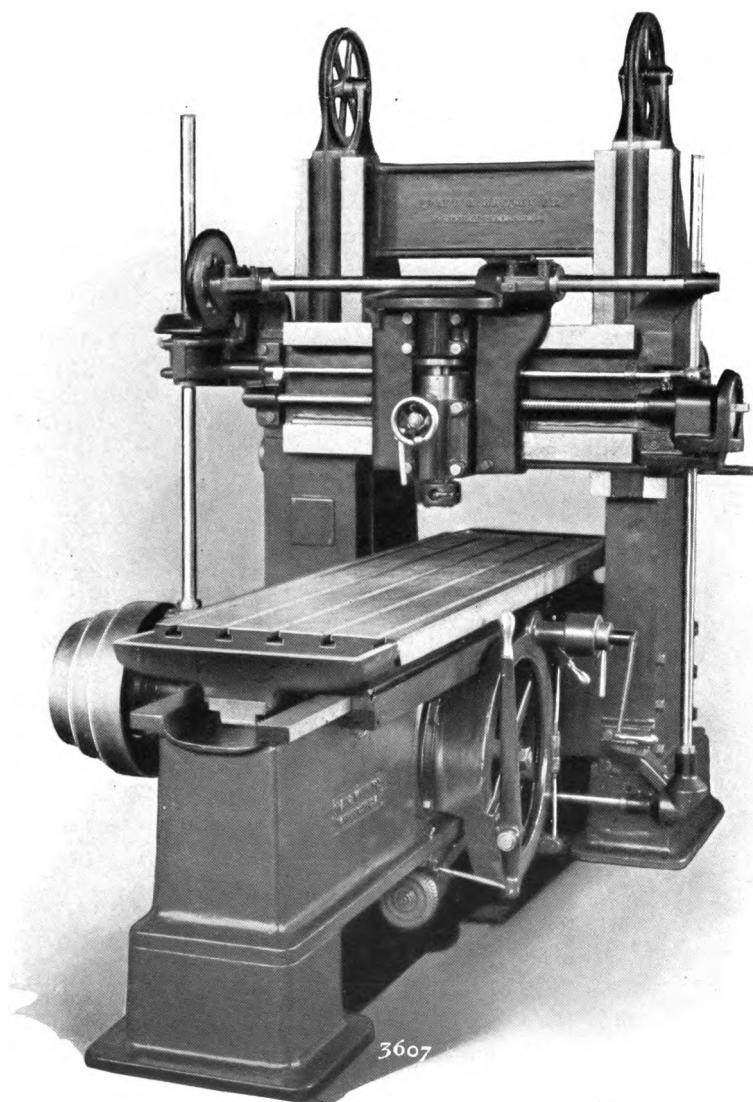
Bed is made in lengths to accommodate tables from 4 to 14 feet. Machine has two heads, which have both vertical and longitudinal adjustment. Table is driven by large worm and worm rack and is provided with quick power return.

## SPECIFICATIONS

RANGE . . .	Table — Length . . . . .	4' to 14'
	" Width . . . . .	14½"
	" Travel . . . . .	4' to 14'
	" Top to Center of Spindle, minimum . . . . .	2¾"
	" Top to Center of Spindle, maximum . . . . .	16"
	" Center to End of Spindle, minimum . . . . .	4¾"
	" Center to End of Spindle, maximum . . . . .	13½"
	Spindles — Distance between Ends, minimum . . . . .	9½"
	" Distance between Ends, maximum . . . . .	27"
	T-slots ; number, size and distance apart . . . . .	3, ¾", 5"
SPINDLE . . .	Special Steel ; Bearings, cylindrical ; Front . . . . .	3¾" x 7½"
	Boxes, Bronze ; adjustable for wear.	
	Hole through . . . . .	1½"
	*Taper Hole, No. 3 Power m/m.	
	Front End ; Thread, 3¼"; 5 Pi., one each R. & L. Hand.	
SPEEDS . . .	Spindle Speeds (8), R. P. M. . . . .	8½ to 42½
	Gearing Ratio . . . . .	12.3 to 1
	Cone Diameters (4), largest . . . . .	21"
	Pulleys (Regular Countershaft), 2 sets . . . . .	15" x 4"
	Pulleys (Quick Return Countershaft), 1 set . . . . .	10" x 2¾"
	Belt Width (Cone) . . . . .	2½"
	Belt Width (Countershaft Pulleys) . . . . .	3¾"
	Countershaft Speeds (Regular), R. P. M. . . . .	208 and 262
	Countershaft Speeds (Quick Return), R. P. M. . . . .	200
FEEDS . . .	Table (24), P. R. Sp. . . . .	.0241" to .3856"
FLOOR SPACE	Machine, with 4' Table . . . . .	12' 3" x 9'
WEIGHTS . . .	Machine, Regular Equipment (4' Table), net pounds . . . . .	7600
	Additional, per foot of Table . . . . .	400
	Crating Material (domestic), approximate pounds . . . . .	850
	Boxing Material (foreign), approximate pounds . . . . .	2000
	Box, cubic feet . . . . .	315
REGULAR EQUIPMENT	The Machine, with Swinging Oil Pots; Set of Wrenches; suitable Supporting Jacks and Feed Change Gears; 2 Countershafts (one 2-speed tight and loose Pulley and one quick return).	

\* For detailed information, see "Tapers", page 247.

Code words, page 265.



No. 2 Vertical Spindle Milling Machine

## NO. 2 VERTICAL MILLING MACHINE

MADE TO ORDER ONLY

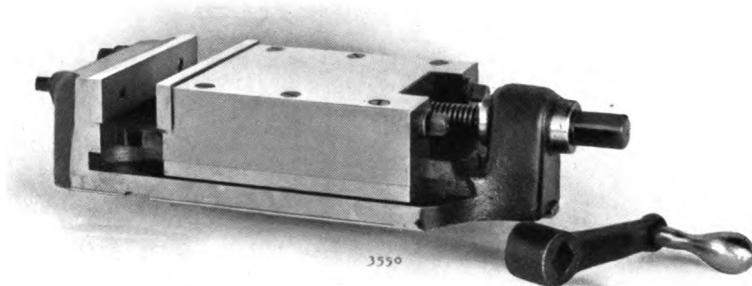
Made in one size, with either one or two spindles. Table is made in various lengths; both table and spindles are provided with power feed in either direction.

## SPECIFICATIONS

		One Sp.	Two Sp.
RANGE . . . .	Table — Length . . . . .	6'	6'
	" Width . . . . .	22"	22"
	" Travel . . . . .	6'	6'
	" Top to End of Spindle, minimum . . . . .	3/4"	3/4"
	" Top to End of Spindle, maximum . . . . .	25"	25"
	Distance between Uprights . . . . .	24 1/2"	24 1/2"
	T-slots (5); size, 3/4"; distance apart, 4 5/8".		
SPINDLE . . . .	Special Steel; Bearings, cylindrical; Front . . . . .	2 3/4" x 8"	2 3/4" x 8"
	Hole through . . . . .	5/8"	5/8"
	*Taper Hole (Power Milling Machine) . . . . .	No. 3	No. 3
	Front End . . . . .	2 3/4", 5 Pl., R. H.	2 3/4", 5 Pl., R. H.
SPEEDS . . . .	Spindle Speeds (6), R. P. M. . . . .	11 1/2 to 61	11 1/2 to 61
	Gearing Ratio . . . . .	6.85 to 1	5.56 to 1
	Cone Diameters (3), large . . . . .	19"	22"
	Pulleys (Countershaft), 2 sets 18" x 4" and 12" x 5" . . . . .	24" x 4 1/4" and 14" x 7"	
	Belt Width (Cone) . . . . .	3 1/4"	4"
	Belt Width (Counter. Pulleys) . . . . .	3 3/4" and 4 3/4"	4" and 6 3/4"
	Counter Speeds, R. P. M. . . . .	110 and 300	160 and 430
FEEDS . . . .	Table, by Feed Cones (4), R. P. Sp. . . . .	.0378 to .325	.0378 to .325
	Head Transverse (4) . . . . .	.0366 to .0314	.0366 to .0314
FLOOR SPACE	Floor Space . . . . .	6 1/4' x 13 1/2'	8 1/4' x 13 1/2'
WEIGHTS . . . .	Machine, with Countershaft, net pounds . . . . .	8800	11900
	Additional, per foot of Table Crating Material (domestic), approximate pounds . . . . .	500	500
	Boxing Material (foreign), ap- proximate pounds . . . . .	800	800
	Box, cubic feet . . . . .	2000	2700
		276	370

#For detailed information, see "Tapers", page 247.

Code words, page 265.



## VISES FOR MILLING MACHINES

Vises are regularly furnished with hardened and ground Jaws fitted, and with suitable Crank Wrench. Nos. 4 and 12 are furnished with Extension Crank Wrenches. Where Jaws and Cranks are not wanted suitable allowance will be made.

Used on Machine	Size Number	Jaws			Weight Net Pounds
		Width Inches	Depth Inches	Opening Inches	
HAND MILLING MACHINE	No. 10 . . . . }	2½	4 5/8	7/8	2 5/8
	No. 2. Vertical Vise Slide . . . . }				
	No. 2. Regular . . . . }	11	5	1	3
	No. 2. Column Power . . . . }				
LINCOLN MILLING MACHINE	No. 2 . . . . .	4	7	1 1/4	52
	No. 12 . . . . . }	12	7	1 1/4	62
	No. 13 . . . . . }				

Arbor without Arm Support—No. 2 and No. 10 Hand Milling Machines

Arbor with Arm Support—No. 2 and No. 10 Hand Milling Machines  
Also No. 2 Column Power Milling Machine

Arbor for No. 2 Lincoln Milling Machine

Arbor for No. 12 and No. 13 Lincoln Milling Machines

5675

## ARBORS FOR MILLING MACHINES

Hand Milling Machine Arbors are made in two styles, with or without Arm Support.

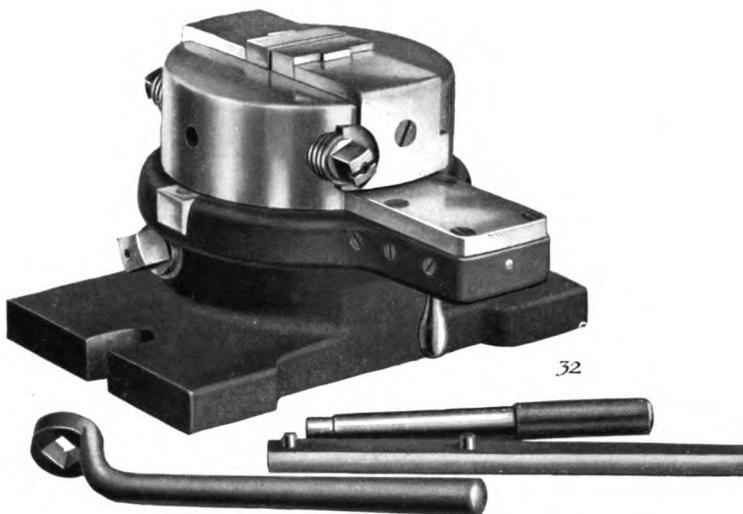
Lincoln Milling Machine Arbors are made in one style only, with Arm Support ; the No. 2 is provided with tang, and the Nos. 12 and 13 drilled and tapped for Pull-back ; Arbors are splined for cutters.

All Arbors are made in two lengths, hardened and ground, and are furnished with suitable collars and nut.

	Number	Diameter	Cutter Length		* Taper
			No Arm	With Arm	
HAND MILLING MACHINE	10	{ 1 1 $\frac{7}{8}$	2 and 3 $\frac{1}{2}$	2 and 4	No. o. Power M. M.
			3 and 5	4 and 6	No. o. Power M. M.
			3 and 5	4 and 6	No. o. Power M. M.
	2	{ 1 1 $\frac{7}{8}$	2 and 3 $\frac{1}{2}$	1 $\frac{1}{2}$ and 4	No. 1. Power M. M.
			3 and 5	1 $\frac{1}{4}$ and 6	No. 1. Power M. M.
			3 and 5	1 $\frac{1}{4}$ and 6	No. 1. Power M. M.
LINCOLN MILLING MACHINE	12	{ 1 1 $\frac{1}{4}$		6 and 9	No. 2. Power M. M.
				6 and 9	No. 2. Power M. M.
	13	{ 1 1 $\frac{1}{4}$ 1 $\frac{1}{2}$		6 and 9	No. 11. Jarno
				6 and 9	No. 11. Jarno
			10 and 14	10 and 14	No. 12. Jarno
			10 and 14	10 and 14	No. 12. Jarno

\* For detailed information, see Tapers, page 247.

† Are also used on No. 2 Column Power Milling Machine.



32

## INDEX MILLING FIXTURE

Made in one size. Regularly furnished with 8-Notch Index Ring, tool steel (hardened and ground); 2-Jaw Chuck with Blank Inserted Jaws and suitable Wrenches.

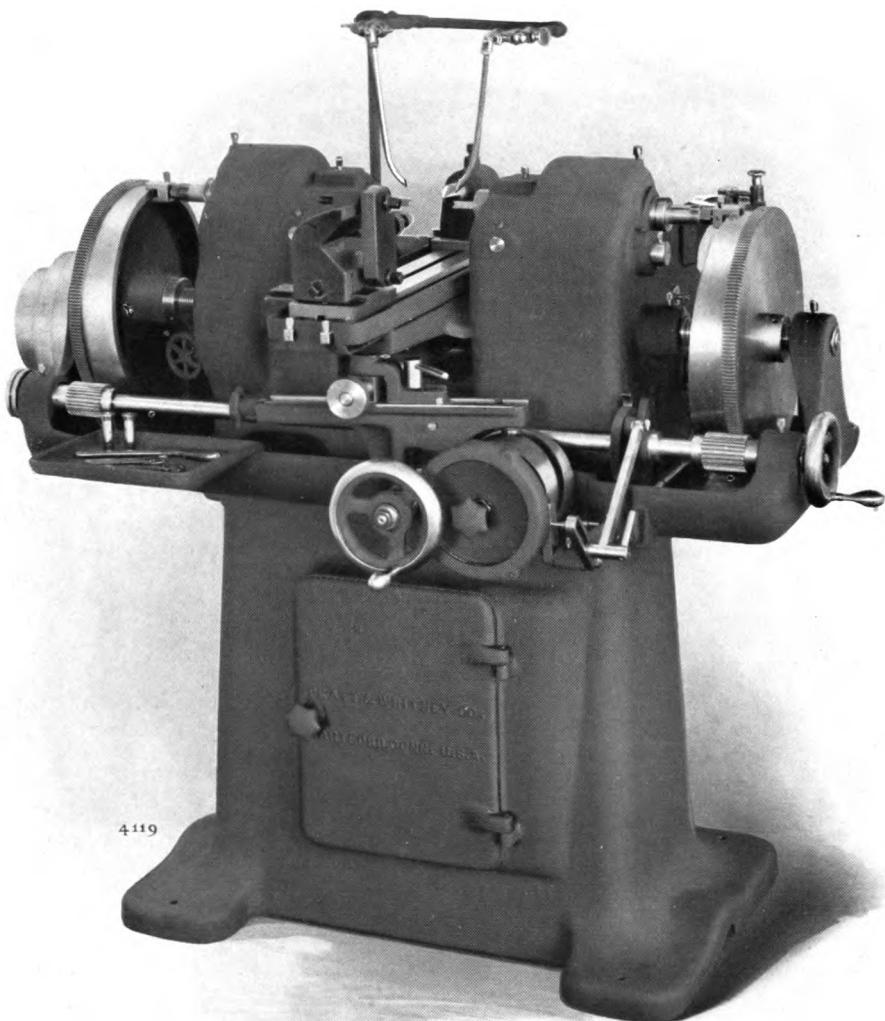
No. 2

Hole through	1 $\frac{1}{2}$ "
Jaws, width	1 $\frac{1}{8}$ "
Total height of fixture	5 $\frac{1}{2}$ "
Base, dimensions	9 $\frac{1}{4}$ " x 5 $\frac{5}{8}$ "
Weight, pounds	35



## VERTICAL MILLING ATTACHMENT

Made for the Nos. 2 and 10 Hand Milling Machines. The No. 2 attachment is also suitable for the No. 2 Column Power Milling Machine. The attachment is very rigid and is securely clamped to the overhanging arm, which is reversed end for end. The vertical spindle is driven by means of mitre gears from the main spindle of the machine, the taper hole being same as in machine spindle (see machine specifications). It can be operated at any desired angle, accurate graduations being provided. This attachment is found very convenient for taking angular cuts with cylindrical cutters, also for cutting T-slots, key-seating, etc.



Spline Milling Machine

## SPLINE MILLING MACHINE

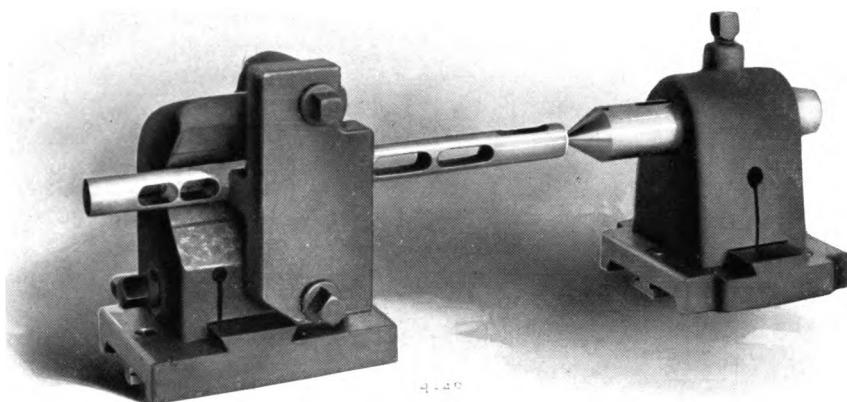
A new tool of exceptional merit, designed for the economical milling of slots and splines with closed ends, such as gun receivers, adjustable sights, tang-slots in collets, etc. Machine can be furnished with special fixtures for milling circular, spiral or irregular grooves.

The automatic features of the machine, coupled with the inexpensive and durable Fish-tail Type of cutters used, reduces the operating expense to the minimum.

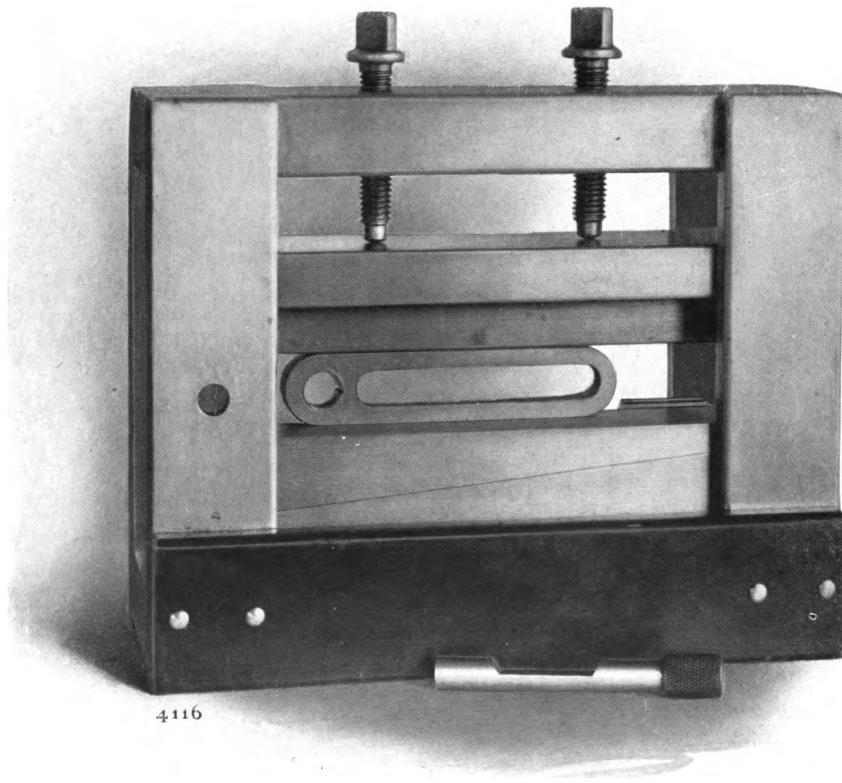
### SPECIFICATIONS

RANGE . . . . .	Table Travel . . . . .	0" to 4"
	Table Top to Center of Cutter Spindles . . . . .	3½"
	Cutting Diameter, maximum . . . . .	1"
	Cutting Depth (using both Spindles), maximum . . . . .	4"
	Cutting Depth (using one Spindle), maximum . . . . .	2"
SPEEDS . . . . .	Spindle Speeds (6), R. P. M. . . . .	401 to 1532
	Cone Diameters (3), large diameter . . . . .	12"
	Pulleys (Counter. Friction) . . . . .	12" x 4¼"
	Belt Width (Cone) . . . . .	2"
	Belt Width (Counter. Pulley) . . . . .	4⅛"
	Countershaft Speeds, R. P. M. . . . .	250 and 325
FEEDS . . . . .	Table Feeds (5), P. R. Sp. ¼" stroke . . . . .	.0007" to .0057"
	Table Feeds (5), P. R. Sp. 4" stroke . . . . .	.0112" to .092"
	Spindle Feed, per notch of Feed Ratchet . . . . .	.0028"
FLOOR SPACE	Floor Space . . . . .	56½" x 43½"
WEIGHTS . . . . .	Regular Equipment, net pounds . . . . .	1800
	Crating Material (domestic), approximate pounds . . . . .	100
	Boxing Material (foreign), approximate pounds . . . . .	450
	Box, cubic feet . . . . .	62
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and Piping. Universal Vise and Foot Stock for Round Stock. 4 Draw-in Collets (2 each, ¼" and 1⅜"). 2 Cutters, any size, with 2 or 4 lips. Countershaft (2-speed Friction). Set of Wrenches. (See attachments on following pages).	

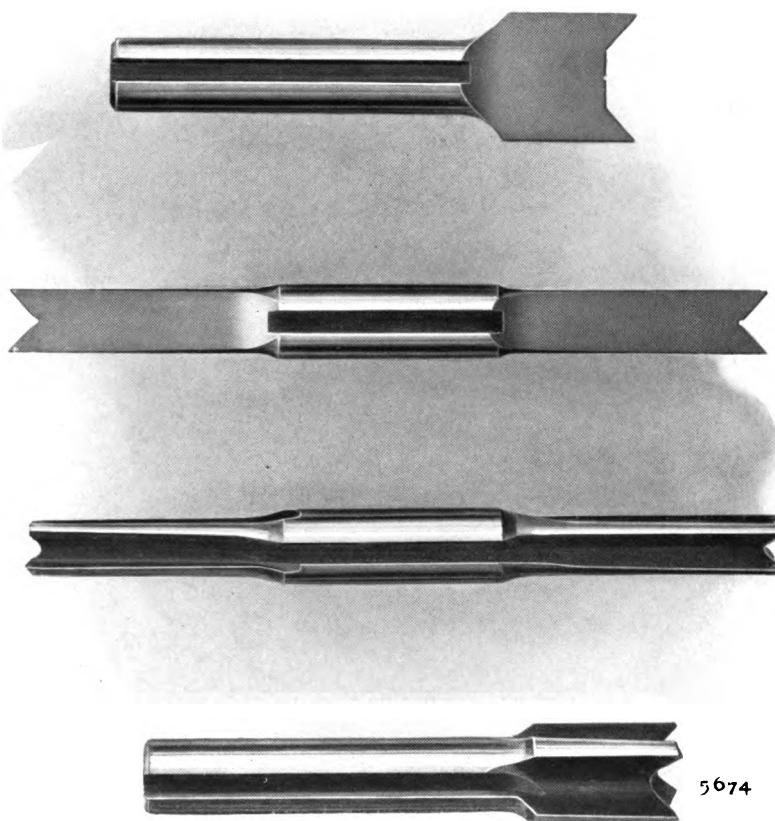
Code words, page 265.



Universal Vise and Foot Stock for Round Work—Sample of Work Shown in Place

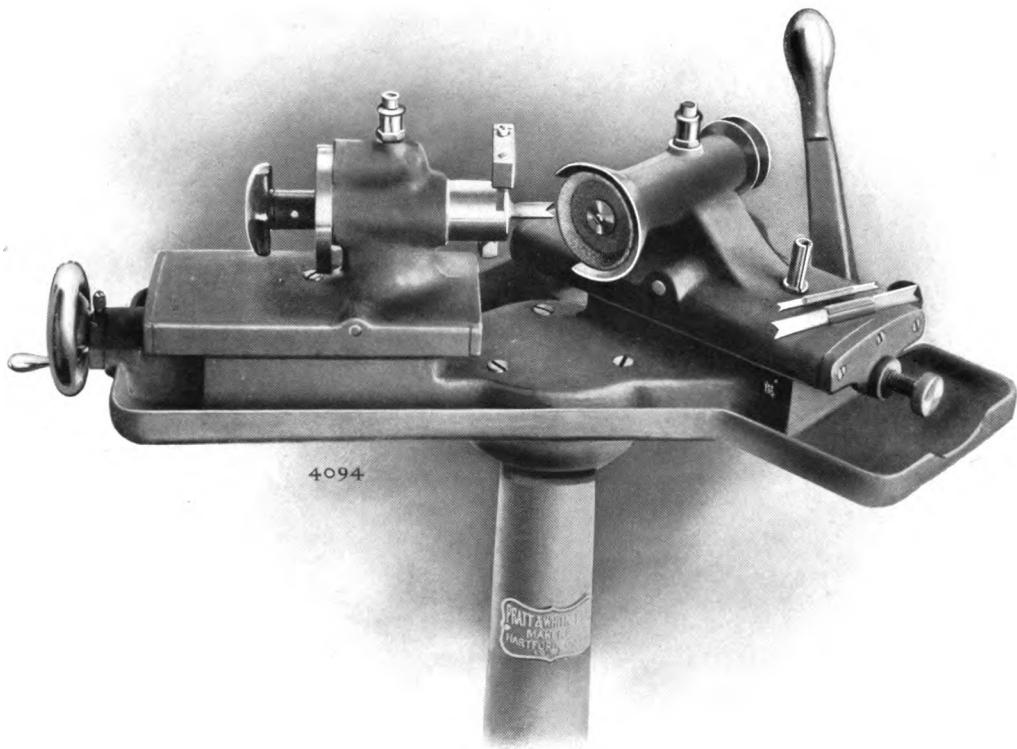


Universal Vise for Square and Flat Stock with Work in Place



5674

Two and Four-lip Fish-tail Cutters as used with Spline Milling Machine



(Patented)

Grinding Machine for Fish-tail Cutters

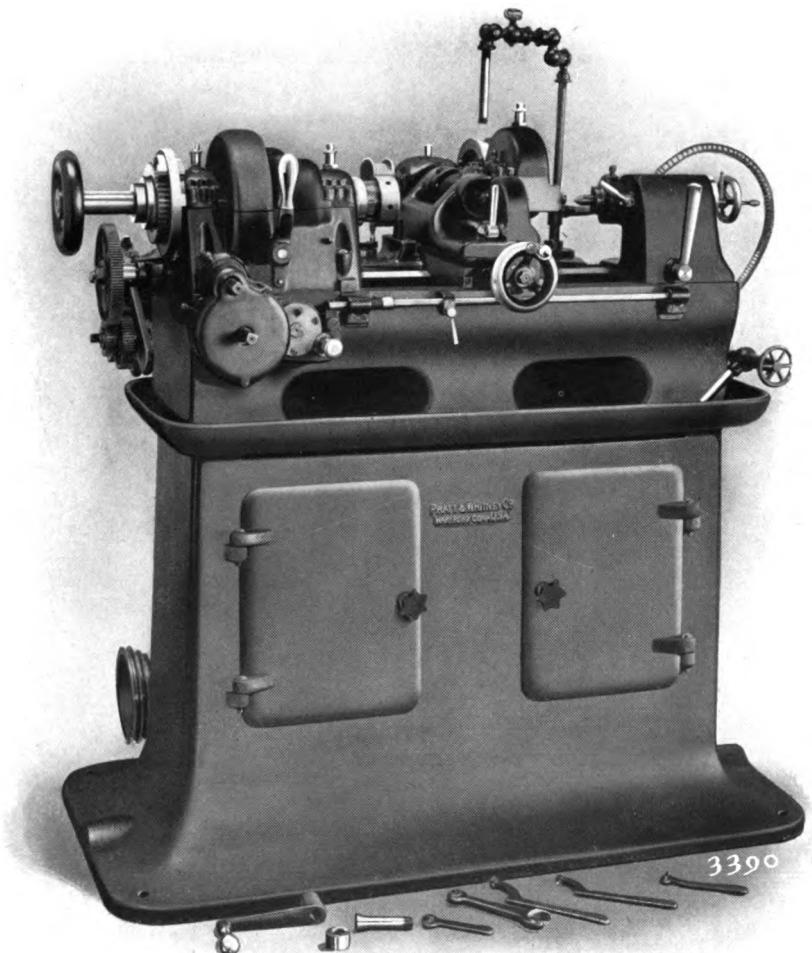
## FISH-TAIL CUTTER GRINDER

This machine is designed for grinding fish-tail cutters as used on the Spline Milling Machine. The wheel and cutter slides are located in the proper relation to one another to always maintain the correct angles on the cutters.

### SPECIFICATIONS

RANGE . . .	Cutter Slide Adjustment (by lever) . . . . .	2"
	Wheel Slide Adjustment (by screw) . . . . .	3"
GRINDING WHEELS	(Cupped), 2 1/2" diameter ; 5/8" wide ; 3/8" hole.	
SPEEDS . . .	Spindle Speed, R. P. M. . . . .	5143
	Pulley (Spindle), Grooved, diameter . . . . .	1 3/4"
	Pulley (Counter., tight and loose) . . . . .	6" x 1 5/8"
	Belt Width (Spindle Pulley), 1/4" round.	
	Countershaft Speed, R. P. M. . . . .	600
FLOOR SPACE	Floor Space . . . . .	27" Circle
WEIGHTS . . .	Machine, Regular Equipment, net pounds . . . . .	275
	Crating Material (domestic), approximate pounds . . . . .	50
	Boxing Material (foreign), approximate pounds . . . . .	100
	Box, cubic feet . . . . .	22
REGULAR EQUIPMENT	The Machine, with 1 Grinding Wheel. 2 Collets (1/4" and 7/16") and Countershaft.	

Code words, page 265.



(Patented)

4½ x 12-inch Thread Milling Machine with Draw-back Collet Attachment

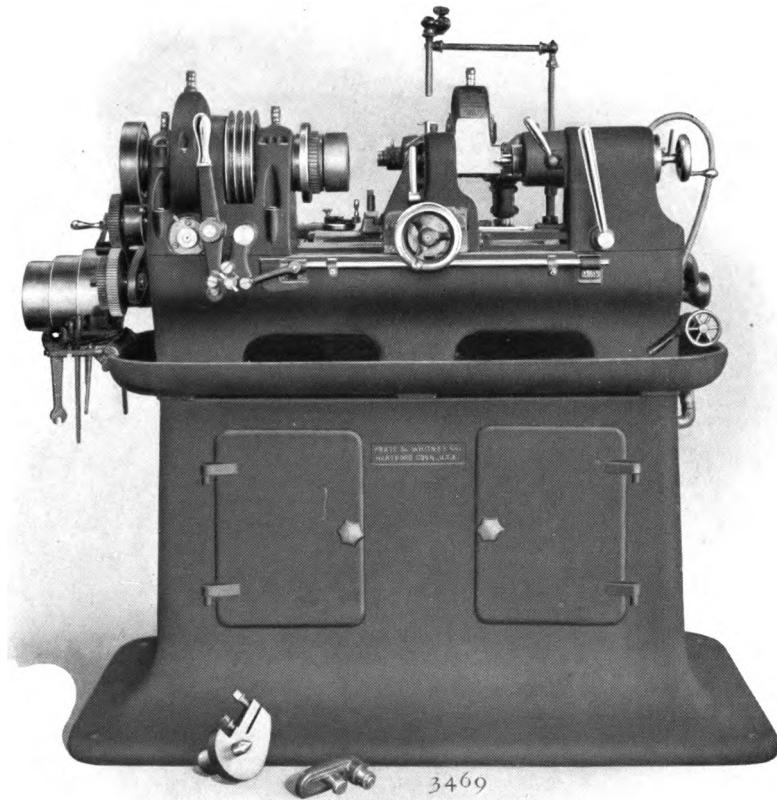
**4½ X 12-INCH THREAD MILLING MACHINE**

For cutting small precision screws, worms, lead and feed screws, spiral gears, also for splining and oil grooving shafts, etc. It is far superior to the engine lathe in accuracy, finish of work and economy of operation.

**SPECIFICATIONS**

<b>RANGE . . .</b>	Length that can be cut between Centers . . . . .	12"
	Diameter that can be cut . . . . .	4½"
	Lead that can be cut (Regular Gear), minimum and maximum	24 Pi. to 12"
	Lead that can be cut (Special Gear), minimum and maximum	40 Pi. to 12"
	Depth that can be cut . . . . .	1⁹/₁₆"
	Collet Capacity (Spindle) . . . . .	1"
	Collet Capacity (Draw-back Attachment) . . . . .	5/₈"
	Hole through Spindle . . . . .	1 1/₁₆"
	Follow Rest Capacity . . . . .	1 3/₄"
	Index Ring (Regular), 48 notches	
	Lead Screw (Regular), 2 Pi.; (Metric), 12 m/m P.	
<b>CUTTERS . . .</b>	Diameters . . . . .	1 ¼" and 1 5/₈"
	Hole . . . . .	7/₈"
<b>SPEEDS . . .</b>	Work Spindle Speed Changes . . . . .	64
	Work Spindle Speed, minimum . . . . .	1 rev. in 4 min.
	Work Spindle Speed, maximum . . . . .	16 R. P. M.
	Cutter Spindle Speeds, R. P. M. . . . .	271 and 346
	Countershaft Speeds, R. P. M. . . . .	250 and 320
	Pulleys (Countershaft, tight and loose) . . . . .	10" x 3"
<b>FLOOR SPACE</b>	Floor Space . . . . .	29" x 52"
<b>WEIGHTS . . .</b>	Machine, with Regular Equipment . . . . .	1850
	Crating Material (domestic), approximate pounds . . . . .	200
	Boxing Material (foreign), approximate pounds . . . . .	550
	Box, cubic feet . . . . .	65
<b>REGULAR EQUIPMENT</b>	The Machine, with Oil Pump, Tank and Piping.	
	1 Spindle Collet (round), any standard size up to 1" diameter.	
	1 Follow Rest, with Bushing, any specified size up to 1 3/₄" diameter.	
	1 Index Ring (48 notches).	
	12 Change Gears.	
	1 Cutter, any Pi. specified.	
	Countershaft. Set of Wrenches.	
<b>INTERNAL MILLING</b>	The Machine can be arranged for internal milling, to order.	
<b>CUTTERS . . .</b>	Cutters either U. S., V., International or Whitworth Standards, 1 ¼" and 1 5/₈" diameters, are carried in stock.	
<b>DRAW-BACK COLLET MECHANISM</b>	With Collets, any size from 1/₈" to 5/₈" inclusive, by 16th, can be furnished to order.	

Code words, page 265.



(Patented)

6 x 14-inch Thread Milling Machine

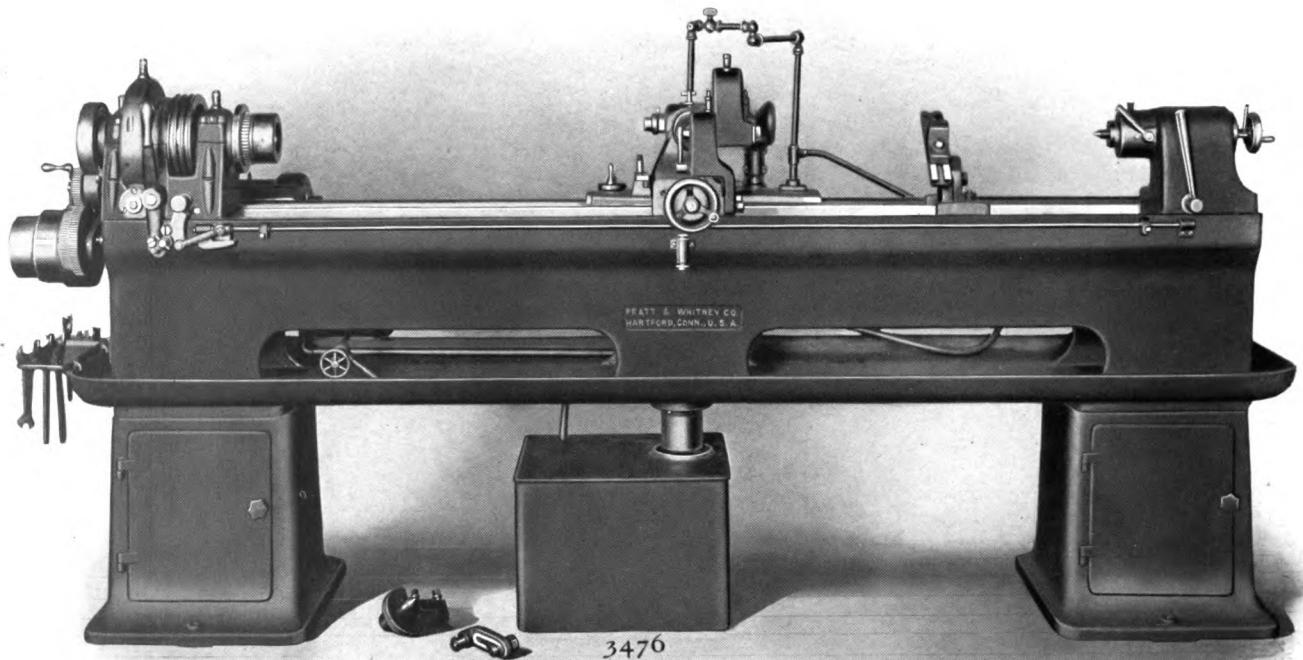
## 6-INCH THREAD MILLING MACHINE

For cutting precision screws, worms, lead and feed screws, spiral gears, hobs and taps, also for splining and oil grooving shafts, etc. It is far superior to the engine lathe in accuracy, finish of work and economy of operation.

### SPECIFICATIONS

RANGE . . .	Length that can be cut between Centers . . . . .	14", 48", 80", 132"
	Diameter that can be cut . . . . .	6"
	Lead that can be cut (Regular Gears), minimum and maximum . . . . .	12 Pi. to 15"
	Lead that can be cut (Special Gears), minimum and maximum . . . . .	24 Pi. to 24"
	Depth that can be cut (Regular Cutter Head) . . . . .	1 $\frac{7}{8}$ "
	Depth that can be cut (Oversize Cutter Head) . . . . .	5 $\frac{5}{8}$ "
	Collet Capacity, Spindle (Regular Head) . . . . .	2"
	Collet Capacity, Spindle (Oversize Head) . . . . .	3"
	Collet Capacity, Drawback (Regular and Oversize) . . . . .	7/8"
	Hole through Spindle (Regular Head) . . . . .	2 $\frac{1}{2}$ "
	Hole through Spindle (Oversize Head) . . . . .	3 $\frac{1}{2}$ "
	Follow Rest Capacity (Regular) . . . . .	2"
	Follow Rest Capacity (Oversize) . . . . .	3"
	Index Ring (Regular), 48 notches.	
	Lead Screw (Regular), 2 Pi.; (Metric), 12 m/m P.	
CUTTERS . . .	Diameter for Regular Cutter Head . . . . .	2", 2 $\frac{1}{4}$ ", 2 $\frac{5}{8}$ "
	Diameter for Oversize Cutter Head . . . . .	2 $\frac{5}{8}$ " and 3 $\frac{1}{4}$ "
	Hole for Regular Cutter Head . . . . .	3/4"
	Hole for Oversize Cutter Head . . . . .	1"
SPEEDS . . .	Work Spindle Speed Changes . . . . .	54
	Work Spindle Speed, minimum (Direct Sp. Drive) . . .	1 rev. in 6 min.
	Work Spindle Speed, maximum (Direct Sp. Drive) . . .	5 $\frac{3}{10}$ R. P. M.
	Work Spindle Speed, minimum (Lead Screw Drive) . . .	1 rev. in 25 min.
	Cutter Spindle Speeds (3), R. P. M. . . . .	118, 144, 177
	Countershaft Speed, R. P. M. . . . .	215
	Pulleys (Countershaft, tight and loose) . . . . .	12" x 4 $\frac{1}{4}$ "
FLOOR SPACE	Machine 6" x 14"      6" x 48"      6" x 80"      6" x 132"	
	Floor Space 41" x 61",      41" x 7' 11",      41" x 10' 7",      41" x 14' 11"	
WEIGHTS . . .	Machine, Regular Equipment, net pounds . . . . .	2650
	Crating Material (domestic), approximate pounds . . . . .	300
	Boxing Material (foreign), approxi- mate pounds . . . . .	900
	Box, cubic feet . . . . .	117
	Machine, Regular Equipment, approximate pounds . . . . .	3200
	Crating Material (domestic), approximate pounds . . . . .	600
	Boxing Material (foreign), approxi- mate pounds . . . . .	1000
	Box, cubic feet . . . . .	1000
	Machine, Regular Equipment, approximate pounds . . . . .	3800
	Crating Material (domestic), approximate pounds . . . . .	1200
	Boxing Material (foreign), approxi- mate pounds . . . . .	2000
	Box, cubic feet . . . . .	195
	Machine, Regular Equipment, approximate pounds . . . . .	5125
	Crating Material (domestic), approximate pounds . . . . .	275

Code words, page 265.



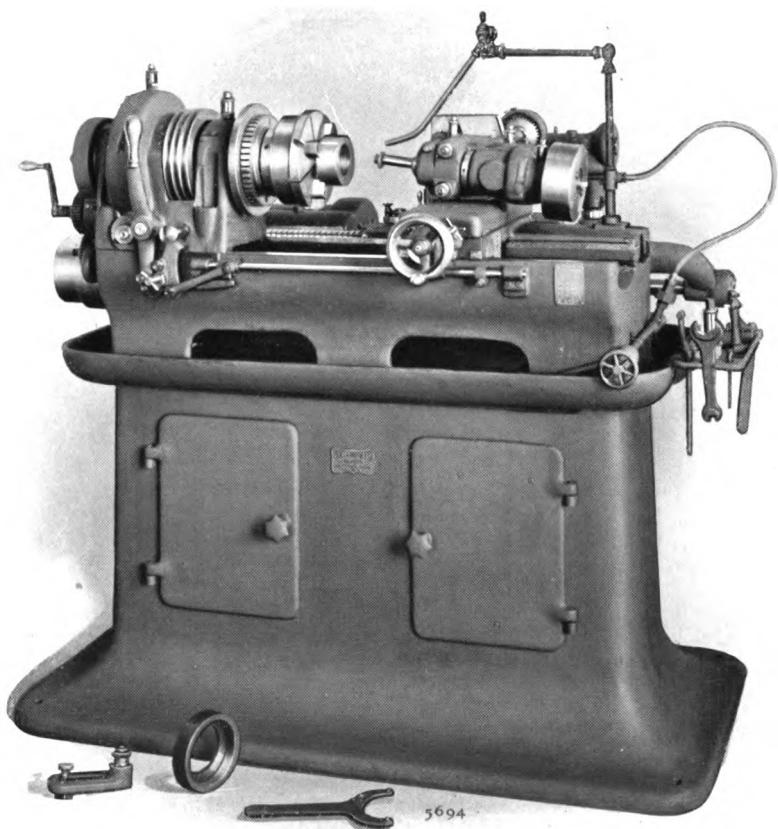
3476

(Patented)  
6 x 80-inch Thread Milling Machine

## 6-INCH THREAD MILLING MACHINE

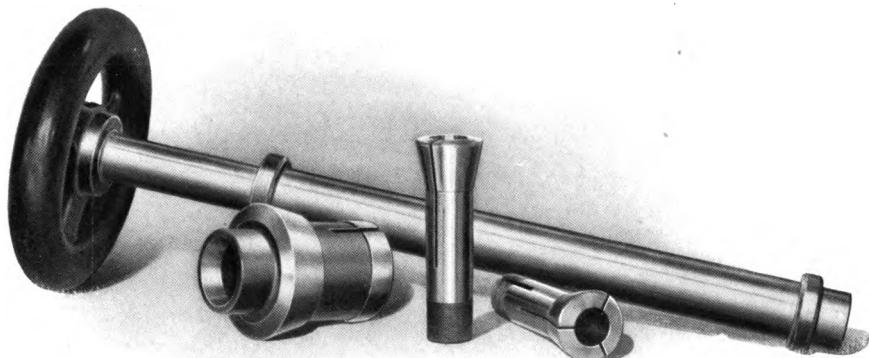
<b>REGULAR EQUIPMENT</b>	The Machine, with Oil Pump, Tank and Piping. 1 Spindle Collet, 2" hole. 1 Spindle Collet Bushing (round), any size up to 1 3/4". 1 Follow Rest, with 1 Bushing, any size up to 2". 1 Stationary Rest (on 6" x 80" and 6" x 132" Machines). 1 Live Center and Work Driver. 1 Index Ring (48 notches). 1 Lead Screw, 2 Pi. or 12 m/m P. 17 Change Gears. 1 Cutter, any Pi specified. 2 Countershafts. Set of Wrenches.
<b>OVERSIZE HEAD TAILSTOCK AND FOLLOW REST</b>	With 3" capacity, will be found advantageous when machine is to be regularly used for screw cutting beyond 2" diameter. Furnished in place of regular parts to order.
<b>SPECIAL HEAVY CUTTER HEAD</b>	Designed for Cutters up to 3 1/4" diameter, 1" hole, and is capable of milling a thread 5/8" deep at one cut. Furnished to order in place of regular cutter head and especially recommended in connection with oversize head parts.
<b>INTERNAL MILLING</b>	The machine can be furnished to order, with an Internal Milling Attachment, suitable for milling threads of moderate pitch in holes from 1 1/4" in diameter to about 6". When machine is thus arranged it is adapted for internal milling only. Cut on page 148.
<b>BACKING-OUT ATTACHMENT</b>	To enable depth of cut to be tapered out to zero in three turns of spindle. (Furnished to order).
<b>COMPOUND TAPER ATTACHMENT</b>	With special carriage and bed, furnished to order on 6" x 14" and 6" x 48" machines. The attachment is designed to permit the accurate threading of both the tapers and cylindrical portion of work if desired, such as on certain screws, taps, etc. Cut on page 149.
<b>POWER QUICK RETURN DEVICE</b>	Furnished to order on 6" x 80" and 6" x 132" machines.
<b>DRAW-BACK COLLET ATTACHMENT</b>	With Collets from 3/8" to 7/8" inclusive by 16th. (Furnished to order). Cut on page 149.
<b>CUTTERS . . .</b>	U. S., V., International, Worm and Acme Standards are carried in stock.
<b>SPECIAL EQUIPMENTS</b>	These machines may be furnished with special equipments to meet demands out of the ordinary. Full information furnished upon receipt of drawings or samples.

Code words, page 265.



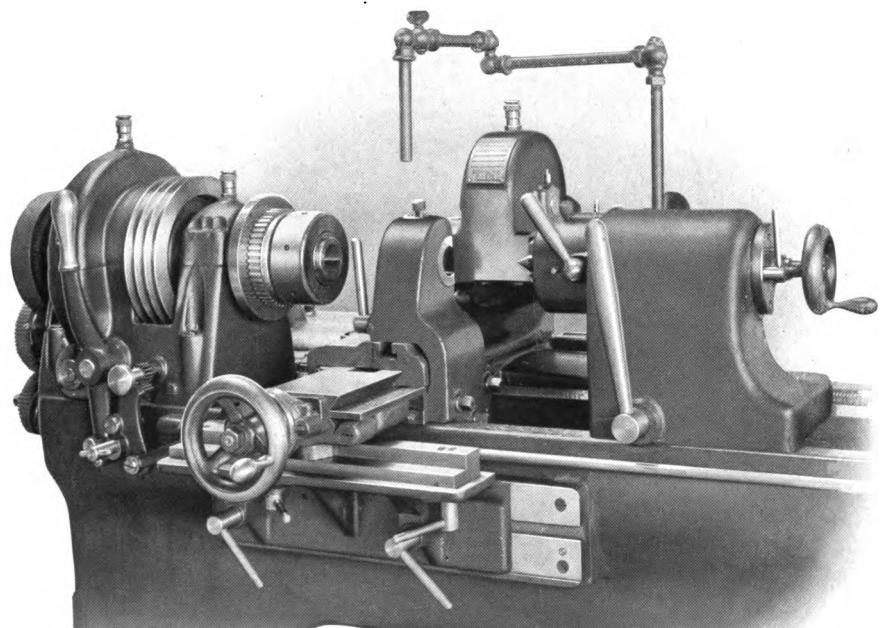
(Patented)

6 x 14-inch Thread Miller, Arranged for Internal Multiple Thread Cutting



3606

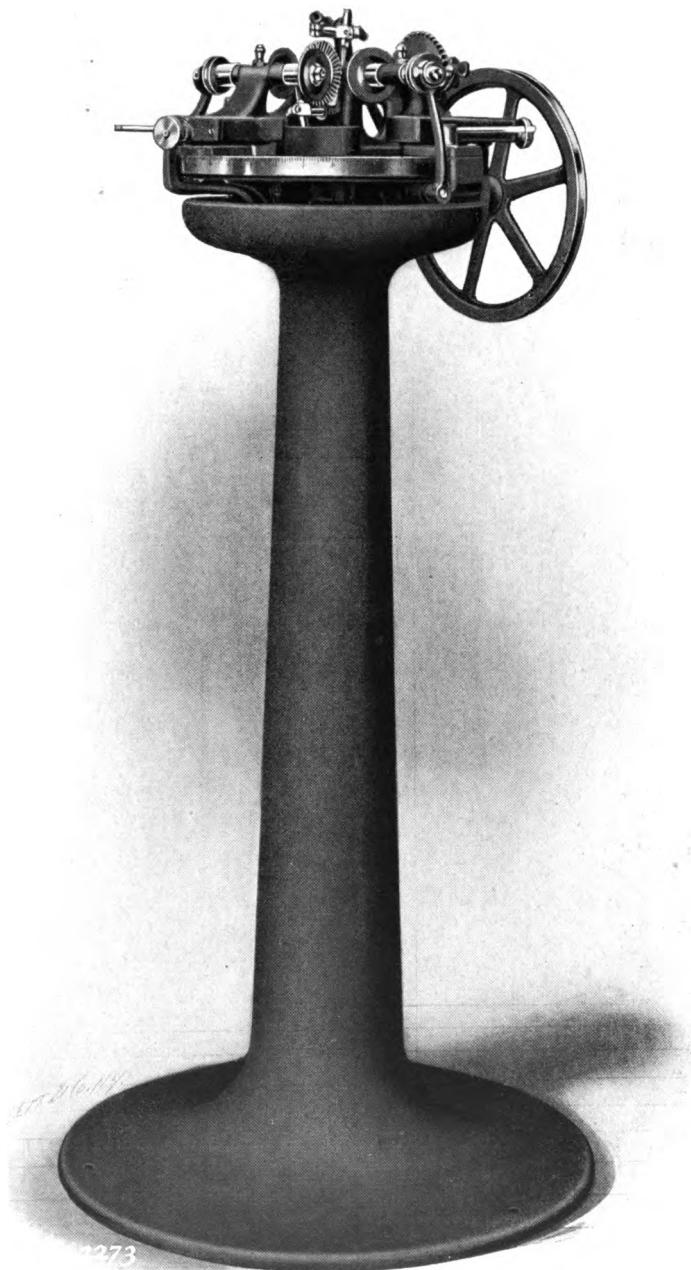
Draw-back Collet Attachment



3575

(Patented)

Taper Milling Attachment



(Patented)

Automatic Cutter Grinder

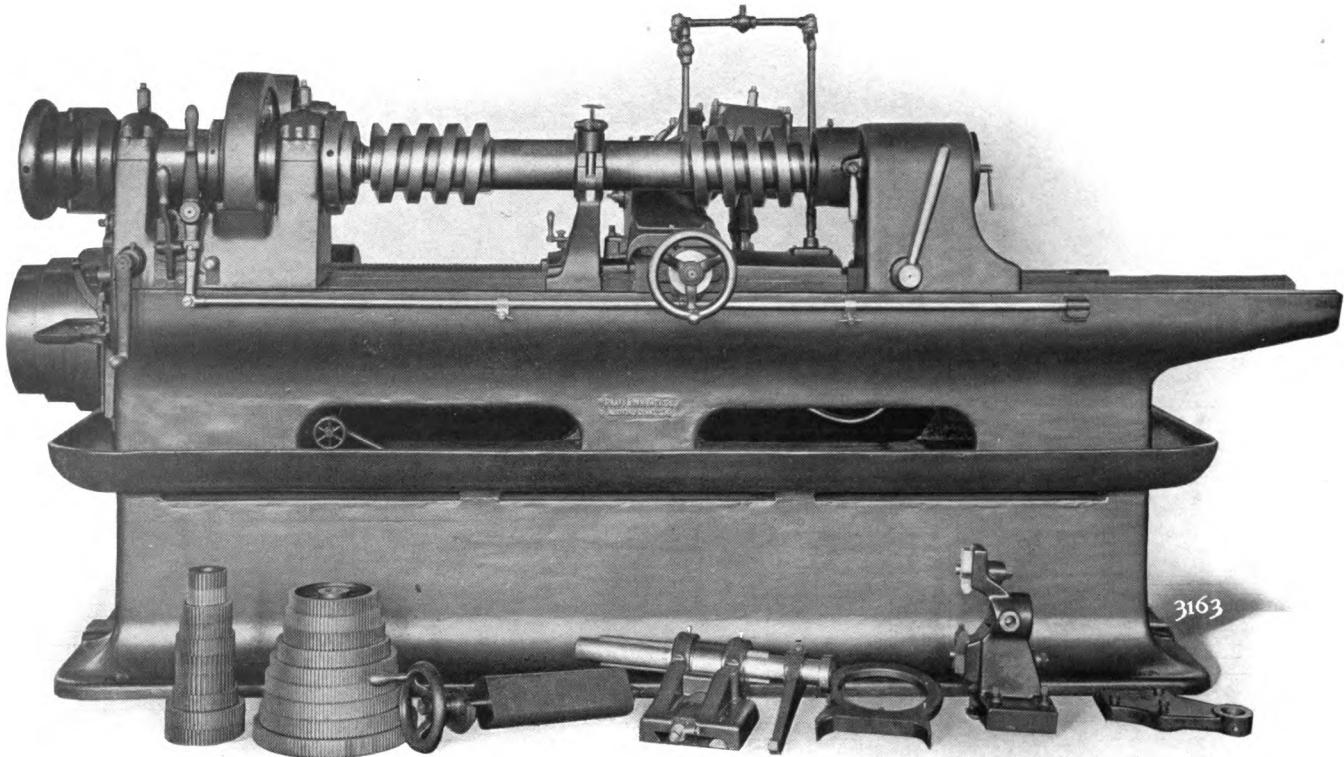
## AUTOMATIC GRINDER FOR THREAD MILLING. CUTTERS

This grinder is provided with three-wheel heads and will automatically grind both the sides and tops of cutters simultaneously. Accurate graduations are provided in order to obtain the desired angles.

### SPECIFICATIONS

RANGE . . .	Travel of Grinding Wheel Spindles . . . . .	$\frac{1}{8}$ "
	Capacity Cutter, diameter, maximum . . . . .	$3\frac{1}{2}$ "
	Graduation in degrees, any desired angle obtainable.	
GRINDING WHEELS	Grinding Wheels, $2\frac{1}{2}$ " x $\frac{1}{8}$ " and $\frac{3}{8}$ " Hole.	
SPEEDS . . .	Spindle Speed, R. P. M. . . . .	7000
	Pulley (Counter., tight and loose) . . . . .	$6'' \times 1\frac{5}{8}$ "
	Belt Width (Spindle Pulley), $\frac{1}{8}$ " Twisted Rawhide.	
	Belt Width (Machine Driving), $\frac{1}{4}$ " round.	
	Belt Width (Counter., tight and loose) . . . . .	$1\frac{1}{2}$ "
	Countershaft Speed, R. P. M. . . . .	400
FLOOR SPACE	Floor Space . . . . .	22" Circle
WEIGHTS . . .	Machine, Regular Equipment, net pounds . . . . .	265
	Crating Material (domestic), approximate pounds . . . . .	50
	Boxing Material (foreign), approximate pounds . . . . .	200
	Box, cubic feet . . . . .	24
REGULAR EQUIPMENT	The Machine, with 3 Index Plates (24, 30 and 34 teeth). 3 Grinding Wheels. 2 Countershafts. 1 Cutter Adapter, either $\frac{7}{8}$ ", $\frac{3}{4}$ " or 1" diameter. (Spindle end is $\frac{5}{8}$ " diameter). Set of Wrenches.	

Code words, page 265.



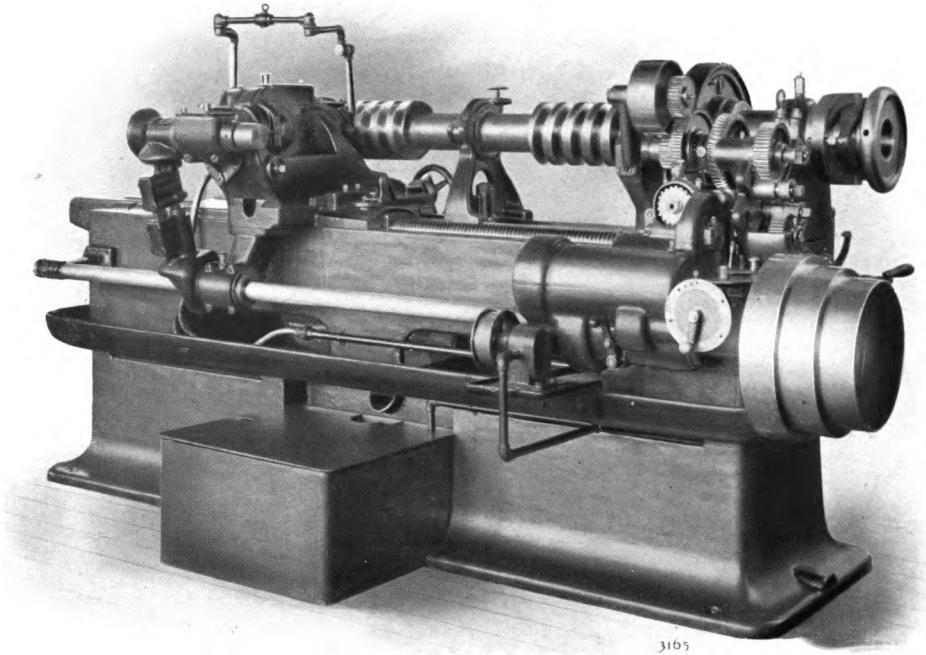
(Patented)  
12 x 48-inch Thread Milling Machine

## 12 X 48-INCH THREAD MILLING MACHINE

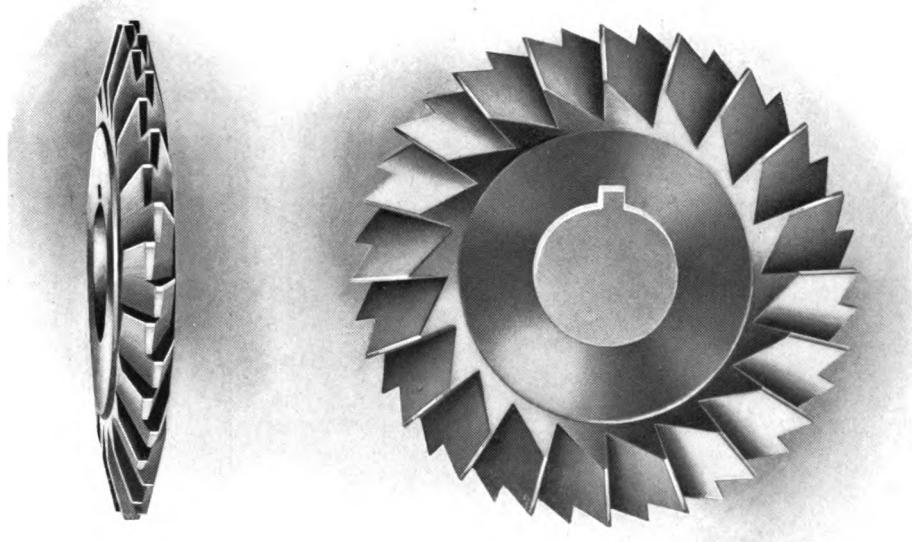
This machine is particularly designed for heavy work such as large elevator and gun-mount worms, heavy screws and other work, which is beyond the capacity of the 6-inch machine.

## SPECIFICATIONS

RANGE . . . .	Length that can be cut between Centers . . . . .	48"
	Diameter that can be cut . . . . .	12"
	Lead that can be cut, minimum and maximum . . . . .	6" Pi. to 96" Lead
	Depth that can be cut . . . . .	1 $\frac{3}{8}$ "
	Collet Capacity . . . . .	3 $\frac{1}{2}$ "
	Hole through Spindle . . . . .	3 $\frac{9}{16}$ "
	Follow Rest Capacity . . . . .	4"
	Index Ring (Regular), 24 notches.	
	Lead Screw (Regular), 1" Lead; (Metric), 24 m/m	
	Lead.	
CUTTERS . . . .	Diameters, Regular Cutter Head . . . . .	4", 4 $\frac{1}{2}$ ", 5", 5 $\frac{1}{2}$ ", 6"
	Diameters, Oversize Cutter Head, maximum . . . . .	6 $\frac{1}{2}$ "
	Hole, Regular Cutter Head . . . . .	1 $\frac{3}{8}$ "
	Hole, Oversize Cutter Head . . . . .	1 $\frac{7}{8}$ "
SPEEDS . . . .	Work Spindle Speed Changes for each Cutter Speed . . . . .	24
	Spindle Speed, minimum . . . . .	1 rev. in 37 min.
	Spindle Speed, maximum . . . . .	1 rev. in 1 $\frac{1}{4}$ min.
	Cutter Spindle Speeds (6), R. P. M. . . . .	31 to 65
	Countershaft Speeds, R. P. M. . . . .	320 and 440
	Pulleys (Countershaft, tight and loose) . . . . .	11" and 15" x 6 $\frac{1}{4}$ "
FLOOR SPACE	Floor Space . . . . .	50" x 9' 5"
WEIGHTS . . . .	Machine, Regular Equipment, net pounds . . . . .	6800
	Crating Material (domestic), approximate pounds . . . . .	800
	Boxing Material (foreign), approximate pounds . . . . .	1800
	Box, cubic feet . . . . .	217
REGULAR EQUIPMENT	Machine, with Oil Pump, Tank and Piping. 1 Master Collet, 3 $\frac{1}{2}$ " diameter. 1 Collet Bushing (round), any size up to 3 $\frac{1}{4}$ " diameter. 1 Tailstock Bushing, any size up to 3 $\frac{1}{2}$ ". 1 Cutter (any pitch specified). 1 Follow Rest, with Adjustable Jaws. 1 Index Ring (24 notches). 17 Change Gears. 2 Countershafts and Set of Wrenches.	

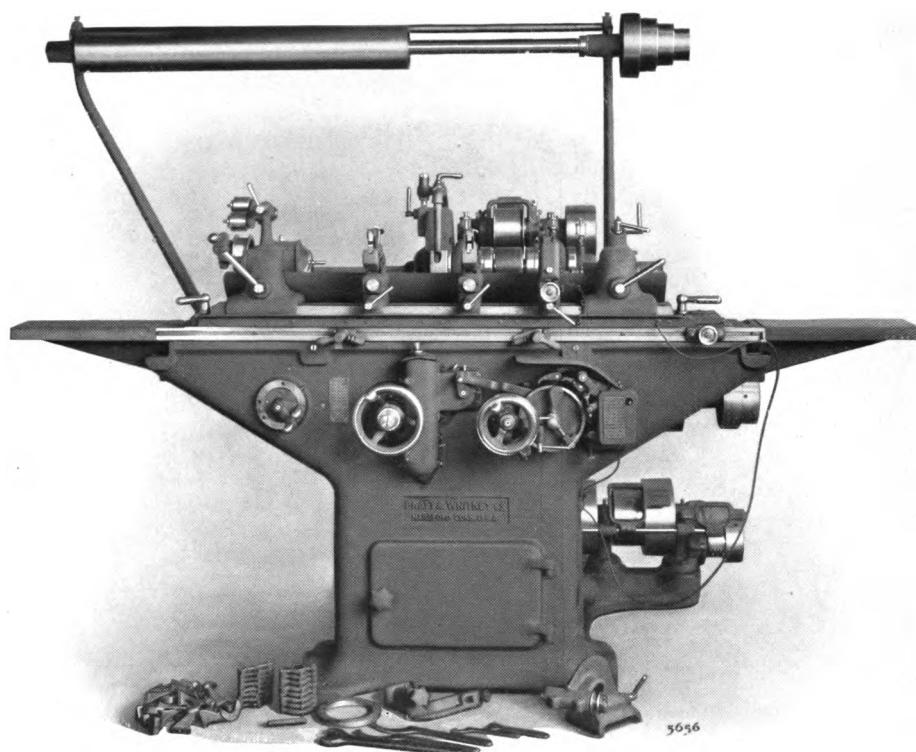


Rear View: 12 x 48-inch Thread Milling Machine



(Patented)

Thread Milling Cutter



(Patented)

4 x 30-inch Cylindrical Automatic Sizing Grinder

## 4 X 30-INCH CYLINDRICAL AUTOMATIC SIZING GRINDER

In the design are embodied many new important improvements which greatly increase its production capacity and also make possible a greater degree of accuracy.

**Automatic Sizing Device** A very simple device, very easy to operate, which, after setting to the required diameter, will automatically grind any number of pieces to the exact size irrespective of wear of wheel. In operation it controls and utilizes both the roughing and finishing feeds, thereby obtaining the maximum output.

**Back-rest** Rigid, Automatic Positive Feeding Type, which automatically follows up and correctly supports the work without yielding, at a pressure easily governed to meet any requirement. In action it readily demonstrates its superiority over either the yielding or hand adjusted type.

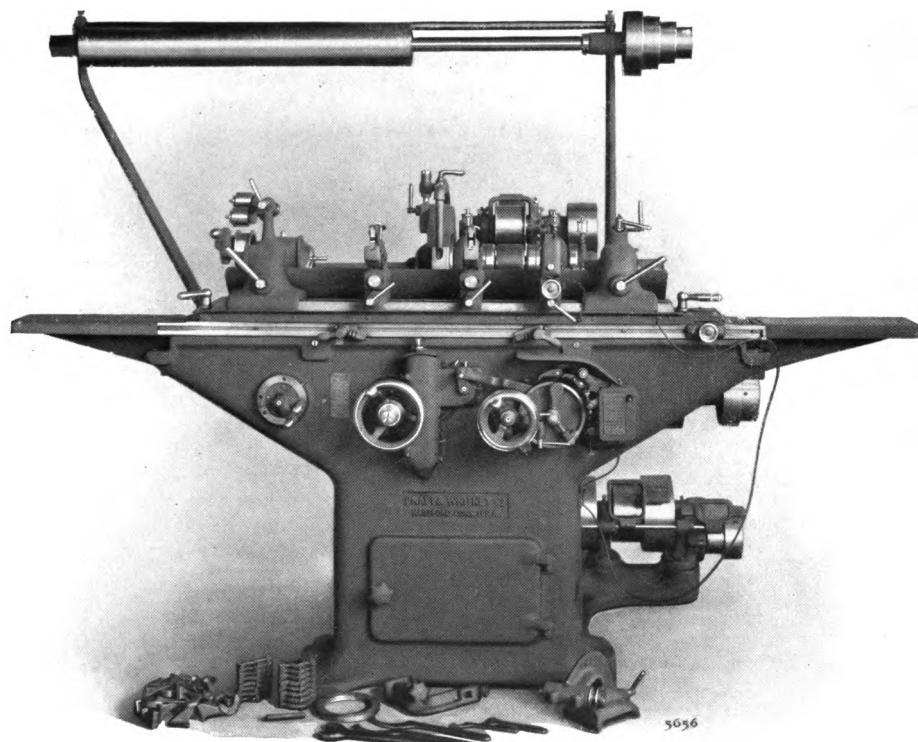
**Overhead Driving Mechanism** Consists of but a tight and loose pulley countershaft. The other necessary driving parts have been simplified and placed within easy reach of the operator by being made a part of the machine proper.

### SPECIFICATIONS

RANGE . . .	Center Distance, maximum . . . . .	30"
	Swing over Table . . . . .	4"
	Taper, per foot, maximum . . . . .	2"
GRINDING WHEELS	Diameter . . . . .	12"
	Width . . . . .	½" to 1¾"
	Hole . . . . .	5"
WHEEL SPINDLE	Tool Steel (H. & G.); Cylindrical Bearings, diameter . . . . .	1¾" and 1⅓" x 5"
	Boxes, Bronze; conical, on O. D., adjustable for wear.	
	*Taper Hole in Head and Tailstock Spindles, Jarno Taper, No. 5.	
SPEEDS . . .	Wheel Speeds (2), R. P. M. . . . .	1890 and 2980
	Work Speeds (4), R. P. M. . . . .	100 to 384
	Pulley (Counter, tight and loose) . . . . .	12" x 5¼"
	Belt Width (Wheel Spindle Driving Pulley) . . . . .	3"
	Countershaft Speed, R. P. M. . . . .	410
FEEDS . . .	Table Feeds (6), inches per minute . . . . .	21 to 101
	Wheel Feeds, ½ to 12 teeth feed, reducing diameter of work . . . . .	.000125" to .003"
FLOOR SPACE	Floor Space . . . . .	10' 8" x 46¼"
WEIGHTS . .	Machine, with Regular Equipment, net pounds . . . . .	4000
	Crating Material (domestic), approximate pounds . . . . .	350
	Boxing Material (foreign), approximate pounds . . . . .	1100
	Box, cubic feet . . . . .	180
REGULAR EQUIPMENT	The Machine, with Automatic Sizing Device. 1 Grinding Wheel. 1 Wheel Truing Device. 1 Center Grinding Attachment. 2 Universal Back-rests. 36 Back-rest Shoes (2 each, ¼" to 2"). 16 Work Dogs (½" to 2¼"). Set of Wrenches and Countershaft.	

\*For detailed information, see "Tapers", page 247.

Code words, page 265.



(Patented)

6 x 48-inch Cylindrical Automatic Sizing Grinder

## 6 X 48-INCH CYLINDRICAL AUTOMATIC SIZING GRINDER

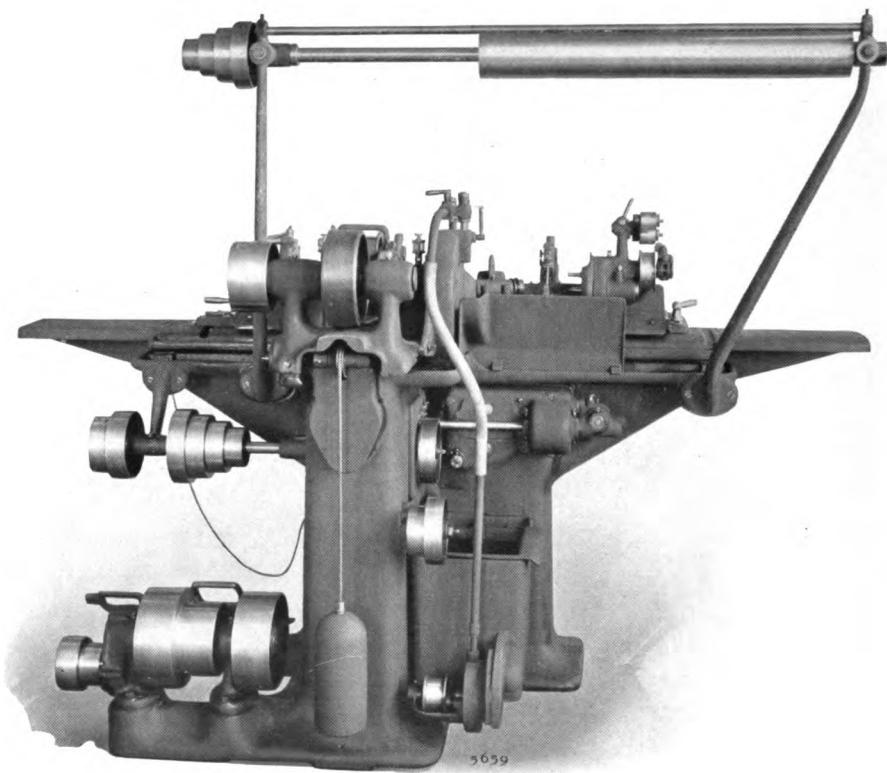
This Grinder is similar in design to the 4 x 30-inch, but its greater range makes it suitable for a large variety of work beyond the capacity of the smaller machine.

### SPECIFICATIONS

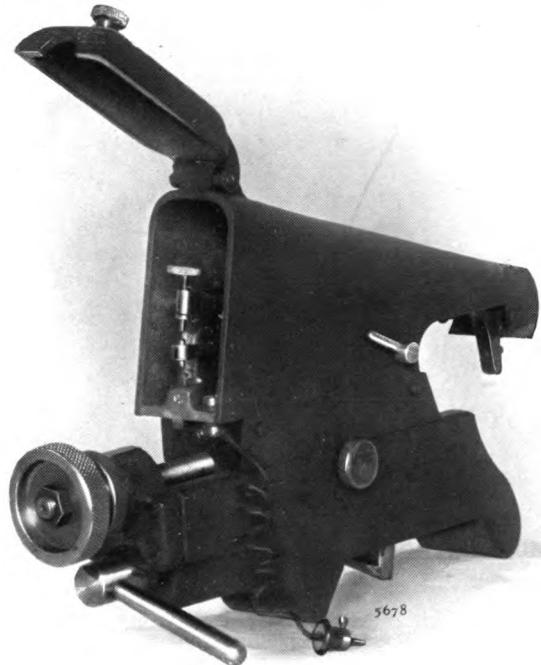
RANGE . . . . .	Center Distance, maximum . . . . .	48"
	Swing over Bed . . . . .	6"
	Taper, per foot, maximum . . . . .	2"
<hr/>		
GRINDING WHEELS . . . . .	Diameter . . . . .	12"
	Width . . . . .	1" to 2½"
	Hole . . . . .	5"
<hr/>		
WHEEL SPINDLE . . . . .	Tool Steel (H. & G.) ; Cylindrical Bearings, diameter . . . . .	1 ¾" and 1 ¾" x 5"
	Boxes, Bronze; conical on O. D., adjustable for wear.	
	*Taper Hole in Head and Tailstock Spindles, Jarno Taper, No. 8.	
<hr/>		
SPEEDS . . . . .	Wheel Speeds (2), R. P. M. . . . .	1890 and 2980
	Work Speeds (4), R. P. M. . . . .	82 to 313
	Pulley (Counter, tight and loose) . . . . .	12" x 5¼"
	Belt Width (Wheel Spindle Driving Pulley) . . . . .	3"
	Countershaft Speed, R. P. M. . . . .	410
<hr/>		
FEEDS . . . . .	Table Feeds (6), inches per minute . . . . .	21 to 101
	Wheel Feeds, ½ to 12 teeth feed, reducing diameter of work . . . . .	.000125" to .003"
<hr/>		
FLOOR SPACE . . . . .	Floor Space . . . . .	13' 3" x 50 ¾"
<hr/>		
WEIGHTS . . . . .	Machine, with Regular Equipment, net pounds . . . . .	4400
	Crating Material (domestic), approximate pounds . . . . .	400
	Boxing Material (foreign), approximate pounds . . . . .	1200
	Box, cubic feet . . . . .	190
<hr/>		
REGULAR EQUIPMENT . . . . .	The Machine, with Automatic Sizing Device.	
	1 Grinding Wheel. 1 Wheel Truing Device.	
	1 Center Grinding Attachment.	
	2 Universal Back-rests.	
	36 Back-rest Shoes (2 each, ¾" to 2").	
	18 Work Dogs (½" to 2 ¾").	
	Set of Wrenches and Countershaft.	

\* For detailed information, see "Tapers", page 247.

Code words, page 265.



Cylindrical Grinder: Rear View



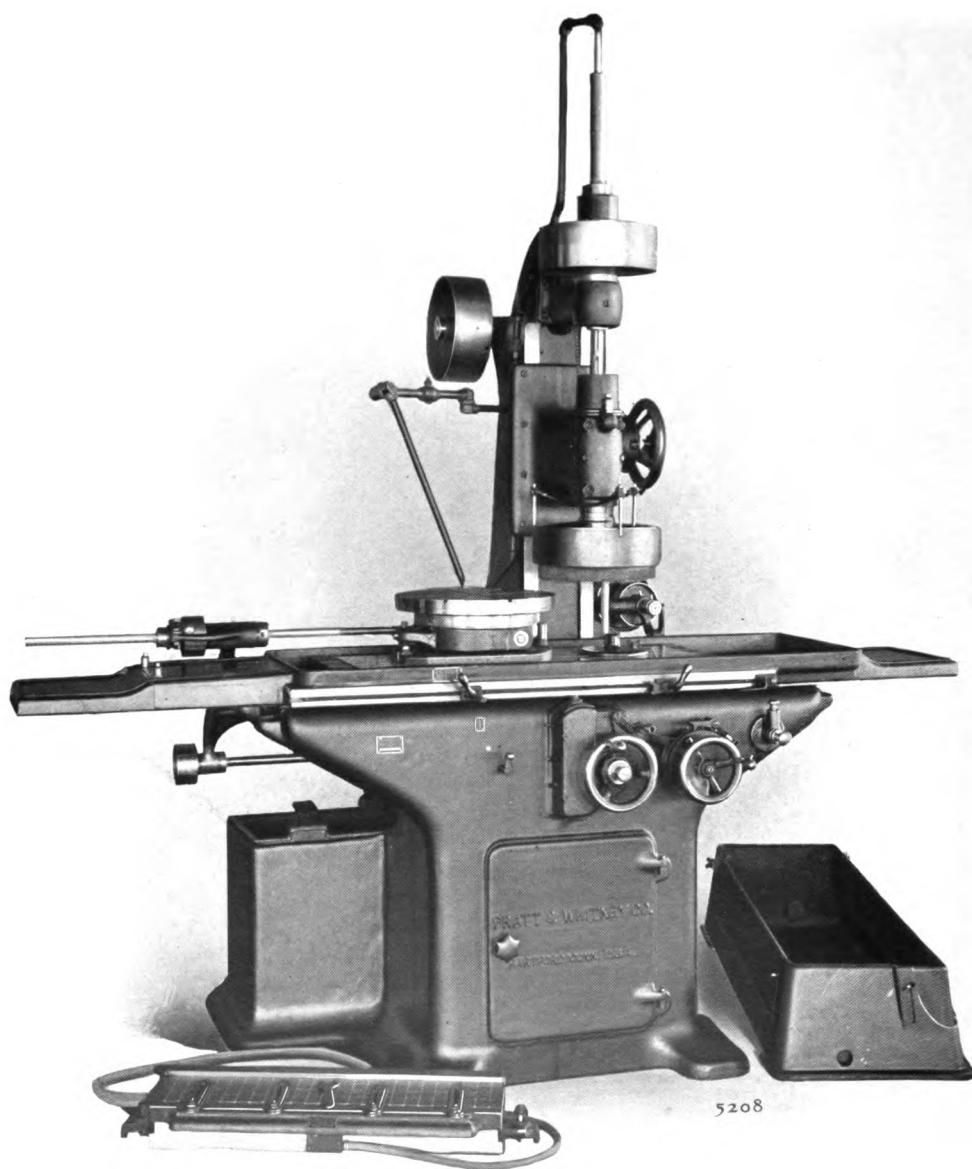
(Patented)

Automatic Sizing Device: 4 x 30 and 6 x 48-inch Cylindrical Grinders



56778

Automatic Positive Feeding Back-rests for Cylindrical Grinders



(Patented)

3-foot Vertical Surface Grinder

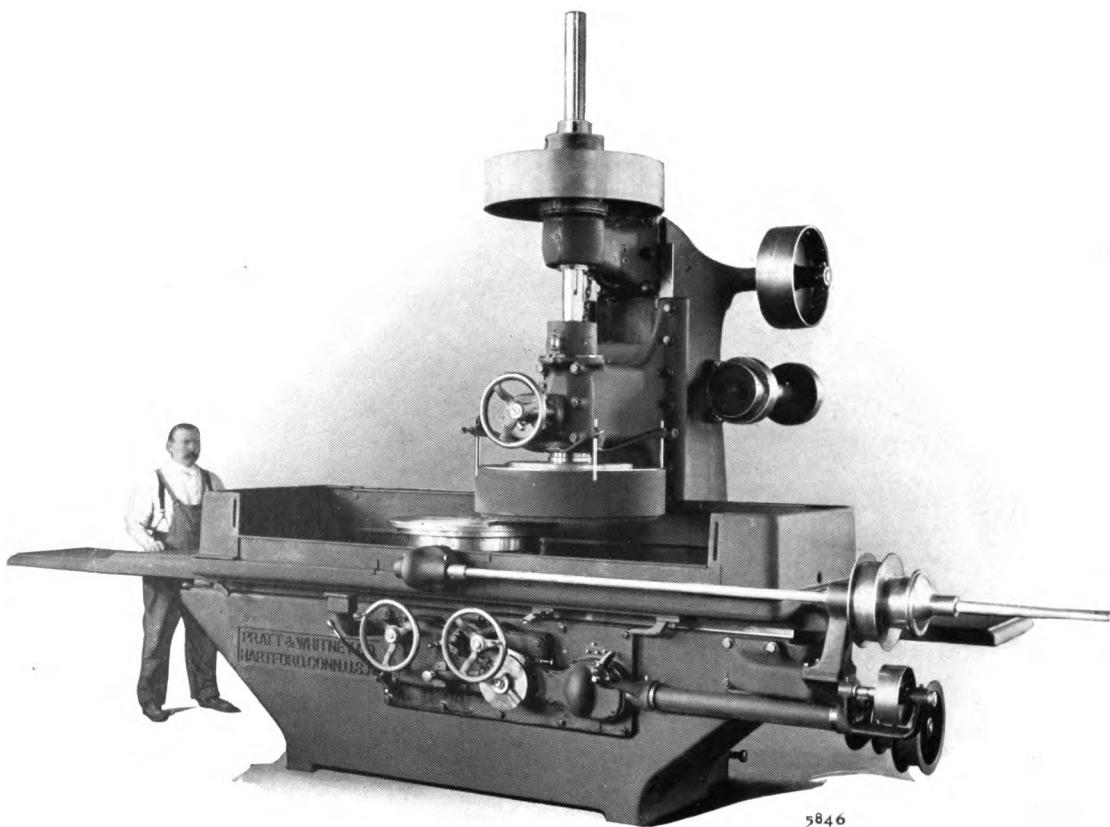
## 3-FOOT VERTICAL SURFACE GRINDER

This machine, of entirely new design, is not only handling the regular lines of vertical grinding, but is also rapidly replacing the Planer and Milling Machine on a large variety of work where too much metal does not have to be removed, doing the work with greater accuracy and at a fraction of previous costs.

### SPECIFICATIONS

RANGE . . . . .	Table Working Surface . . . . .	$10\frac{3}{4}'' \times 36''$
	Table Top to (new) Grinding Wheel, maximum . . . . .	$13''$
	Table Travel, maximum . . . . .	$36''$
ROTARY CHUCK . . . . .	(Plain), diameter, $16''$ ; height, $4\frac{1}{2}''$ . *(Magnetic), diameter, $16''$ ; height, $8\frac{1}{4}''$ .	
*RECTANGULAR MAGNETIC CHUCK . . . . .	Working Surface, $7\frac{1}{4}'' \times 31''$ ; height, $4''$ .	
WHEELS . . . . .	Diameter, $12''$ ; height, $4''$ ; thickness, $1\frac{1}{4}''$ . (Wheels and Mounts, $14''$ diameter, furnished to order).	
SPEEDS . . . . .	Spindle Speed, R. P. M. . . . .	$1133$
	Pulley (Spindle) . . . . .	$12'' \times 4\frac{1}{4}''$
	Pulley (Driving on Counter.) . . . . .	$20'' \times 6\frac{1}{4}''$
	Pulleys (Counter, tight and loose) . . . . .	$14'' \times 8''$
	Belt Width (Spindle Pulley) . . . . .	$4''$
	Belt Width (Counter, Driving Pulleys) . . . . .	$6''$
	Belt Width (Counter, tight and loose Pulleys) . . . . .	$8''$
	Revolving Chuck Speeds (2), R. P. M. . . . .	68 and 140
	Countershaft Speed, R. P. M. . . . .	$425$
FEEDS . . . . .	Table Power Feed (2), inches per minute . . . . .	$51.3''$ and $105.2''$
	Table Power Feed, per rev. of Spindle . . . . .	$.045''$ and $.093''$
	Table Hand Feed, per rev. of Hand Wheel . . . . .	$1.14''$
	Head, Vertical, 1 to 10 teeth, giving . . . . .	$.0002''$ to $.002''$
FLOOR SPACE . . . . .	Floor Space . . . . .	$61\frac{1}{2}'' \times 136''$
WEIGHTS . . . . .	Machine, Regular Equipment, net pounds . . . . .	4700
	Crating Material (domestic), approximate pounds . . . . .	800
	Boxing Material (foreign), approximate pounds . . . . .	1200
	Boxes (2), cubic feet . . . . .	252
PLAIN EQUIPMENT . . . . .	The Machine, with Water Pump and suitable Piping. 1 Grinding Wheel. Wheel Truing Device. Set of Wrenches. Countershaft (tight and loose Pulley). (When machine is ordered with both Plain and Magnetic Chucks two Emery Wheels are furnished).	

\*When Magnetic Chucks are ordered ascertain voltage for which they must be arranged.  
Code words, page 265.



5846

(Patented)  
6-foot Vertical Surface Grinder

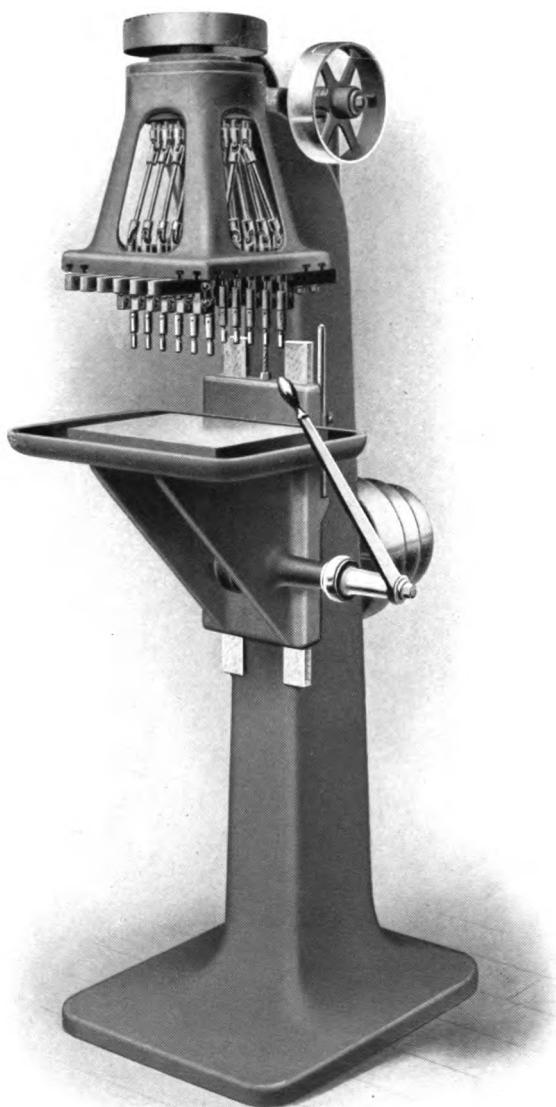
## 6-FOOT VERTICAL SURFACE GRINDER

The design and construction of this larger machine are very similar to the smaller one, the same distinctive features which tend toward rigidity and accuracy being retained. This machine, although weighing twenty-four thousand pounds, is a precision tool of extreme accuracy, every precaution necessary to obtain this result being exercised in its manufacture.

### SPECIFICATIONS

RANGE . . .	Table Working Surface . . . . .	6' x 20"
	Table Top to (new) Grinding Wheel, maximum . . . . .	17"
	Table Travel, maximum . . . . .	6'
ROTARY CHUCK . . .	(Plain), diameter, 30"; height, 9".	
	*(Magnetic), diameter, 30"; height, 12".	
RECTANGULAR MAGNETIC CHUCK . . .	Working Surface, 21" x 63½"; height, 3¾".	
WHEELS . . .	Diameter, 30"; height, 6½"; thickness, 4".	
SPEEDS . . .	Spindle Speed, R. P. M. . . . .	550
	Pulley (Spindle), diameter . . . . .	30"
	Belt Width (Spindle Pulley) . . . . .	7"
	Belt Width (Motor Driving Pulley) . . . . .	10"
	Revolving Chuck Speeds (2), R. P. M. . . . .	25 and 63
	Motor Speed, R. P. M., approximate . . . . .	900
FEEDS . . .	Table Power Feed (2), inches per minute. . . . .	48 and 122
	Table Hand Feed, per revolution of Hand Wheel . . . . .	1"
	Head Vertical Feed; 1 to 8 teeth, giving . . . . .	.0005" to .004"
FLOOR SPACE . . .	Floor Space, including Motor Space . . . . .	24' x 10'
WEIGHTS . . .	Machine, Regular Equipment, net pounds . . . . .	24000
	Crating Material (domestic), approximate pounds . . . . .	1500
	Boxing Material (foreign), approximate pounds . . . . .	4000
	Boxes (2), cubic feet . . . . .	525
PLAIN EQUIPMENT . . .	The Machine, Motor Driven, with 50 H. P. Motor. Water Pump and suitable Piping. 1 Grinding Wheel. 1 Wheel Band. Wheel Truing Device. Set of Wrenches.	

\* When Magnetic Chucks are ordered ascertain voltage for which they are to be arranged.  
Code words, page 265.



(Patented)

No. 11 Adjustable Multiple Spindle Drill

## NO. 11 MULTIPLE SPINDLE DRILL

Machines are furnished with either square or rectangular heads, with or without power feed. All heads are fitted with full number of spindle driving gears in all cases, thus, if desired, additional spindles may be added if full number is not originally ordered. Countershift and wrenches are furnished with all machines.

## SPECIFICATIONS

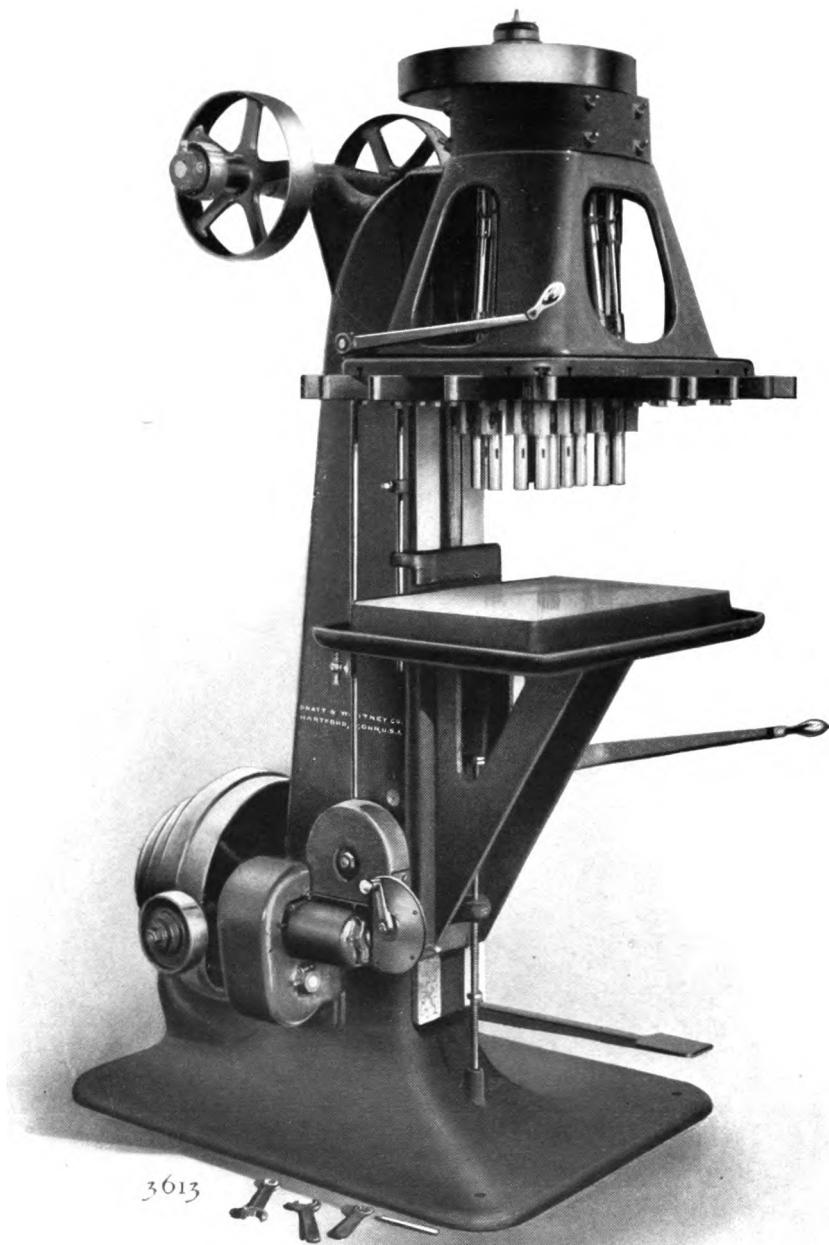
RANGE . . . . .	Table Working Surface (Square Head) . . . . .	12" x 12"
	Table Working Surface (Rectangular Head) . . . . .	12" x 18"
*Table Top to (3/4") Spindle Ends, minimum . . . . .		6"
*Table Top to (3/4") Spindle Ends, maximum . . . . .		15"
Vertical Travel of Knee on Column . . . . .		12"
Column Face to Head Center (Square Head) . . . . .		7 3/4"
Column Face to Head Center (Rectangular Head) . . . . .		7 3/4"
Drilling Capacity (diameter, Drills) . . . . .		3 1/2" to 1/4"
<hr/>		
SPINDLES . . . . .	Spindle Center Distance, minimum diameter of Spindle plus . . . . .	3 1/2"
	Spindle Center Distance, maximum (Square Head) . . . . .	7" x 7"
	Spindle Center Distance, maximum (Rectangular Head) . . . . .	7" x 13"
	Spindles, maximum number in Square Head . . . . .	12
	Spindles, maximum number in Rectangular Head . . . . .	16
	Spindles, Vertical Adjustment (see page 173).	
	Spindle Diameters, largest regularly used . . . . .	3/4"
	Spindles, Taper Hole (see page 173).	
<hr/>		
SPEEDS . . . . .	Spindle Speeds, Square Head (2), R. P. M. . . . .	1110 and 1470
	Spindle Speeds, Rectangular Head (2), R. P. M. . . . .	1100 and 1460
	Pulley (Driving on Head) . . . . .	12" x 2"
	Pulley (Countershift) . . . . .	10" x 3 1/2"
	Belt Width (Driving Pulley) . . . . .	1 3/4"
	Belt Width (Counter. Pulleys) . . . . .	3 1/4"
	Countershift Speed, R. P. M. . . . .	500
<hr/>		
FEEDS . . . . .	Power to Knee, Square Head (4), R. P. Sp. . . . .	.00096 to .0042
	Power to Knee, Rectangular Head (4), R. P. Sp. . . . .	.00097 to .0043
<hr/>		
FLOOR SPACE . . . . .	Floor Space . . . . .	25" x 33"
<hr/>		
WEIGHTS . . . . .	Machine, Square Head and Counter., net pounds . . . . .	930
	Crating Material (domestic), approximate pounds . . . . .	150
	Boxing Material (foreign), approximate pounds . . . . .	400
	Box, cubic feet . . . . .	53

IMPORTANT—Inquiries for Multiple Spindle Drills should be accompanied by full dimensioned prints of work to be done.

\*Spindles in central positions.

Code words, page 265.

†Special Feeds to order.



(Patented)

No. 12 Adjustable Multiple Spindle Drill

## NO. 12 MULTIPLE SPINDLE DRILL

Machines are furnished with either square or rectangular heads, with or without power feed. All heads are fitted with full number of spindle driving gears in all cases, thus, if desired, additional spindles may be added if full number is not originally ordered. Countershhaft and wrenches are furnished with all machines.

## SPECIFICATIONS

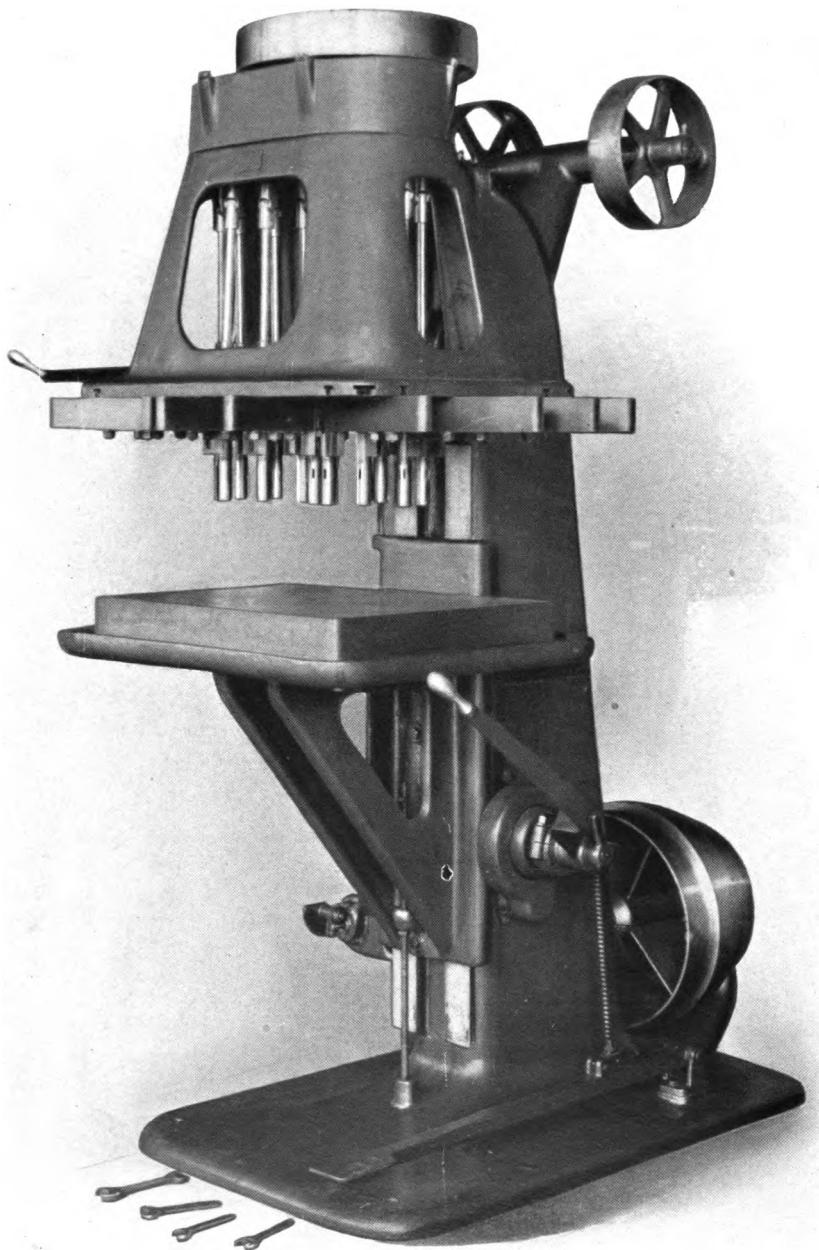
RANGE . . .	Table Working Surface (Square Head) . . . . .	$23\frac{1}{2}'' \times 20\frac{3}{4}''$
	Table Working Surface (Rectangular Head) . . . . .	$29\frac{1}{2}'' \times 18\frac{3}{4}''$
	*Table Top to ( $1\frac{1}{4}$ ) Spindle Ends, minimum . . . . .	$4\frac{1}{2}''$
	*Table Top to ( $1\frac{1}{4}$ ) Spindle Ends, maximum . . . . .	$34''$
	Vertical Travel of Knee on Column . . . . .	$18\frac{1}{2}''$
	Vertical Adjustment of Table in Knee . . . . .	$10\frac{7}{8}''$
	Column Face to Head Center (Square Head) . . . . .	$11\frac{3}{4}''$
	Column Face to Head Center (Rectangular Head) . . . . .	$10\frac{5}{8}''$
	Drilling Capacity (diameter, Drills) . . . . .	$\frac{1}{8}''$ to $\frac{3}{8}''$
SPINDLES . . .	Spindle Center Distance, minimum diameter of Spindle plus. . . . .	$\frac{3}{8}''$
	Spindle Center Distance, maximum (Square Head) . . . . .	$10'' \times 10''$
	Spindle Center Distance, maximum (Rectangular Head) . . . . .	$8'' \times 17''$
	Spindles, maximum number in Square Head . . . . .	12
	Spindles, maximum number in Rectangular Head . . . . .	16
	Spindles, Vertical Adjustment (see page 173). . . . .	
	Spindle Diameters, largest regularly used . . . . .	$1\frac{1}{4}''$
	Spindles, Taper Hole (see page 173). . . . .	
SPEEDS . . .	Spindle Speeds, Square Head (3), R. P. M. . . . .	307 to 582
	Spindle Speeds, Rectangular Head (3), R. P. M. . . . .	297 to 562
	Pulley (Driving on Head) . . . . .	$19'' \times 2\frac{1}{2}''$
	Pulley (Countershhaft) . . . . .	$10'' \times 4\frac{1}{4}''$
	Belt Width (Driving Pulley) . . . . .	$2\frac{1}{4}''$
	Belt Width (Counter. Pulleys) . . . . .	4"
	Countershhaft Speed, R. P. M. . . . .	550
†FEEDS . . .	Power to Knee, Square Head (4), R. P. Sp. . . . .	.0024 to .0076
	Power to Knee, Rectangular Head (4), R. P. Sp. . . . .	.0025 to .0079
FLOOR SPACE	Floor Space . . . . .	$32'' \times 50''$
WEIGHTS . . .	Machine, Square Head and Counter., net pounds . . . . .	2050
	Crating Material (domestic), approximate pounds . . . . .	225
	Boxing Material (foreign), approximate pounds . . . . .	600
	Box, cubic feet . . . . .	99

**IMPORTANT** — Inquiries for Multiple Spindle Drills should be accompanied by full dimensioned prints of work to be done.

\*Spindles in central positions.

Code words, page 265.

†Special Feeds to order.



(Patented)

No. 13 Adjustable Multiple Spindle Drill

## NO. 13 MULTIPLE SPINDLE DRILL

Machines are furnished with either square or rectangular heads, with or without power feed. All heads are fitted with full number of spindle driving gears in all cases, thus, if desired, additional spindles may be added if full number is not originally ordered. Countershaft and wrenches are furnished with all machines.

## SPECIFICATIONS

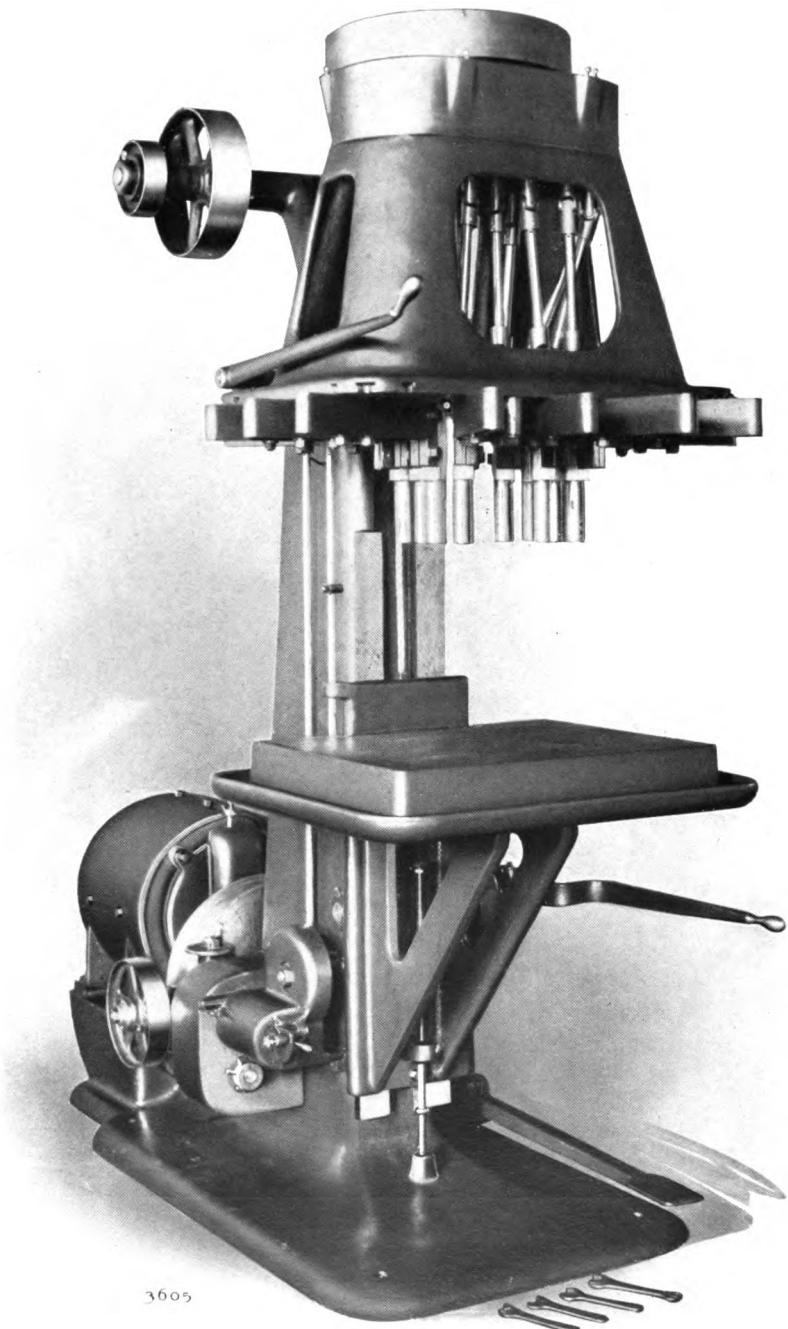
RANGE . . .	Table Working Surface (Square Head) . . . . .	$29\frac{1}{4}'' \times 26\frac{1}{4}''$
	Table Working Surface (Rectangular Head) . . . . .	$34\frac{3}{4}'' \times 26\frac{1}{4}''$
	*Table Top to ( $1\frac{1}{4}$ ) Spindle Ends, minimum . . . . .	7"
	*Table Top to ( $1\frac{1}{4}$ ) Spindle Ends, maximum . . . . .	$36\frac{1}{2}''$
	Vertical Travel of Knee on Column . . . . .	$17\frac{1}{4}''$
	Vertical Adjustment of Table in Knee . . . . .	$12\frac{1}{4}''$
	Column Face to Head Center (Square Head) . . . . .	$15\frac{1}{4}''$
	Column Face to Head Center (Rectangular Head) . . . . .	$14\frac{1}{4}''$
	Drilling Capacity (diameter, Drills) . . . . .	$\frac{3}{8}''$ to $\frac{1}{2}''$
<hr/>		
SPINDLES . . .	Spindle Center Distance, minimum diameter of Spindle plus	$\frac{1}{8}''$
	Spindle Center Distance, maximum (Square Head) . . . . .	$13'' \times 13''$
	Spindle Center Distance, maximum (Rectangular Head) . . . . .	$9'' \times 21''$
	Spindles, maximum number in Square Head . . . . .	12
	Spindles, maximum number in Rectangular Head . . . . .	16
	Spindles, Vertical Adjustment (see page 173).	
	Spindle Diameters, largest regularly used . . . . .	$1\frac{1}{2}''$
	Spindles, Taper Hole (see page 173).	
<hr/>		
SPEEDS . . .	Spindle Speeds, Square Head (3), R. P. M. . . . .	235 to 432
	Spindle Speeds, Rectangular Head (3), R. P. M. . . . .	229 to 422
	Pulley (Driving on Head) . . . . .	$21'' \times 3\frac{1}{2}''$
	Pulley (Countershaft) . . . . .	$12'' \times 4\frac{3}{4}''$
	Belt Width (Driving Pulley) . . . . .	$3\frac{1}{4}''$
	Belt Width (Counter. Pulleys) . . . . .	$4\frac{1}{2}''$
	Countershaft Speed, R. P. M. . . . .	550
<hr/>		
FEEDS . . .	Power to Knee, Square Head (4), R. P. Sp. . . . .	.0025" to .0078"
	Power to Knee, Rectangular Head (4), R. P. Sp. . . . .	.0025" to .008"
<hr/>		
FLOOR SPACE	Floor Space . . . . .	$44'' \times 65''$
<hr/>		
WEIGHTS . . .	Machine, Square Head and Counter., net pounds . . . . .	3770
	Crating Material (domestic), approximate pounds . . . . .	250
	Boxing Material (foreign), approximate pounds . . . . .	850
	Box, cubic feet . . . . .	155

IMPORTANT—Inquiries for Multiple Spindle Drills should be accompanied by full dimensioned prints of work to be done.

\*Spindles in central positions.

Code words, page 265.

†Special Feeds to order.



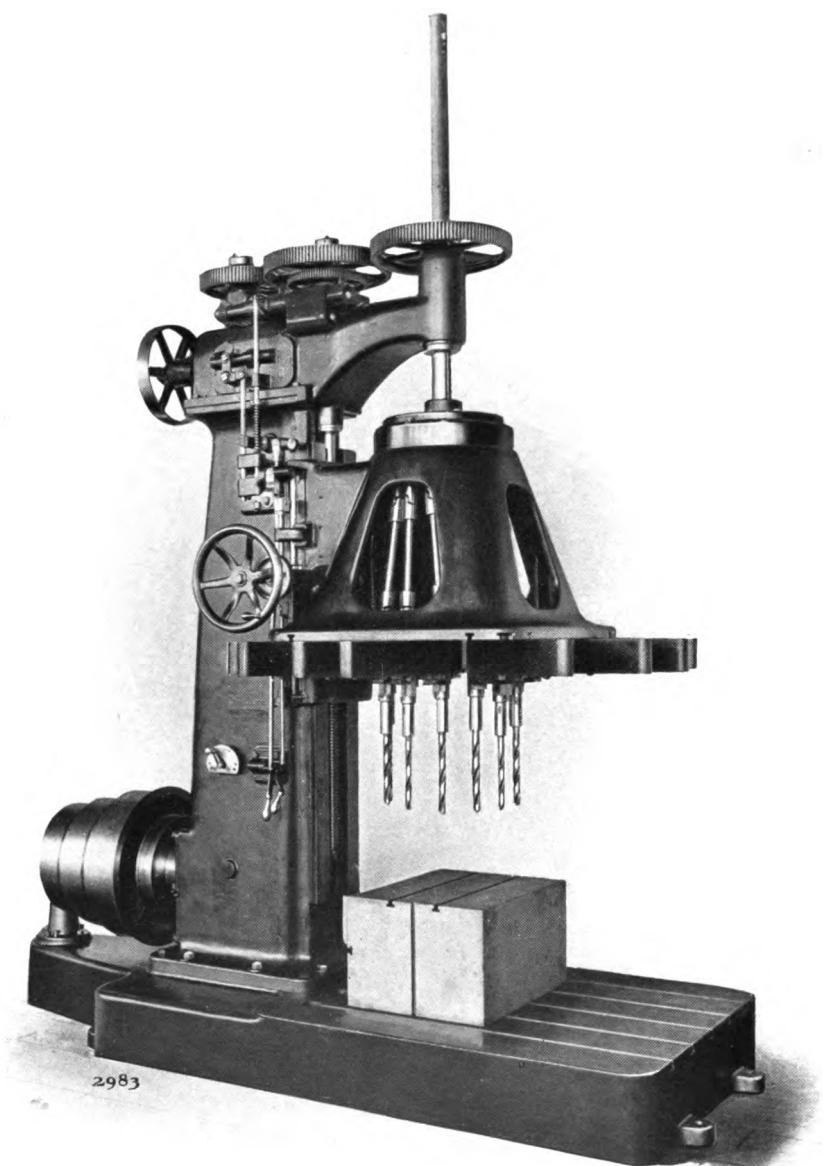
**Adjustable Multiple Spindle Drill, Motor Driven**

## SPINDLES AND DRILLS FOR MULTIPLE SPINDLE DRILLS

Spindles				Sizes of Drills Recommended		
Size Inches	Used on Machine Numbers	Taper * Hole Number	Vertical Adjustment Inches	Steel Inches	Cast-iron Brass Inches	Wood Rubber Inches
$\frac{3}{8}$	11, 12	3 } Drill	$2\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$
$\frac{1}{2}$	11, 12	4 }	$2\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{4}$
$\frac{5}{8}$	11, 12, 13	5 } Collet	$2\frac{1}{4}$	$\frac{7}{8}$	$\frac{1}{4}$	$\frac{5}{8}$
$\frac{3}{4}$	11, 12, 13	5 }	$2\frac{1}{4}$	$\frac{3}{2}$	$\frac{1}{8}$	$\frac{3}{8}$
$\frac{7}{8}$	12, 13	1 }	$2\frac{7}{8}$	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{7}{16}$
1	12, 13	1 }	$2\frac{7}{8}$	$\frac{13}{16}$	$\frac{1}{8}$	$\frac{1}{2}$
$1\frac{1}{8}$	12, 13	1 }	$2\frac{5}{8}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{5}{8}$
$1\frac{1}{4}$	12, 13	2 }	$3\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{4}$
$1\frac{1}{2}$	13	2 }	$3\frac{1}{2}$	$\frac{5}{8}$	$\frac{11}{16}$	1

NOTE—All spindles  $\frac{3}{4}$ " and under are provided with blank drill collet.

\* For detailed information, see "Tapers", page 247.



2983

(Patented)

No. 14 Adjustable Multiple Spindle Drill

## NO. 14 MULTIPLE SPINDLE DRILL

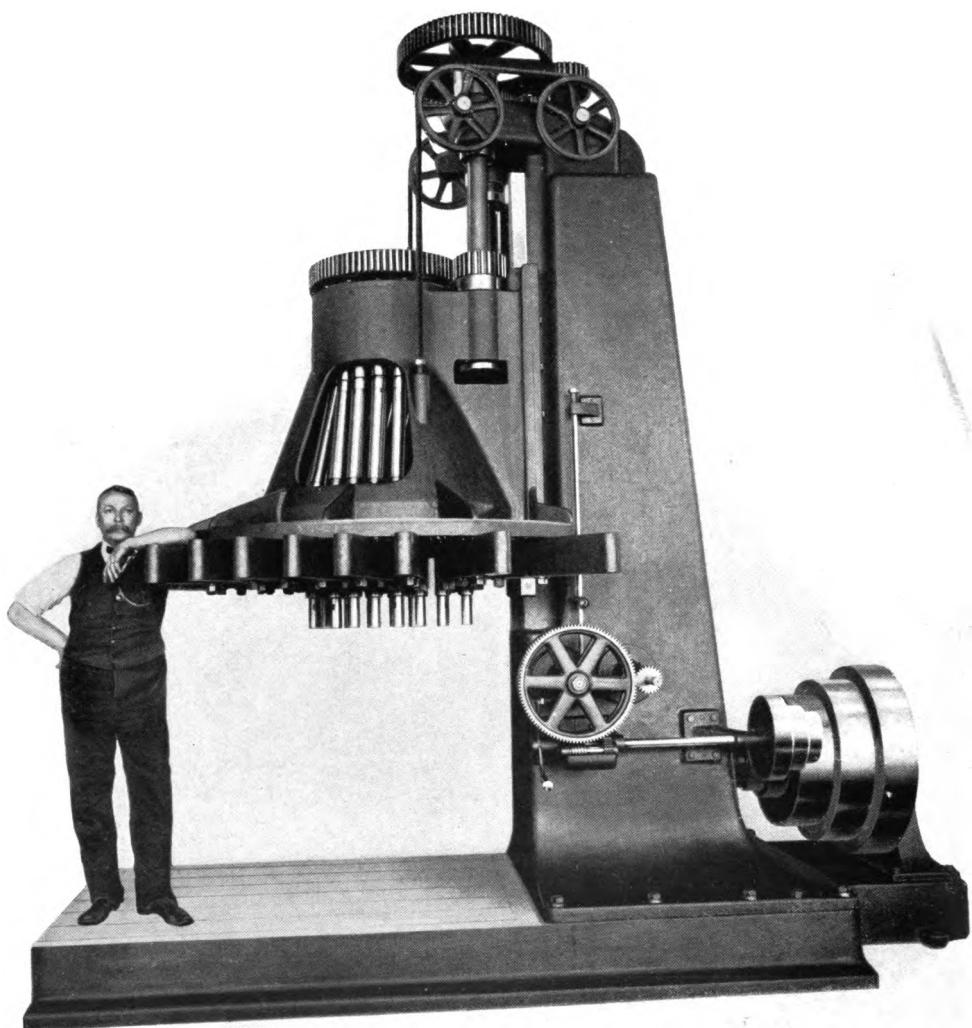
MADE TO ORDER

An exceptionally powerful and rigid machine, calculated to use "high speed" drills (1 inch maximum capacity) to the limit of their efficiency. Furnished with either square or rectangular head. Countershaft and wrenches are furnished with each machine.

## SPECIFICATIONS

RANGE . . . . .	Base Working Surface . . . . .	45" x 52"
	Base Top to (largest) Spindle Ends, maximum . . . . .	40"
	Vertical Travel of Head on Column . . . . .	32"
	Column Face to Head Center (Square Head) . . . . .	18"
	Column Face to Head Center (Rectangular Head) . . . . .	18"
	Drilling Capacity (diameter, Drills) . . . . .	½" to 1"
	T-slots in Base (5); ¾" wide; 7½" apart.	
BOX TABLE . . . . .	(To order only), dimensions . . . . .	15" x 21" x 27"
	T-slots, 1 1/8" wide.	
SPINDLES . . . . .	Spindle Center Distance, minimum diameter of Spds. plus . . . . .	1 1/8"
	Spindle Center Distance, maximum (Square Heads) . . . . .	20" x 20" and 26" x 26"
	Spindle Center Distance, maximum (Rectangular Heads) . . . . .	20" x 32"
	Spindles in Square Head, maximum number . . . . .	12
	Spindles in Rectangular Head, maximum number . . . . .	16
	Spindle, Vertical Adjustment (2 ¼" Spindle) . . . . .	3"
	Spindle Diameters, largest regularly used . . . . .	2 ¼"
	Spindle Taper Hole, No. 3 Morse.	
SPEEDS . . . . .	Spindle Speeds (6), R. P. M. . . . .	239 to 464
	Cone Diameters (3), largest diameter . . . . .	23 3/4"
	Pulley (Counter., tight and loose) . . . . .	18" x 8"
	Belt Width (Cone) . . . . .	6"
	Belt Width (Counter. Pulleys) . . . . .	7 3/4"
	Countershaft Speed, R. P. M. . . . .	280, 320
FEEDS . . . . .	Power to Head (4), R. P. Sp. . . . .	.004" to 0123"
	(Quick return by power or hand in either direction).	
FLOOR SPACE . . . . .	Floor Space . . . . .	7' 2 1/2" x 9' 11 7/8"
WEIGHTS . . . . .	Machine, with Square Head, net pounds . . . . .	14000
	Crating Material (domestic), approximate pounds . . . . .	1000
	Boxing Material (foreign), approximate pounds . . . . .	3000
	Box, cubic feet . . . . .	511

Code words, page 265.



2029

(Patented)

No. 7, Type G, Adjustable Multiple Spindle Drill

# NO. 7, TYPE "G", MULTIPLE SPINDLE DRILL

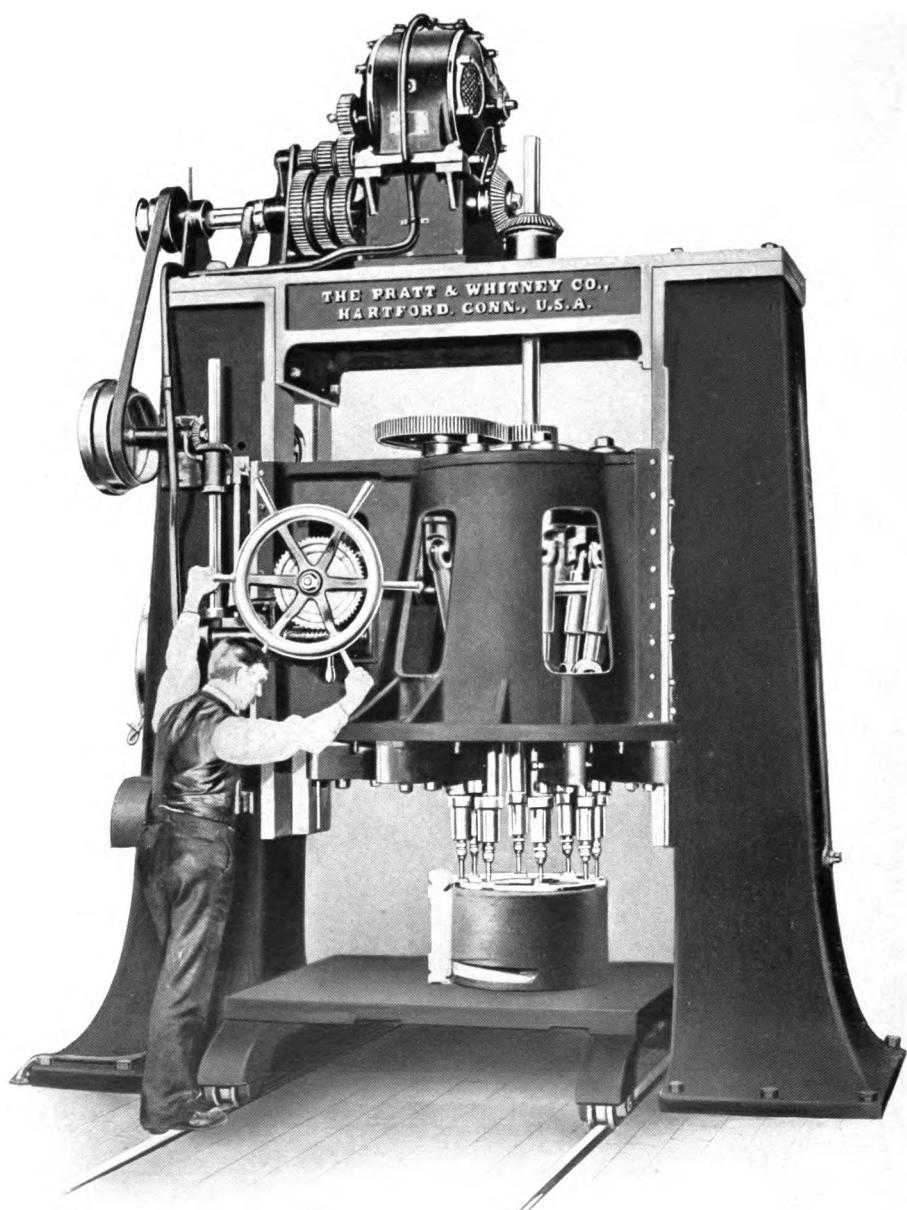
MADE TO ORDER

Designed for drilling valves and cylinder flanges up to 36-inch diameter. Furnished with 24 or 36-inch head. Regular number of spindles 16, but may be varied in building to suit requirements.

## SPECIFICATIONS

RANGE . . .	Base Working Surface . . . . .	50" x 48"
	Base Top to Spindle Ends, maximum . . . . .	6 1/2"
	Vertical Travel of Head on Column . . . . .	24"
	Column Face to Head Center (24" Head) . . . . .	18"
	Column Face to Head Center (36" Head) . . . . .	20"
	Drilling Capacity (diameter, Drills) . . . . .	5 1/2" to 1 1/4"
SPINDLES . . .	Spindle Center Distance, minimum . . . . .	3 1/2"
	Spindle Center Distance, maximum (24" Head) . . . . .	24"
	Spindle Center Distance, maximum (36" Head) . . . . .	36"
	Spindles, number used . . . . .	8 to 16
	Spindle, Vertical Adjustment . . . . .	4"
	Spindle, diameter . . . . .	2 1/2"
	Spindle Taper Hole, No. 3 Morse.	
SPEEDS . . .	Spindle Speeds (3), R. P. M. . . . .	97 to 199
	Cone Diameters (3), large diameter . . . . .	33"
	Pulley (Counter, tight and loose) . . . . .	28" x 8"
	Belt Width (Cone) . . . . .	6"
	Belt Width (Counter, Pulley) . . . . .	7 3/4"
	Countershaft Speed, R. P. M. . . . .	380
FEEDS . . .	Power to Head, R. P. Sp. . . . .	.005" to .012"
FLOOR SPACE	Floor Space . . . . .	12' 6" x 8' 4"
WEIGHTS . . .	Machine, with Countershaft, net pounds . . . . .	28200
	Crating Material (domestic), approximate pounds . . . . .	1200
	Boxing Material (foreign), approximate pounds . . . . .	5500
	Box, cubic feet . . . . .	700

Code words, page 265.



(Patented)

No. 10, Type H, Adjustable Multiple Spindle Drill  
Motor Driven: Special Arrangement for Track Table

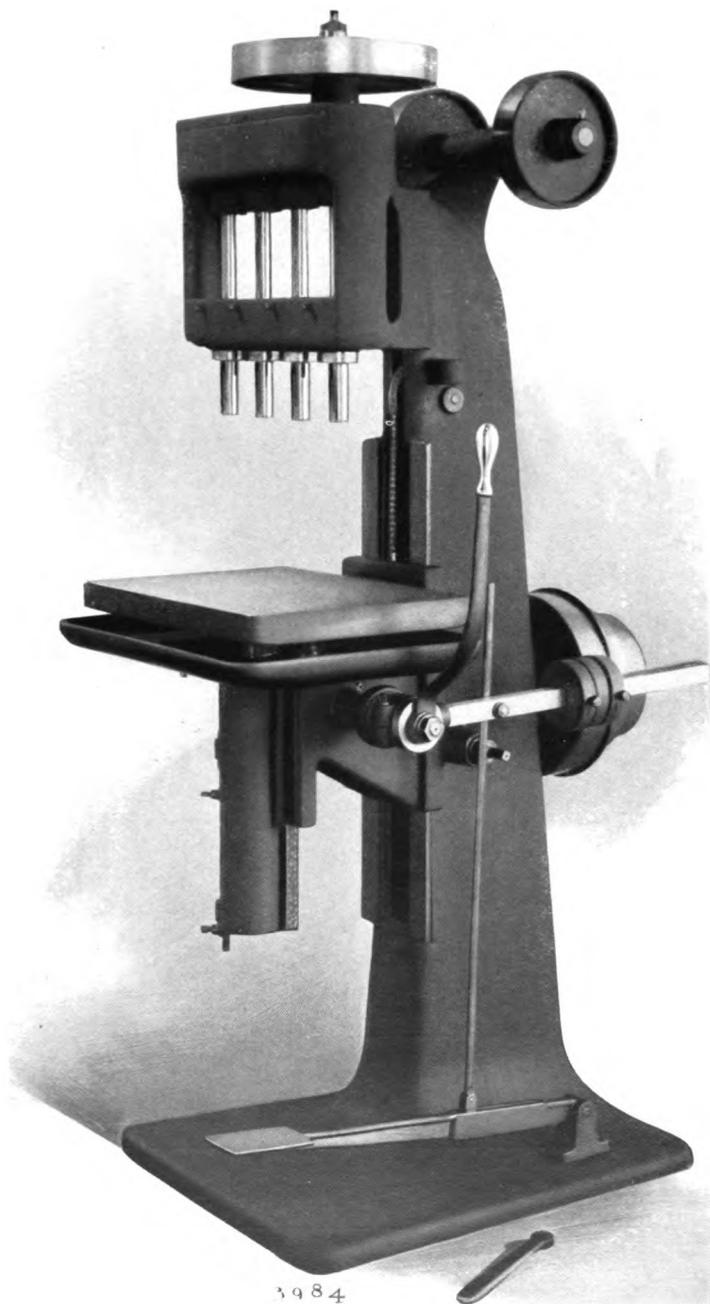
**NO. 10, TYPE "H", MULTIPLE SPINDLE DRILL**  
**MADE TO ORDER**

As regularly made, uprights are mounted upon bed-plate, but they can be specially mounted to accommodate track for truck-table if desired. Heads are made either circular or rectangular. Furnished with motor drive when desired.

**SPECIFICATIONS**

RANGE . . . . .	Base Working Surface . . . . .	78" x 50"
	Base Top to Spindle Ends (Rectangular Head) . . . . .	52"
	Base Top to Spindle Ends (Circular Head) . . . . .	47"
	Vertical Travel of Head on Uprights . . . . .	24"
	Uprights, distance between . . . . .	72 $\frac{1}{2}$ "
	Drilling Capacity (diameter, Drills) . . . . .	1 $\frac{5}{8}$ "
<hr/>		
SPINDLES . . . . .	Spindle Center Distance, minimum . . . . .	4 $\frac{1}{2}$ "
	Spindle Center Distance (Rectangular Head), minimum . . . . .	24 $\frac{5}{8}$ " x 13 $\frac{1}{2}$ "
	Spindle Center Distance (Rectangular Head), maximum . . . . .	40" x 32"
	Spindle Center Distance (Circular Head), minimum . . . . .	18" Circle
	Spindle Center Distance (Circular Head), maximum . . . . .	37" Circle
	Spindles, number used . . . . .	10 or less
	Spindles, diameter . . . . .	3 $\frac{1}{2}$ "
	Spindle, Vertical Adjustment . . . . .	4 $\frac{1}{4}$ "
	Spindle Taper Hole, No. 4 Morse.	
<hr/>		
SPEEDS . . . . .	Spindle Speeds vary ; approximate, R. P. M. . . . .	65 to 244
	Cone Diameters (3), large diameter . . . . .	28"
	Pulley (Counter, tight and loose) . . . . .	22" x 6 $\frac{1}{2}$ "
	Belt Width (Cone) . . . . .	4"
	Belt Width (Counter, Pulleys) . . . . .	6 $\frac{1}{4}$ "
	Countershaft Speed, R. P. M. . . . .	385
<hr/>		
FEEDS . . . . .	Power to Head, R. P. Sp., varies ; approximate . . . . .	.002" to .007"
	(Quick return by power or hand in either direction).	
<hr/>		
FLOOR SPACE . . . . .	Floor Space . . . . .	150" x 61"
<hr/>		
WEIGHTS . . . . .	10-Spindle Machine, with Countershaft . . . . .	30500
	Crating Material (domestic), approximate pounds . . . . .	1500
	Boxing Material (foreign), approximate pounds . . . . .	6000
	Box, cubic feet . . . . .	700

Code words, page 265.



No. 11 Gang Drill

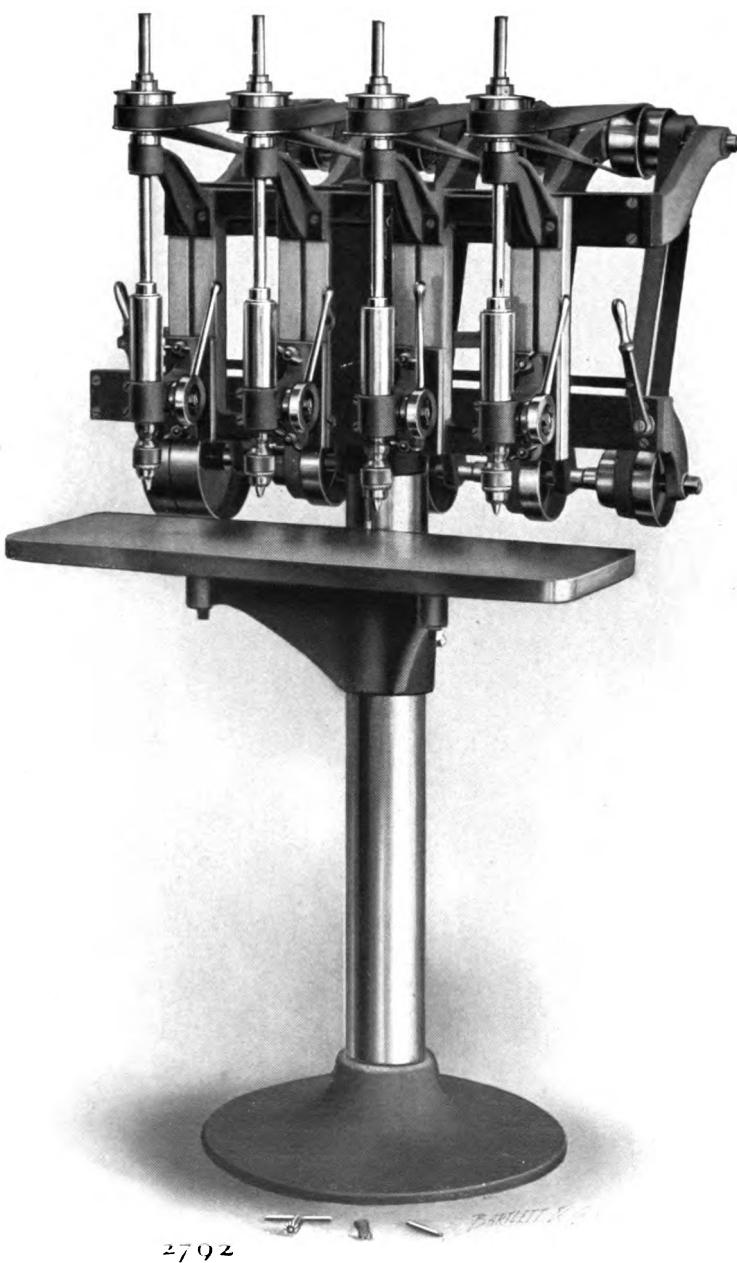
## NO. 11 GANG DRILL

This machine is particularly adapted for drilling work having a number of holes of varying diameters. It is also used on work where a series of operations can be performed by means of drills, counterbores or other piloted tools.

## SPECIFICATIONS

RANGE . . .	Table Working Surface . . . . .	15" x 20"
	Table Top to Spindle Ends, maximum . . . . .	19"
	Vertical Movement of Table . . . . .	7"
	Vertical Adjustment of Knee on Column . . . . .	12"
	Column Face to Spindle Center . . . . .	8"
	Drilling Capacity (diameter, Drills) . . . . .	¾"
SPINDLES . . .	Number (4); Tool Steel; Bearings, cylindrical; Lower Spindles Gear Driven. . . . .	1 ½" x 2 ¼"
	Boxes, Bronze.	
	Taper Hole, No. 2 Morse.	
	Center Distance between Spindles . . . . .	4"
SPEEDS . . .	Spindle Speeds, 2 Central Spindles (4), R. P. M. . . . .	289 to 477
	Spindle Speeds, L. H. Outer Spindle (4), R. P. M. . . . .	463 to 764
	Spindle Speeds, R. H. Outer Spindle (4), R. P. M. . . . .	723 to 1193
	Pulley (Head) . . . . .	12"
	Cone Diameters (2) . . . . .	8 ¼", 9 ½"
	Pulleys (Counter. Friction) . . . . .	8" x 3 ¼"
	Belt Width (Head Pulley) . . . . .	2"
	Belt Width (Cone) . . . . .	2 ½"
	Belt Width (Counter. Pulleys) . . . . .	3"
	Countershaft Speeds, R. P. M. . . . .	250, 300
FEEDS . . .	To Table; Hand by Lever and Treadle. (Power to order).	
FLOOR SPACE	Floor Space . . . . .	28" x 40"
WEIGHTS . . .	Machine, with Regular Equipment, net pounds . . . . .	1175
	Crating Material (domestic), approximate pounds . . . . .	150
	Boxing Material (foreign), approximate pounds . . . . .	450
	Box, cubic feet . . . . .	53
REGULAR EQUIPMENT	Machine, with Set of Wrenches. Countershaft (two-speed double friction). (Power Feed to Table to order).	

Code words, page 265.



2792

BARTLETT & CO.

Four-spindle Sensitive Drill

## SENSITIVE DRILLS—SPECIFICATIONS

	One Spindle	Two Spindle	Three Spindle	Four Spindle	Bench Drill
Table Working Surface . . . . .	9 1/2" x 12 1/2"	9 1/2" x 19 1/2"	10" x 27 1/2"	12" x 34"	10 1/2" x 14"
Table Top to Chuck, maximum distance . . . . .	33"	32"	30 1/4"	30 1/4"	8 3/4"
Table, Vertical Adjustment . . . . .	30"	30"	26"	26"	
Heads, Vertical Adjustment . . . . .	6"	6"	6"	6"	6"
Drilling Capacity (*diameter Drills) . . . . .	0" to 5/8"	0" to 5/8"	0" to 5/8"	0" to 5/8"	0" to 5/8"
Drilling Capacity, diameter work (Outer Spindle) . . . . .	12"	14"	18"	23"	13"
Drilling Capacity, diameter work (Center Spindle) . . . . .			12"	14"	
Spindles, Vertical Movement . . . . .	2 1/4"	2 1/4"	2 1/4"	2 1/4"	2 1/4"
Spindles, Center Distance apart . . . . .		7"	7"	7"	
Spindle Taper Hole, Morse Taper . . . . .	No. 1	No. 1	No. 1	No. 1	No. 1
Spindle Speeds (3), R.P.M. . . . .	468 to 1505	468 to 1505	468 to 1505	468 to 1505	720 to 2016
Pulley (tight and loose on machine), diameter . . . . .	4"	5"	6"	8"	6"
Speed of tight and loose Pulley, R. P. M. . . . .	450	450	450	450	450
<b>FLOOR SPACE</b>					
Floor Space . . . . .	22" x 30"	22" x 31 1/2"	29 3/4" x 31 1/2"	38" x 33 1/2"	18" x 32"

### WEIGHTS

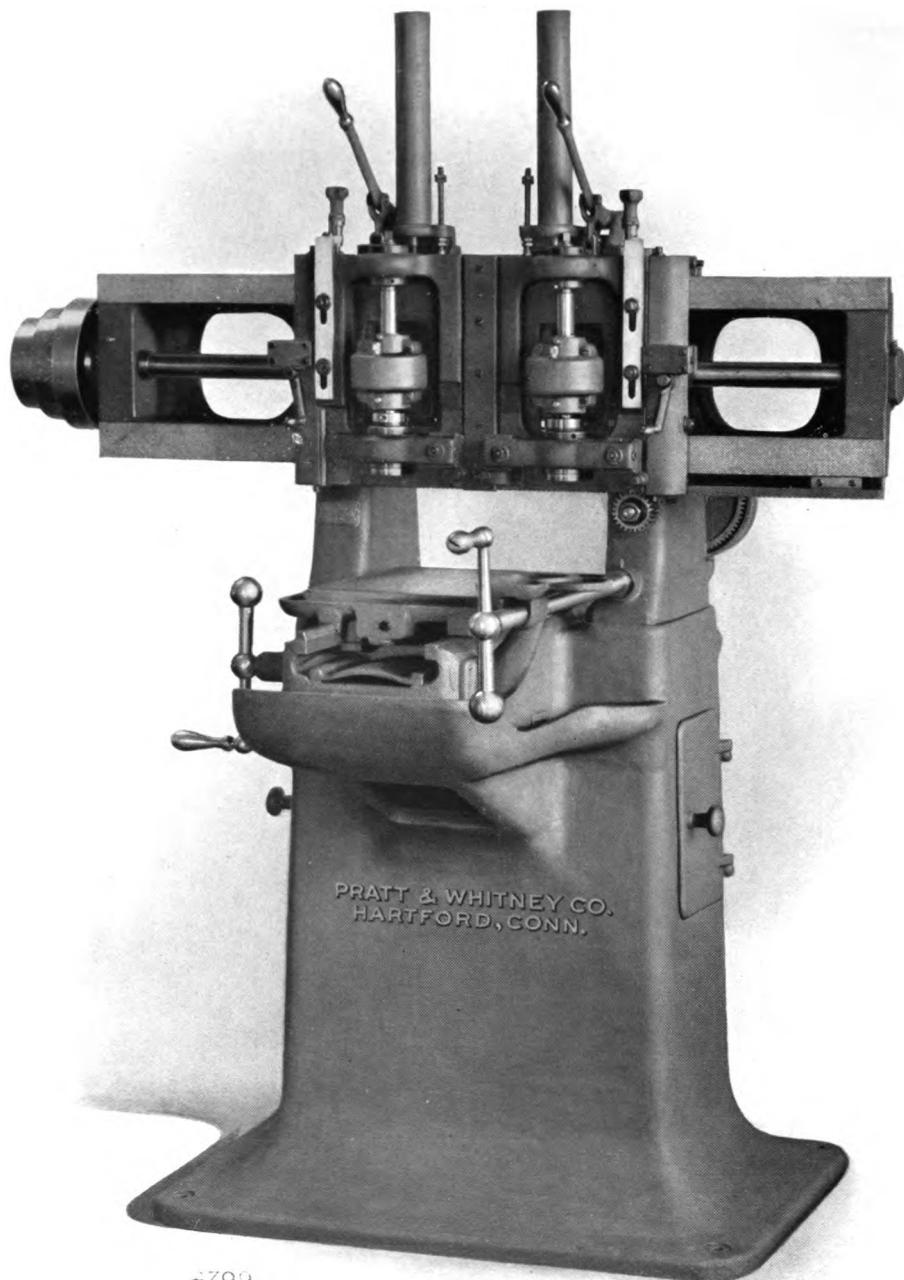
Machine, net pounds . . . . .	310	440	550	700	165
Crating Material (domestic), approx. pounds . . . . .	125	150	175	200	40
Boxing Material (foreign), approximate pounds . . . . .	160	175	200	250	60
Box, cubic feet . . . . .	31	35	44	53	10

### REGULAR EQUIPMENT

The Machine, with Wrenches and belted ready for use.

NOTE—No holes are put in two, three or four-spindle tables unless appendages are ordered.

\* 5/8-inch Drills are often used, in which case drill chuck is removed and taper hole in spindle utilized.  
Code words, page 265.



(Patented)

No. 11 Profiling Machine, Gear Driven

## NO. 11 PROFILING MACHINE

These machines are invaluable for work which can be reproduced from a master form. In gun and sewing machine factories, where they are extensively used, the process of hand-fitting has been practically eliminated upon parts finished in this manner. The machines are made with either gear or belt drive. For high speed work the belt driven machine is recommended, although special high speed gears may be furnished to meet certain requirements.

## SPECIFICATIONS

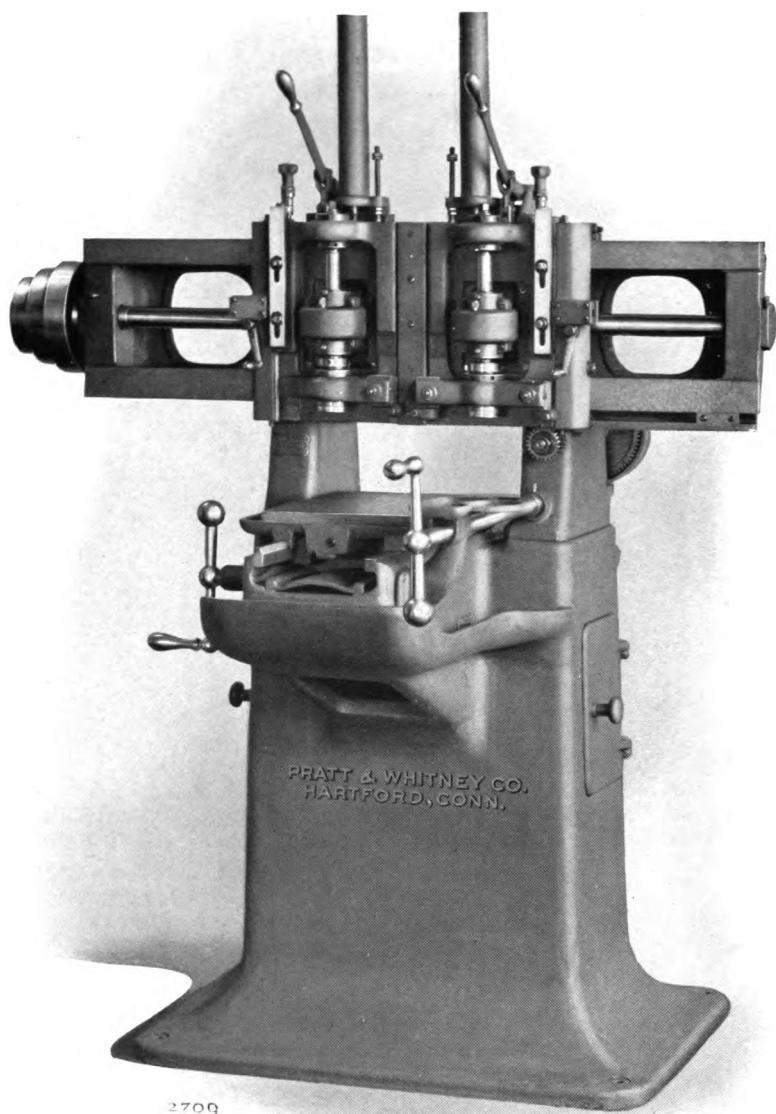
RANGE . . . . .	Table Working Surface . . . . .	8" x 10½"
	*Table Top to Bottom of Cross Slide . . . . .	4"
	Table Longitudinal Movement . . . . .	17¾"
	Cross Slide, Transverse Movement . . . . .	19½"
	Head, Vertical Movement . . . . .	3"
	Uprights, distance between . . . . .	14"
SPINDLES . . . . .	Two Spindles, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear.	1 5/8" x 2 9/16"
	Center Distance between Spindles . . . . .	9"
	†Center Distance between Spindle and Guide-pin . . . . .	3"
	Center Distance, maximum adjustment of Guide-pin . . . . .	1 1/8"
	‡Taper Hole, Jarno Taper, No. 5.	
	Pull-back Rods provided.	
SPEEDS . . . . .	Spindle Speed, Gear Driven (3), R. P. M. . . . .	435 to 860
	Spindle Speed, Belt Driven (3), R. P. M. . . . .	1165 to 2300
	Counter Speed, Gear Driven, R. P. M. . . . .	450
	Counter Speed, Belt Driven, R. P. M. . . . .	480
	Cone Diameters (3), large diameter and width . . . . .	8 7/16" x 2 1/8"
	Pulley (Countershaft), Gear Driven . . . . .	9" x 2 1/4"
	Pulleys (Countershaft), Belt Driven . . . . .	7" x 2 3/4"
FLOOR SPACE . . . . .	Gear Driven Machine . . . . .	55" x 49"
	Belt Driven Machine . . . . .	58" x 65"
WEIGHTS . . . . .	Machine, Regular Equipment, net pounds . . . . .	2100
	Crating Material (domestic), approximate pounds . . . . .	300
	Boxing Material (foreign), approximate pounds . . . . .	650
	Box, cubic feet . . . . .	105
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and suitable Piping; Set of Wrenches; Countershaft (tight and loose Pulley). (Friction Countershaft can be furnished to order).	

\*Raising Blocks to increase this distance furnished to order.

†If other than specified standard, special guide-pin blocks can be furnished to order.

‡Spindles with special tapers furnished to order. For detailed information concerning Jarno Tapers, see "Tapers", page 247.

Code words, page 265.



(Patented)

No. 12 Profiling Machine, Gear Driven

## NO. 12 PROFILING MACHINE

Made with either gear or belt drive. For high speed work the belt driven machine is recommended, although special high speed gears may be furnished to meet certain requirements.

## SPECIFICATIONS

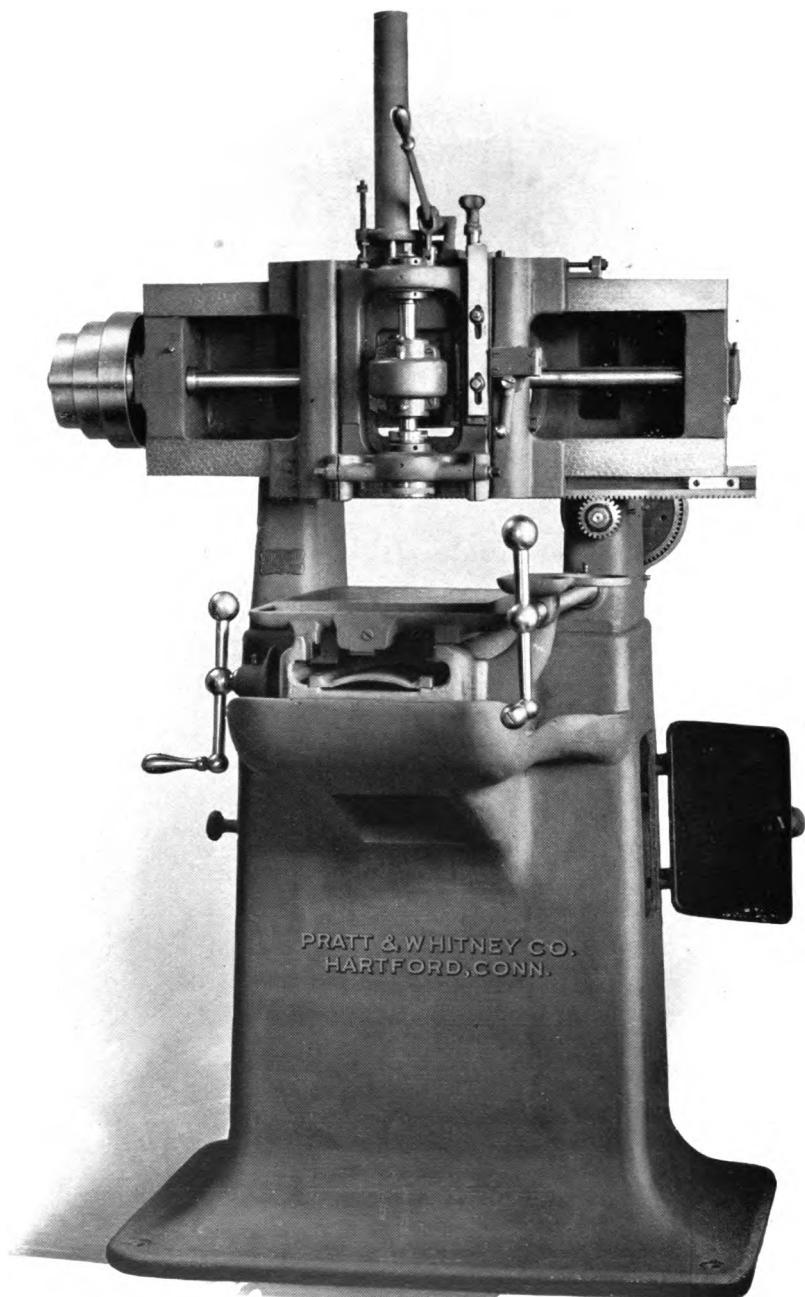
RANGE . . .	Table Working Surface . . . . .	12" x 15"
	*Table Top to Bottom of Cross Slide . . . . .	5 1/4"
	Table Longitudinal Movement . . . . .	23 1/2"
	Cross Slide, Transverse Movement . . . . .	26 3/4"
	Head, Vertical Movement . . . . .	3 3/4"
	Uprights, distance between . . . . .	19"
SPINDLES . . .	Two Spindles, Special Steel ; Bearings, cylindrical ; Front Boxes, Bronze ; conical on O. D., adjustable for wear.	1 9/16" x 2 1/8"
	Center Distance between Spindles . . . . .	12"
	†Center Distance between Spindle and Guide-pin . . . . .	4 1/8"
	Center Distance, maximum adjustment of Guide-pin . . . . .	1 1/8"
	‡Taper Hole, Jarno Taper, No. 7.	
	Pull-back Rods provided.	
SPEEDS . . .	Spindle Speed, Gear Driven (3), R. P. M. . . . .	318 to 716
	Spindle Speed, Belt Driven (3), R. P. M. . . . .	818 to 1850
	Counter Speed, Gear Driven, R. P. M. . . . .	350
	Counter Speed, Belt Driven, R. P. M. . . . .	350
	Cone Diameters (3), large diameter and width . . . . .	12" x 2 5/8"
	Pulley (Countershaft), Gear Driven . . . . .	10" x 3"
	Pulleys (Countershaft), Belt Driven . . . . .	10" x 3"
FLOOR SPACE	Gear Driven Machine . . . . .	72" x 53"
	Belt Driven Machine . . . . .	72" x 65"
WEIGHTS . . .	Machine, Regular Equipment, net pounds . . . . .	2800
	Crating Material (domestic), approximate pounds . . . . .	400
	Boxing Material (foreign), approximate pounds . . . . .	750
	Box, cubic feet . . . . .	144
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and suitable Piping ; Set of Wrenches ; Countershaft (tight and loose Pulley). (Friction Countershaft can be furnished to order).	

\*Raising Blocks to increase this distance furnished to order.

†If other than specified standard, special guide-pin blocks can be furnished to order.

‡Spindles with special tapers furnished to order. For detailed information concerning Jarno Tapers, see "Tapers", page 247.

Code words, page 265.



2527

(Patented)

No. 13 Profiling Machine, Gear Driven

## NO. 13 PROFILING MACHINE

Made with either gear or belt drive. For high speed work the belt driven machine is recommended, although special high speed gears may be furnished to meet certain requirements.

## SPECIFICATIONS

RANGE . . . . .	Table Working Surface . . . . .	12" x 15"
	*Table Top to Bottom of Cross Slide . . . . .	5 $\frac{1}{4}$ "
	Table Longitudinal Movement . . . . .	19"
	Cross Slide, Transverse Movement . . . . .	18"
	Head, Vertical Movement . . . . .	3"
	Uprights, distance between . . . . .	15 $\frac{1}{2}$ "
SPINDLES . . . . .	One Spindle, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear	1 $\frac{1}{2}$ " x 2 $\frac{9}{16}$ "
	†Center Distance between Spindle and Guide-pin . . . . .	4 $\frac{1}{8}$ "
	Center Distance, maximum adjustment of Guide-pin . . . . .	1 $\frac{1}{16}$ "
	‡Taper Hole, Jarno Taper, No. 5.	
	Pull-back Rod provided.	
SPEEDS . . . . .	Spindle Speed, Gear Driven (3), R. P. M. . . . .	435 to 860
	Spindle Speed, Belt Driven (3), R. P. M. . . . .	1165 to 2300
	Counter Speed, Gear Driven, R. P. M. . . . .	450
	Counter Speed, Belt Driven, R. P. M. . . . .	480
	Cone Diameters (3), large diameter and width . . . . .	8 $\frac{7}{16}$ " x 2 $\frac{1}{8}$ "
	Pulleys (Countershaft), Gear Driven . . . . .	9" x 2 $\frac{1}{4}$ "
	Pulleys (Countershaft), Belt Driven . . . . .	7" x 2 $\frac{3}{4}$ "
FLOOR SPACE . . . . .	Gear Driven Machine . . . . .	55" x 49"
	Belt Driven Machine . . . . .	58" x 65"
WEIGHTS . . . . .	Machine, Regular Equipment, net pounds . . . . .	1800
	Crating Material (domestic), approximate pounds . . . . .	250
	Boxing Material (foreign), approximate pounds . . . . .	500
	Box, cubic feet. . . . .	90
REGULAR EQUIPMENT . . . . .	The Machine, with Oil Pump, Tank and suitable Piping; Set of Wrenches; Countershaft (tight and loose Pulley). (Friction Countershaft can be furnished to order).	

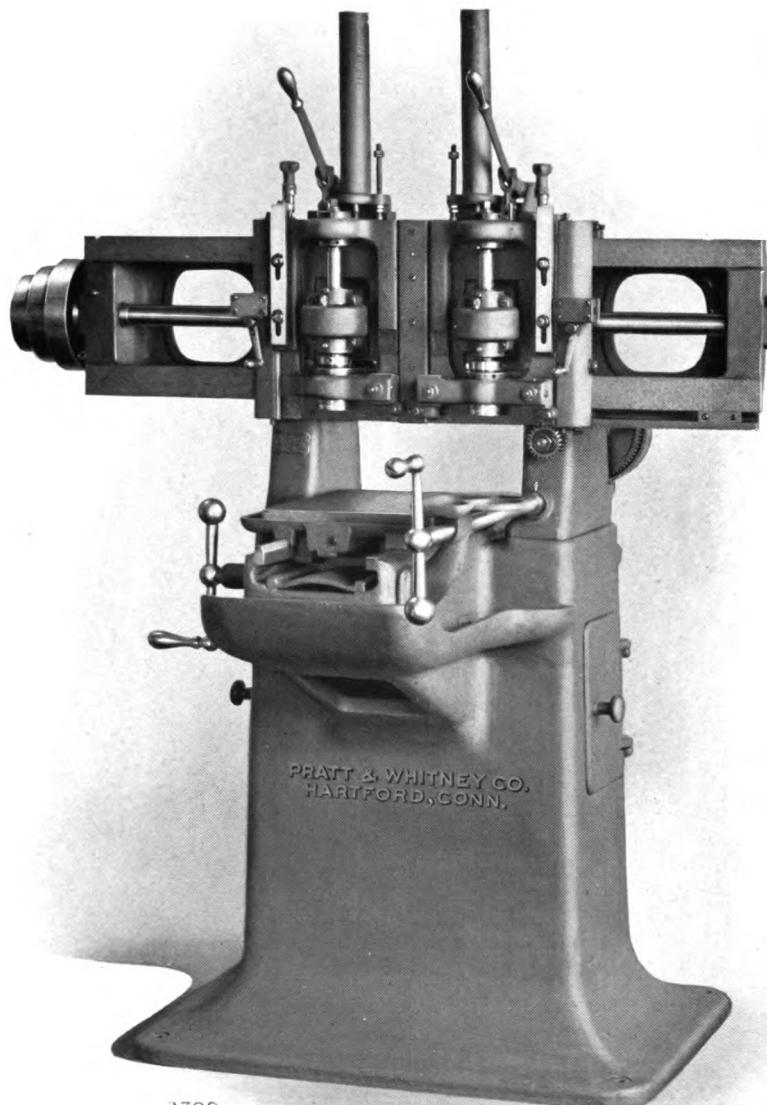
\* Raising Blocks to increase this distance furnished to order.

† If other than specified standard, special guide-pin blocks can be furnished to order.

‡ Spindles with special tapers furnished to order. For detailed information concerning Jarno Tapers, see

"Tapers", page 247.

Code words, page 265.



(Patented)

No. 14 Profiling Machine, Gear Driven

## NO. 14 PROFILING MACHINE

Made with either gear or belt drive. For high speed work the belt driven machine is recommended, although special high speed gears may be furnished to meet certain requirements

## SPECIFICATIONS

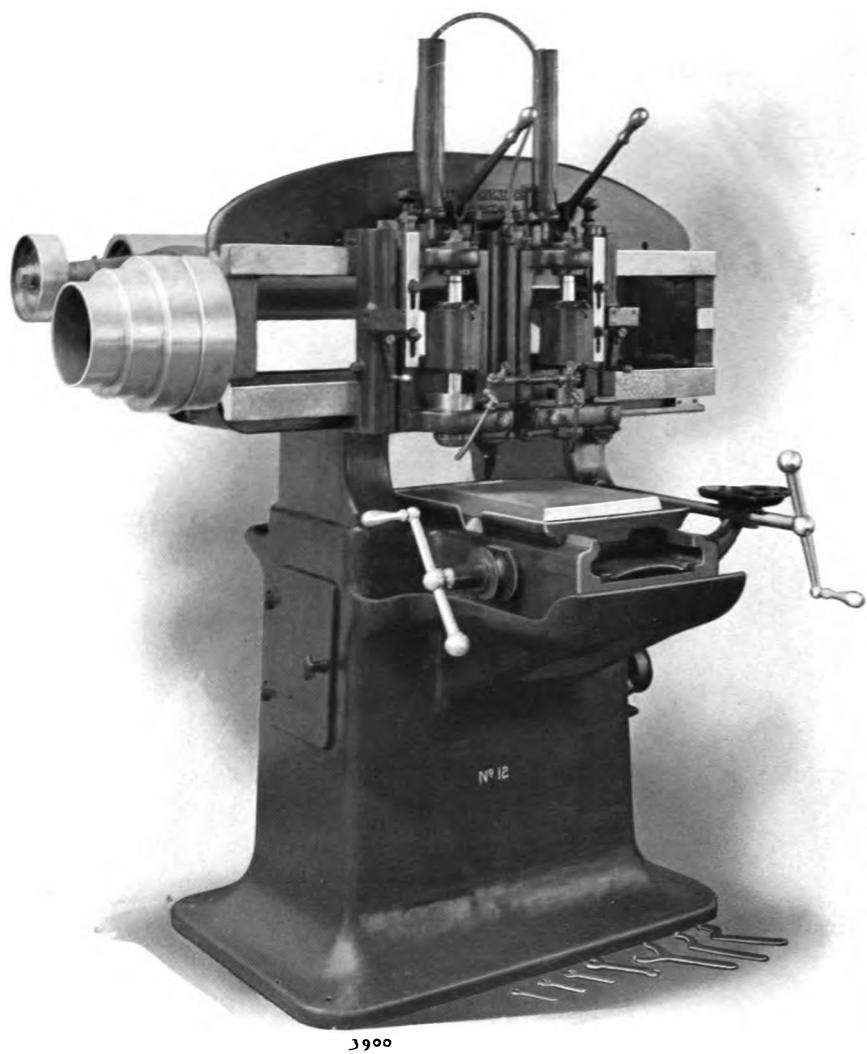
RANGE . . . . .	Table Working Surface . . . . .	12" x 15"
	*Table Top to bottom of Cross Slide . . . . .	5 $\frac{1}{4}$ "
	Table Longitudinal Movement . . . . .	19"
	Cross Slide, Transverse Movement . . . . .	26"
	Head, Vertical Movement . . . . .	3"
	Uprights, distance between . . . . .	15 $\frac{1}{2}$ "
<hr/>		
SPINDLES . . . . .	Two Spindles, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear.	1 $\frac{3}{5}$ " x 2 $\frac{9}{16}$ "
	Center Distance between Spindles . . . . .	11 $\frac{1}{4}$ "
	†Center Distance between Spindle and Guide-pin . . . . .	4 $\frac{1}{8}$ "
	Center Distance, maximum adjustment of Guide-pin . . . . .	1 $\frac{1}{16}$ "
	‡Taper Hole, Jarno Taper, No. 5.	
	Pull-back Rods provided.	
<hr/>		
SPEEDS . . . . .	Spindle Speed, Gear Driven (3), R. P. M. . . . .	435 to 860
	Spindle Speed, Belt Driven (3), R. P. M. . . . .	1165 to 2300
	Counter Speed, Gear Driven, R. P. M. . . . .	450
	Counter Speed, Belt Driven, R. P. M. . . . .	480
	Cone Diameters (3), large diameter and width . . . . .	8 $\frac{7}{8}$ " x 2 $\frac{1}{8}$ "
	Pulley (Countershaft), Gear Driven . . . . .	9" x 2 $\frac{1}{4}$ "
	Pulleys (Countershaft), Belt Driven. . . . .	7" x 2 $\frac{1}{4}$ "
<hr/>		
FLOOR SPACE . . . . .	Gear Driven Machine . . . . .	72" x 49"
	Belt Driven Machine . . . . .	72" x 65"
<hr/>		
WEIGHTS . . . . .	Machine, Regular Equipment, net pounds . . . . .	2100
	Crating Material (domestic), approximate pounds . . . . .	300
	Boxing Material (foreign), approximate pounds . . . . .	650
	Box, cubic feet . . . . .	110
<hr/>		
REGULAR EQUIPMENT . . . . .	The Machine, with Oil Pump, Tank and suitable Piping; Set of Wrenches; Countershaft (tight and loose Pulley). (Friction Countershaft can be furnished to order).	

\*Raising blocks to increase this distance furnished to order.

†If other than specified standard, special guide-pin blocks can be furnished to order.

‡Spindles with special tapers furnished to order. For detailed information concerning Jarno Tapers, see "Tapers", page 247.

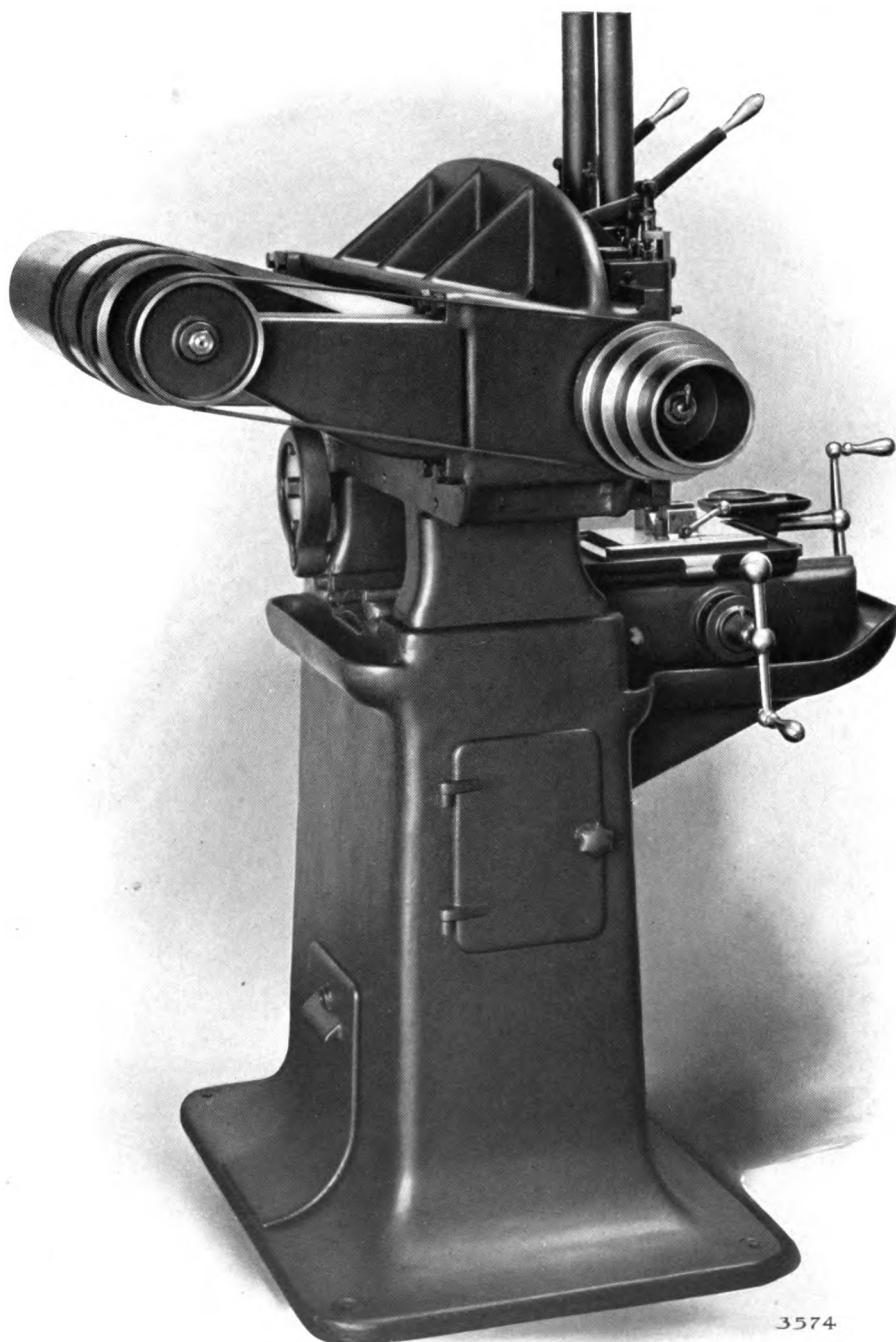
Code words, page 265.



3900

(Patented)

Profiling Machine, Belt Drive

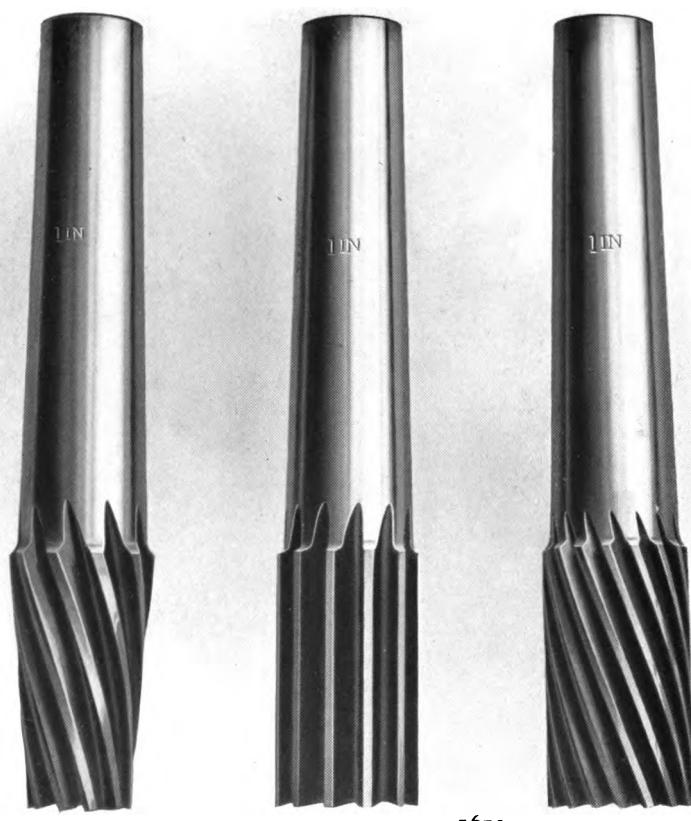


3574

(Patented)

Side View: Profiling Machine, Belt Drive

## Cutters for Profiling Machines



Five-degree Taper Cutter

Straight Cutter

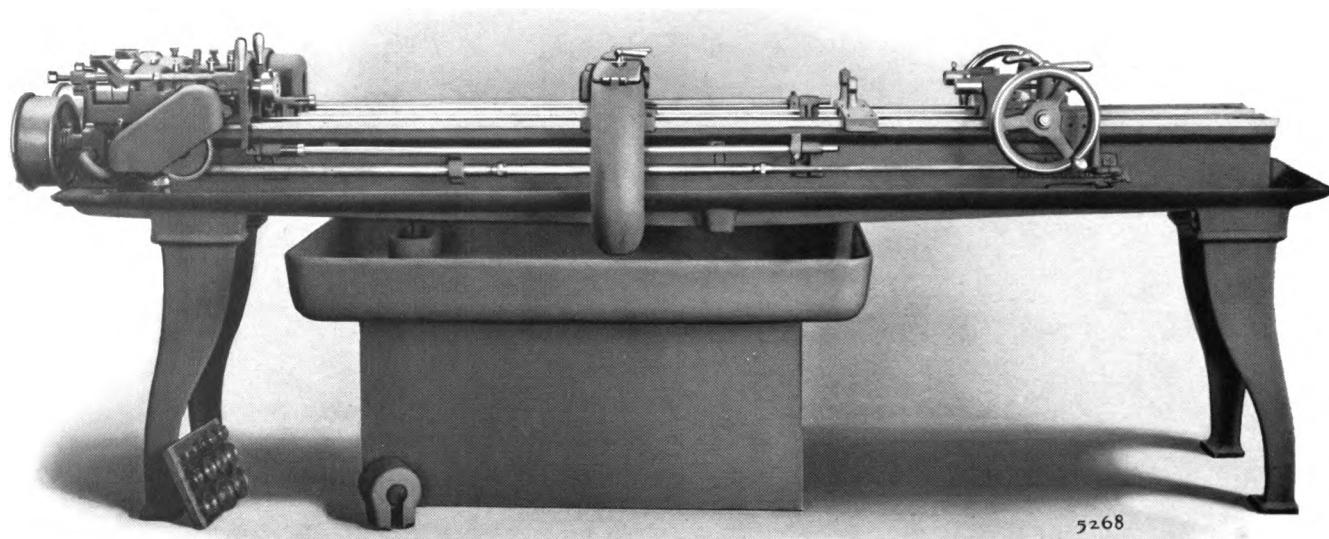
Facing Cutter

## CUTTERS FOR PROFILING MACHINE

Machine Numbers	Style	Size — Inches
11, 12, 13, 14	Straight	$\frac{1}{2}$
11, 12, 13, 14	Straight	$\frac{5}{8}$
11, 12, 13, 14	Straight	$\frac{3}{4}$
12	Straight	$\frac{7}{8}$
12	Straight	1
12	Straight	$1\frac{1}{8}$
11, 13, 14	Facing	$\frac{3}{4}$
11, 12, 13, 14	Facing	1
11, 12, 13, 14	Facing	$1\frac{1}{4}$
12	Facing	$1\frac{1}{2}$
11, 12, 13, 14	.50 Taper	$\frac{1}{2}$
11, 12, 13, 14	.50 Taper	$\frac{5}{8}$
11, 12, 13, 14	.50 Taper	$\frac{3}{4}$
12	.50 Taper	$\frac{7}{8}$
12	.50 Taper	1
12	.50 Taper	$1\frac{1}{8}$

## COLLETS

Collets with No. 3 Jarno or other inside taper can be furnished to fit machine.  
Price quoted upon application.



No. 1 Gun Barrel and Tube Drilling Machine

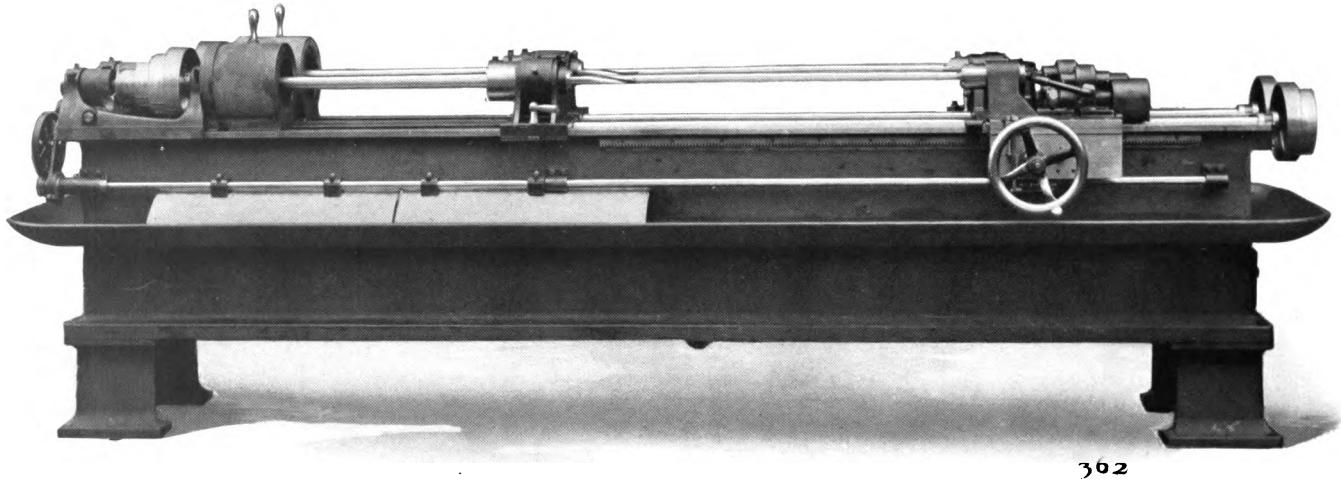
## NO. 1 GUN BARREL AND TUBE DRILLING MACHINE

These machines have practically revolutionized the method of making rifle and gun barrels and are extensively used in arms factories the world over, including the United States Government Arsenals and those of foreign countries. They are also used for deep hole drilling on such work as hollow spindles, locomotive axles, bridge-pins, printing press rolls and work of a like nature.

## SPECIFICATIONS

RANGE . . . .	Length of Bed (A) . . . . .      (A) 6' — (B) 14½"
	Drilling Capacity, length (B) . . . . .      (A) 9½' — (B) 32½"
	Drilling Capacity, diameter . . . . .      1½"
	Swing over Bed . . . . .      6½"
SPEEDS . . . .	Spindle Speed Changes (3), R. P. M. . . . .      1250 to 2500 Number of Spindles . . . . .      2 Driving Pulley . . . . .      6" x 1¾" Pulleys (Counter, tight and loose) . . . . .      7" x 3¼" Countershaft Speed, R. P. M. . . . .      750
FLOOR SPACE	Floor Space (9½' Bed) . . . . .      11' 3" x 28"
WEIGHTS . . . .	Machine, Regular Equipment (9½' Bed), net pounds . . . . .      3000 Crating Material (domestic), approximate pounds . . . . .      400 Boxing Material (foreign), approximate pounds . . . . .      1000 Box, cubic feet . . . . .      128
REGULAR EQUIPMENT	The Machine, with Oil Pumps, Tank and Piping. 1 each, Drill and Support Bushing for Spindle. Set of Change Gears. Set of Wrenches. Countershaft (tight and loose Pulley). (3-change Pulleys are furnished with Counter).

Code words, page 265.



No. 1½ Gun Barrel Drilling Machine, Belt Driven

## NO. 1½ GUN BARREL AND TUBE DRILLING MACHINE

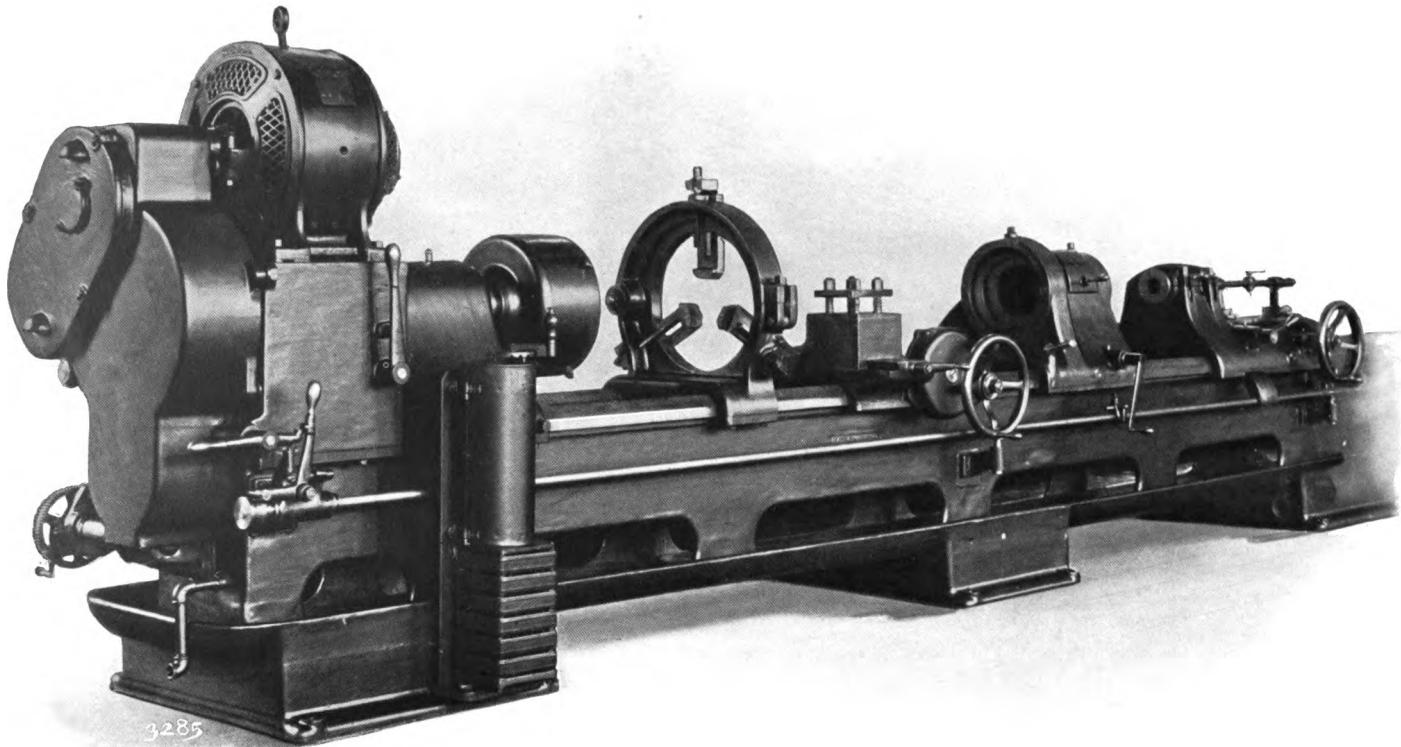
MADE TO ORDER ONLY

## SPECIFICATIONS

RANGE . . . . .	Length of Bed (A) . . . . .	{ (A) 8'—(B) 9 $\frac{7}{8}$ " (A) 12'—(B) 33 $\frac{7}{8}$ " (A) 16'—(B) 57 $\frac{7}{8}$ " (A) 20'—(B) 81 $\frac{7}{8}$ " (A) 22'—(B) 93 $\frac{7}{8}$ " (A) 24'—(B) 105 $\frac{7}{8}$ "
	Drilling Capacity, length (B) . . . . .	
	Drilling Capacity, diameter . . . . .	
	Swing over Bed . . . . .	
SPEEDS . . . . .	Spindle Speed Changes (4), R. P. M. . . . .	63 to 922
	Number of Spindles . . . . .	2
	Gearing Ratio . . . . .	3 $\frac{3}{10}$ to 1
	Cone Diameters (4), largest . . . . .	9"
	Pulleys (Counter., tight and loose) . . . . .	10" x 2 $\frac{1}{8}$ "
	Countershaft Speed, R. P. M. . . . .	Plain, 300; B. G., 375
FLOOR SPACE	Floor Space (12' Bed) . . . . .	13' 4" x 44"
WEIGHTS . . . . .	Machine, Regular Equipment (12' Bed), net pounds . . . . .	5600
	Crating Material (domestic), approximate pounds . . . . .	500
	Boxing Material (foreign), approximate pounds . . . . .	1200
	Box, cubic feet . . . . .	165
REGULAR EQUIPMENT	The Machine, with Oil Pumps, Tank and Piping. 1 each, Drill and Support Bushing for Spindle. Set of Change Gears. Set of Wrenches. Countershaft (tight and loose Pulley).	

NOTE — Machine can be furnished with Back Gears if desired.

Code words, page 265.



No. 4 Gun Barrel and Tube Drilling Machine, Motor Driven

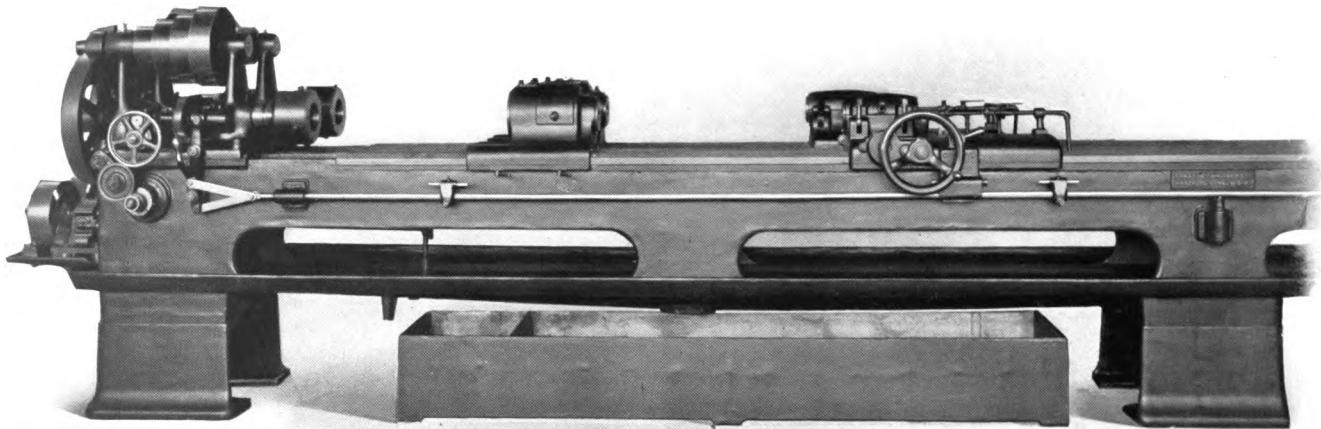
## NO. 4 GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

## SPECIFICATIONS

RANGE . . .	Length of Bed . . . . .	40'
	Drilling Capacity, length . . . . .	17½"
	Drilling Capacity, diameter . . . . .	9"
	Swing over Bed . . . . .	30"
SPEEDS . . .	Spindle Speed Changes (4), R. P. M. . . . .	5 to 80
	Number of Spindles . . . . .	1
	Gearing Ratio . . . . .	8.24 to 1
	Cone Diameters (4), largest . . . . .	18"
	Pulleys (Counter, tight and loose) . . . . .	18" x 5 ¼"
	Countershaft Speed, R. P. M. . . . .	200
FLOOR SPACE	Floor Space . . . . .	42' x 52"
WEIGHTS . . .	Machine, Regular Equipment, net pounds . . . . .	28000
	Crating Material (domestic), approximate pounds . . . . .	800
	Boxing Material (foreign), approximate pounds . . . . .	5600
	Box, cubic feet . . . . .	500
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and Piping. 1 each, Drill and Support Bushing for Spindle. Set of Change Gears. Set of Wrenches. Countershaft (tight and loose Pulley).	

Code words, page 265.



No. 12 Gun Barrel and Tube Drilling Machine, Belt Driven

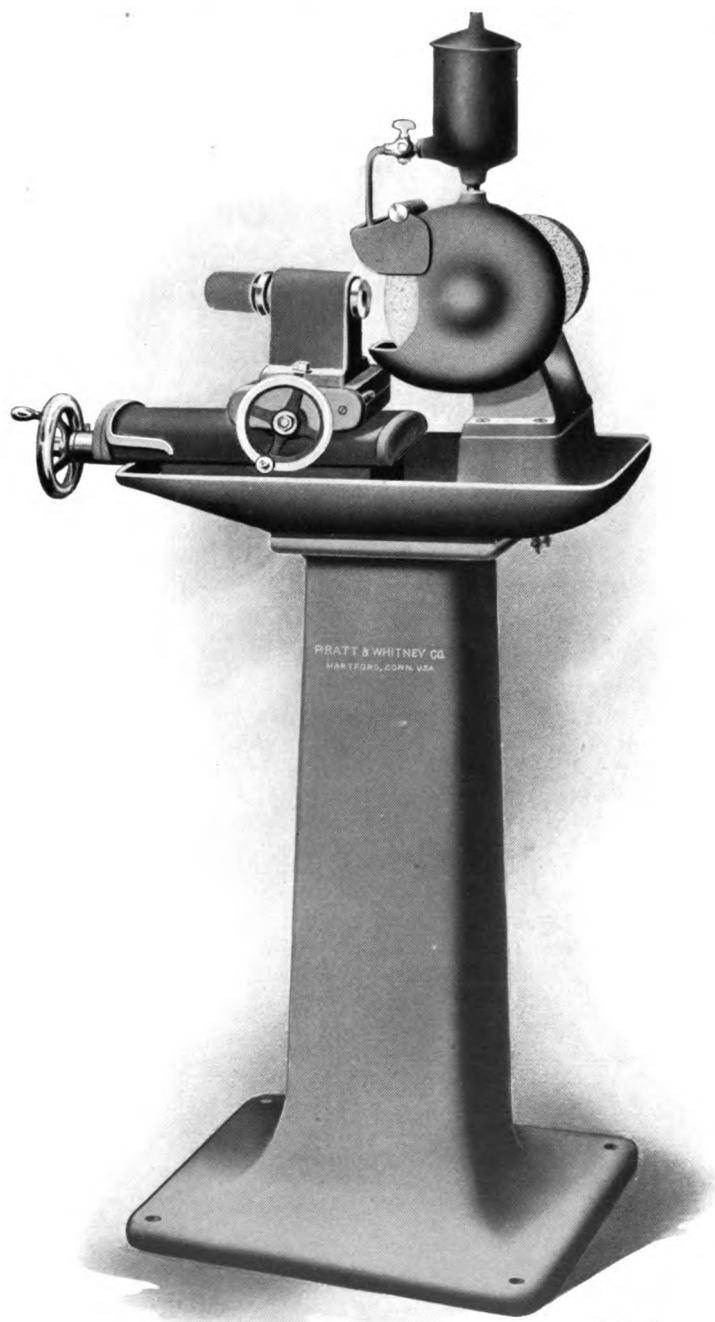
## NO. 12 GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

## SPECIFICATIONS

RANGE . . . . .	Length of Bed (A) . . . . .	$\left\{ \begin{array}{l} (\text{A}) 16' - (\text{B}) 51\frac{5}{8}'' \\ (\text{A}) 27' - (\text{B}) 117\frac{5}{8}'' \\ (\text{A}) 33' - (\text{B}) 153\frac{5}{8}'' \end{array} \right.$
	Drilling Capacity, length (B) . . . . .	
	Drilling Capacity, diameter . . . . .	3"
	Swing over Bed . . . . .	12"
SPEEDS . . . . .	Spindle Speed Changes (4), R. P. M. . . . .	33 to 117
	Number of Spindles . . . . .	2
	Gearing Ratio . . . . .	6 to 1
	Cone Diameters (4), largest . . . . .	12"
	Pulleys (Counter, tight and loose) . . . . .	6", 8", 10", 12" x 3 $\frac{1}{8}$ "
	Countershaft Speed, R. P. M. . . . .	350
FLOOR SPACE	Floor Space (27' Bed) . . . . .	28' x 36"
WEIGHTS . . . . .	Machine, Regular Equipment (27' Bed), net pounds . . . . .	10000
	Crating Material (domestic), approximate pounds . . . . .	700
	Boxing Material (foreign), approximate pounds . . . . .	3000
	Box, cubic feet . . . . .	325
REGULAR EQUIPMENT	The Machine, with Oil Pumps, Tank and Piping. 1 each, Drill and Support Bushing for Spindle. Set of Change Gears. Set of Wrenches. Countershaft (tight and loose Pulley).	

Code words, page 265.



4243

**Gun Barrel Drill Grinding Machine**

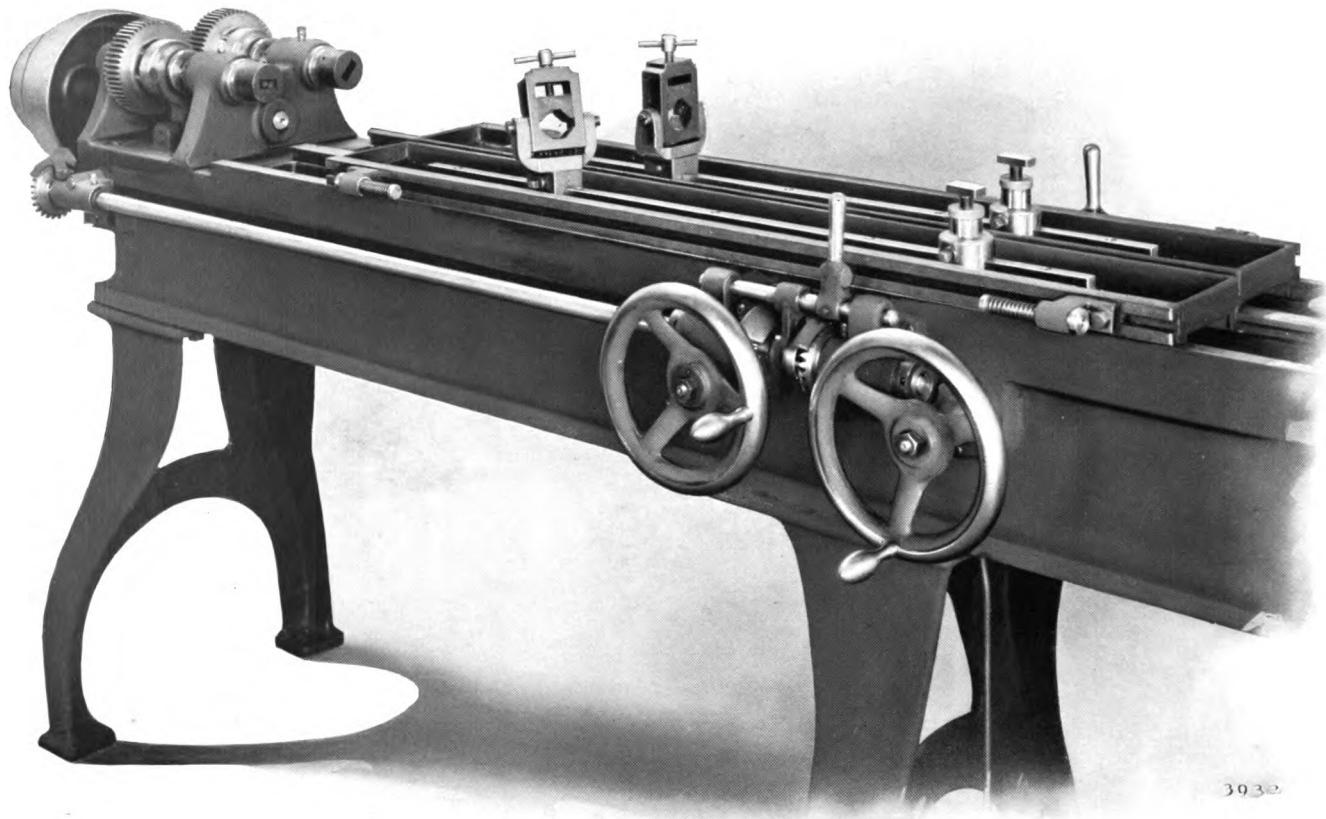
## GUN BARREL DRILL GRINDER

For grinding drills used in Gun Barrel Drilling Machine in a correct manner, which is of the utmost importance in order to obtain the best results. The clearance angle of the drill is governed by a suitable cam, and the point may be readily stepped by means of the compound slides, in order to break the chip.

### SPECIFICATIONS

RANGE . . . . .	Longitudinal Adjustment of Drill Slide . . . . .	$2\frac{3}{4}''$
	Transverse Adjustment of Drill Slide . . . . .	$2''$
GRINDING WHEELS	Wheel (Front) . . . . .	$8'' \times 1'' - \frac{5}{8}''$ hole
	Wheel (Back) . . . . .	$4\frac{1}{2}'' \times \frac{7}{16}'' - \frac{7}{16}''$ hole
SPEEDS . . . . .	Spindle Speed, R. P. M. . . . .	$1326$
	Pulley (Spindle) . . . . .	$2\frac{3}{8}'' \times 1\frac{1}{4}''$
	Pulley (Counter., tight and loose) . . . . .	$7'' \times 2\frac{1}{4}''$
	Belt Width (Spindle Pulley) . . . . .	$1''$
	Belt Width (Counter., Pulleys) . . . . .	$2''$
	Countershaft Speed, R. P. M. . . . .	450
FLOOR SPACE	Floor Space . . . . .	$29'' \times 32''$
WEIGHTS . . . . .	Machine, Regular Equipment, net pounds . . . . .	775
	Crating Material (domestic), approximate pounds . . . . .	150
	Boxing Material (foreign), approximate pounds . . . . .	250
	Box, cubic feet . . . . .	30
REGULAR EQUIPMENT	The Machine, with 1 Bushing. 2 Grinding Wheels. Set of Wrenches. Countershaft (tight and loose Pulley).	

Code words, page 265.



Gun Barrel Reaming Machine

## GUN BARREL AND TUBE REAMING MACHINE

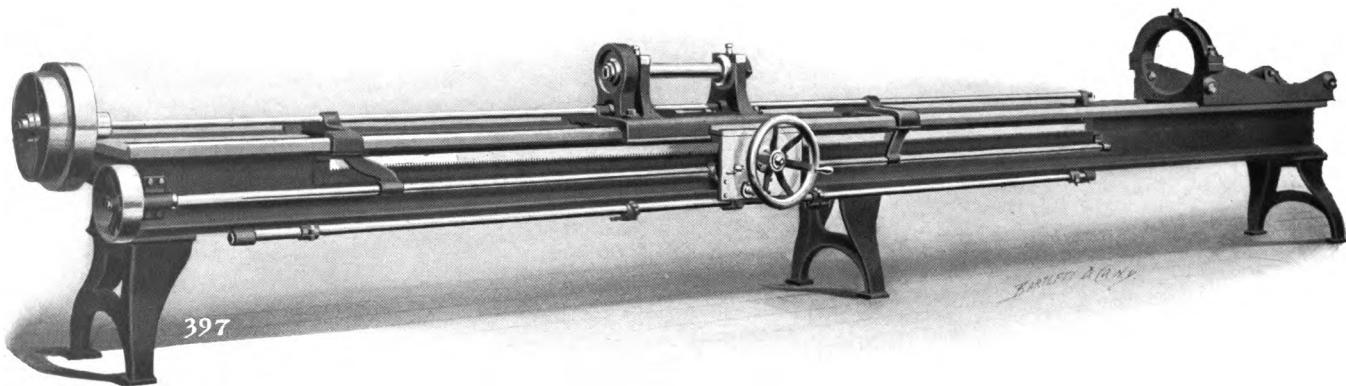
MADE TO ORDER ONLY

Built in one size for reaming holes in small caliber guns.

## SPECIFICATIONS

RANGE . . . . .	Length of Bed . . . . .	$8\frac{1}{2}'$
	Capacity, length of Hole, maximum . . . . .	36"
	Capacity, diameter of Hole, maximum . . . . .	$\frac{13}{16}"$
	Cone Diameters (3), largest . . . . .	$10\frac{1}{2}"$
	Pulley (Counter, tight and loose) . . . . .	$12" \times 2\frac{1}{2}"$
	Belt Width (Cone) . . . . .	$2\frac{1}{4}"$
	Belt Width (Counter. Pulleys) . . . . .	$2\frac{1}{4}"$
	Countershaft Speed, R. P. M. . . . .	120
FLOOR SPACE . . . . .	Floor Space . . . . .	$9'4" \times 26\frac{3}{4}"$
WEIGHTS . . . . .	Regular Equipment, net pounds . . . . .	2000
	Crating Material, approximate pounds . . . . .	250
	Boxing Material, approximate pounds . . . . .	500
	Box, cubic feet . . . . .	75
REGULAR EQUIPMENT . . . . .	The Machine, with Oil Pump and suitable Piping ; Set of Wrenches and Countershaft (tight and loose Pulley).	

Code words, page 265.



No. 2 Tube and Gun Barrel Lapping Machine

# GUN BARREL LAPPING MACHINE

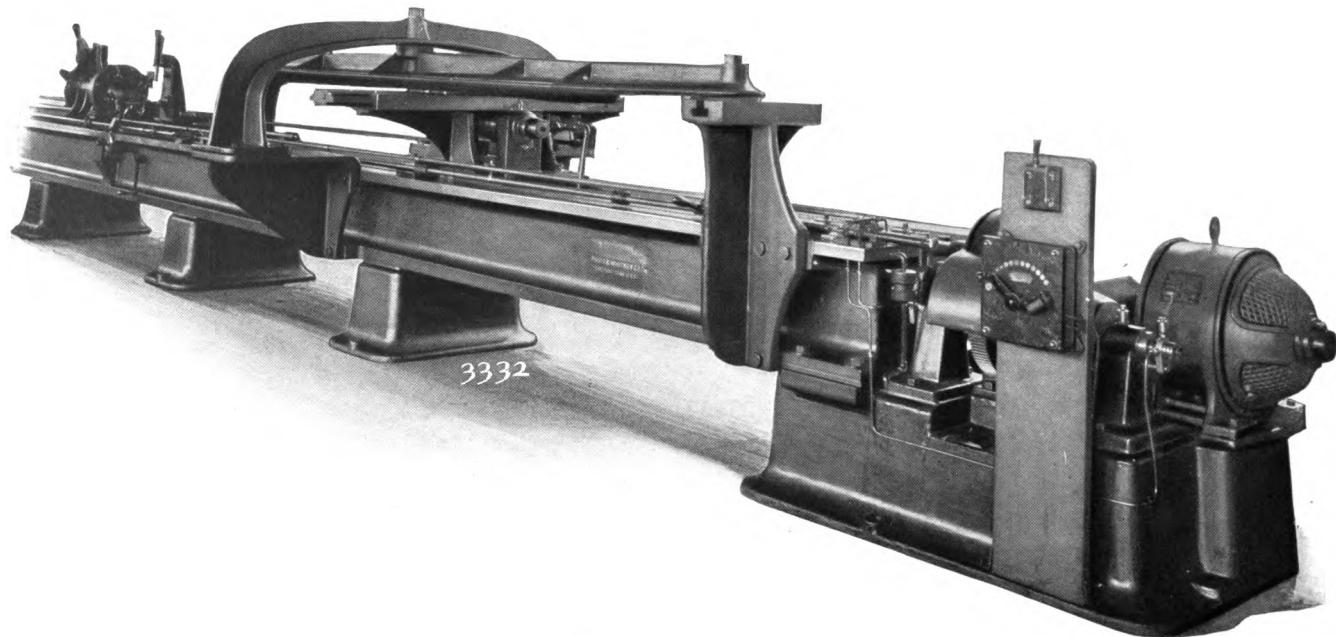
MADE TO ORDER

This machine is designed for lapping out gun tubes or similar work up to 4-inch bore.

## SPECIFICATIONS

RANGE . . . . .	Length of Bed . . . . .	24'
	Capacity, length of Tube, maximum . . . . .	12'
	Capacity, diameter Hole, maximum . . . . .	4"
	Cone Diameters (2), largest diameter . . . . .	18"
	Pulley (Countershaft, tight and loose) . . . . .	10" x 5½"
	Belt Width (Cone) . . . . .	3"
	Belt Width (Countershaft Pulley) . . . . .	5¼"
	Countershaft Speed, R. P. M. . . . .	480
FLOOR SPACE	Floor Space . . . . .	25' 8" x 3'
WEIGHTS . . . . .	Machine, with Regular Equipment, net pounds . . . . .	6200
	Crating Material (domestic), approximate pounds . . . . .	600
	Boxing Material (foreign), approximate pounds . . . . .	1800
	Box, cubic feet . . . . .	195
REGULAR EQUIPMENT	The Machine, with Countershaft and Set of Wrenches.	

Code words, page 265.



No. 5 Rifling Machine, Motor Driven

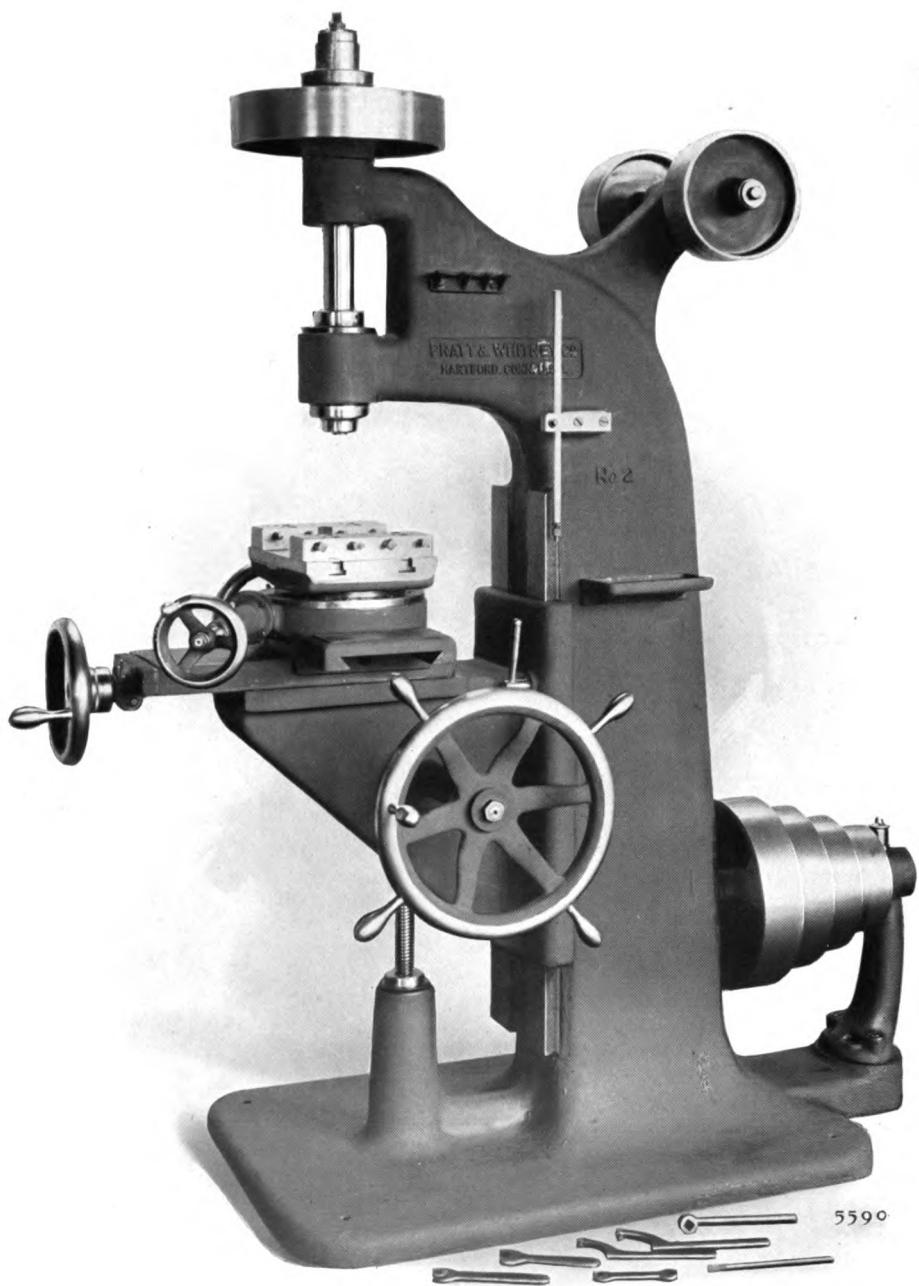
## NO. 3 RIFLING MACHINE

These machines have proven a most important factor in the modern method of manufacturing guns and, like the Gun Barrel Drilling Machines, are extensively used in arms factories and government arsenals the world over. Their design represents years of careful study and experience in dealing with problems and conditions entirely foreign to the average mechanic. They are arranged for either Uniform or Increased Twist and with Scrape or Hook Cutter as ordered.

## SPECIFICATIONS

RANGE . . . . .	Swing over Bed . . . . .	8"
	Length of Bed . . . . .	12' 4"
	Rifling Length, maximum . . . . .	36"
	Rifling Pitch, straight to one turn in . . . . .	5"
	Rifling Grooves (usual number) . . . . .	4, 5, 6
	Carriage Travel, maximum . . . . .	46"
	Carriage Cutting Speed, per minute . . . . .	30'
	Carriage Returning Speed, per minute . . . . .	30'
	Hole through Spindle . . . . .	1½"
	Feed Screw, diameter and pitch . . . . .	2", 1" Double
	Pulley (Driving on Machine) . . . . .	9" x 1½"
	Pulley (Counter, tight and loose) . . . . .	10" x 2¾"
	Belt Width (Driving Pulley) . . . . .	1½"
	Belt Width (Counter. Pulley) . . . . .	2¼"
	Countershaft Speed, R. P. M. . . . .	234
FLOOR SPACE	Floor Space . . . . .	5' 2" x 12' 8"
WEIGHTS . . . . .	Machine, Regular Equipment, net pounds . . . . .	3100
	Crating Material (domestic), approximate pounds . . . . .	350
	Boxing Material (foreign), approximate pounds . . . . .	1000
	Box, cubic feet . . . . .	145
REGULAR EQUIPMENT	Machine arranged for Uniform Twist and Scrape Cutter. 2 Countershafts (tight and loose Pulley). 1 Rifling Rod. Set of Wrenches. (Machine arranged with Hook Cutter, to order).	

Code words, page 265.



No. 2 Die Sinking Machine

## NO. 2 DIE SINKING MACHINE

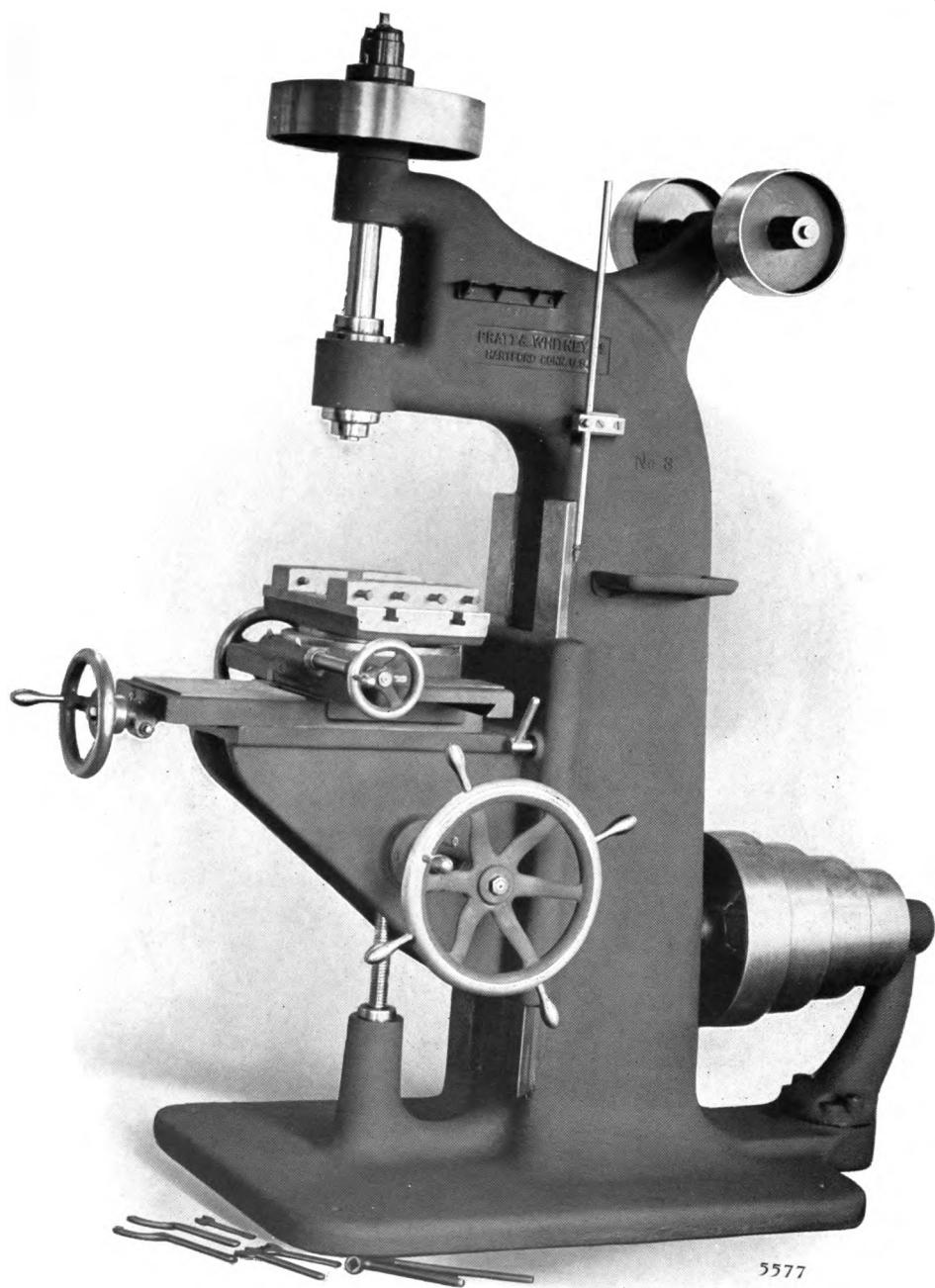
For sinking forging dies these machines have been proved to be indispensable in forging plants the world over. In their design are incorporated the necessary essentials of exceptional rigidity, accuracy, convenience and ease of operation. Knees and slide are all mounted upon long dovetail bearings, taper gibs being provided for maintaining proper relation between bearing surfaces. Micrometer dials are provided, which, in conjunction with accurate screws and adjustable nuts for wear on slide-screws, give exceptionally accurate control of the work.

## SPECIFICATIONS

RANGE . . .	Vise—Working Surface to Spindle End, maximum . . . . .	18"
	" Vertical Movement of Knee . . . . .	16"
	" Center to Column Face, maximum . . . . .	18"
	" Transverse Movement (to and from Column) . . . . .	10"
	" Longitudinal Movement . . . . .	11"
	" Dimensions of Top . . . . .	9" x 13½"
	" Jaws; width, depth and opening . . . . .	9", 1½", 7½"
	" Graduated in degrees.	
	Spindle Center to Column Face . . . . .	13"
	Micrometer Dials graduated in thousandths	
SPINDLES . . .	Special Steel; Lower Bearing conical. Boxes, Bronze; cylindrical on O. D. *Taper Hole, 18" Lathe. Spindle Collet furnished, No. 6.	
SPEEDS . . .	Spindle Speeds (6), R. P. M. . . . .	53 to 390
	Cone Diameters (3), large . . . . .	12"
	Pulleys (Spindle) . . . . .	14" x 3¼"
	Pulleys (Counter.), 2 sets . . . . .	8" and 16" x 4¼"
	Belt Width (Cone) . . . . .	3"
	Belt Width (Spindle Pulley) . . . . .	3"
	Belt Width (Counter. Pulley) . . . . .	4"
	Countershaft Speed, R. P. M. . . . .	80 and 260
FLOOR SPACE	Floor Space . . . . .	48" x 72"
WEIGHTS . . .	Machine, with Regular Equipment, net pounds . . . . .	2600
	Crating Material (domestic), approximate pounds . . . . .	350
	Boxing Material (foreign), approximate pounds . . . . .	800
	Box, cubic feet . . . . .	115
REGULAR EQUIPMENT	The Machine, with Circular Vise. Spindle Collet. Set of Wrenches. Countershaft (2-speed tight and loose Pulley).	
TOOL EQUIPMENT	(See page 227).	

\*For detailed information, see "Tapers", page 247.

Code words, page 265.



5577

No. 3 Die Sinking Machine

## NO. 3 DIE SINKING MACHINE

This machine is similar in design to the No. 2, but is considerably larger and is preferable for the heavier class of work.

## SPECIFICATIONS

RANGE . . . .	Vise — Working Surface to Spindle End, maximum . . . . .	23"
	" Vertical Movement . . . . .	18"
	" Center to Column Face, maximum . . . . .	21½"
	" Transverse Movement (to and from Column) . . . . .	12"
	" Longitudinal Movement . . . . .	15"
	" Dimensions of Top . . . . .	11" x 18"
	" Jaws; width, depth and opening . . . . .	11", 1¾", 11"
	" Graduated in degrees.	
	Spindle Center to Column Face . . . . .	15¾"
	Micrometer Dials graduated in thousandths.	
SPINDLE . . . .	Special Steel; Lower Bearing conical. Boxes, Bronze; cylindrical on O. D. *Taper Hole, 25" Lathe. Spindle Collet furnished, No. 8.	
SPEEDS . . . .	Spindle Speeds (6), R. P. M. . . . .	43 to 224
	Cone Diameters (3), large . . . . .	14"
	Pulleys (Spindle) . . . . .	16" x 4"
	Pulleys (Counter.), 2 sets . . . . .	12" and 18" x 4½"
	Belt Width (Cone) . . . . .	4¼"
	Belt Width (Spindle Pulley) . . . . .	4"
	Belt Width (Counter. Pulley) . . . . .	4¼"
	Countershaft Speed, R. P. M. . . . .	60 and 160
FLOOR SPACE	Floor Space . . . . .	56" x 88"
WEIGHTS . . . .	Machine, Regular Equipment, net pounds . . . . .	3900
	Crating Material (domestic), approximate pounds . . . . .	650
	Boxing Material (foreign), approximate pounds . . . . .	1000
	Box, cubic feet . . . . .	175
REGULAR EQUIPMENT	The Machine, with Circular Vise. Spindle Collet. Set of Wrenches. Countershaft (2-speed tight and loose Pulley).	
TOOL EQUIPMENT	(See page 227.)	

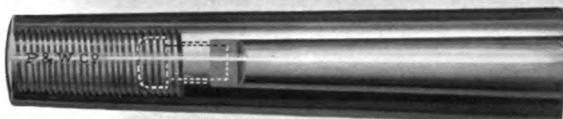
\* For detailed information, see "Tapers", page 247.

Code words, page 265.

### Collets and Cutters for Die Sinking Machines



No. 9 Spring Collet: 1-inch Straight Hole



Nos. 5 to 8 Taper Collets



No. 3 Collet for Nos. 1 and 2 Spring Collets



Nos. 1 and 2 Spring Collets with Cutter



Straight Cutter



Trimming Cutter



Five-degree Taper Cutter



Roughing Cutter

5673

## TOOL EQUIPMENT—DIE SINKING MACHINE

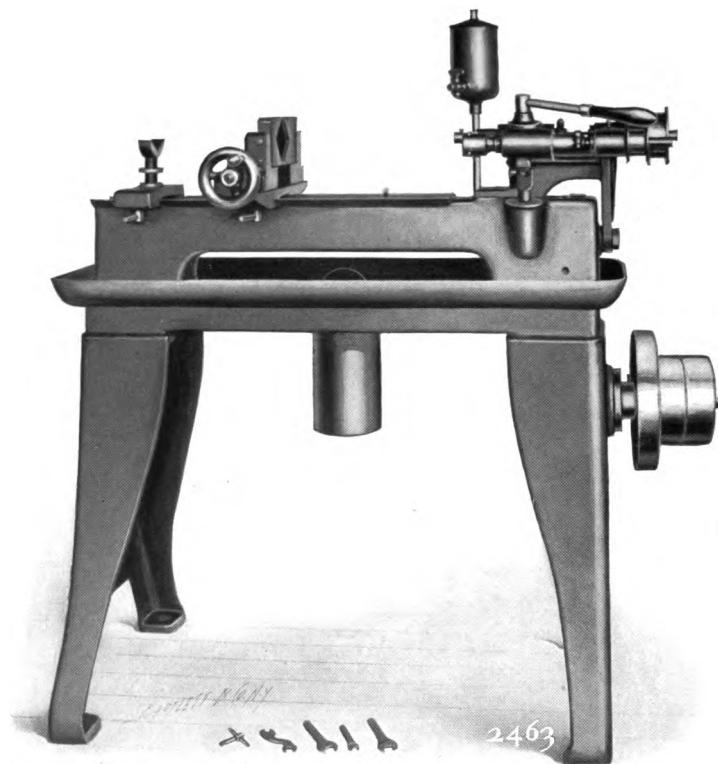
	Machine		Fit Collet
	No. 2	No. 3	
Collets — Number	1 2 3 5 *6 — — —	— — — — — 7 *8 9	3 3 6 and 8 Spindle Spindle Spindle Spindle Spindle Spindle Spindle
Cutters	• • • • • • • • • • • • • • • • • • Roughing, Straight $\frac{1}{16}$ Taper, Trimming   1 each • • • • • • • • • • • •	$\frac{1}{16}$ " $\frac{1}{8}$ " $\frac{3}{16}$ " $\frac{5}{16}$ " $\frac{3}{8}$ " $\frac{7}{16}$ " 1"	— — — $\frac{1}{2}$ " $\frac{5}{16}$ " $\frac{3}{4}$ " $\frac{7}{8}$ " 1"

Complete set (4 Collets, 32 Cutters) . . . . . No. 2 Machine  
 Complete set (2 Collets, 20 Cutters) . . . . . No. 3 Machine

NOTE — Inside Tapers . . . . . { Nos. 5 and 7 Collets, No. 2 Drill Socket  
 † Given diameter at small end. { Nos. 6 and 8 Collets, No. 2 Gang Drill

\* Regularly furnished with machine.

† Given diameter at small end.



4-inch Two-spindle Centering Machine

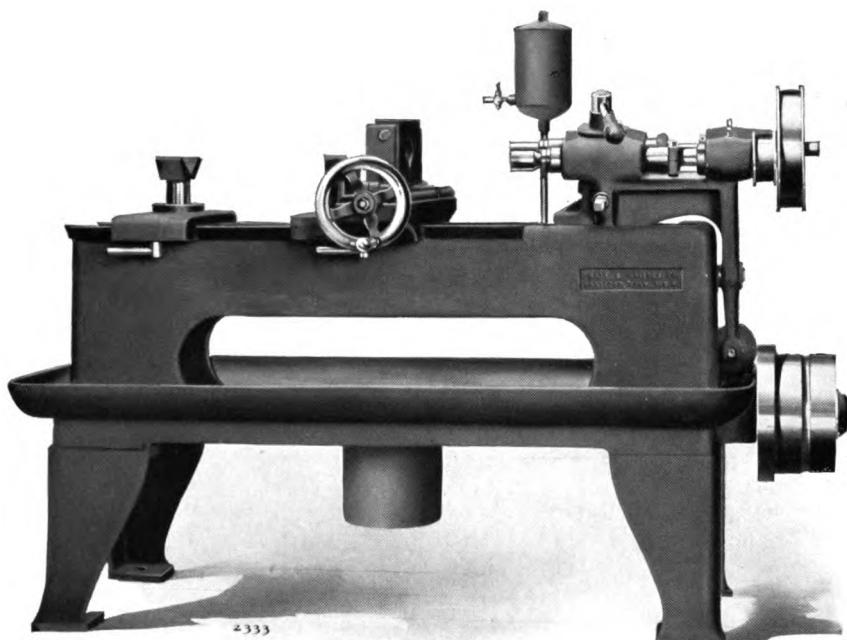
## 4-INCH CENTERING MACHINE

Spindles are located in a swinging head, the oscillation of which brings either spindle central with vise. The correct central position of spindles is maintained by means of convenient adjusting screws. Radial and longitudinal movement of spindles are controlled by one lever. Spindles are driven at different speeds and provided with efficient stops.

### SPECIFICATIONS

<b>CAPACITY . . .</b>	Capacity . . . . .	4"
	Spindle Longitudinal Movement . . . . .	1 $\frac{1}{2}$ "
<b>SPEEDS . . .</b>	Drill Spindle, R. P. M. . . . .	1782
	Reamer Spindle, R. P. M. . . . .	770
	Counter. Pulleys . . . . .	7" x 2 $\frac{3}{8}$ "
	Counter. Speed, R. P. M. . . . .	225
<b>FLOOR SPACE</b>	Floor Space . . . . .	23" x 50"
<b>WEIGHTS . . .</b>	Machine, Regular Equipment, net pounds . . . . .	500
	Crating Material (domestic), approximate pounds . . . . .	125
	Boxing Material (foreign), approximate pounds . . . . .	250
	Box, cubic feet . . . . .	23
<b>REGULAR EQUIPMENT</b>	The Machine, with 2 Independent Spindles (one each, Drilling and Reaming). Vise, with H. & G. Jaws. Adjustable Rest (movable on Bed). 1 Drill Chuck. 150 Twist Drills. 10 Center Reamers. Oil Pot and Receiver. Set of Wrenches. Countershaft (tight and loose Pulley).	
<b>REVOLVING CHUCK</b>	2" capacity, for accurately centering finished work on the 4" machine, can be furnished to order, in which case a drum countershaft replaces the regular.	

Code words, page 265.



6-inch Two-spindle Centering Machine

## 6-INCH CENTERING MACHINE

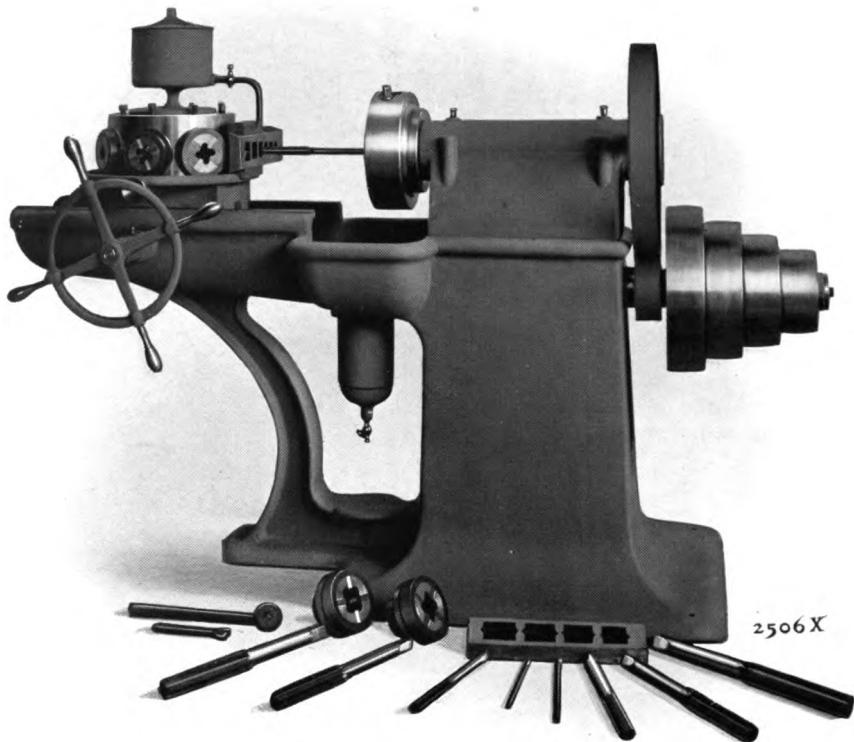
This machine, while similar in construction to the 4-inch, is provided with a dash pot to cushion the head as it is operated from side to side.

### SPECIFICATIONS

<b>CAPACITY . . .</b>	Capacity . . . . .	<b>6"</b>
	Spindle Longitudinal Movement . . . . .	<b>3"</b>
<b>SPEEDS . . .</b>	Drill Spindle, R. P. M. . . . .	<b>781</b>
	Reamer Spindle, R. P. M. . . . .	<b>267</b>
	Counter. Pulleys . . . . .	<b>12" x 2 1/4"</b>
	Counter. Speed, R. P. M. . . . .	<b>200</b>
<b>FLOOR SPACE</b>	Floor Space . . . . .	<b>28" x 5' 3"</b>
<b>WEIGHTS . . .</b>	Machine, Regular Equipment, net pounds . . . . .	<b>1000</b>
	Crating Material (domestic), approximate pounds . . . . .	<b>160</b>
	Boxing Material (foreign), approximate pounds . . . . .	<b>450</b>
	Box, cubic feet . . . . .	<b>52</b>
<b>REGULAR EQUIPMENT</b>	The Machine, with 2 Independent Spindles (one each, Drilling and Reaming). Vise, with H. & G. Jaws. Adjustable Rest (movable on Bed). 1 Drill Chuck. 150 Twist Drills. 10 Center Reamers. Oil Pot and Receiver. Set of Wrenches. Countershaft (tight and loose Pulley).	

Code words, page 265.

P R E C I S I O N T O O L S



No. 4 Turret Head Power Bolt Cutter

## BOLT CUTTER, NO. 4 TURRET HEAD POWER

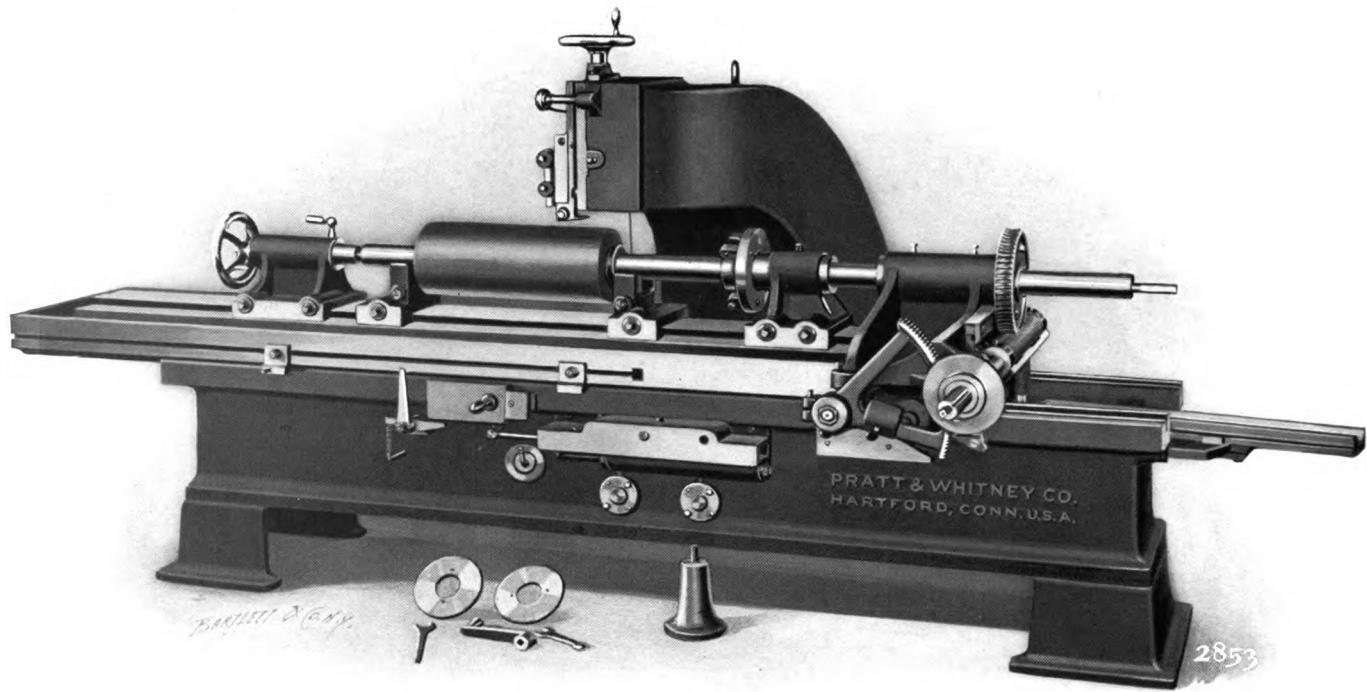
This machine is used extensively in car shops and is also found very convenient for jobbing purposes. When supplied with the various size dies, coupled with the convenient method of handling tapping operations, it is always ready for instant use and will effectively cover the general run of work.

## SPECIFICATIONS

RANGE . . .	Threading or Tapping Capacity . . . . .	$1\frac{1}{2}$ "
	Travel of Turret Slide . . . . .	$20$ "
TURRET . . .	Round; 8 holes, $3$ " diameter.	
SPINDLE . . .	C. I.; Bearing Portion, cylindrical; $4\frac{3}{8}$ " diameter. Boxes, C. I., adjustable for wear. Hole through Spindle . . . . .	$3\frac{1}{4}$ "
SPEEDS . . .	Spindle Speeds (4), R. P. M. . . . . Gearing Ratio . . . . . Cone Diameters (4), large diameter . . . . . Pulleys (Counter. Friction) . . . . . Belt Width (Cone) . . . . . Belt Width (Counter. Pulleys) . . . . . Countershaft Speed, R. P. M. . . . .	30 to 120 5 to 1 $15$ " $14\frac{1}{2} \times 4\frac{1}{2}$ " $3\frac{1}{4}$ " $4\frac{1}{4}$ " 300
FLOOR SPACE	Floor Space . . . . .	$77 \times 27$ "
WEIGHTS . .	Machine, Regular Equipment, net pounds . . . . . Crating Material (domestic), approximate pounds . . . . . Boxing Material (foreign), approximate pounds . . . . . Box, cubic feet . . . . .	1500 125 400 73
REGULAR EQUIPMENT	The Machine, with 2 Nut Plates. 1 Nut Plate Holder. Oil Pot and Oil Reservoir. Countershaft (double friction). Set of Wrenches. Taps and Dies, $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{3}{8}$ " and $1\frac{1}{2}$ ", U. S. S.	

NOTE—Taps are Machine Nut Type and Dies are Grant Bolt Cutter Type. In ordering parts, see Small Tool Catalogue.

Code words, page 265.



No. 1 Roll Grooving Machine

## NO. 1 ROLL GROOVING MACHINE

MADE TO ORDER ONLY

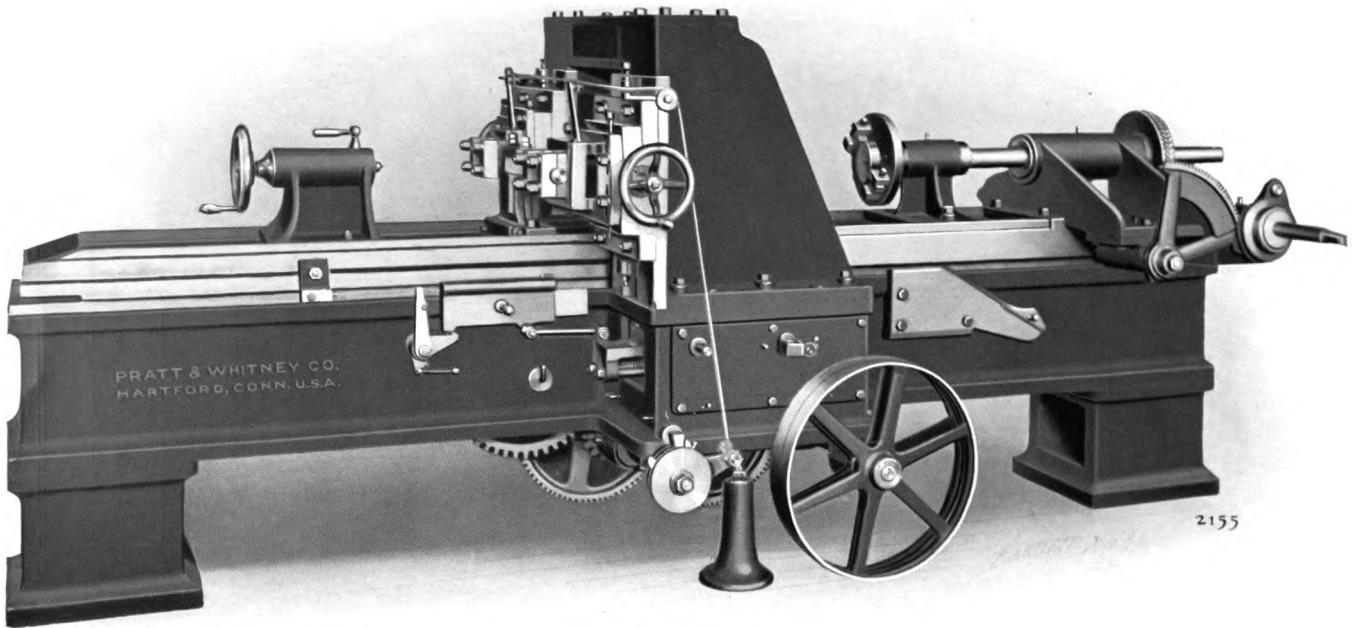
An exceptionally powerful, rigid and conveniently operated machine, designed for grooving chilled cast-iron rolls used for grinding grain. No. 1 machine is a single-tool machine and is largely used for jobbing purposes.

## SPECIFICATIONS

RANGE . . . .	Roll that can be grooved, maximum length . . . . .	36"
	Roll that can be grooved, maximum diameter . . . . .	12"
	Roll that can be grooved, minimum diameter . . . . .	5 $\frac{3}{4}$ "
	Offset of Spiral, per foot 9" roll . . . . .	0" to 2 $\frac{1}{2}$ "
	Cutting Speed, per minute . . . . .	24"
	Returning Speed, per minute . . . . .	40'
	Countershhaft Pulleys . . . . .	28" x 4 $\frac{1}{4}$ "
	Countershhaft Speed, R. P. M. . . . .	70"
FLOOR SPACE	Floor Space . . . . .	8' x 15'
WEIGHTS . . . .	Machine, Regular Equipment, net pounds . . . . .	10000
	Crating Material (domestic), approximate pounds . . . . .	1000
	Boxing Material (foreign), approximate pounds . . . . .	2500
	Box, cubic feet . . . . .	300
REGULAR EQUIPMENT	The Machine, with 3 Index Plates. Suitable Jacks. Set of Wrenches. Countershft (tight and loose Pulley).	
SPECIAL EQUIPMENT	The machine may readily be altered to accommodate rolls beyond the given capacity. All inquiries should be accompanied by detailed information regarding rolls to be grooved.	
CUTTERS . . . .	Furnished to order upon receipt of drawings and specifications stating form and grooves per inch required.	

Code words, page 265.

250



No. 2 Roll Grooving Machine

## NO. 2 ROLL GROOVING MACHINE

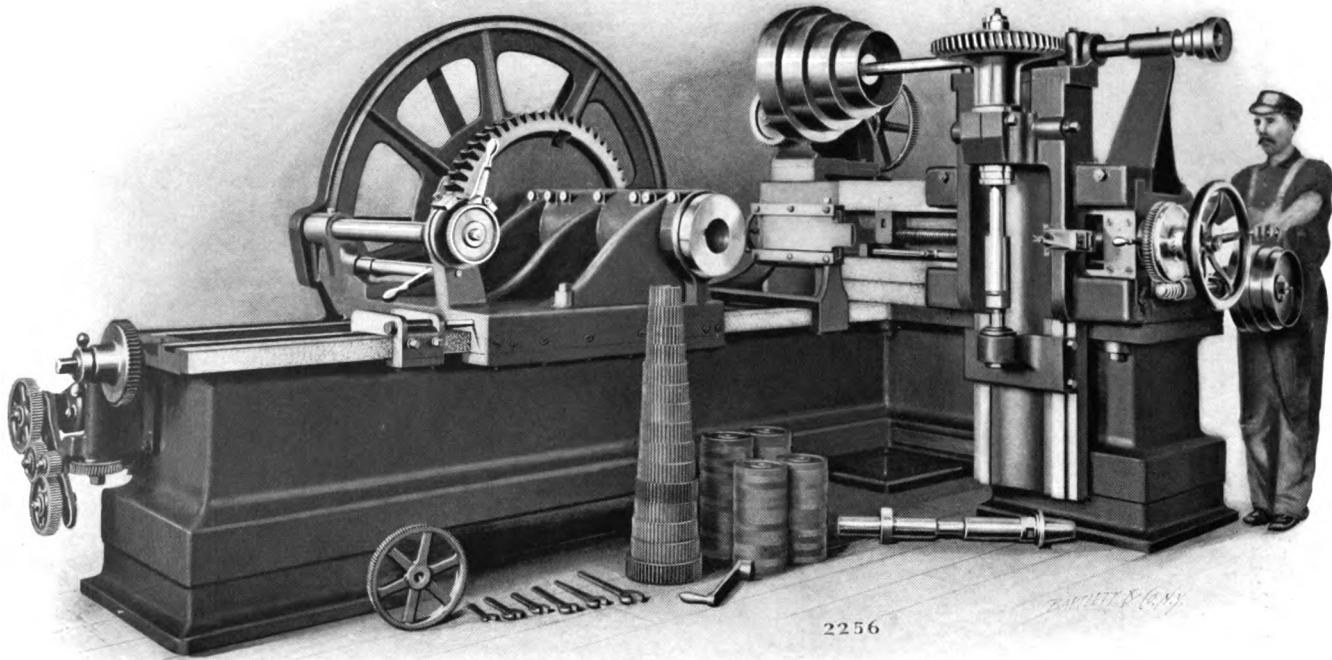
MADE TO ORDER ONLY

This is a double-tool machine of wider range than the No. 1. It cuts two grooves simultaneously, which adds greatly to the production capacity of the machine.

## SPECIFICATIONS

RANGE . . . . .	Roll that can be grooved, maximum length . . . . .	42"
	Roll that can be grooved, maximum diameter . . . . .	16"
	Roll that can be grooved, minimum diameter . . . . .	6"
	Offset of Spiral, per foot 9" roll . . . . .	0" to $3\frac{1}{10}$ "
	Cutting Speed, per minute . . . . .	24"
	Returning Speed, per minute . . . . .	24'
	Countershaft Pulleys . . . . .	18" x 4 $\frac{1}{4}$ "
	Countershaft Speed, R. P. M. . . . .	95"
FLOOR SPACE	Floor Space . . . . .	6 $\frac{1}{2}$ ' x 17'
WEIGHTS . . . . .	Machine, Regular Equipment, net pounds . . . . .	12700
	Crating Material (domestic), approximate pounds . . . . .	1300
	Boxing Material (foreign), approximate pounds . . . . .	3000
	Box, cubic feet . . . . .	360
REGULAR EQUIPMENT	The Machine, with 3 Index Plates. Suitable Jacks. Set of Wrenches. Countershaft (tight and loose Pulley).	
SPECIAL EQUIPMENT	The machine may readily be altered to accommodate rolls beyond the given capacity. All inquiries should be accompanied by detailed information regarding rolls to be grooved.	
CUTTERS . . . . .	Furnished to order upon receipt of drawings and specifications stating form and grooves per inch required.	

Code words, page 265.



120-inch Gear Cutter

## GEAR CUTTING MACHINES

MADE TO ORDER ONLY

Made in three sizes, 60, 90 and 120-inch. 60 and 90-inch machines are made to cut either spur or worm gears, or both; the 120-inch is made in one style only, to cut both spur and worm gears. An internal gear cutting attachment can be furnished with either machine if ordered.

## SPECIFICATIONS

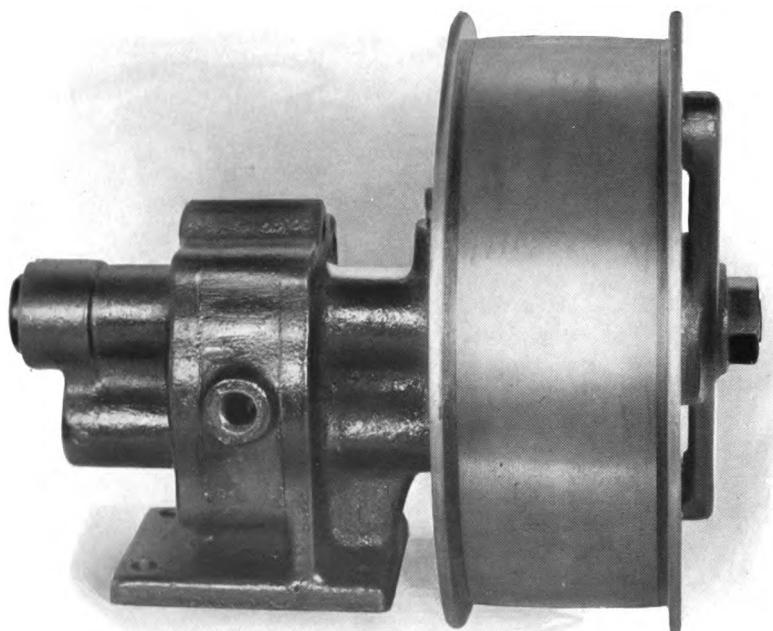
RANGE . . . .	Largest Gear Machine will cut Largest Cutter or Hob used . . . Divisions in Circle, maximum Index Ratchets furnished . . . Ratio of Index Gear and Pinion Work Spindle, diameter . . . Cutter Spindle Bearings . . . Cutter Spindle, Vertical Adjustment . . . . . Cone, number of steps . . . . Cone, largest step . . . . Belt Width (Cone) . . . . Countershaft Pulleys . . . . Countershaft Speeds, R. P. M.	60"	90"	120"
	9"	12½"	15"	
	2148	3600	3720	
	67	64	67	
	12 to 1	20 to 1	20 to 1	
	4½"	5"	9"	
	2¾" x 11½"	3" x 13½"	3⅜" x 17¾"	
	½"	1¼"	1¾"	
	3	3	4	
	18"	18½"	25"	
	3½"	4"	4½"	
	12" and 14" x 5¼"	12" and 16" x 5¼"	14" and 18" x 5¾"	
	400 and 500	155 and 270	400 and 500	
FLOOR SPACE	Floor Space . . . . .	6' x 8'	7' 6" x 11'	10' x 12'
WEIGHTS . . . .	Spur Machine, net pounds . . . Worm Machine, net pounds . . . Spur and Worm Machine, net pounds . . . . . Crating Material (domestic), approximate pounds . . . Boxing Material (foreign), approximate pounds . . . Box, cubic feet . . . . .	6200 6300 7000 1300 1800 260	9800 10000 11500 500 3000 300	26000 1000 5000 550
REGULAR EQUIPMENT	The Machine, with Suitable Index Ratchets. Change Gears. Work and Cutter Arbors. Cutter Center Gauge. Countershaft (2-speed tight and loose Pulley). Set of Wrenches.			

Code words, page 265.



2878

**Oil Pump for Low Pressures**



5810

**No. 2 High Pressure Oil Pump**

## ROTARY OIL PUMPS

These pumps are of approved design, made in the most substantial manner and give excellent results. The Nos. 0, 3 and 12 are low pressure pumps for use on milling machines, screw machines, etc.

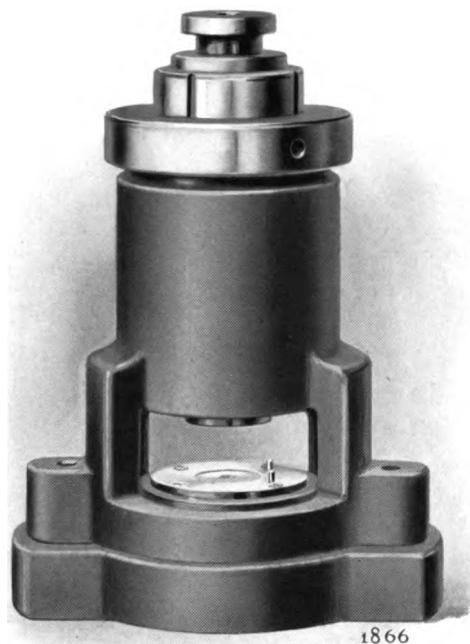
Special attention is directed to the No. 2, perfectly balanced, high pressure pump. In the design the usual stuffing box has been eliminated. Bearings are hardened and ground and, in fact, both design and workmanship ensure the highest possible efficiency in pump construction. It is used on the gun barrel drilling machines and for similar purposes where a high pressure oil supply is necessary.

### SPECIFICATIONS

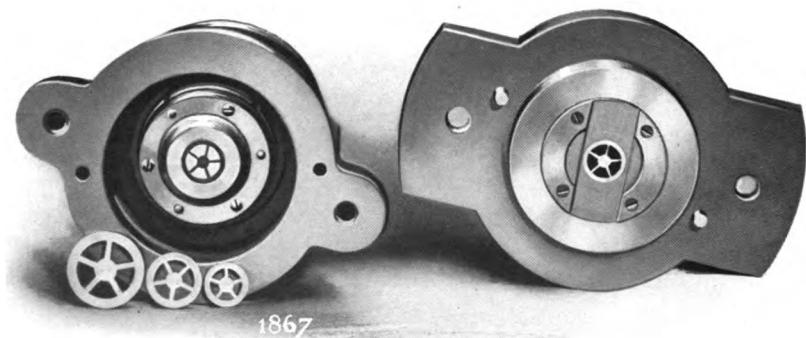
	No. 0	No. 2	No. 3	No. 12
*Capacity, quarts per minute . . . . .	1 $\frac{1}{8}$	6	9	6
Pressure per square inch, pounds . . . . .	100	500 to 1000	100	100
Pipes, inlet and delivery . . . . .	3/8"	3/8"	1/2"	1/2"
Speed, R. P. M. . . . .	150	300	150	150
Driving Pulley, diameter . . . . .	3"	9"	7"	5"
Belt Width . . . . .	1"	3"	2"	1 1/2"
Base Dimensions . . . . .	3" x 3 1/4"	3 1/4" x 4 1/2"	6" x 6 1/2"	3 1/8" x 3 1/4"
Weight, net pounds . . . . .	8	25	31	20
Boxing Material, approximate pounds . . .	4	5	8	5

\*Based on lift of 4' and varies directly as the speed.

Code words, page 265.



**Sub-press Base and Stand**



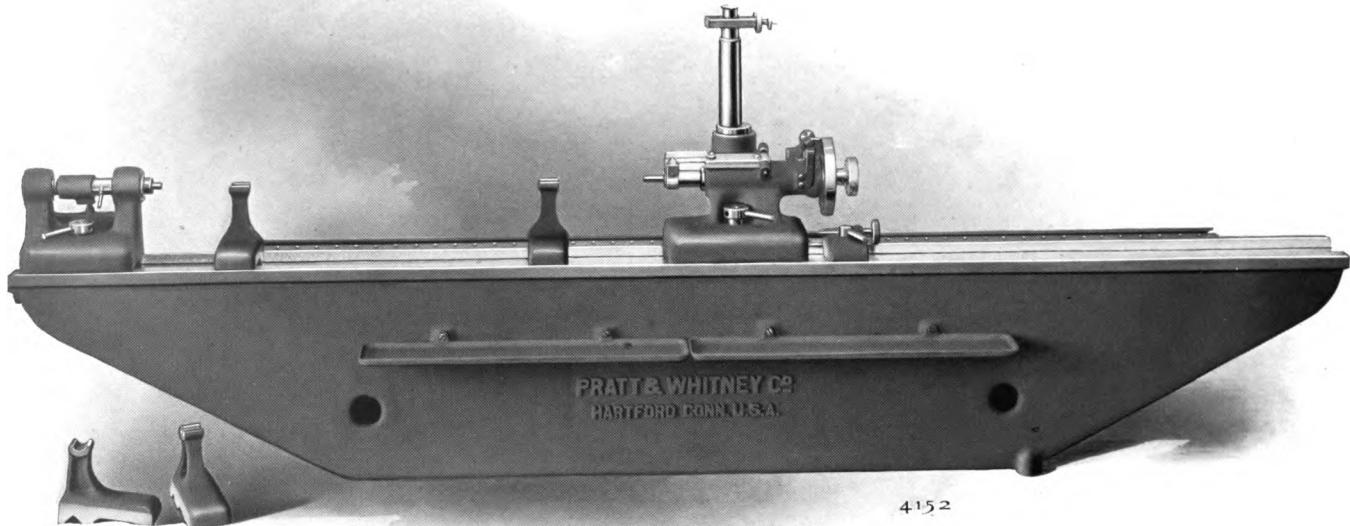
**Sub-press Base Showing Dies and Blanks**

## SUB-PRESS BASES AND STANDS

Ready for the insertion of punches and dies. All sizes are of a uniform height of  $8\frac{1}{2}$ " from base to top of button when punches and dies are together. Piston bearing is of Babbitt metal with means provided for taking up the wear. Sub-press Dies are made to order to drawings or models, and are made either simple or compound.

No. 1 . . . . .	Piston diameter . . . . .	1.25
No. 2 . . . . .	Piston diameter . . . . .	1.75
No. 3 . . . . .	Piston diameter . . . . .	2.25
No. 4 . . . . .	Piston diameter . . . . .	2.75
No. 5 . . . . .	Piston diameter . . . . .	3.25
No. 6 . . . . .	Piston diameter . . . . .	3.75

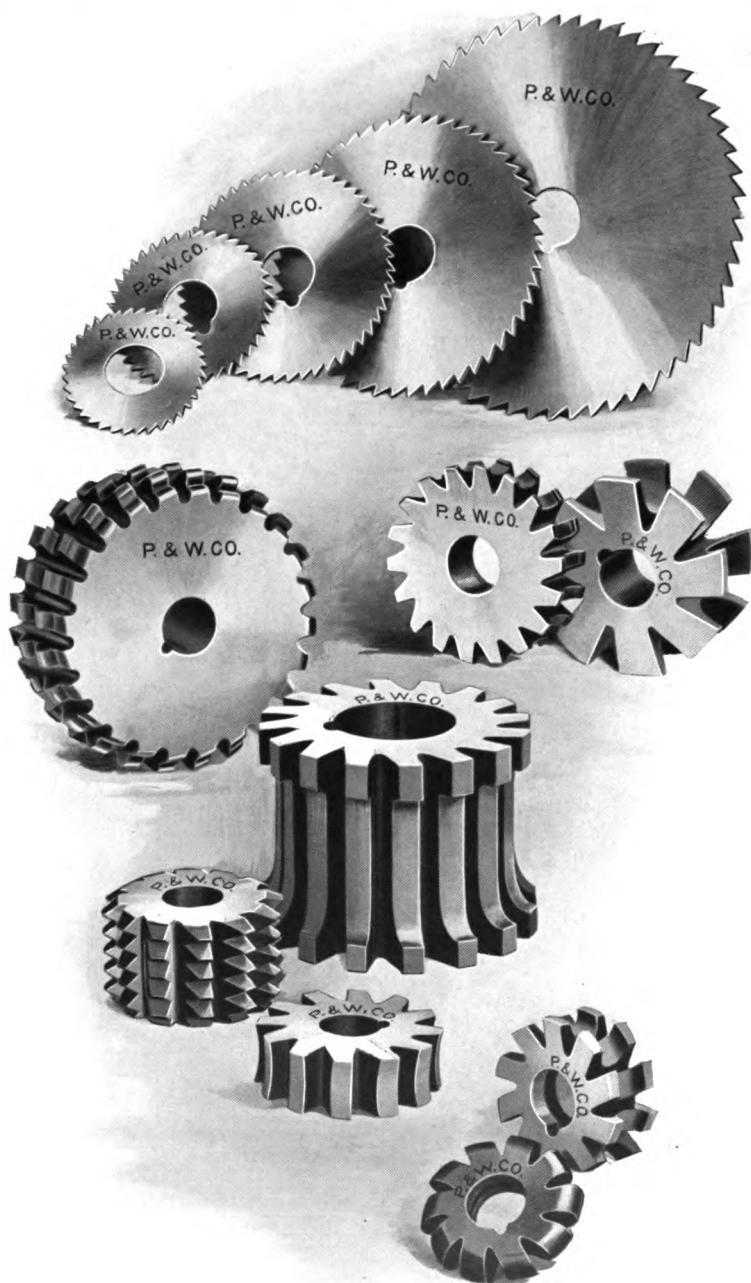
Code words, page 265.



Pratt & Whitney Standard Measuring Machine. For Description, see Catalogue Devoted to Gauges and Standards

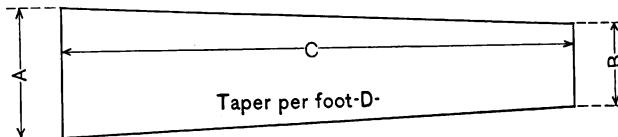


A Separate Catalogue is Issued Covering the Extensive Line of Gauges and Standards Manufactured by Pratt & Whitney Company



A SEPARATE CATALOGUE IS DEVOTED TO THE COMPLETE LINE OF  
SMALL TOOLS, SUCH AS TAPS, DIES, MILLING CUTTERS,  
TWIST DRILLS, ETC., ETC., MANUFACTURED BY  
PRATT & WHITNEY COMPANY

## TAPERS

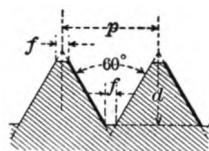


DETAIL OF TAPERS USED, SEE MACHINE SPECIFICATIONS FOR NUMBERS

Taper	No.	A	B	C	D
Jarno	2	.250	.20	1	.600
Jarno	3	.375	.30	1 $\frac{1}{2}$	.600
Jarno	4	.500	.40	2	.600
Jarno	5	.625	.50	2 $\frac{1}{2}$	.600
Jarno	6	.750	.60	3	.600
Jarno	7	.875	.70	3 $\frac{1}{2}$	.600
Jarno	8	1.000	.80	4	.600
Jarno	9	1.125	.90	4 $\frac{1}{2}$	.600
Jarno	10	1.250	1.00	5	.600
Jarno	11	1.375	1.10	5 $\frac{1}{2}$	.600
Jarno	12	1.500	1.20	6	.600
Jarno	13	1.625	1.30	6 $\frac{1}{2}$	.600
Jarno	14	1.750	1.40	7	.600
Jarno	15	1.875	1.50	7 $\frac{1}{2}$	.600
Jarno	16	2.000	1.60	8	.600
Jarno	17	2.125	1.70	8 $\frac{1}{2}$	.600
Jarno	18	2.250	1.80	9	.600
Jarno	19	2.375	1.90	9 $\frac{1}{2}$	.600
Jarno	20	2.500	2.00	10	.600
Morse	1	.475	.369	2 $\frac{1}{8}$	.600
Morse	2	.700	.572	2 $\frac{9}{16}$	.602
Morse	3	.938	.778	3 $\frac{3}{16}$	.602
Morse	4	1.231	1.020	4 $\frac{1}{16}$	.623
Power M. M.	0	.873	.685	4 $\frac{1}{2}$	.503
Power M. M.	1	1.014	.797	6	.435
Power M. M.	2	1.285	1.047	5 $\frac{17}{32}$	.516
Power M. M.	3	1 $\frac{1}{4}$	1.477	6 $\frac{1}{16}$	$\frac{1}{2}$
Drill Socket	2	.540	.409	2 $\frac{1}{2}$	.629
Drill Collet	3	$\frac{1}{4}$	.211	$\frac{1}{8}$	$\frac{9}{16}$
Drill Collet	4	.281	.230	1 $\frac{1}{16}$	$\frac{1}{16}$
Drill Collet	5	.378	.300	1 $\frac{5}{8}$	$\frac{9}{16}$
Gang Drill	2	.749	.555	4	.581
Lathe	25"	1.528	1.246	6	.564
Lathe	18"	1.083	.854	4 $\frac{7}{8}$	.5643

All dimensions are in inches.

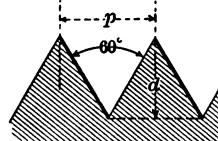
## UNITED STATES STANDARD THREAD



Formula 
$$\left\{ \begin{array}{l} p = \text{pitch} = \frac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .64952 \\ f = \text{flat} = \frac{p}{8} \end{array} \right.$$

Diameter Inches	No. Threads per Inch						
$\frac{1}{4}$	20	1	8	$2\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	7	$2\frac{1}{4}$	$4\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{3}{8}$	16	$1\frac{1}{4}$	7	$2\frac{3}{8}$	4	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{7}{16}$	14	$1\frac{3}{8}$	6	$2\frac{1}{2}$	4	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{1}{2}$	13	$1\frac{1}{2}$	6	$2\frac{5}{8}$	4	$3\frac{1}{4}$	3
$\frac{9}{16}$	12	$1\frac{5}{8}$	$5\frac{1}{2}$	$2\frac{3}{4}$	4	$3\frac{3}{8}$	3
$\frac{5}{8}$	11	$1\frac{3}{4}$	5	$2\frac{7}{8}$	$3\frac{1}{2}$	4	3
$\frac{3}{4}$	10	$1\frac{7}{8}$	5	3	$3\frac{1}{2}$		
$\frac{7}{8}$	9	2	$4\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$		

## SHARP "V" THREAD (THEORETICAL)

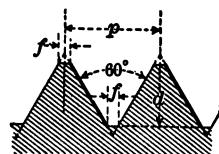


Formula 
$$\left\{ \begin{array}{l} p = \text{pitch} = \frac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .86603 \end{array} \right.$$

Diameter Inches	No. Threads per Inch						
$\frac{1}{4}$	20	$\frac{7}{8}$	9	2	$4\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	9	$2\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{3}{8}$	16	1	8	$2\frac{1}{4}$	$4\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{7}{16}$	14	$1\frac{1}{8}$	7	$2\frac{3}{8}$	$4\frac{1}{2}$	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{1}{2}$	12	$1\frac{1}{4}$	7	$2\frac{1}{2}$	4	$3\frac{1}{4}$	3
$\frac{9}{16}$	12	$1\frac{3}{8}$	6	$2\frac{5}{8}$	4	$3\frac{3}{8}$	3
$\frac{5}{8}$	11	$1\frac{1}{2}$	6	$2\frac{3}{4}$	4	4	3
$\frac{11}{16}$	11	$1\frac{5}{8}$	5	$2\frac{7}{8}$	4		
$\frac{3}{4}$	10	$1\frac{3}{4}$	5	3	$3\frac{1}{2}$		
$\frac{7}{8}$	10	$1\frac{7}{8}$	$4\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$		

## INTERNATIONAL AND FRENCH STANDARD THREAD

(METRIC SYSTEM)



$$\text{Formula} \left\{ \begin{array}{l} p = \text{pitch} \\ d = \text{depth} = p \times .64952 \\ f = \text{flat} = \frac{p}{8} \end{array} \right.$$

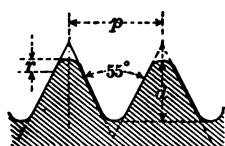
### INTERNATIONAL STANDARD

Diameter Millimeters	Pitch Millimeters	Diameter Millimeters	Pitch Millimeters	Diameter Millimeters	Pitch Millimeters
6	1.0	20	2.5	48	5.0
7	1.0	22	2.5	52	5.0
8	1.25	24	3.0	56	5.5
9	1.25	27	3.0	60	5.5
10	1.5	30	3.5	64	6.0
11	1.5	33	3.5	68	6.0
12	1.75	36	4.0	72	6.5
14	2.0	39	4.0	76	6.5
16	2.0	42	4.5	80	7.0
18	2.5	45	4.5		

### FRENCH STANDARD

Diameter Millimeters	Pitch Millimeters	Diameter Millimeters	Pitch Millimeters	Diameter Millimeters	Pitch Millimeters
3	0.5	16	2.0	36	4.0
4	0.75	18	2.5	38	4.0
5	0.75	20	2.5	40	4.0
6	1.0	22	2.5	42	4.5
7	1.0	24	3.0	44	4.5
8	1.0	26	3.0	46	4.5
9	1.0	28	3.0	48	5.0
10	1.5	30	3.5	50	5.0
12	1.5	32	3.5		
14	2.0	34	3.5		

## WHITWORTH STANDARD THREAD

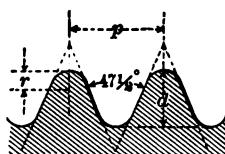


Formula

$$\begin{cases} p = \text{pitch} = \frac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .64033 \\ r = \text{radius} = p \times .1373 \end{cases}$$

Diameter Inches	No. Threads per Inch						
$\frac{1}{4}$	20	$\frac{7}{8}$	9	2	4 $\frac{1}{2}$	$3\frac{1}{4}$	3 $\frac{1}{4}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	9	$2\frac{1}{8}$	4 $\frac{1}{2}$	$3\frac{3}{8}$	3 $\frac{1}{4}$
$\frac{3}{8}$	16	1	8	$2\frac{1}{4}$	4	$3\frac{1}{2}$	3 $\frac{1}{4}$
$\frac{7}{16}$	14	$1\frac{1}{8}$	7	$2\frac{3}{8}$	4	$3\frac{3}{8}$	3 $\frac{1}{4}$
$\frac{1}{2}$	12	$1\frac{1}{4}$	7	$2\frac{1}{2}$	4	$3\frac{3}{4}$	3
$\frac{9}{16}$	12	$1\frac{3}{8}$	6	$2\frac{5}{8}$	4	$3\frac{7}{8}$	3
$\frac{5}{8}$	11	$1\frac{1}{2}$	6	$2\frac{3}{4}$	$3\frac{1}{2}$	4	3
$\frac{11}{16}$	11	$1\frac{5}{8}$	5	$2\frac{7}{8}$	$3\frac{1}{2}$		
$\frac{3}{4}$	10	$1\frac{3}{4}$	5	3	$3\frac{1}{2}$		
$\frac{13}{16}$	10	$1\frac{7}{8}$	4 $\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$		

## BRITISH ASSOCIATION STANDARD THREAD

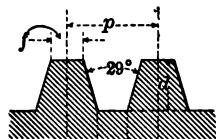


Formula

$$\begin{cases} p = \text{pitch} \\ d = \text{depth} = p \times .6 \\ r = \text{radius} = \frac{2 \times p}{11} \end{cases}$$

No.	Diameter Millimeters	Pitch Millimeters	No.	Diameter Millimeters	Pitch Millimeters
0	6.0	1.00	7	2.5	0.48
1	5.3	0.90	8	2.2	0.43
2	4.7	0.81	9	1.9	0.39
3	4.1	0.73	10	1.7	0.35
4	3.64	0.66	12	1.3	0.28
5	3.2	0.59	14	1.0	0.23
6	2.8	0.53	16	79	0.19

## ACME STANDARD SCREW THREAD



Formula

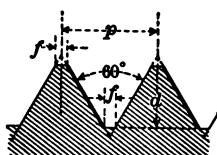
$$\left\{ \begin{array}{l} p = \text{pitch} = \frac{1}{\text{No. threads per inch}} \\ d = \text{depth} = \frac{1}{2} p + .010 \\ f = \text{flat on top of thread} = p \times .3707 \\ f' = \text{flat on bottom of thread} = p \times .3707 - .0052 \end{array} \right.$$

Pitch	No. of Threads per Inch	Depth of Thread	Width at Top of Thread	Width at Bottom of Thread	Space at Top of Thread	Thickness at Root of Thread
2	$\frac{1}{2}$	.1010	.7414	.7362	.1.2586	.1.2637
$1\frac{1}{8}$	$\frac{8}{5}$	.9475	.6950	.6897	.1.1799	.1.1850
$1\frac{3}{8}$	$\frac{4}{3}$	.8850	.6487	.6435	.1.1012	.1.1064
$1\frac{5}{8}$	$\frac{8}{3}$	.8225	.6025	.5973	.1.0226	.1.0277
$1\frac{1}{2}$	$\frac{2}{3}$	.7600	.5560	.5508	.9439	.9491
$1\frac{7}{8}$	$\frac{6}{5}$	.7287	.5329	.5277	.9046	.9097
$1\frac{3}{8}$	$\frac{8}{11}$	.6975	.5097	.5045	.8652	.8704
$1\frac{1}{16}$	$\frac{16}{11}$	.6662	.4865	.4813	.8259	.8311
$1\frac{1}{4}$	$\frac{4}{5}$	.635	.4633	.4581	.7866	.7918
$1\frac{3}{16}$	$\frac{16}{9}$	.6037	.4402	.4350	.7472	.7525
$1\frac{1}{8}$	$\frac{8}{9}$	.5725	.4170	.4118	.7079	.7131
$1\frac{1}{16}$	$\frac{16}{9}$	.5412	.3938	.3886	.6686	.6739
1	1	.510	.3707	.3655	.6293	.6345
$1\frac{1}{8}$	$1\frac{1}{15}$	.4787	.3476	.3424	.5898	.5950
$\frac{7}{8}$	$1\frac{1}{4}$	.4475	.3243	.3191	.5506	.5558
$1\frac{1}{16}$	$1\frac{1}{3}$	.4162	.3012	.2960	.5112	.5164
$\frac{3}{4}$	$1\frac{1}{3}$	.385	.2780	.2728	.4720	.4772
$1\frac{1}{8}$	$1\frac{1}{15}$	.3537	.2548	.2496	.4327	.4379
$2\frac{1}{3}$	$1\frac{1}{2}$	.3433	.2471	.2419	.4194	.4246
$\frac{5}{8}$	$1\frac{3}{5}$	.3225	.2316	.2264	.3934	.3986
$1\frac{5}{8}$	$1\frac{7}{9}$	.2912	.2085	.2033	.3539	.3591
$\frac{9}{16}$	2	.260	.1853	.1801	.3147	.3199
$1\frac{1}{2}$	$2\frac{2}{3}$	.2287	.1622	.1570	.2752	.2804
$1\frac{1}{8}$	$2\frac{1}{2}$	.210	.1482	.1430	.2518	.2570
$\frac{3}{8}$	$2\frac{2}{3}$	.1975	.1390	.1338	.2359	.2411
$1\frac{1}{16}$	3	.1766	.1235	.1183	.2098	.2150
$1\frac{5}{8}$	$3\frac{1}{2}$	.1662	.1158	.1106	.1966	.2018
$1\frac{1}{8}$	$3\frac{1}{2}$	.1528	.1059	.1007	.1797	.1849
$\frac{1}{4}$	4	.1350	.0927	.0875	.1573	.1625
$2\frac{1}{8}$	$4\frac{1}{2}$	.1211	.0824	.0772	.1398	.1450
$\frac{5}{8}$	5	.110	.0741	.0689	.1259	.1311
$1\frac{3}{8}$	$5\frac{1}{3}$	.1037	.0695	.0643	.1179	.1232
$\frac{1}{2}$	6	.0933	.0617	.0565	.1049	.1101
$\frac{7}{8}$	7	.0814	.0530	.0478	.0899	.0951
$\frac{1}{8}$	8	.0725	.0463	.0411	.0787	.0839
$\frac{1}{5}$	9	.0655	.0413	.0361	.0699	.0751
$1\frac{1}{16}$	10	.060	.0371	.0319	.0629	.0681
$1\frac{1}{16}$	16	.0412	.0232	.0180	.0392	.0444

## A. S. M. E. STANDARD

### FOR MACHINE SCREWS

United States Standard Form of Thread



Formula

$$\left\{ \begin{array}{l} p = \text{pitch} = \frac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .64952 \\ f = \text{flat} = \frac{p}{8} \end{array} \right.$$

This standard for machine screws was recommended by the American Society of Mechanical Engineers at the Indianapolis meeting, May 28-31, 1907.

For full and complete details concerning this standard and the Engineers' recommendations, see their report, Volume 28, No. 9.

## STANDARD SCREWS

NOTE—Maximum sizes given are the standard sizes.

Basic Size		Outside Diameter		Pitch Diameter		Root Diameter	
No.	O. D. - T. P. I.	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
0	.060-80	.0572	.0600	.0505	.0519	.0410	.0438
1	.073-72	.0700	.0730	.0625	.0640	.0520	.0550
2	.086-64	.0828	.0860	.0742	.0759	.0624	.0657
3	.099-56	.0955	.0990	.0857	.0874	.0721	.0758
4	.112-48	.1082	.1120	.0966	.0985	.0808	.0849
5	.125-44	.1210	.1250	.1082	.1102	.0910	.0955
6	.138-40	.1338	.1380	.1197	.1218	.1007	.1055
7	.151-36	.1466	.1510	.1308	.1330	.1097	.1149
8	.164-36	.1596	.1640	.1438	.1460	.1227	.1279
9	.177-32	.1723	.1770	.1544	.1567	.1307	.1364
10	.190-30	.1852	.1900	.1660	.1684	.1407	.1467
12	.216-28	.2111	.2160	.1903	.1928	.1633	.1666
14	.242-24	.2368	.2420	.2123	.2149	.1807	.1879
16	.268-22	.2626	.2680	.2358	.2385	.2013	.2090
18	.294-20	.2884	.2940	.2587	.2615	.2208	.2290
20	.320-20	.3144	.3200	.2847	.2875	.2468	.2550
22	.346-18	.3402	.3460	.3070	.3099	.2649	.2738
24	.372-16	.3660	.3720	.3284	.3314	.2810	.2908
26	.398-16	.3920	.3980	.3544	.3574	.3070	.3168
28	.424-14	.4178	.4240	.3745	.3776	.3204	.3312
30	.450-14	.4438	.4500	.4005	.4036	.3464	.3572

Continued on next page

## A. S. M. E. STANDARD

## SPECIAL SCREWS

NOTE—Maximum sizes given are the standard sizes

Basic Size		Outside Diameter		Pitch Diameter		Root Diameter	
No.	O. D.—T. P. I.	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1	.073-64	.0698	.0730	.0612	.0629	.0494	.0527
2	.086-56	.0825	.0860	.0727	.0744	.0591	.0628
3	.099-48	.0952	.0990	.0836	.0855	.0678	.0719
4	.112-40	.1078	.1120	.0937	.0958	.0747	.0795
	.112-36	.1076	.1120	.0918	.0940	.0707	.0759
5	.125-40	.1208	.1250	.1067	.1088	.0877	.0925
	.125-36	.1206	.1250	.1048	.1070	.0837	.0889
6	.138-36	.1336	.1380	.1178	.1200	.0967	.1019
	.138-32	.1333	.1380	.1154	.1177	.0917	.0974
7	.151-32	.1463	.1510	.1284	.1307	.1047	.1104
	.151-30	.1462	.1510	.1269	.1294	.1017	.1077
8	.164-32	.1593	.1640	.1414	.1437	.1177	.1234
	.164-30	.1592	.1640	.1399	.1423	.1147	.1207
9	.177-30	.1722	.1770	.1529	.1553	.1277	.1337
	.177-24	.1718	.1770	.1473	.1499	.1158	.1229
10	.190-32	.1853	.1900	.1674	.1697	.1437	.1494
	.190-24	.1848	.1900	.1603	.1629	.1287	.1359
12	.216-24	.2108	.2160	.1863	.1889	.1547	.1619
14	.242-20	.2364	.2420	.2067	.2095	.1688	.1770
16	.268-20	.2624	.2680	.2327	.2355	.1948	.2030
18	.294-18	.2882	.2940	.2550	.2579	.2129	.2218
20	.320-18	.3142	.3200	.2810	.2839	.2389	.2478
22	.346-16	.3400	.3460	.3024	.3054	.2550	.2648
24	.372-18	.3662	.3720	.3330	.3359	.2909	.2998
26	.398-14	.3918	.3980	.3485	.3516	.2944	.3052
28	.424-16	.4180	.4240	.3804	.3834	.3330	.3482
30	.450-16	.4440	.4500	.4064	.4094	.3590	.3688

## CONSTANTS FOR FINDING DIAMETER AT BOTTOM OF THREAD

Threads per Inch	U. S. Standard Constant	"V" Thread Constant	Threads per Inch	U. S. Standard Constant	"V" Thread Constant
64	.02030	.02706	16	.08119	.10825
60	.02165	.02887	14	.09279	.12372
56	.02320	.03093	13	.09993	.13323
50	.02598	.03464	12	.10825	.14434
48	.02706	.03608	11	.11809	.15746
44	.02952	.03936	10	.12990	.17321
40	.03248	.04330	9	.14434	.19245
36	.03668	.04811	8	.16238	.21651
32	.04059	.05413	7	.18558	.24744
30	.04330	.05773	6	.21651	.28868
28	.04639	.06186	5½	.23619	.31492
26	.04996	.06662	5	.25981	.34641
24	.05413	.07217	4½	.28868	.38490
22	.05905	.07873	4	.32476	.43301
20	.06495	.08660	3½	.37115	.49487
18	.07217	.09623	3	.43301	.57733

C=Constant for number of threads per inch.

D=Outside diameter.

D<sub>1</sub>=Diameter at bottom of thread.

D<sub>1</sub>=D—C.

### EXAMPLE

Given outside diameter of U. S. S. screw thread, 2 inches; 4½ threads per inch; find diameter at bottom of thread. D=2 inches; for 4½ threads U. S. S., constant, C=.2886; then diameter at bottom of thread, D<sub>1</sub>=2-.2886=1.7114 inches.

## TAP DRILLS

## FOR U. S. STANDARD THREAD

Size Inches	Size of Drill	Size Inches	Size of Drill	Size Inches	Size of Drill
$\frac{1}{4}$	12	$\frac{5}{8}$	$\frac{3}{4}$	$1\frac{3}{8}$	$1\frac{1}{4}$
$\frac{1}{6}$	D	$\frac{3}{4}$	$\frac{5}{8}$	$1\frac{1}{2}$	$1\frac{1}{2}$
$\frac{7}{8}$	N	$\frac{7}{8}$	$\frac{7}{8}$	$1\frac{5}{8}$	$1\frac{3}{4}$
$\frac{1}{8}$	S	1	$\frac{2}{3}$	$1\frac{3}{4}$	$1\frac{1}{2}$
$\frac{1}{2}$	$1\frac{9}{16}$	$1\frac{1}{8}$	$\frac{5}{8}$	$1\frac{7}{8}$	$1\frac{3}{8}$
$\frac{9}{16}$	$1\frac{5}{8}$	$1\frac{1}{4}$	$1\frac{5}{16}$	2	$1\frac{1}{3}$
	3 2				

FOR U. S. FORM OF THREAD  $\frac{1}{6}$  TO  $\frac{7}{16}$ -INCH DIAMETER

Diameter Inches	Number of Threads to the Inch	Exact Diameter Bottom of Thread Inches	Gauge Number of Drill	Diameter Inches	Number of Threads to the Inch	Exact Diameter Bottom of Thread Inches	Gauge Number of Drill
$\frac{1}{6}$	60	.041	57	$\frac{5}{16}$	56	.055	53
$\frac{1}{6}$	64	.042	56	$\frac{5}{16}$	60	.056	53
$\frac{3}{16}$	48	.067	50	$\frac{7}{16}$	40	.077	46
$\frac{3}{16}$	50	.068	50	$\frac{7}{16}$	44	.080	45
$\frac{3}{16}$	56	.071	49	$\frac{7}{16}$	48	.082	44
$\frac{3}{16}$	60	.072	48	$\frac{9}{16}$	32	.100	37
$\frac{1}{8}$	40	.093	41	$\frac{9}{16}$	36	.105	35
$\frac{1}{8}$	44	.096	40	$\frac{9}{16}$	40	.108	34
$\frac{1}{8}$	48	.098	39	$\frac{11}{16}$	32	.131	29
$\frac{5}{32}$	32	.116	31	$\frac{11}{16}$	36	.136	28
$\frac{5}{32}$	36	.120	36	$\frac{13}{16}$	40	.139	27
$\frac{5}{32}$	40	.124	30	$\frac{13}{16}$	24	.149	24
$\frac{1}{6}$	24	.133	29	$\frac{13}{16}$	28	.157	20
$\frac{3}{16}$	28	.141	27	$\frac{15}{16}$	32	.162	19
$\frac{1}{6}$	30	.144	26	$\frac{15}{16}$	36	.167	18
$\frac{1}{6}$	32	.147	25	$\frac{17}{16}$	24	.180	13
$\frac{1}{6}$	36	.152	23	$\frac{17}{16}$	28	.188	10
$\frac{3}{16}$	24	.164	19	$\frac{19}{16}$	32	.194	8
$\frac{3}{16}$	28	.172	16	$\frac{19}{16}$	36	.198	7
$\frac{3}{16}$	32	.178	14	$\frac{21}{16}$	18	.193	9
$\frac{3}{16}$	36	.183	12	$\frac{21}{16}$	20	.201	5
$\frac{1}{4}$	18	.178	14	$\frac{23}{16}$	24	.211	3
$\frac{1}{4}$	20	.185	12	$\frac{23}{16}$	26	.216	2
$\frac{1}{4}$	22	.190	10	$\frac{25}{16}$	32	.225	1
$\frac{1}{4}$	24	.196	8				
$\frac{1}{4}$	26	.200	6				

**TAP DRILLS****FOR MACHINE SCREW TAPS**

These drills will give a thread near enough full for all practical purposes, but not a *full* thread.

Size of Taps	No. of Threads	Size of Drills	Size of Taps	No. of Threads	Size of Drills
2	48	51	12	24	19
2	56	50	13	20	19
2	64	49	13	24	15
3	40	49	14	20	16
3	48	48	14	22	13
3	56	44	14	24	9
4	32	48	15	18	13
4	36	45	15	20	10
4	40	44	15	24	6
5	30	44	16	16	13
5	32	43	16	18	10
5	36	41	16	20	6
5	40	40	16	24	2
6	30	41	17	16	7
6	32	37	17	18	4
6	36	36	17	20	2
6	40	33	18	16	3
7	28	35	18	18	2
7	30	34	18	20	A
7	32	31	19	16	I
8	24	34	19	18	B
8	30	30	19	20	D
8	32	30	20	16	C
9	24	30	20	18	E
9	28	29	20	20	H
9	30	28	22	16	H
9	32	27	22	18	J
10	24	28	24	14	K
10	28	26	24	16	L
10	30	24	24	18	N
10	32	24	26	14	N
11	24	24	26	16	O
11	28	21	28	14	Q
11	30	19	28	16	S
12	20	24	30	14	T
12	22	20	30	16	V

## TAP DRILLS

FOR A. S. M. E. STANDARD

## MACHINE SCREW TAPS

The diameter given for each hole to be tapped allows for a practical clearance at the root of the thread of the screw and will not impose undue strain upon the tap in service.

Size of Tap	Number of Threads	Size of Drill	Size of Tap	Number of Threads	Size of Drill
0	80	.0465	9	32	.1405
1	64	.055	10	24	.140
1	72	.0595	10	30	.152
2	56	.0670	10	32	.154
2	64	.070	12	24	.166
3	48	.076	12	28	.173
3	56	.0785	14	20	.182
4	36	.080	14	24	.1935
4	40	.082	16	20	.209
4	48	.089	16	22	.213
5	36	.0935	18	18	.228
5	40	.098	18	20	.234
5	44	.0995	20	18	.257
6	32	.1015	20	20	.261
6	36	.1065	22	16	.272
6	40	.110	22	18	.281
7	30	.113	24	16	.295
7	32	.116	24	18	.302
7	36	.120	26	14	.316
8	30	.1285	26	16	.323
8	32	.1285	28	14	.339
8	36	.136	28	16	.348
9	24	.1285	30	14	.368
9	30	.136	30	16	.377

# STANDARD DIMENSIONS OF WROUGHT-IRON WELDED TUBES

## BRIGGS' STANDARD

Nominal Inside Inches	Diameter of Tubes			Screwed Ends	
	Actual Inside Inches	Actual Outside Inches	Thickness of Metal Inches	No. of Threads per Inch	Length of Perfect Thread Inches
$\frac{1}{8}$	0.270	0.405	0.068	27	0.19
$\frac{1}{4}$	0.364	0.540	0.088	18	0.29
$\frac{3}{8}$	0.494	0.675	0.091	18	0.30
$\frac{1}{2}$	0.623	0.840	0.109	14	0.39
$\frac{5}{8}$	0.824	1.050	0.113	14	0.40
1	1.048	1.315	0.134	11½	0.51
$1\frac{1}{4}$	1.380	1.660	0.140	11½	0.54
$1\frac{1}{2}$	1.610	1.900	0.145	11½	0.55
2	2.067	2.375	0.154	11½	0.58
$2\frac{1}{2}$	2.468	2.875	0.204	8	0.89
3	3.067	3.500	0.217	8	0.95
$3\frac{1}{2}$	3.548	4.000	0.226	8	1.00
4	4.026	4.500	0.237	8	1.05
$4\frac{1}{2}$	4.508	5.000	0.246	8	1.10
5	5.045	5.563	0.259	8	1.16
6	6.065	6.625	0.280	8	1.26
7	7.023	7.625	0.301	8	1.36
8	7.982	8.625	0.322	8	1.46
*9	9.000	9.688	0.344	8	1.57
10	10.019	10.750	0.366	8	1.68

Taper of conical tube ends, 1 in 32 to axis of tube ( $\frac{3}{4}$  inch per foot).

The sizes of twist drills to be used in boring holes to be reamed with pipe reamer, and threaded with pipe tap, are as follows :

Size, Tap	Diameter, Drill	Size, Tap	Diameter, Drill
$\frac{1}{8}$ inch	$\frac{3}{16}$ inch	$1\frac{1}{4}$ inches	$1\frac{7}{8}$ inches
$\frac{1}{4}$ inch	$1\frac{7}{16}$ inch	$1\frac{1}{2}$ inches	$1\frac{23}{32}$ inches
$\frac{3}{8}$ inch	$1\frac{9}{16}$ inch	2 inches	$2\frac{1}{16}$ inches
$\frac{1}{2}$ inch	$1\frac{15}{16}$ inch	$2\frac{1}{2}$ inches	$2\frac{3}{4}$ inches
$\frac{5}{8}$ inch	$1\frac{31}{32}$ inch	3 inches	$3\frac{1}{8}$ inches
1 inch	$1\frac{1}{8}$ inches		

\*By the action of the manufacturers of wrought-iron pipe and boiler tubes, at a meeting held in New York, May 9, 1889, a change in size of actual outside diameter of 9-inch pipe was adopted, making the latter 9.625 instead of 9.688 inches, as given in the table of Briggs' Standard pipe diameters.

# DIFFERENT STANDARDS FOR WIRE GAUGE IN USE IN THE UNITED STATES

DIMENSIONS OF SIZES IN DECIMAL PARTS OF AN INCH

No. of Wire Gauge	American or Brown & Sharpe	Birmingham or Stubs' Wire	Washburn & Moen Mfg. Co., Worcester Mass.	Trenton Iron Co., Trenton N. J.	Stubs' Steel Wire	U. S. Standard for Plate	No. of Wire Gauge
000000	. . .	. .	. .	. .	. .	.46875	000000
00000	. . .	. .	.45	. .	. .	.4375	00000
0000	.46	.454	.3938	.4	. .	.40625	0000
000	.40964	.425	.3625	.36	. .	.375	000
00	.3648	.38	.3310	.33	. .	.34375	00
0	.32486	.34	.3065	.305	. .	.3125	0
1	.2893	.3	.2830	.285	.227	.28125	1
2	.25763	.284	.2625	.265	.219	.265625	2
3	.22942	.259	.2437	.245	.212	.25	3
4	.20431	.238	.2253	.225	.207	.234375	4
5	.18194	.22	.2070	.205	.204	.21875	5
6	.16202	.203	.1920	.19	.201	.203125	6
7	.14428	.18	.1770	.175	.199	.1875	7
8	.12849	.165	.1620	.16	.197	.171875	8
9	.11443	.148	.1483	.145	.194	.15625	9
10	.10189	.134	.1350	.13	.191	.140625	10
11	.090742	.12	.1205	.1175	.188	.125	11
12	.080808	.109	.1055	.105	.185	.109375	12
13	.071961	.095	.0915	.0925	.182	.09375	13
14	.064084	.083	.0800	.08	.180	.078125	14
15	.057068	.072	.0720	.07	.178	.0703125	15
16	.05082	.065	.0625	.061	.175	.0625	16
17	.045257	.058	.0540	.0525	.172	.05625	17
18	.040303	.049	.0475	.045	.168	.05	18
19	.03589	.042	.0410	.04	.164	.04375	19
20	.031961	.035	.0348	.035	.161	.0375	20
21	.028462	.032	.03175	.031	.157	.034375	21
22	.025347	.028	.0286	.028	.155	.03125	22
23	.022571	.025	.0258	.025	.153	.028125	23
24	.0201	.022	.0230	.0225	.151	.025	24
25	.0179	.02	.0204	.02	.148	.021875	25
26	.01594	.018	.0181	.018	.146	.01875	26
27	.014195	.016	.0173	.017	.143	.0171875	27
28	.012041	.014	.0162	.016	.139	.015625	28
29	.011257	.013	.0150	.015	.134	.0140625	29
30	.010025	.012	.0140	.014	.127	.0125	30
31	.008928	.01	.0132	.013	.120	.0109375	31
32	.00795	.009	.0128	.012	.115	.01015625	32
33	.00708	.008	.0118	.011	.112	.009375	33
34	.006304	.007	.0104	.01	.110	.00859375	34
35	.005614	.005	.0095	.0095	.108	.0078125	35
36	.005	.004	.0090	.009	.106	.00703125	36
37	.004453	. .	. .	.0085	.103	.006040625	37
38	.003965	. .	. .	.008	.101	.00625	38
39	.003531	. .	. .	.0075	.099	. . . . .	39
40	.003144	. .	. .	.007	.097	. . . . .	40

## WEIGHTS

## OF SQUARE AND ROUND BARS OF WROUGHT IRON IN POUNDS PER LINEAR FOOT—KENT

Iron weighing 480 pounds per cubic foot.

For steel add 2 per cent.

Thickness of Diameter in Inches	Weight of Square Bar One Foot Long	Weight of Round Bar One Foot Long	Thick- ness of Diameter in Inches	Weight of Square Bar One Foot Long	Weight of Round Bar One Foot Long	Thick- ness of Diameter in Inches	Weight of Square Bar One Foot Long	Weight of Round Bar One Foot Long
0			$2\frac{1}{8}$	24.08	18.91	$5\frac{7}{8}$	96.30	75.64
$\frac{1}{8}$	.013	.010	$\frac{3}{4}$	25.21	19.80	$\frac{7}{8}$	98.55	77.40
$\frac{3}{8}$	.052	.041	$\frac{1}{8}$	26.37	20.71	$\frac{1}{2}$	100.8	79.19
$\frac{5}{8}$	.117	.092	$\frac{7}{8}$	27.55	21.64	$\frac{9}{8}$	103.1	81.00
$\frac{1}{4}$	.208	.164	$\frac{1}{8}$	28.76	22.59	$\frac{5}{8}$	105.5	82.83
$\frac{5}{16}$	.326	.256	3	30.00	23.56	$\frac{1}{8}$	107.8	84.69
$\frac{3}{8}$	.469	.368	$\frac{1}{8}$	31.26	24.55	$\frac{3}{4}$	110.2	86.56
$\frac{7}{16}$	.638	.501	$\frac{1}{8}$	32.55	25.57	$\frac{1}{8}$	112.6	88.45
$\frac{1}{2}$	.833	.654	$\frac{3}{8}$	33.87	26.60	$\frac{7}{8}$	115.1	90.36
$\frac{9}{16}$	1.055	.828	$\frac{1}{4}$	35.21	27.65	$\frac{1}{8}$	117.5	92.29
$\frac{5}{8}$	1.302	1.023	$\frac{5}{8}$	36.58	28.73	6	120.0	94.25
$\frac{11}{16}$	1.576	1.237	$\frac{1}{8}$	37.97	29.82	$\frac{1}{8}$	125.1	98.22
$\frac{3}{4}$	1.875	1.473	$\frac{7}{8}$	39.39	30.94	$\frac{1}{4}$	130.2	102.3
$\frac{13}{16}$	2.201	1.728	$\frac{1}{2}$	40.83	32.07	$\frac{3}{8}$	135.5	106.4
$\frac{7}{8}$	2.552	2.004	$\frac{9}{16}$	42.30	33.23	$\frac{1}{2}$	140.8	110.6
$\frac{15}{16}$	2.930	2.301	$\frac{1}{8}$	43.80	34.40	$\frac{5}{8}$	146.3	114.9
I	3.333	2.618	$\frac{11}{16}$	45.33	35.60	$\frac{3}{4}$	151.9	119.3
$\frac{1}{8}$	3.763	2.955	$\frac{3}{4}$	46.88	36.82	$\frac{5}{8}$	157.6	123.7
$\frac{1}{8}$	4.219	3.313	$\frac{13}{16}$	48.45	38.05	7	163.3	128.3
$\frac{5}{8}$	4.701	3.692	$\frac{1}{8}$	50.05	39.31	$\frac{1}{8}$	169.2	132.9
$\frac{1}{4}$	5.208	4.091	$\frac{1}{8}$	51.68	40.59	$\frac{1}{4}$	175.2	137.6
$\frac{5}{16}$	5.742	4.510	4	53.33	41.89	$\frac{3}{8}$	181.3	142.4
$\frac{3}{8}$	6.302	4.950	$\frac{1}{8}$	55.01	43.21	$\frac{1}{2}$	187.5	147.3
$\frac{7}{16}$	6.888	5.410	$\frac{1}{8}$	56.72	44.55	$\frac{5}{8}$	193.8	152.2
$\frac{1}{2}$	7.500	5.890	$\frac{3}{8}$	58.45	45.91	$\frac{3}{4}$	200.2	157.2
$\frac{9}{16}$	8.138	6.392	$\frac{1}{4}$	60.21	47.29	$\frac{7}{8}$	206.7	162.4
$\frac{5}{8}$	8.802	6.913	$\frac{5}{16}$	61.99	48.69	8	213.3	167.6
$\frac{11}{16}$	9.942	7.455	$\frac{3}{8}$	63.80	50.11	$\frac{1}{4}$	226.9	178.2
$\frac{3}{4}$	10.21	8.018	$\frac{7}{8}$	65.64	51.55	$\frac{1}{2}$	240.8	189.2
$\frac{13}{16}$	10.95	8.601	$\frac{1}{2}$	67.50	53.01	$\frac{3}{4}$	255.2	200.4
$\frac{7}{8}$	11.72	9.204	$\frac{9}{16}$	69.39	54.50	9	270.0	212.1
$\frac{15}{16}$	12.51	9.828	$\frac{1}{8}$	71.30	56.00	$\frac{1}{4}$	285.2	224.0
2	13.33	10.47	$\frac{11}{16}$	73.24	57.52	$\frac{1}{2}$	300.8	236.3
$\frac{1}{8}$	14.18	11.14	$\frac{3}{4}$	75.21	59.07	$\frac{3}{4}$	316.9	248.9
$\frac{1}{8}$	15.05	11.82	$\frac{13}{16}$	77.20	60.63	10	333.3	261.8
$\frac{3}{8}$	15.95	12.53	$\frac{7}{8}$	79.22	62.22	$\frac{1}{4}$	350.2	275.1
$\frac{1}{4}$	16.88	13.25	$\frac{1}{8}$	81.26	63.82	$\frac{1}{2}$	367.5	288.6
$\frac{5}{16}$	17.83	14.00	5	83.33	65.45	$\frac{3}{4}$	385.2	302.5
$\frac{3}{8}$	18.80	14.77	$\frac{1}{8}$	85.43	67.10	11	403.3	316.8
$\frac{7}{16}$	19.80	15.55	$\frac{1}{8}$	87.55	68.76	$\frac{1}{4}$	421.9	331.3
$\frac{1}{2}$	20.83	16.36	$\frac{3}{8}$	89.70	70.45	$\frac{1}{2}$	440.8	346.2
$\frac{9}{16}$	21.89	17.19	$\frac{1}{4}$	91.88	72.16	$\frac{3}{4}$	460.2	361.4
$\frac{5}{8}$	22.97	18.04	$\frac{1}{8}$	94.08	73.89	12	480.0	377.0

To compute the weight of sheet steel: Divide the thickness, expressed in thousandths, by 25; the result is the weight, in pounds, per square foot.

TABLE GIVING THE AMOUNT OF TAPER IN A CERTAIN  
LENGTH WHEN THE TAPER PER FOOT IS GIVEN

Length of Tapered Portion	Taper per Foot										
	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	*600	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
$\frac{1}{2}$	.0002	.0002	.0003	.0007	.0010	.0013	.0016	.0016	.0020	.0026	.0033
$\frac{1}{6}$	.0003	.0005	.0007	.0013	.0020	.0026	.0031	.0033	.0039	.0052	.0065
$\frac{1}{8}$	.0007	.0010	.0013	.0026	.0039	.0052	.0062	.0065	.0078	.0104	.0130
$\frac{3}{16}$	.0010	.0015	.0020	.0039	.0059	.0078	.0094	.0098	.0117	.0156	.0195
$\frac{1}{4}$	.0013	.0020	.0026	.0052	.0078	.0104	.0125	.0130	.0156	.0208	.0260
$\frac{1}{6}$	.0016	.0024	.0033	.0065	.0098	.0130	.0156	.0163	.0195	.0260	.0326
$\frac{3}{8}$	.0020	.0029	.0039	.0078	.0117	.0156	.0187	.0195	.0234	.0312	.0391
$\frac{7}{16}$	.0023	.0034	.0046	.0091	.0137	.0182	.0219	.0228	.0273	.0365	.0456
$\frac{1}{2}$	.0026	.0039	.0052	.0104	.0156	.0208	.0250	.0260	.0312	.0417	.0521
$\frac{9}{16}$	.0029	.0044	.0059	.0117	.0176	.0234	.0281	.0293	.0352	.0469	.0586
$\frac{5}{8}$	.0033	.0049	.0065	.0130	.0195	.0260	.0312	.0326	.0391	.0521	.0651
$\frac{11}{16}$	.0036	.0054	.0072	.0143	.0215	.0286	.0344	.0358	.0430	.0573	.0716
$\frac{3}{4}$	.0039	.0059	.0078	.0156	.0234	.0312	.0375	.0391	.0469	.0625	.0781
$\frac{13}{16}$	.0042	.0063	.0085	.0169	.0254	.0339	.0406	.0423	.0508	.0677	.0846
$\frac{7}{8}$	.0046	.0068	.0091	.0182	.0273	.0365	.0437	.0456	.0547	.0729	.0911
$\frac{15}{16}$	.0049	.0073	.0098	.0195	.0293	.0391	.0469	.0488	.0586	.0781	.0977
1	.0052	.0078	.0104	.0208	.0312	.0417	.050	.0521	.0625	.0833	.1042
2	.0104	.0156	.0208	.0417	.0625	.0833	.100	.1042	.125	.1667	.2083
3	.0156	.0234	.0312	.0625	.0937	.1250	.150	.1562	.1875	.250	.3125
4	.0208	.0312	.0417	.0833	.125	.1667	.200	.2083	.250	.3333	.4167
5	.0260	.0391	.0521	.1042	.1562	.2083	.250	.2604	.3125	.4167	.5208
6	.0312	.0469	.0625	.125	.1875	.250	.300	.3125	.375	.500	.625
7	.0365	.0547	.0729	.1458	.2187	.2917	.350	.3646	.4375	.5833	.7292
8	.0417	.0625	.0833	.1667	.250	.3333	.400	.4167	.500	.6667	.8333
9	.0469	.0703	.0937	.1875	.2812	.375	.450	.4687	.5625	.750	.9375
10	.0521	.0781	.1042	.2083	.3125	.4167	.500	.5208	.625	.8333	1.0417
11	.0573	.0859	.1146	.2292	.3437	.4583	.550	.5729	.6875	.9167	1.1458
12	.0625	.0937	.125	.250	.375	.500	.600	.625	.750	1.000	1.250
13	.0677	.1016	.1354	.2708	.4062	.5417	.650	.6771	.8125	1.0833	1.3542
14	.0729	.1094	.1458	.2917	.4375	.5833	.700	.7292	.875	1.1667	1.4583
15	.0781	.1172	.1562	.3125	.4687	.625	.750	.7812	.9375	1.250	1.5625
16	.0833	.125	.1667	.3333	.500	.6667	.800	.8333	1.000	1.3333	1.6667
17	.0885	.1328	.1771	.3542	.5312	.7083	.850	.8854	1.0625	1.4167	1.7708
18	.0937	.1406	.1875	.3750	.5625	.750	.900	.9375	1.125	1.500	1.875
19	.0990	.1484	.1979	.3958	.5937	.7917	.950	.9896	1.1875	1.5833	1.9792
20	.1042	.1562	.2083	.4167	.625	.8333	1.000	1.0417	1.250	1.6667	2.0833
21	.1094	.1641	.2187	.4375	.6662	.875	1.050	1.0937	1.3125	1.750	2.1875
22	.1146	.1719	.2292	.4583	.6875	.9167	1.100	1.1458	1.375	1.8333	2.2917
23	.1198	.1797	.2396	.4792	.7187	.9583	1.150	1.1979	1.4375	1.9167	2.3958
24	.125	.1875	.250	.500	.750	1.000	1.200	1.250	1.500	2.000	2.500

\*Pratt & Whitney Standard Taper.

# TABLE OF DECIMAL EQUIVALENTS OF MILLIMETERS AND FRACTIONS OF MILLIMETERS

Millimeters Inches	Millimeters Inches	Millimeters Inches	Millimeters Inches
$1\frac{1}{0} = .00039$	$1\frac{3}{0} = .01299$	$1\frac{6}{0} = .02520$	$1\frac{9}{0} = .03740$
$1\frac{5}{0} = .00079$	$1\frac{3}{4} = .01339$	$1\frac{5}{5} = .02559$	$1\frac{9}{5} = .03780$
$1\frac{9}{0} = .00118$	$1\frac{3}{5} = .01378$	$1\frac{6}{0} = .02598$	$1\frac{9}{7} = .03819$
$1\frac{3}{0} = .00157$	$1\frac{3}{6} = .01417$	$1\frac{6}{5} = .02638$	$1\frac{9}{8} = .03858$
$1\frac{6}{0} = .00197$	$1\frac{3}{7} = .01457$	$1\frac{7}{0} = .02677$	$1\frac{9}{9} = .03898$
$1\frac{0}{0} = .00236$	$1\frac{3}{8} = .01496$	$1\frac{7}{5} = .02717$	$1 = .03937$
$1\frac{5}{0} = .00276$	$1\frac{3}{9} = .01535$	$1\frac{8}{0} = .02756$	$2 = .07874$
$1\frac{8}{0} = .00315$	$1\frac{4}{0} = .01575$	$1\frac{8}{5} = .02795$	$3 = .11811$
$1\frac{9}{0} = .00354$	$1\frac{4}{1} = .01614$	$1\frac{9}{2} = .02835$	$4 = .15748$
$1\frac{0}{0} = .00394$	$1\frac{4}{2} = .01654$	$1\frac{9}{3} = .02874$	$5 = .19685$
$1\frac{1}{0} = .00433$	$1\frac{4}{3} = .01693$	$1\frac{9}{4} = .02913$	$6 = .23622$
$1\frac{1}{0} = .00472$	$1\frac{4}{4} = .01732$	$1\frac{9}{5} = .02953$	$7 = .27559$
$1\frac{1}{0} = .00512$	$1\frac{4}{5} = .01772$	$1\frac{9}{6} = .02992$	$8 = .31496$
$1\frac{4}{0} = .00551$	$1\frac{4}{6} = .01811$	$1\frac{9}{7} = .03032$	$9 = .35433$
$1\frac{5}{0} = .00591$	$1\frac{4}{7} = .01850$	$1\frac{9}{8} = .03071$	$10 = .39370$
$1\frac{6}{0} = .00630$	$1\frac{4}{8} = .01890$	$1\frac{9}{9} = .03110$	$11 = .43307$
$1\frac{6}{0} = .00669$	$1\frac{5}{0} = .01929$	$1\frac{9}{0} = .03150$	$12 = .47244$
$1\frac{8}{0} = .00709$	$1\frac{5}{1} = .01969$	$1\frac{8}{1} = .03189$	$13 = .51181$
$1\frac{9}{0} = .00748$	$1\frac{5}{2} = .02008$	$1\frac{8}{2} = .03228$	$14 = .55118$
$1\frac{0}{0} = .00787$	$1\frac{5}{3} = .02047$	$1\frac{8}{3} = .03268$	$15 = .59055$
$1\frac{0}{0} = .00827$	$1\frac{5}{4} = .02087$	$1\frac{8}{4} = .03307$	$16 = .62992$
$1\frac{0}{0} = .00866$	$1\frac{5}{5} = .02126$	$1\frac{8}{5} = .03346$	$17 = .66929$
$1\frac{2}{0} = .00906$	$1\frac{5}{6} = .02165$	$1\frac{8}{6} = .03386$	$18 = .70866$
$1\frac{0}{0} = .00945$	$1\frac{5}{7} = .02205$	$1\frac{8}{7} = .03425$	$19 = .74803$
$1\frac{0}{0} = .00984$	$1\frac{5}{8} = .02244$	$1\frac{8}{8} = .03465$	$20 = .78740$
$1\frac{0}{0} = .01024$	$1\frac{5}{9} = .02283$	$1\frac{9}{0} = .03504$	$21 = .82677$
$1\frac{2}{7} = .01063$	$1\frac{6}{0} = .02323$	$1\frac{9}{1} = .03543$	$22 = .86614$
$1\frac{0}{0} = .01102$	$1\frac{6}{1} = .02362$	$1\frac{9}{2} = .03583$	$23 = .90551$
$1\frac{0}{0} = .01142$	$1\frac{6}{2} = .02402$	$1\frac{9}{3} = .03622$	$24 = .94488$
$1\frac{3}{0} = .01181$	$1\frac{6}{3} = .02441$	$1\frac{9}{4} = .03661$	$25 = .98425$
$1\frac{0}{0} = .01220$	$1\frac{6}{4} = .02480$	$1\frac{9}{5} = .03701$	$26 = 1.02362$
$1\frac{3}{2} = .01260$			

10 m/m = 1 centimeter = 0.3937 inches.

10 cm. = 1 decimeter = 3.937 inches.

10 dm. = 1 meter = 39.37 inches.

25.4 m/m = 1 English inch.

## ENGLISH INCHES INTO MILLIMETERS

Inch	0	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{3}{4}$	$\frac{13}{16}$	$\frac{7}{8}$	$\frac{15}{16}$
0	0.0	1.6	3.2	4.8	6.4	7.9	9.5	11.1	12.7	14.3	15.9	17.5	19.1	20.6	22.2	23.8
1	25.4	27.0	28.6	30.2	31.7	33.3	34.9	36.5	38.1	39.7	41.3	42.9	44.4	46.0	47.6	49.2
2	50.8	52.4	54.0	55.6	57.1	58.7	60.3	61.9	63.5	65.1	66.7	68.3	69.8	71.4	73.0	74.6
3	76.2	77.8	79.4	81.0	82.5	84.1	85.7	87.3	88.9	90.5	92.1	93.7	95.2	96.8	98.4	100.0
4	101.6	103.2	104.8	106.4	108.0	109.5	111.1	112.7	114.3	115.9	117.5	119.1	120.7	122.2	123.8	125.4
5	127.0	128.6	130.2	131.8	133.4	134.9	136.5	138.1	139.7	141.3	142.9	144.5	146.1	147.6	149.2	150.8
6	152.4	154.0	155.6	157.2	158.8	160.3	161.9	163.5	165.1	166.7	168.3	169.9	171.5	173.0	174.6	176.2
7	177.8	179.4	181.0	182.6	184.2	185.7	187.3	188.9	190.5	192.1	193.7	195.3	196.9	198.4	200.0	201.6
8	203.2	204.8	206.4	208.0	209.6	211.1	212.7	214.3	215.9	217.5	219.1	220.7	222.3	223.8	225.4	227.0
9	228.6	230.2	231.8	233.4	235.0	236.5	238.1	239.7	241.3	242.9	244.5	246.1	247.7	249.2	250.8	252.4
10	254.0	255.6	257.2	258.8	260.4	261.9	263.5	265.1	266.7	268.3	269.9	271.5	273.1	274.6	276.2	277.8
11	279.4	281.0	282.6	284.2	285.7	287.3	288.9	290.5	292.1	293.7	295.3	296.9	298.4	300.0	301.6	303.2
12	304.8	306.4	308.0	309.6	311.1	312.7	314.3	315.9	317.5	319.1	320.7	322.3	323.8	325.4	327.0	328.6
13	330.2	331.8	333.4	335.0	336.5	338.1	339.7	341.3	342.9	344.5	346.1	347.7	349.2	350.8	352.4	354.0
14	355.6	357.2	358.8	360.4	361.9	363.5	365.1	366.7	368.3	369.9	371.5	373.1	374.6	376.2	377.8	379.4
15	381.0	382.6	384.2	385.8	387.3	388.9	390.5	392.1	393.7	395.3	396.9	398.5	400.1	401.6	403.2	404.8
16	406.4	408.0	409.6	411.2	412.7	414.3	415.9	417.5	419.1	420.7	422.3	423.9	425.4	427.0	428.6	430.2
17	431.8	433.5	435.0	436.6	438.1	439.7	441.3	442.9	444.5	446.1	447.7	449.3	450.8	452.4	454.0	455.6
18	457.2	458.8	460.4	462.0	463.5	465.1	466.7	468.3	469.9	471.5	473.1	474.7	476.2	477.8	479.4	481.0
19	482.6	484.2	485.8	487.4	488.9	490.5	492.1	493.7	495.3	496.9	498.5	500.1	501.6	503.2	504.8	506.4
20	508.0	509.6	511.2	512.8	514.3	515.9	517.5	519.1	520.7	522.3	523.9	525.5	527.0	528.6	530.2	531.8
21	533.4	535.0	536.6	538.2	539.7	541.3	542.9	544.5	546.1	547.7	549.3	550.9	552.4	554.0	555.6	557.2
22	558.8	560.4	562.0	563.6	565.1	566.7	568.3	569.9	571.5	573.1	574.7	576.3	577.8	579.4	581.0	582.6
23	584.2	585.8	587.4	589.0	590.5	592.1	593.7	595.3	596.9	598.5	600.1	601.7	603.2	604.8	606.4	608.0

39.37 inches = 1 m. = 10 dm. = 100 cm. = 1000 m/m. 24.00 inches = 0.6096 m. 1 yard = 0.9144 m.  
1 mile = 1609.3 m.

TABLE OF DECIMAL EQUIVALENTS  
OF EIGHTHS, SIXTEENTHS, THIRTY-SECONDS AND  
SIXTY-FOURTHS OF AN INCH

$\frac{1}{4}$	.	.	.	.	.015625
$\frac{3}{8}$	.	.	.	.	.03125
$\frac{5}{8}$	.	.	.	.	.046875
$1-16$	.	.	.	.	.0625
$\frac{5}{4}$	.	.	.	.	.078125
$\frac{3}{2}$	.	.	.	.	.09375
$\frac{7}{8}$	.	.	.	.	.109375
$1-8$	.	.	.	.	.1250
$\frac{9}{4}$	.	.	.	.	.140625
$\frac{5}{2}$	.	.	.	.	.15625
$\frac{11}{8}$	.	.	.	.	.171875
$3-16$	.	.	.	.	.1875
$\frac{13}{4}$	.	.	.	.	.203125
$\frac{7}{2}$	.	.	.	.	.21875
$\frac{5}{4}$	.	.	.	.	.234375
$1-4$	.	.	.	.	.2500
$\frac{17}{4}$	.	.	.	.	.265625
$\frac{9}{2}$	.	.	.	.	.28125
$\frac{1}{4}$	.	.	.	.	.296875
$5-16$	.	.	.	.	.3125
$\frac{21}{4}$	.	.	.	.	.328125
$\frac{11}{2}$	.	.	.	.	.34375
$\frac{23}{4}$	.	.	.	.	.359375
$3-8$	.	.	.	.	.3750
$\frac{25}{4}$	.	.	.	.	.390625
$\frac{13}{2}$	.	.	.	.	.40625
$\frac{27}{4}$	.	.	.	.	.421875
$7-16$	.	.	.	.	.4375
$\frac{29}{4}$	.	.	.	.	.453125
$\frac{15}{2}$	.	.	.	.	.46875
$\frac{31}{4}$	.	.	.	.	.484375
$1-2$	.	.	.	.	.5000
$\frac{33}{4}$	.	.	.	.	.515625
$\frac{17}{2}$	.	.	.	.	.53125
$\frac{35}{4}$	.	.	.	.	.546875
$9-16$	.	.	.	.	.5625
$\frac{37}{4}$	.	.	.	.	.578125
$\frac{19}{2}$	.	.	.	.	.59375
$\frac{39}{4}$	.	.	.	.	.609375
$5-8$	.	.	.	.	.6250
$\frac{41}{4}$	.	.	.	.	.640625
$\frac{23}{2}$	.	.	.	.	.65625
$\frac{43}{4}$	.	.	.	.	.671875
$11-16$	.	.	.	.	.6875
$\frac{45}{4}$	.	.	.	.	.703125
$\frac{25}{2}$	.	.	.	.	.71875
$\frac{47}{4}$	.	.	.	.	.734375
$3-4$	.	.	.	.	.7500
$\frac{49}{4}$	.	.	.	.	.765625
$\frac{25}{2}$	.	.	.	.	.78125
$\frac{41}{4}$	.	.	.	.	.796875
$13-16$	.	.	.	.	.8125
$\frac{53}{4}$	.	.	.	.	.828125
$\frac{27}{2}$	.	.	.	.	.84375
$\frac{55}{4}$	.	.	.	.	.859375
$7-8$	.	.	.	.	.8750
$\frac{57}{4}$	.	.	.	.	.890625
$\frac{29}{2}$	.	.	.	.	.90625
$\frac{59}{4}$	.	.	.	.	.921875
$15-16$	.	.	.	.	.9375
$\frac{61}{4}$	.	.	.	.	.953125
$\frac{31}{2}$	.	.	.	.	.96875
$\frac{63}{4}$	.	.	.	.	.984375
I	.	.	.	.	1.0000

# CABLE AND TELEGRAPH CODE

YERAF	<b>*Bolt Cutter, No. 4.</b>	YETOM	With Rectangular Head, no Power Feed, no Spindles.
YERDA	Regular Equipment with Taps and Dies.	YEVAK	With Rectangular Head and Power Feed, no Spindles.
YEREG	Regular Equipment without Taps and Dies.	YEVEL	Spindles (specify number and size).
YERFE	Taps and Dies only, complete set.	YEVHA	<b>*Drill, No. 12 Multiple Spindle.</b>
YERGI	<b>*Centering Machine, 4-inch.</b>	YEVKE	With Square Head, no Power Feed, no Spindles.
YERHO	Regular Equipment with Drills and Reamers.	YEVL	With Square Head and Power Feed, no Spindles.
YERIH	Regular Equipment without Drills or Reamers.	YEVON	With Rectangular Head, no Power Feed, no Spindles.
YERKU	<b>*Centering Machine, 6-inch.</b>	YEVPY	With Rectangular Head and Power Feed, no Spindles.
YERLY	Regular Equipment with Drills and Reamers.	YEVUP	Spindles (specify number and size).
YEROK	Regular Equipment without Drills or Reamers.	YEWAL	<b>*Drill, No. 13 Multiple Spindle.</b>
YERUL	<b>*Cutting-off Machine, 2½-inch</b>	YEDEM	With Square Head, no Power Feed, no Spindles.
YESAG	Regular Equipment.	YEWKA	With Square Head and Power Feed, no Spindles.
YESEH	<b>*Cutting-off Machine, 3¼-inch</b>	YEWLE	With Rectangular Head, no Power Feed, no Spindles.
YESFA	Regular Equipment.	YEWOP	With Rectangular Head and Power Feed, no Spindles.
YESGE	<b>*Die Sinking Machine, No. 2.</b>	YEWP	Spindles (specify number and size).
YESHI	Regular Equipment without Tools.	YEWR	<b>Drill, No. 14 Multiple Spindle.</b>
YESIK	Regular and Tool Equipment.	YEXAM	With Square Head.
YESKO	Tools only, complete set.	YEXEN	With Rectangular Head.
YESLU	<b>*Die Sinking Machine, No. 3.</b>	YEXIP	Spindles (specify number and size).
YESOL	Regular Equipment without Tools.	YEXLA	<b>Drill, No. 7 Type "G" Multiple.</b>
YETAH	Regular and Tool Equipment.	YEXME	With 24" Head.
YETEK	Tools only, complete set.	YEXNI	With 36" Head.
YETGA	<b>*Drill, No. 11 Gang.</b>	YEXOR	Spindles (specify number and size).
YETHE	Regular Equipment.	YEXPO	<b>Drill, No. 10 Type "H" Multiple.</b>
YETIL	Regular Equipment and Power Feed to Table.	YEXRU	With Rectangular Head.
YETKI	<b>*Drill, No. 11 Multiple Spindle.</b>	YEXSY	With Circular Head.
YETLO	With Square Head, no Power Feed, no Spindles.	YEXUS	Spindles (specify number and size).
YETNY	With Square Head and Power Feed, no Spindles.		

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

YEZAN	Drill, Sensitive.	YIHUD	*Grinder, 3-foot Vertical Surface.
YEZEP	One-spindle, Regular Equipment.	YIHWA	With Plain Equipment.
YEZIR	Two-spindle, Regular Equipment.	YIHXE	With Plain Rotary Chuck.
YEZMA	Three-spindle, Regular Equipment.	YIHZI	With Rectangular Magnetic Chuck.
YEZNE	Four-spindle, Regular Equipment.	YIKAZ	With Plain Rotary and Rectangular Magnetic Chucks.
YEZOS	Bench, Regular Equipment.	YIKBI	With Plain Rotary, Rectangular Magnetic and Rotary Magnetic Chucks.
YEZPI	Drill Chuck (s).	YIKCO	With Rectangular Magnetic and Rotary Magnetic Chucks.
YEZRO	Bell Center.	YIKDU	Plain Rotary Chuck.
YEZSU	Dead Center.	YIKEB	Rectangular Magnetic Chuck.
YEZTY	"V" Block with Extension.	YIKFY	Rotary Magnetic Chuck.
YIFUB	<b>Gear Cutting Machine, 60-inch.</b>	YIKIC	Magnetic Chuck, arranged for 110 volts direct current.
YIFWI	For Spur Gears only.	YIKOD	Magnetic Chuck, arranged for 220 volts direct current.
YIFXO	For Worm Gears only.	YIKUF	Grinding Wheel, suitable for—
YIFZU	For Spur and Worm Gears.	YIKXA	*Grinder, 6-foot Vertical Surface.
YIGBU	Internal Gear Cutting Attachment.	YIKZE	With Plain Equipment.
YIGCY	<b>Gear Cutting Machine, 90-inch.</b>	YILAB	With Plain Rotary Chuck.
YIGEX	For Spur Gears only.	YILBE	With Rectangular Magnetic Chuck.
YIGIZ	For Worm Gears only.	YILCI	With Plain Rotary and Rectangular Magnetic Chucks.
YIGOB	For Spur and Worm Gears.	YILDO	With Plain Rotary, Rectangular Magnetic and Rotary Magnetic Chucks.
YIGUC	Internal Gear Cutting Attachment.	YILEC	With Rectangular Magnetic and Rotary Magnetic Chucks.
YIGVA	<b>Gear Cutting Machine, 120-inch.</b>	YILFU	Plain Rotary Chuck.
YIGWE	For Spur and Worm Gears.	YILGY	Rectangular Magnetic Chuck.
YIGXI	Internal Gear Cutting Attachment.	YILID	Rotary Magnetic Chuck.
YIGZO	<b>*Grinder, 4x30-inch Cylindrical.</b>	YILOF	Magnetic Chuck, arranged for 110 volts direct current.
YIHAX	Regular Equipment with Automatic Sizing Device.	YILUG	Magnetic Chuck, arranged for 220 volts direct current.
YIHBO	Regular Equipment without Automatic Sizing Device.	YILZA	Grinding Wheel, suitable for —
YIHCU	Grinding Wheel.	YIMAC	Grinder, Thread Milling Machine Cutter.
YIHDX	<b>*Grinder, 6x48-inch Cylindrical.</b>	YIMBA	Regular Equipment.
YIHEZ	Regular Equipment with Automatic Sizing Device.	YIMCE	Grinding Wheels.
YIHIB	Regular Equipment without Automatic Sizing Device.		
YIHOC	Grinding Wheel.		

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

<b>YIMDI</b>	<b>Grinder, Fish-tail Cutter.</b>	<b>YIROL</b>	<b>*Gun Barrel and Tube Drilling Machine, No. 12.</b>
<b>YIMED</b>	<b>Regular Equipment.</b>	<b>YISAH</b>	<b>Regular Equipment, 16' Bed.</b>
<b>YIMFO</b>	<b>Grinding Wheels.</b>	<b>YISEK</b>	<b>Regular Equipment, 27' Bed.</b>
<b>YIMGU</b>	<b>Grinder, Gun Barrel Drill.</b>	<b>YISGA</b>	<b>Regular Equipment, 33' Bed.</b>
<b>YIMHY</b>	<b>Regular Equipment.</b>	<b>YISHE</b>	<b>Machine to drill holes — dia — deep.</b>
<b>YIMOG</b>	<b>Grinding Wheels (front).</b>		
<b>YINAD</b>	<b>Grinding Wheels (back).</b>		
<b>YINCA</b>	<b>Gun Barrel and Tube Drilling Machine, No. 1.</b>	<b>YISIL</b>	<b>Gun Barrel Turning Machine.</b>
<b>YINDE</b>	<b>Regular Equipment, 6' Bed.</b>	<b>YISKI</b>	<b>Regular Equipment.</b>
<b>VINEF</b>	<b>Regular Equipment, 9½' Bed.</b>	<b>YISLO</b>	<b>Gun Barrel Reaming Machine.</b>
<b>YINFI</b>	<b>Regular Equipment, 13' Bed.</b>	<b>YISNY</b>	<b>Regular Equipment.</b>
<b>YINGO</b>	<b>Regular Equipment, 17' Bed.</b>	<b>YISOM</b>	<b>Gun Barrel and Tube Lapping Machine.</b>
<b>YINHU</b>	<b>Machine to drill holes — dia. — deep.</b>	<b>YITAK</b>	<b>Regular Equipment.</b>
<b>YINKY</b>	<b>*Gun Barrel and Tube Drilling Machine, No. 1½.</b>	<b>YITEL</b>	<b>Gun Barrel Rifling Machine, No. 3.</b>
<b>YINOH</b>	<b>Regular Equipment, 8' Bed.</b>	<b>YITHA</b>	<b>Regular Equipment, Uniform Twist and Scrape Cutter.</b>
<b>YIPAF</b>	<b>Regular Equipment, 12' Bed.</b>	<b>YITIM</b>	<b>Regular Equipment, Uniform Twist and Hook Cutter.</b>
<b>YIPDA</b>	<b>Regular Equipment, 16' Bed.</b>	<b>YITKE</b>	<b>Regular Equipment, Increased Twist and Hook Cutter.</b>
<b>VIPEG</b>	<b>Regular Equipment, 20' Bed.</b>		
<b>YIPFE</b>	<b>Regular Equipment, 22' Bed.</b>		
<b>YIPGI</b>	<b>Regular Equipment, 24' Bed.</b>		
<b>YIPHO</b>	<b>Machine to drill holes — dia. — deep.</b>		
<b>YIPIH</b>	<b>With Back Geared Head.</b>		
<b>YIPKU</b>	<b>*Gun Barrel and Tube Drilling Machine, No. 2.</b>	<b>YITLI</b>	<b>Gun Barrel Rifling Machine, No. 3½.</b>
<b>YIPLY</b>	<b>Regular Equipment, 19' Bed.</b>	<b>YITMO</b>	<b>Regular Equipment, Uniform Twist (specify rifling length).</b>
<b>YIPOK</b>	<b>Regular Equipment, 40' Bed.</b>	<b>YITON</b>	<b>Regular Equipment, Increased Twist (specify rifling length).</b>
<b>YIPUL</b>	<b>Machine to drill holes — dia. — deep.</b>		
<b>YIRAG</b>	<b>*Gun Barrel and Tube Drilling Machine, No. 3.</b>	<b>YITPY</b>	<b>Gun Barrel Rifling Machine, No. 4.</b>
<b>YIREH</b>	<b>Regular Equipment, 20' Bed.</b>	<b>YITUP</b>	<b>Regular Equipment, Uniform Twist (specify rifling length).</b>
<b>VIRFA</b>	<b>Regular Equipment, 25' Bed.</b>	<b>YIXAN</b>	<b>Regular Equipment, Increased Twist (specify rifling length).</b>
<b>VIRGE</b>	<b>Regular Equipment, 40' Bed.</b>		
<b>YIRHI</b>	<b>Regular Equipment, 46' Bed.</b>		
<b>YIRIK</b>	<b>Machine to drill holes — dia. — deep.</b>		
<b>YIRKO</b>	<b>*Gun Barrel and Tube Drilling Machine, No. 4.</b>	<b>YIXEP</b>	<b>Gun Barrel Rifling Machine, No. 5.</b>
<b>YIRLU</b>	<b>Regular Equipment, 40' Bed.</b>	<b>YIXIR</b>	<b>Regular Equipment, Uniform Twist (specify rifling length).</b>
<b>YIRMY</b>	<b>Machine to drill holes — dia. — deep.</b>	<b>YIXMA</b>	<b>Regular Equipment, Increased Twist (specify rifling length).</b>

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

YIXNE	Pistol Rifling Machine.	YODOZ	Closer "C".
YIXOS	Regular Equipment.	YODTA	Closer "D".
YIXPI	Gun Barrel Chambering Machine.	YODUB	Closer "E".
YIXRO	Regular Equipment.	YODWI	Complete Set of Step-chucks and Closers.
YIXSU	Gun Receiver, Splining Machine.	YODXO	<i>Centers:</i>
YIXTY	Regular Equipment.	YODZU	Large, Plain.
YIXUT	Lathe, No. 3 Bench.	YOFBU	Female.
YIZAP	Regular Equipment.	YOFCY	Plain "V".
YIZER	<i>Countershafts:</i>	YOFEX	Swivel "V".
YIZIS	Two-speed Wall.	YOFIZ	<i>Drill Pads:</i>
YIZNA	Two-speed Wall Rod.	YOFOB	1" Diameter.
YIZOT	Two-speed Wall with Grinding Attachment.	YOFVA	2" Diameter.
YIZPE	Two-speed Wall Rod with Grinding Attachment.	YOFWE	4" Diameter.
YIZRI	Wall Rod Brackets.	YOFXI	6" Diameter.
YIZSO	Wall Rods.	YOFZO	<i>Indexing Parts:</i>
YIZTU	<i>Collets:</i>	YOGAX	Index Pawl and Block.
YIZVY	Draw-back Collets, English or Metric (specify sizes).	YOGBO	Index Plate for Head (specify notches).
YOBAS	Center Collets.	YOGCU	<i>Angle Plate.</i>
YOBET	<i>Chucks, Combination and Drill Type:</i>	YOGDY	<i>Raising Blocks, Set of Three.</i>
YOBRA	4" Three-jaw Comb., 2 Sets of Jaws and Chuck-plate.	YOGEZ	<i>Slide-rests.</i>
YOBSE	6" Three-jaw Comb., 2 Sets of Jaws and Chuck-plate.	YOGIB	Compound Slide-rest, English Screws and Dials.
YOBTI	Chuck-plate, Blank.	YOGOC	Compound Slide-rest, Metric Screws and Dials.
YOBUX	Drill Chuck, $\frac{5}{8}$ with Taper Stem.	YOGUD	Double Slide-rest with Lever Movement.
YOBVO	<i>Chucks, Face-plate Type:</i>	YOGWA	Double Slide-rest with Screw Movement.
YOBXY	With Tapped Holes.	YOGXE	<i>Grinding Rests:</i>
YOCAT	With T-slots.	YOGZI	With Traversing Spindles, English Screws and Dials.
YOCOX	Set of 4 Jaws for Chuck with T-slots.	YOHAZ	With Traversing Spindles, Metric Screws and Dials.
YOCSA	<i>Step-chucks and Closers:</i>	YOHBI	Slide-rest, Traverse Spindle Grinder.
YOCTE	Chuck "A".	YOHCO	Slide-rest, Tool Post Grinder.
YOCUZ	Chuck "B".	YOHDU	<i>Quill Parts:</i>
YOCVI	Chuck "C".	YOHEB	Quill Rest.
YOCWO	Chuck "D".	YOHFY	Chuck Quill.
YOCZY	Chuck "E".	YOHIC	Face-plate Quill with Tapped Holes in Face-plate.
YODYB	Closer "A".	YOHOD	Face-plate Quill with T-slots in Face-plate.
YODIX	Closer "B".	YOHUF	Quill Driver.

## CABLE AND TELEGRAPH CODE—Continued

YOHXA	<i>Table Rests:</i>	YOMOH	Compound Elevating Rest in place of Rise and Fall Rest.
YOHZE	Triangular.	YOMUK	Quick Withdrawing Mechanism for Compound Elevating Rest.
YOKAB	Rectangular.	YONAF	Collets, English or Metric (specify sizes).
YOKBE	<i>Back-rests:</i>	YONDA	Chuck - plate, 3" dia. (Blank), ready to receive Chuck.
YOKCI	3" Capacity.	YONEG	Chuck - plate, 3½" dia. (Blank), ready to receive Chuck.
YOKDO	4" Capacity.	YONFE	<i>Tool Equipment—10-inch Lathe.</i>
YOKEC	5" Capacity.	YONGI	<i>Chucks:</i>
YOKFU	6" Capacity.	YONHO	1—4" Three-jaw Comb. with 2 Sets of Jaws and Plate.
YOKGY	<i>Tailstocks:</i>	YONIH	1—6" Three-jaw Comb. with 2 Sets of Jaws and Plate.
YOKID	Lever Tailstock, Plain.	YONKU	1— $\frac{5}{16}$ " Drill Chuck with Taper Stem.
YOKOF	Lever Tailstock with Cross Slide.	YONLY	1— $\frac{5}{16}$ " Drill Holder, Size "A", No. 60 to $\frac{5}{16}$ " Capacity.
YOKUG	Open-Tailstock with one Spindle and Pulley.	YONOK	<i>Step-chucks and Closers:</i>
YOKZA	Half Open-Tailstock with one Spindle and Dog.	YONUL	2—Step-chucks $\frac{5}{8}$ " to 2" Capacity.
YOLAC	Extra Spindle and Dog for Half Open-Tailstock.	YOPAG	2—Step-chucks 2" to 4" Capacity.
YOLBA	<i>Milling Attachment:</i>	YOPEH	2—Step-chucks 4" to 6" Capacity.
YOLCE	With 48-Notch Index Plate, English Screws and Dials.	YOPFA	1—Closer for 2" Step-chucks.
YOLDI	With 48-Notch Index Plate, Metric Screws and Dials.	YOPGE	1—Closer for 4" Step-chucks.
YOLFO	Cutter Head for Milling Attachment.	YOPHI	1—Closer for 6" Step-chucks.
YOLGU	Arbors for Milling Attachment (specify sizes).	YOPIK	<i>Tool Holders:</i>
YOLHY	<i>Filing Attachment:</i>	YOPKO	1—Threading Tool Holder, No. 2 P. & W., with "V" Single Cutter.
YOLIF	Complete with Driver.	YOPLU	1—Cutter "V" Double Off-set.
YOLOG	<i>Threading Attachment:</i>	YOPMY	1—Cutter for Center Turning.
YOLUH	With English Micrometer Adjustment.	YOPOL	12—Cutters, U. S. S., from 6 to 20 Pi. (English Equipment).
YOMAD	With Metric Micrometer Adjustment.	YORAH	12—Cutters, Int. Std., from 1 to .5 m/m P. (Metric Equipment).
YOMCA	Hob Screws with Hob for Chasing Nut (specify pitches).	YOREK	12—Cutters, Whitworth Std., 5 to 20 Pi. (to order only).
YOMDE	Threading Tool and Holder.	YORGА	1—Knurling Tool Holder with 3 pairs of Knurls, fine, medium and coarse.
YOMEF	Brackets and Gear for accommodating Old Model Threading Attachment to New Model Lathe.	YORHE	1—Combination Tool Holder with 13 High Speed Cutters,
YOMFI	<b>Lathe, 10-inch Toolmakers'.</b>		
YOMGO	Regular Equipment, English.		
YOMHU	Regular and Tool Equipment, English.		
YOMIG	Regular Equipment, Metric.		
YOMKY	Regular and Tool Equipment, Metric.		

## CABLE AND TELEGRAPH CODE—Continued

	2 Small Boring Bars and Holder, 1 Centering Tool, 1 Wrench.	YOTMI	8' Bed, Regular Equipment, English, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.
YORIL	1—Cutting-off Tool Holder, No. o Johnson, with 12 Blades.	YOTNO	Above Equipment, ditto, also Pan (no Oil Pump).
YORKI	18—Center Reamers, 6 each $\frac{1}{4}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ " cut.	YOTOP	Above Equipment, ditto, also Pan and Oil Pump.
YORLO	1—Screw Pitch Gauge	YOTPU	10' Bed, Regular Equipment English.
YORNY	1—Center Gauge.	YOTRY	10' Bed, Regular Equipment, English, also Pan (no Oil Pump).
YOROM	1—Female Center	YOTUR	10' Bed, Regular Equipment, English, also Pan and Oil Pump.
YOSAK	1—Cabinet for Tools.	YOVAM	10' Bed, Regular Equipment, English, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.
YOSEL	1—Pyramid for Chucks, etc.	YOVEN	Above Equipment, ditto, also Pan (no Oil Pump).
YOSHA	Tool Equipment Complete, English.	YOVIP	Above Equipment, ditto, also Pan and Oil Pump.
YOSIM	Tool Equipment Complete, Metric.	YOVLA	6' Bed, Regular Equipment, Metric.
YOSKE	Tool Equipment Complete, Whitworth.	YOVME	6' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).
YOSLI	Lathe, 14-inch.	YOVOR	6' Bed, Regular Equipment, Metric, also Pan and Oil Pump.
YOSMO	6' Bed, Regular Equipment, English.	YOVPO	6' Bed, Regular Equipment, Metric, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.
YOSON	6' Bed, Regular Equipment, English, also Pan (no Oil Pump).	YOVRU	Above Equipment, ditto, also Pan (no Oil Pump).
YOSPY	6' Bed, Regular Equipment, English, also Pan and Oil Pump.		
YOSUP	6' Bed, Regular Equipment, English, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.		
YOTAL	Above Equipment, ditto, also Pan (no Oil Pump).		
YOTEM	Above Equipment, ditto, also Pan and Oil Pump.		
YOTIN	8' Bed, Regular Equipment, English.		
YOTKA	8' Bed, Regular Equipment, English, also Pan (no Oil Pump).		
YOTLE	8' Bed, Regular Equipment, English, also Pan and Oil Pump.		

## CABLE AND TELEGRAPH CODE—Continued

YOVSY	Above Equipment, ditto, also Pan and Oil Pump.		sleeve, shaft and cutter, for milling spiral grooves in shaft as required; Draw-back Collet Mechanism complete with nine (9) collets from $\frac{3}{8}$ " to $\frac{7}{8}$ " diameter varying by sixteenths; complete set of Expansion Arbors, comprising three (3) arbors, Nos. 1, 2 and 3, with adjusting screws and nineteen (19) expanding bushings, hardened and ground, from $\frac{3}{4}$ " to $1\frac{1}{8}$ " diameter, advancing by sixteenths and from $1\frac{1}{2}$ " to 2", advancing by eighths.
YOWAN	8' Bed, <i>Regular Equipment, Metric.</i>		
YOWEP	8' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).		
YOWIR	8' Bed, Regular Equipment, Metric, also Pan and Oil Pump.		
YOWMA	8' Bed, Regular Equipment, Metric, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.	YOXSO	$14'' \times 6'$ Lathe.
YOWOS	Above Equipment, ditto, also Pan (no Oil Pump).		With the same equipment as above, and, in addition, with Oil Pump, Piping and Independent Countershaft for Oil Pump, Oil Pan, Cabinet and Reservoir Legs.
YOWPI	Above Equipment, ditto, also Pan and Oil Pump.		
YOWRO	10' Bed, <i>Regular Equipment, Metric.</i>		
YOWTY	10' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).	YOXTU	$14'' \times 6'$ Lathe.
YOXAP	10' Bed, Regular Equipment, Metric, also Pan and Oil Pump.		Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism with nine (9) collets, 8, 9, 10, 12, 14, 16, 18, 20 and 22 millimeters in diameter; complete set of Expansion Arbors, comprising three arbors, Nos. 1, 2 and 3, with adjustable screws, and seventeen Expanding Bushings, hardened and ground, 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 m/m diameter.
YOXER	10' Bed, Regular Equipment, Metric, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.		
YOXIS	Above Equipment, ditto, also Pan (no Oil Pump).		
YOXNA	Above Equipment, ditto, also Pan and Oil Pump.		
YOXOT	<i>Quick Withdrawing Mechanism.</i>		
YOXPE	<b>Appliances (for 14-inch Lathe).</b>		
YOXRI	$14'' \times 6'$ Lathe.		
	Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional	YOXVV	$14'' \times 6'$ Lathe.
			With the same equipment as above, and, in addition, with Oil Pump, Piping and Independent Countershaft for Oil

## CABLE AND TELEGRAPH CODE—Continued

	Pump, Oil Pan, Cabinet and Reservoir Legs.	arbors, Nos. 1, 2 and 3, with adjustable screws, and seventeen Expanding Bushings, hardened and ground, 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 m/m diameter.
YOZAR	<i>14" x 8' Lathe.</i> Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with nine (9) collets from $\frac{3}{8}$ " to $\frac{7}{8}$ " diameter varying by sixteenths; complete set of Expansion Arbors, comprising three (3) arbors, Nos. 1, 2 and 3, with adjusting screw, and nineteen (19) Expanding Bushings, hardened and ground, from $\frac{3}{4}$ " to $1\frac{7}{8}$ " diameter, advancing by sixteenths and from $1\frac{1}{2}$ " to 2", advancing by eighths.	YOZPA <i>14" x 8' Lathe.</i> With the same equipment as above, and, in addition, with Oil Pump, Piping and Independent Countershaft for Oil Pump, Oil Pan, Cabinet and Reservoir Legs.
YOZRE	<i>14" x 10' Lathe.</i> Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft, and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with nine (9) collets from $\frac{3}{8}$ " to $\frac{7}{8}$ " diameter, varying by sixteenths; complete set of Expansion Arbors, comprising three (3) arbors, Nos. 1, 2 and 3, with adjusting screw, and nineteen (19) Expanding Bushings, hardened and ground, from $\frac{3}{4}$ " to $1\frac{7}{8}$ " diameter, advancing by sixteenths and from $1\frac{1}{2}$ " to 2", advancing by eighths.	YOZES <i>14" x 8' Lathe.</i> With the same equipment as above, and, in addition, with Oil Pump, Piping and Independent Countershaft for Oil Pump, Oil Pan, Cabinet and Reservoir Legs.
YOZIT	<i>14" x 8' Lathe</i> Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeves, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism with nine (9) collets, 8, 9, 10, 12, 14, 16, 18, 20 and 22 millimeters in diameter; complete set of Extension Arbors, comprising three	YOZSI <i>14" x 10' Lathe.</i> With the same equipment as above, and, in addition, with Oil Pump, Piping and Independent Countershaft for Oil Pump, Oil Pan, Cabinet and Reservoir Legs.
YOZTO	<i>14" x 10' Lathe.</i> Complete with Taper Attachment and the following appliances: Relieving Attachment for	

## CABLE AND TELEGRAPH CODE—Continued

	straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft, and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism with nine (9) collets, 8, 9, 10, 12, 14, 16, 18, 20 and 22 millimeters in diameter; complete set of Expansion Arbors, comprising three arbors Nos. 1, 2 and 3, with adjustable screws, and seventeen Expanding Bushings, hardened and ground, 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 m/m diameter.	YUCZU 8—Bushings for No. 2 Arbor, Regular Sizes, English. YUDBU 5—Bushings for No. 3 Arbor, Regular Sizes, English. YUDCY 5—Bushings for No. 1 Arbor, Regular Sizes, Metric YUDEX 6—Bushings for No. 2 Arbor, Regular Sizes, Metric. YUDIZ 6—Bushings for No. 3 Arbor, Regular Sizes, Metric. YUDOB Draw-in Spindle. YUDUC Complete Set of Arbors and Bushings with Draw-in Spindle, English. YUDVA Complete Set of Arbors and Bushings without Draw-in Spindle, English. YUDWE Complete Set of Arbors and Bushings with Draw-in Spindle, Metric. YUDXI Complete Set of Arbors and Bushings without Draw-in Spindle, Metric. YUDZO Step - chuck and Closer Attachment: YUFAX 2—Step-chucks, $\frac{7}{8}$ " to 3" Capacity. YUFBO 2—Step-chucks, 3" to 6" Capacity. YUFCU 1—Closer for 3" Chuck. YUFDY 1—Closer for 6" Chuck. YUFEZ Drawn-in Spindle. YUFIB Complete Set of Chucks and Closers with Draw-in Spindle. YUFOC Complete Set of Chucks and Closers without Draw-in Spindle. YUFUD Chuck-plates: YUFWA 7" dia. (Blank) ready to receive Chuck. YUFXE 3 $\frac{1}{2}$ " dia. (Blank) ready to receive Chuck. YUFZI Translating Gears: YUGAZ 127 Teeth. YUGBI 85 and 127 Teeth. YUGCO Micrometer Stop Clamp:
YOZWY	14" x 10' Lathe.	
	With the same equipment as above, and, in addition, with Oil Pump, Piping and Independent Countershaft for Oil Pump, Oil Pan, Cabinet and Reservoir Legs.	
YUBAT	Taper Attachment:	
YUBOX	Taper Attachment not wanted.	
YUBSA	Relieving Attachment:	
YUBTE	Regular Relieving Attachment.	
YUBUZ	Spiral Relieving Attachment.	
YUBVI	Collet Attachment:	
YUBWO	Collet Attachment Complete with Collets.	
YUBZY	Collet Attachment without Collets.	
YUCBY	Collets, English or Metric (specify sizes).	
YUCIX	Rack for Collets and Expansion Arbors.	
YUCOZ	Expansion Arbors and Bushings:	
YUCTA	No. 1 Arbor.	
YUCUB	No. 2 Arbor.	
YUCWI	No. 3 Arbor.	
YUCXO	4—Bushings for No. 1 Arbor, Regular Sizes, English.	

## CABLE AND TELEGRAPH CODE—Continued

YUGDU	<i>*Lathe, 16-inch.</i>	ing Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.
YUGEB	<i>6' Bed, Regular Equipment, English.</i>	
YUGFY	<i>6' Bed, Regular Equipment, English, also Pan (no Oil Pump).</i>	
YUGIC	<i>6' Bed, Regular Equipment, English, also Pan and Oil Pump.</i>	
YUGOD	<i>6' Bed, Regular Equipment, English, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.</i>	
YUGUF	<i>Above Equipment, ditto, also Pan (no Oil Pump).</i>	
YUGXA	<i>Above Equipment, ditto, also Pan and Oil Pump.</i>	
YUGZE	<i>8' Bed, Regular Equipment, English.</i>	
YUHAB	<i>8' Bed Regular Equipment, English, also Pan (no Oil Pump).</i>	
YUHBE	<i>8' Bed, Regular Equipment, English, also Pan and Oil Pump.</i>	
YUHCI	<i>8' Bed, Regular Equipment, English, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.</i>	
YUHDO	<i>Above Equipment, ditto, also Pan (no Oil Pump).</i>	
YUHEC	<i>Above Equipment, ditto, also Pan and Oil Pump.</i>	
YUHFU	<i>10' Bed, Regular Equipment, English.</i>	
YUHGY	<i>10' Bed, Regular Equipment, English, also Pan (no Oil Pump).</i>	
YUHID	<i>10' Bed, Regular Equipment, English, also Pan and Oil Pump.</i>	
YUHOF	<i>10' Bed, Regular Equipment, English, also Regular Reliev-</i>	
YUHUG	<i>Above Equipment, ditto, also Pan (no Oil Pump).</i>	
YUHZA	<i>Above Equipment, ditto, also Pan and Oil Pump.</i>	
YUKAC	<i>6' Bed, Regular Equipment, Metric.</i>	
YUKBA	<i>6' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).</i>	
YUKCE	<i>6' Bed, Regular Equipment, Metric, also Pan and Oil Pump.</i>	
YUKDI	<i>6' Bed, Regular Equipment, Metric, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.</i>	
YUKED	<i>Above Equipment, ditto, also Pan (no Oil Pump).</i>	
YUKFO	<i>Above Equipment, ditto, also Pan and Oil Pump.</i>	
YUKGU	<i>8' Bed, Regular Equipment, Metric.</i>	
YUKHY	<i>8' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).</i>	
YUKIF	<i>8' Bed, Regular Equipment, Metric, also Pan and Oil Pump.</i>	
YUKOG	<i>8' Bed, Regular Equipment, Metric, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.</i>	
YUKUH	<i>Above Equipment, ditto, also Pan (no Oil Pump).</i>	
YULAD	<i>Above Equipment, ditto, also Pan and Oil Pump.</i>	
YULCA	<i>10' Bed, Regular Equipment, Metric.</i>	
YULDE	<i>10' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).</i>	

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

- YULEF** 10' Bed, Regular Equipment, Metric, also Pan and Oil Pump.
- YULFI** 10' Bed, Regular Equipment, Metric, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.
- YULGO** Above Equipment, ditto, also Pan (no Oil Pump).
- YULHU** Above Equipment, ditto, also Pan and Oil Pump.
- YULIG** **Appliances (for 16-inch Lathe).**
- YULKY** 16" x 6' Lathe.  
Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeves, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with fifteen (15) collets from  $\frac{3}{8}$ " to  $1\frac{1}{4}$ " by sixteenths; complete set of Expansion Arbors, comprising three (3) arbors, Nos. 1, 2 and 3, with adjusting screws, and seventeen (17) Expanding Bushings, hardened and ground, from  $\frac{3}{4}$ " to  $1\frac{7}{16}$ " diameter, advancing by sixteenths and from  $1\frac{1}{2}$ " to 2", advancing by eighths.
- YUMAF** 16" x 6' Lathe.  
With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
- YUMDA** 16" x 6' Lathe.  
Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeves, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with fifteen (15) collets (metric), 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30 and 32 millimeters diameter; complete set Expansion Arbors, comprising three (3) arbors, Nos. 1, 2 and 3, with adjusting screws, and seventeen (17) Expanding Rings (metric), 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 millimeters.
- YUMEG** 16" x 6' Lathe.  
With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
- YUMFE** 16" x 8' Lathe.  
Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with fifteen (15) collets, from  $\frac{3}{8}$ " to  $1\frac{1}{4}$ " by sixteenths; complete set of Expansion Arbors, comprising three (3) arbors, Nos. 1, 2 and 3, with adjusting screws and seventeen (17) Expanding Bushings, hardened and ground, from  $\frac{3}{4}$ " to  $1\frac{7}{16}$ " diameter, advancing by sixteenths and from  $1\frac{1}{2}$ " to 2", advancing by eighths.

## CABLE AND TELEGRAPH CODE—Continued

<b>YUMGI</b>	<i>16" x 8' Lathe.</i> With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.	Arbors, comprising three (3) arbors, Nos. 1, 2 and 3, with adjusting screws, and seventeen (17) Expanding Bushings, hardened and ground from, $\frac{3}{4}$ " to $1\frac{1}{8}$ " diameter, advancing by sixteenths, and from $1\frac{1}{2}$ " to 2", advancing by eighths.
<b>YUMHO</b>	<i>16" x 8' Lathe.</i> Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with fifteen (15) collets (metric), 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30 and 32 millimeters diameter; complete set of Expansion Arbors, comprising three arbors, Nos. 1, 2 and 3, with adjusting screws, and seventeen (17) Expanding Rings (metric), 19, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 millimeters.	<b>YUMLY</b> <i>16" x 10' Lathe.</i> With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
<b>YUMOK</b>	<i>16" x 10' Lathe.</i> Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with fifteen (15) collets (metric), 8, 9, 10, 11, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 millimeters.	<b>YUMIH</b> <i>16" x 8' Lathe.</i> With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
<b>YUMKU</b>	<i>16" x 10' Lathe.</i> Complete with Taper Attachment and the following appliances: Relieving Attachment for straight and taper taps, and Milling Cutters with straight flutes; including Spiral Relieving Attachment with additional sleeve, shaft and cutter for milling spiral grooves in shaft as required; Draw-back Collet Mechanism, complete with fifteen (15) collets from $\frac{3}{8}$ " to $1\frac{1}{4}$ " by sixteenths; complete set of Expansion	<b>YUNAG</b> <i>16" x 10' Lathe.</i> With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
<b>YUNAH</b>	<i>Geared Head:</i>	<b>YUNEH</b> <i>Geared Head:</i>
<b>YUNFA</b>	<i>Geared Head in place of Cone Head.</i>	<b>YUNFA</b> <i>Geared Head in place of Cone Head.</i>
<b>YUNGE</b>	<i>Tool Rests:</i>	<b>YUNGE</b> <i>Tool Rests:</i>
<b>YUNHI</b>	<i>Plain Compound Rest in place of Compound Elevating Rest.</i>	<b>YUNHI</b> <i>Plain Compound Rest in place of Compound Elevating Rest.</i>

## CABLE AND TELEGRAPH CODE—Continued

YUNIK	Plain Elevating Rest in place of Compound Elevating Rest.	YUSPU	<i>Step-chuck and Closer Attachment:</i>
YUNKO	Ball Turning Rest.	YUSRY	2—Step-chucks, $\frac{7}{8}$ " to $3\frac{3}{4}$ " Capacity.
YUNLU	Roller Follow Rest.	YUTAM	1—Step-chuck, $3\frac{3}{4}$ " to 7" Capacity.
YUNOL	<i>Taper Attachment:</i>	YUTEN	1—Step-chuck with 4 Adjustable Jaws, $4\frac{1}{2}$ " Capacity.
YUPAH	Taper Attachment not wanted.	YUTIP	1—Closer for $3\frac{3}{4}$ " Chuck.
YUPEK	<i>Relieving Attachment:</i>	YUTLA	1—Closer for 7" and $4\frac{1}{2}$ " Chucks.
YUPGA	Regular Relieving Attachment.	YUTME	1—Spindle Bushing for Step-chucks.
YUPHE	Spiral Relieving Attachment.	YUTNI	1—Draw-in Spindle.
YUPIL	Side Relieving Attachment.	YUTOR	Complete Set of Chucks and Closers with Draw-in Spindle.
YUPKI	<i>Collet Attachment:</i>	YUTPO	Complete Set of Chucks and Closers without Draw-in Spindle.
YUPLO	Collet Attachment Complete.	YUTRU	<i>Chuck-plates:</i>
YUPNY	Collet Attachment without Collets.	YUTSY	7" dia. (Blank) ready to receive Chuck.
YUPOM	Collets, English or Metric (specify sizes).	YUTUS	$3\frac{1}{2}$ " dia. (Blank) ready to receive Chuck.
YURAK	Rack for Collets and Expansion Arbors.	YUXAR	Indexing Face-plates for Multiple Thread Cutting.
YUREL	<i>Expansion Arbors and Bushings:</i>	YUXES	<i>Micrometer Stop Clamp.</i>
YURHA	No. 1 Arbor.	YUXIT	*Lathe, $\frac{5}{8} \times 4\frac{1}{2}$ -inch Turret.
YURKE	No. 2 Arbor.	YUXPA	Equipment "A", English.
YURLI	No. 3 Arbor.	YUXRE	Equipment "B", English.
YURMO	4—Bushings for No. 1 Arbor, Regular Sizes, English.	YUXSI	Equipment "A", Metric.
YURON	8—Bushings for No. 2 Arbor, Regular Sizes, English.	YUXTO	Equipment "B", Metric.
YURPY	5—Bushings for No. 3 Arbor, Regular Sizes, English.	YUXWY	Equipment "B", Whitworth.
YUSAL*	5—Bushings for No. 1 Arbor, Regular Sizes, Metric.	YUZAS	Machine without Rod Chuck or Rod Feed Mechanism.
YUSEM	6—Bushings for No. 2 Arbor, Regular Sizes, Metric.	YUZET	Internal Oiling Arrangement to Turret.
YUSIN	6—Bushings for No. 3 Arbor, Regular Sizes, Metric.	YUZRA	Collets, Round (specify sizes).
YUSKA	Draw-in Spindle.	YUZSE	Collets, Hexagon (specify sizes).
YUSLE	Complete Set of Arbors and Bushings with Draw-in Spindle, English.	YUZTI	Collets, Square (specify sizes).
YUSMI	Complete Set of Arbors and Bushings without Draw-in Spindle, English.	YUZVO	Two-jaw Chuck (specify jaws).
YUSNO	Complete Set of Arbors and Bushings with Draw-in Spindle, Metric.	ZABAV	Step - chuck and Closer Attachment.
YUSOP	Complete Set of Arbors and Bushings without Draw-in Spindle, Metric.	ZABBY	Extra Step - chucks (specify number).
		ZABIX	Turret Stop for Rod Feed.
		ZABOZ	Single Turner with Tangent Cutter.

## CABLE AND TELEGRAPH CODE—Continued

ZABTA	Single Turner with Radial Cutter.	ZAFCO	Step-chuck and Closer Attachment.
ZABUB	Multiple Turner with two Tangent Cutters.	ZAFDU	Extra Step-chucks (specify number).
ZABWI	Extra Cutter and Holder for Multiple Tangent Turner.	ZAFEB	Turret Stop for Rod Feed.
ZABXO	Multiple Turner with two Radial Cutters.	ZAFFY	Single Turner with Tangent Cutter and "V" Back-rests.
ZABZU	Extra Cutter and Holder for Multiple Radial Turner.	ZAFIC	Single Turner with Radial Cutter.
ZACAW	End Forming and Pointing Tool.	ZAFOD	Multiple Turner with two Tangent Cutters.
ZACBU	Reamer Holder, Floating Type.	ZAFUF	Extra Cutter and Holder for Multiple Tangent Turner.
ZACCY	Tap Holder, Releasing Type.	ZAFXA	Multiple Turner with two Radial Cutters.
ZACEX	Drill and Counterbore Holder.	ZAFZE	Extra Cutter and Holder for Multiple Radial Turner.
ZACIZ	Dovetail Forming Tool Holder.	ZAGAB	End Forming and Pointing Tool.
ZACOB	Die-head, $\frac{1}{8}$ ", Self-opening (specify chasers, sizes and form of thread).	ZAGBE	Tape Turner.
ZACUC	Die-head, $\frac{1}{8}$ ", Self-opening, with seven sets of Standard Chasers, U. S. S.	ZAGCI	Reamer Holder, Floating Type.
ZACVA	*Lathe, 1 x 15-inch Turret.	ZAGDO	Tap Holder, Releasing Type.
ZACWE	Equipment "A" without Power Feed, English.	ZAGEC	Drill and Counterbore Holder.
ZACXI	Equipment "A" with Power Feed, English.	ZAGFU	Dovetail Forming Tool Holder.
ZACZO	Equipment "B" without Power Feed, English.	ZAGGY	Die-head, $\frac{3}{4}$ ", Self-opening (specify chasers, sizes and form of thread).
ZADAX	Equipment "B" with Power Feed, English.	ZAGID	Die-head, $\frac{3}{4}$ ", Self-opening, with eight sets of Standard Chasers, U. S. S.
ZADBO	Equipment "A" without Power Feed, Metric.	ZAGOF	*Lathe, 1½ x 18-inch Turret.
ZADCU	Equipment "A" with Power Feed, Metric.	ZAGUG	Equipment "A", English.
ZADDY	Equipment "B" without Power Feed, Metric.	ZAGZA	Equipment "B", English.
ZADEZ	Equipment "B" with Power Feed, Metric.	ZAHAC	Equipment "A", Metric.
ZADIB	Equipment "B" without Power Feed, Whitworth.	ZAHBA	Equipment "B", Metric.
ZADOC	Equipment "B" with Power Feed, Whitworth.	ZAHCE	Equipment "B", Whitworth.
ZADUD	Machine without Rod Chuck or Rod Feed Mechanism.	ZAHDI	Machine without Rod Chuck or Rod Feed Mechanism.
ZADWA	Internal Oiling Arrangement to Turret.	ZAHED	Internal Oiling Arrangement to Turret.
ZADXE	Collets, Round (specify sizes).	ZAHFO	Chuck Jaws, Round (specify sizes).
ZADZI	Collets, Hexagon (specify sizes).	ZAHGU	Chuck Jaws, Hexagon (specify sizes).
ZAFAZ	Collets, Square (specify sizes).	ZAHIF	Chuck Jaws, Square (specify sizes).
ZAFBI	Two-jaw Chuck (specify jaws).	ZAHOG	7½"
		ZAHUH	9"
		ZAKAD	12"
			Three-jaw Geared Scroll Chuck with two sets of Jaws for inside and outside gripping.
		ZAKCA	Two-jaw Chuck (specify jaws).

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

ZAKDE	Drill Chuck, 1" capacity, fitted to Turret.	ZANEK	Machine without Rod Chuck or Rod Feed Mechanism.
ZAKEF	Three-taper Split Sleeves for Drill Chuck (specify tapers).	ZANGA	Internal Oiling Arrangement to Turret.
ZAKFI	Drill and Counterbore Holder.	ZANHE	Chuck Jaws, Round (specify sizes).
ZAKGO	Step-chuck and Closer Attachment.	ZANIL	Chuck Jaws, Hexagon (specify sizes).
ZAKHU	Extra Step-chucks (specify number).	ZANKI	Chuck Jaws, Square (specify sizes).
ZAKIG	Universal Turner with "V" Back-rests.	ZANLO	7½"
ZAKKY	Universal Turner with Roller Back-rests.	ZANNY	9"
ZAKOH	Bell-mouth Pointing Tool.	ZANOM	12"
ZAKUK	End Forming and Pointing Tool.	ZAPAK	Forging Chuck with 2" Shank.
ZALAF	Open Side Turner.	ZAPEL	Lever Scroll Chuck, 6" fitted to Turret.
ZALDA	Taper Turner.	ZAPHA	Two-jaw Chuck (specify jaws).
ZALEG	Reamer Holder, Floating Type.	ZAPIM	Drill Chuck, 1½" capacity, fitted to Turret.
ZALFE	Tap Holder, Releasing Type.	ZAPKE	Four-taper Split Sleeves for Drill Chuck (specify tapers).
ZALGI	Dovetail Forming Tool Holder.	ZAPLI	Step-chuck and Closer Attachment.
ZALHO	Die-head, 1", Self-opening (specify chasers, sizes and form of thread).	ZAPMO	Extra Step-chucks (specify number).
ZALIH	Die-head, 1", Self-opening, with eight sets of Standard Chasers, U. S. S.	ZAPON	Universal Turner with "V" Back-rests.
ZALKU	Die-head, 1¼", Self-opening (specify chasers, sizes and form of thread).	ZAPPY	Universal Turner with Roller Back-rests.
ZALLY	Die-head, 1¼", Self-opening, with eight sets of Standard Chasers, U. S. S.	ZAPUP	Bell-mouth Pointing Tool.
ZALOK	Die-head, 1½", Self-opening (specify chasers, sizes and form of thread).	ZARAL	End Forming and Pointing Tool.
ZALUL	Die-head, 1½", Self-opening, with eight sets of Standard Chasers, U. S. S.	ZAREM	Open Side Turner.
ZAMAG	Round Tool Holder, 2¼", for 1¼" Die-head.	ZARIN	Taper Turner.
ZAMEH	*Lathe, 2 x 26-inch Turret.	ZARKA	Reamer Holder, Floating Type.
ZAMFA	Equipment "A", English.	ZARLE	Tap Holder, Releasing Type.
ZAMGE	Equipment "B", English.	ZARMI	Dovetail Forming Tool Holder.
ZAMHI	Equipment "C", English.	ZARNO	Die-head, 1¼", Self-opening (specify chasers, sizes and form of thread).
ZAMIK	Equipment "A", Metric.	ZAROP	Die-head, 1¼", Self-opening, with eight sets of Standard Chasers, U. S. S.
ZAMKO	Equipment "B" Metric.	ZARRY	Die-head, 1½", Self-opening (specify chasers, sizes and form of thread).
ZAMLU	Equipment "C", Metric.	ZARUR	Die-head, 1½", Self-opening with eight sets of Standard Chasers, U. S. S.
ZAMOL	Equipment "B", Whitworth.		
ZANAH	Equipment "C", Whitworth.		

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

ZASAM	Die-head, 2", Self-opening (specify chasers, sizes and form of thread).	ZAVVY	Tap Holder, Releasing Type.
ZASEN	Die-head, 2", Self-opening, with eight sets of Standard Chasers, U. S. S.	ZAWAR	Dovetail Forming Tool Holder.
ZASIP	Round Tool Holder, 3", for 2" Die-head.	ZAWES	Die-head, 1½", Self-opening (specify chasers, sizes and form of thread).
ZASLA	*Lathe, 3 x 36-inch Turret.	ZAWIT	Die-head, 1½", Self-opening, with eight sets of Standard Chasers, U. S. S.
ZASME	Equipment "A" English.	ZAWPA	Die-head, 2", Self-opening (specify chasers, sizes and form of thread).
ZASNI	Equipment "B" English.	ZAWRE	Die-head, 2", Self-opening, with eight sets of Standard Chasers, U. S. S.
ZASOR	Equipment "A" Metric.	ZAWSI	Die-head, 3", Self-opening (specify chasers, sizes and form of thread).
ZASPO	Equipment "B" Metric.	ZAWTO	Die-head, 3", Self-opening, with eight sets of Standard Chasers, U. S. S.
ZASRU	Equipment "B" Whitworth.	ZAXAS	Round Tool Holder, 2¼", for 1½" Die-head.
ZASSY	Machine without Rod Chuck or Rod Feed Mechanism.	ZAXET	Round Tool Holder, 3", for 2" Die-head.
ZASUS	Internal Oiling Arrangement to Turret.	ZAXRA	Round Tool Holder, 4", for 3" Die-head.
ZATAN	Chuck Jaws, Round (specify sizes).	ZAXSE	*Lathe, 2½ x 26-inch Turn-table.
ZATEP	Chuck Jaws, Hexagon (specify sizes).	ZAXTI	Equipment "A".
ZATIR	Chuck Jaws, Square (specify sizes).	ZAXVO	Equipment "B", English.
ZATMA	9" { Three-jaw Geared Scroll Chuck with two sets	ZAZAT	Equipment "B", Metric.
ZATNE	12" { of Jaws for inside and outside gripping.	ZAZOX	Equipment "C".
ZATOS	15" {	ZAZSA	Equipment "D".
ZATPI	Forging Chuck.	ZAZTE	Equipment "E", English.
ZATRO	8½" Lever Scroll Chuck with Holder.	ZAZUZ	Equipment "E", Metric.
YATSU	Two-jaw Chuck (specify jaws).	ZAZVI	Special Forming Slide with Power Transverse Feed.
ZATTY	Drill Chuck, 2" capacity, with 2¼" Round Shank.	ZAZWO	Lead Screw and Change Gears for Thread Cutting.
ZATUT	Five-taper Split Sleeves for 2" Drill Chuck (specify taper).	ZAZZY	Tool Holder for inside and outside Thread Cutting.
ZAVAP	Step-chuck and Closer Attachment.	ZEBBU	15", Three-jaw Geared Scroll Chuck, with three sets of Jaws.
ZAVER	Extra Step-chucks (specify number).	ZEBCY	Two-jaw Chuck, 6¼" diameter (specify jaws).
ZAVIS	Universal Turner with "V" Back-rests.	ZEBEX	Two-jaw Chuck, 8¾" diameter (specify jaws).
ZAVNA	Universal Turner with Roller Back-rests.	ZEBIZ	Forging Chuck.
ZAVOT	Bell-mouth Pointing Tool.		
ZAVPE	End Forming and Pointing Tool.		
ZAVRI	Open Side Turner.		
ZAVSO	Taper Turner.		
ZAVTU	Reamer Holder, Floating Type.		

\*May be furnished with Direct-connected Motor, see page 285.

CABLE AND TELEGRAPH CODE—Continued

ZEBOB	Lever Scroll Chuck, 6".	ZEFGY	Tap Holder, Releasing Type.
ZEBUC	Chuck Jaws for Rod Chuck (specify sizes).	ZEFID	Taper Turner.
ZEBVA	Chuck Plate, Blank.	ZEFOF	Double End Cutter Bar with two Cutters and Holding Blocks.
ZEBWE	Step-chuck and Closer Attach- ment.	ZEFUG	Die-head, 1½", Self-opening (specify chasers, sizes and form of thread).
ZEBXI	Extra Step - chucks (specify number).	ZEFZA	Die-head, 1½", Self-opening, with eight sets of Standard Chasers, U. S. S.
ZEBZO	Face-plate Equipment.	ZEGAC	Die-head, 2", Self-opening (specify chasers, sizes and form of thread).
ZECAX	Universal Turner with "V" Back- rests.	ZEGBA	Die-head, 2", Self-opening, with eight sets of Standard Chasers, U. S. S.
ZECBO	Universal Turner with Roller Back-rests, Leading.	ZEGCE	<b>Measuring Machine.</b>
ZECCU	Universal Turner with Roller Back-rests, Following.	ZEGDI	12-inch.
ZECDY	Universal Turner (Blank).	ZEGED	24-inch.
ZECEZ	Roller Back-rest, Leading.	ZEGFO	36-inch.
ZECIB	Roller Back-rest, Following.	ZEGHY	48-inch.
ZECOC	" V " Back-rest Holders.	ZEGIF	80-inch.
ZECUD	" V " Back-rest, Large.	ZEGOG	300-millimeter.
ZECWA	" V " Back-rest, Small.	ZEGUH	600-millimeter.
ZECXE	Open Side Turner.	ZEHAD	1000-millimeter.
ZECZI	Bell-mouth Pointing Tool.	ZEHCA	1200-millimeter.
ZEDAZ	End Forming and Pointing Tool.	ZEHDE	2000-millimeter.
ZEDBI	Turntable Cut-off and Pointing Tool.	ZEHEF	Combination English and Metric Machine.
ZEDCO	Triple Tool Holder.	ZEHFI	<b>Milling Machine, No. 00 Bench.</b>
ZEDDU	Tool Post Holder with two Tool Posts.	ZEHGO	Regular Equipment.
ZEDEB	Off-set Tool Post Holder with two Tool Posts.	ZEHIG	Index Quill and Center.
ZEDFY	Round Tool Holder, 3", without Bushings.	ZEHKV	Swivel Vise.
ZEDIC	Bushings for 3" Round Tool Holder (specify size).	ZEHOH	Right Angle Piece.
ZEDOD	Round Tool Holder, 2¼", with- out Bushings.	ZEHIUK	* <b>Milling Machine, No. 10 Hand.</b>
ZEDUF	Bushings for 2¼" Round Tool Holder (specify size).	ZEKAF	Regular Equipment, no Arm, no Vise.
ZEDXA	Multiple Tool Holder.	ZEKDA	Regular Equipment, no Arm, with Vise.
ZEDZE	Boring Bar with Adjustable Cut- ter, 1½" x 10".	ZEKEG	Regular Equipment with Arm, no Vise.
ZEFAB	Boring Bar with Adjustable Cut- ter, 1½" x 12".	ZEKFE	Regular Equipment with Arm and Vise.
ZEFBE	Taper Adapter, No. 2 Morse.	ZEKGI	Combination Screw and Rack Transverse Feed.
ZEFCI	Taper Adapter, No. 3 Morse.		
ZEFDO	Taper Adapter, No. 4 Morse.		
ZEFEC	Taper Adapter, No. 5 Morse.		
ZEFFU	Reamer Holder, Floating Type.		

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

ZEKHO	Vertical Milling Attachment.	ZENON	Milling Machine, No. 2 Lincoln.
ZEKIH	Vise, No. 2½.	ZENPY	Regular Equipment, no Vise.
ZEKKU	Arbor, no Arm (specify diameter and cutter length).	ZEPAL	Regular Equipment with Vise.
ZEKLY	Arbor with Arm (specify diameter and cutter length).	ZEPEM	Vise, No. 4, with Extension Crank Wrench.
ZEKOK	*Milling Machine, No. 2 Hand, Regular.	ZEPIN	Vise, No. 4, with Plain Crank Wrench.
ZEKUL	Regular Equipment, no Arm, no Vise.	ZEPKA	Arbor (specify diameter and cutter length).
ZELAG	Regular Equipment, no Arm, with Vise.	ZEPLE	Milling Machine, No. 12 Lincoln.
ZELEH	Regular Equipment with Arm, no Vise.	ZEPMI	Regular Equipment, no Vise.
ZELFA	Regular Equipment with Arm and Vise.	ZEPNO	Regular Equipment with Vise.
ZELGE	Vertical Milling Attachment.	ZEPOP	Oil Pump Equipment not wanted
ZELIK	Vise, No. 11.	ZEPRY	Vise, No. 12, with Extension Crank Wrench.
ZELKO	Arbor, no Arm (specify diameter and cutter length).	ZEPUR	Vise, No. 12, with Plain Crank Wrench.
ZELMY	Arbor with Arm (specify diameter and cutter length).	ZERAM	Arbor (specify diameter and cutter length).
ZELOL	*Milling Machine, No. 2 Hand, Vertical Vise Slide.	ZEREN	Milling Machine, No. 13 Lincoln.
ZEMAH	Regular Equipment, no Arm, no Vise.	ZERIP	Regular Equipment, no Vise.
ZEMEK	Regular Equipment, no Arm, with Vise.	ZERLA	Regular Equipment with Vise
ZEMGA	Regular Equipment with Arm, no Vise.	ZERME	Oil Pump Equipment not wanted.
ZEMHE	Regular Equipment with Arm and Vise.	ZERNI	Vise, No. 12, with Extension Crank Wrench.
ZEMIL	Vertical Milling Attachment.	ZEROR	Vise, No. 12, with Plain Crank Wrench.
ZEMKI	Vise, No. 2½.	ZERPO	Arbor (specify diameter and cutter length).
ZEMLO	Arbor, no Arm (specify diameter and cutter length).	ZERRU	Milling Machine, No. 3½ Power.
ZEMOM	Arbor with Arm (specify diameter and cutter length).	ZERSY	Regular Equipment (specify length of table).
ZENAK	*Milling Machine, No. 2 Column Power.	ZERUS	Milling Machine, No. 2 Vertical.
ZENEL	Regular Equipment, no Vise.	ZESAN	Regular Equipment (specify length of table).
ZENHA	Regular Equipment with Vise.	ZESEP	Milling Fixture, Index.
ZENIM	Vertical Milling Attachment.	ZESIR	Regular Equipment.
ZENKE	Vise, No. 11.	ZESMA	*Milling Machine, Spline.
ZENLI	Arbor (specify diameter and cutter length).	ZESNE	Regular Equipment.
		ZESOS	Universal Vise for Square and Flat Stock.

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

ZESPI	Universal Vise and Foot Stock for Round Stock.	ZEXOX	Backing-out Attachment.
ZESRO	Taper Bushing Chuck (small), no Bushings.	ZEXSA	Compound Taper Attachment.
ZESTY	Bushings for Small Taper Bushing Chuck (specify tapers).	ZEXTE	Stationary Rest.
ZESUT	Taper Bushing Chuck (large), no Bushings.	ZEXUZ	Power Quick Return Device.
ZETAP	Bushings for Large Taper Bushing Chuck (specify tapers).	ZEXVI	Draw-back Collet Attachment with one Collet (Regular Head).
ZETER	Cutters, Two-lip (specify sizes).	ZEXZY	Draw-back Collet Attachment with one Collet, Oversize Head.
ZETIS	Cutters, Four-lip (specify sizes).	ZEZBY	Draw-back Collets for Regular or Oversize Head (specify sizes).
ZETNA	*Milling Machine, 4½ x 12-inch Thread.	ZEZIX	Spindle Collets Regular Head (specify sizes).
ZETOT	Regular Equipment, English.	ZEZOZ	Spindle Collets Oversize Head (specify sizes).
ZETPE	Regular Equipment, Metric.	ZEZTA	Bushings, Collet for Regular Head (specify sizes).
ZETRI	Machine arranged for Internal Milling.	ZEZUB	Bushings, Collet for Oversize Head (specify sizes).
ZETSO	Spindle Collets (specify sizes).	ZEZWI	Bushings, Follow Rest, Regular Head (specify sizes).
ZETVY	Follow Rest Bushings (specify sizes).	ZIBAX	Bushings, Follow Rest Oversize Head (specify sizes).
ZEVAR	Draw-back Collet Mechanism with one Collet (specify sizes).	ZIBBO	Bushings, Tailstock, Regular Head (specify sizes).
ZEVES	Draw-back Collets (specify sizes).	ZIBCU	Bushings, Tailstock, Oversize Head (specify sizes).
ZEVIT	Cutters (specify form, diameter and pitch).	ZIBDY	Cutters (specify form, diameter and pitch).
ZEVPA	*Milling Machine, 6-inch Thread.	ZIBEZ	*Milling Machine, 12 x 48-inch Thread.
ZEVRE	6 x 14" Regular Equipment, English.	ZIBIB	Regular Equipment, English.
ZEVSI	6 x 14" Regular Equipment, Metric.	ZIBOC	Regular Equipment, Metric.
ZEVTO	6 x 48" Regular Equipment, English.	ZIBUD	Oversize Cutter Head in place of Regular.
ZEWAS	6 x 48" Regular Equipment, Metric.	ZIBWA	Bushings, Collet (specify sizes).
ZEWET	6 x 80" Regular Equipment, English.	ZIBZI	Bushings, Tailstock, H. & G. (specify sizes).
ZEWRA	6 x 80" Regular Equipment, Metric.	ZICAZ	Bushings, Tailstock, C. I. (specify sizes).
ZEWSE	6 x 132" Regular Equipment, English.	ZICBI	Cutters (specify form, diameter and pitch).
ZEWTI	6 x 132" Regular Equipment, Metric.	ZICCO	*Profiling Machine, No. 11.
ZEWXY	Oversize Head, Tailstock and Follow Rest in place of Regular.	ZICDU	Regular Equipment, Gear Drive.
ZEXAT	Oversize Cutter Head in place of Regular.	ZICEB	Regular Equipment, Belt Drive
		ZICFY	Oil Pump Equipment not wanted.
		ZICGT	Raising Blocks (specify height).
		ZICIC	Spindles with special Tapers (specify tapers).

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

ZICOD	Cutters (specify style and size).	ZIGHU	Screw Machine, No. 1 Automatic.
ZICUF	*Profiling Machine, No. 12.	ZIGIG	Regular Equipment cammed.
ZICXA	Regular Equipment, Gear Drive.	ZIGKY	Regular Equipment Uncammed.
ZICZE	Regular Equipment, Belt Drive.	ZIGUK	Collets (specify sizes).
ZIDAB	Oil Pump Equipment not wanted.	ZIHAF	Feed Tubes (specify sizes).
ZIDBE	Raising Blocks (specify height).	ZIHDA	Screw Machine, No. 2 Automatic.
ZIDCI	Spindles with special Tapers (specify tapers).	ZIHEG	Regular Equipment, Cammed.
ZIDDO	Cutters (specify style and size).	ZIHFE	Regular Equipment, Uncammed.
ZIDEC	*Profiling Machine, No. 13.	ZIHGI	Collets (specify sizes).
ZIDFU	Regular Equipment, Gear Drive.	ZIHLY	Feed Tubes (specify sizes).
ZIDGY	Regular Equipment, Belt Drive.	ZIHOK	Screw Machine, No. 1 Hand.
ZIDID	Oil Pump Equipment not wanted.	ZIHUL	Regular Equipment.
ZIDOF	Raising Blocks (specify height).	ZIKAG	Collets (specify sizes).
ZIDUG	Spindle with special Taper (specify taper).	ZIKEH	Screw Machine, No. 2 Hand.
ZIDZA	Cutters (specify style and size).	ZIKFA	Regular Equipment, Regular Head.
ZIFAC	*Profiling Machine, No. 14.	ZIKGE	Regular Equipment, Oversize Head.
ZIFBA	Regular Equipment, Gear Drive.	ZIKHI	Screw Cut-off in place of Lever.
ZIFCE	Regular Equipment, Belt Drive.	ZIKIK	Rack and Pinion Feed for Turret Slide.
ZIFDI	Oil Pump Equipment not wanted.	ZIKKO	Collets (specify sizes).
ZIFEI	Raising Blocks (specify height).	ZIKLU	Shaving Machine, No. 2.
ZIFFO	Spindles with special Tapers (specify tapers).	ZIKMY	Regular Equipment.
ZIFGU	Cutters (specify style and size).	ZIKOL	Screw Cut-off in place of Lever.
ZIFHY	Pumps, Rotary.	ZILAH	Collets (specify sizes).
ZIFIF	No. o.	ZILEK	Sub-press Bases and Stands.
ZIFOG	No. 2.	ZILGA	No. 1.
ZIGAD	No. 3.	ZILHE	No. 2.
ZIGCA	No. 12.	ZILIL	No. 3.
ZIGDE	Roll Grooving Machine, No. 1.	ZILKI	No. 4.
ZIGEF	Regular Equipment.	ZILLO	No. 5.
ZIGFI	Roll Grooving Machine, No. 2.	ZILNY	No. 6.
ZIGGO	Regular Equipment.		
INUWI	Motor driven.	INVEG	Motor driven, purchaser to furnish constant speed, alternating current motor.
INUXO	Motor driven, including constant speed, alternating current motor (— volts).	INVIB	Motor driven, purchaser to furnish constant speed, direct current motor.
INUZU	Motor driven, including constant speed, direct current motor (— volts).	INVOC	Motor driven, purchaser to furnish variable speed, direct current motor.
INVAZ	Motor driven, including variable speed, direct current motor (— volts).		

\*May be furnished with Direct-connected Motor, see page 285.

## CABLE AND TELEGRAPH CODE—Continued

## ALTERNATING CURRENT

## VOLTAGES, CYCLES AND PHASE

Volts	Cycles	Phase		
		Single	Two	Three
110		VOXHE	VUBEN	VUCRO
110		VOXIL	VUBIP	VUCSU
110	25	VOXKI	VUBLA	VUCTY
110	40	VOXLO	VUBME	VUDAP
110	60	VOXNY	VUBNI	VUDER
220		VOXOM	VUBOR	VUDIS
220		VOZAK	VUBPO	VUDNA
220	25	VOZEL	VUBRU	VUDOT
220	40	VOZHA	VUBSY	VUDPE
440		VOZIM	VUBUS	VUDRI
440		VOZKE	VUCAN	VUDSO
440	25	VOZLI	VUCEP	VUDTU
440	40	VOZMO	VUCIR	VUDVY
550		VOZON	VUCMA	VUFAR
550		VOZPY	VUCNE	VUFES
550	25	VOZUP	VUCOS	VUFIT
550	40			
550	60	VUBAM	VUCPI	VUFPA

## DIRECT CURRENT VOLTAGES

VUFRE	110	VUFWY	250	VUGRA	550
VUFSI	125	VUGAS	440	VUGSE	600
VUFTO	220	VUGET	500	VUGTI	

## HORSE-POWER MOTORS

VUGUX	1	VUKWI	6	VUPAB	17½
VUGVO	1½	VUKXO	6½	VUPBE	18
VUGXY	2	VUKZU	7	VUPCI	19
VUHAT	2¼	VULBU	7½	VUPDO	19½
VUHOX	2½	VULCY	8	VUPEC	20
VUHSA	2¾	VULEX	10	VUPFU	23
VUHTE	3	VULIZ	11	VUPGY	25
VUHUZ	3½	VULOB	12	VUPID	30
VUKBY	3¾	VULUC	12½	VUPOF	35
VUKIX	4	VULVA	13	VUPUG	40
VUKOZ	4½	VULWE	15	VUPZA	45
VUKTA	5	VULXI	16	VURAC	50
VUKUB	5½	VULZO	17		

## INDEX

Arbors for Milling Machines . . . . .	133
Barrel (gun) and Tube Drilling Machines . . . . .	197
Barrel (gun) Lapping Machine . . . . .	213
Barrel (gun) and Tube Reaming Machine . . . . .	211
Bolt Cutter, Turret Head . . . . .	233
Centering Machines . . . . .	229
Chucks, Two-jaw . . . . .	74
Code, Cable and Telegraph . . . . .	265
Die Sinking Machines and Tools . . . . .	223
Drills :	
No. 11 Gang . . . . .	181
Sensitive . . . . .	183
Multiple Spindle . . . . .	167
Gauges . . . . .	245
Gear Cutting Machines . . . . .	239
Grinders :	
Cylindrical . . . . .	157
Vertical Surface . . . . .	163
Automatic for Thread Milling Machine . . . . .	150
Fish-tail Cutter . . . . .	140
Gun Barrel Drill . . . . .	209
Gun Barrel and Tube Drilling Machines . . . . .	197
Gun Barrel and Tube Reaming Machine . . . . .	211
Gun Barrel Drill Grinding Machine . . . . .	209
Gun Barrel Lapping Machine . . . . .	213
Gun Barrel Rifling Machines . . . . .	215
Grooving Machines, Roll . . . . .	235
Lathes :	
7 x 32-inch Bench . . . . .	13
10-inch Toolmakers' . . . . .	31
14-inch Gib . . . . .	35
16-inch Toolmakers' . . . . .	39
Turret Lathes and Tools . . . . .	51
Turntable Lathes and Tools . . . . .	85
Measuring Machines, Standard . . . . .	244
Milling Machines :	
No. 00 Bench . . . . .	111
Hand . . . . .	113
No. 2 Column Power . . . . .	121
Lincoln . . . . .	123
No. 3½ Power . . . . .	129
No. 2 Vertical . . . . .	131

**INDEX—Continued****Milling Machines — Continued :**

4½ x 12-inch Thread . . . . .	143
6-inch Thread . . . . .	145
12 x 48-inch Thread . . . . .	153
Spline . . . . .	137
Vises for Milling Machines . . . . .	132
Arbors for Milling Machines . . . . .	133
Index Milling Fixture . . . . .	134
Pumps, Rotary . . . . .	241
Profiling Machines . . . . .	185
Rifling Machines . . . . .	215
Roll Grooving Machines . . . . .	235
Screw Machines, Turret-head Hand . . . . .	105
Shaving Machine No. 2 . . . . .	109
Small Tools, Machinists' . . . . .	246
Sub-presses and Dies . . . . .	243
Thread Milling Machines, 4½ x 12-inch . . . . .	143
Thread Milling Machines, 6-inch . . . . .	145
Thread Milling Machines, 12 x 48-inch . . . . .	153
Turret Lathes and Tools . . . . .	51
Turntable Lathe and Tools . . . . .	85
Tables . . . . .	247
Vises for Milling Machines . . . . .	132

