



Precision tools

Pratt & Whitney Company

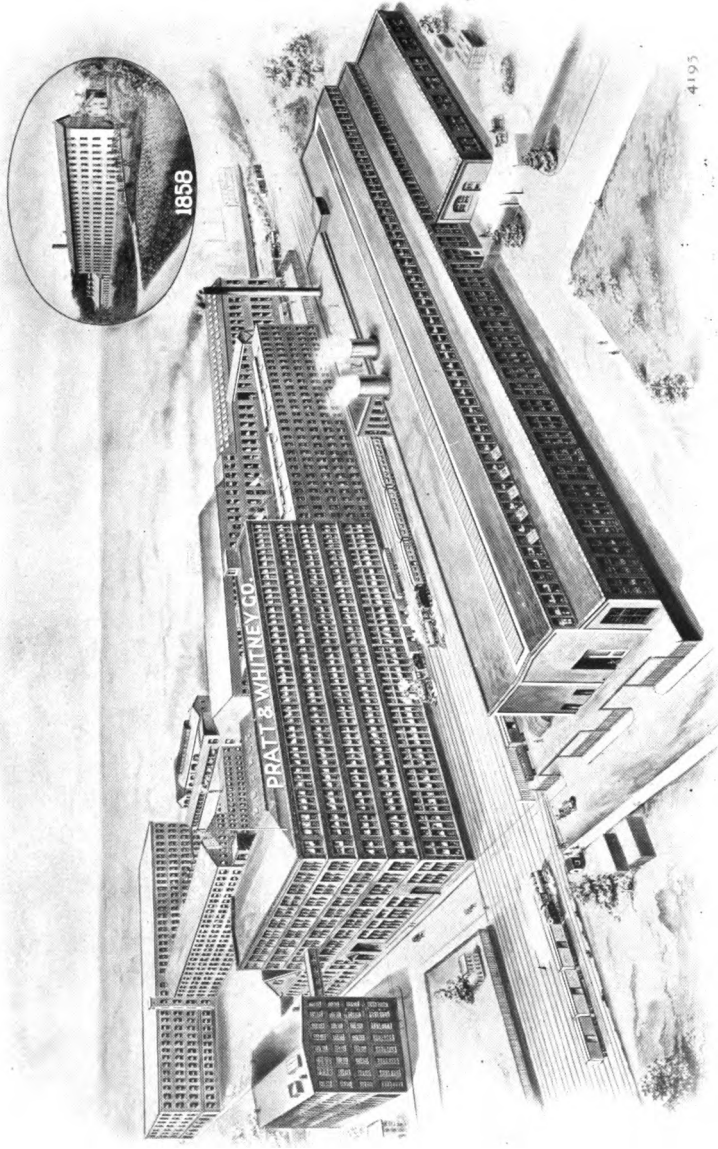
PRECISION TOOLS

PRATT & WHITNEY COMPANY
HARTFORD, CONNECTICUT

TO VISIT
ABOYUAD

1895

at 1895



Machinery Department

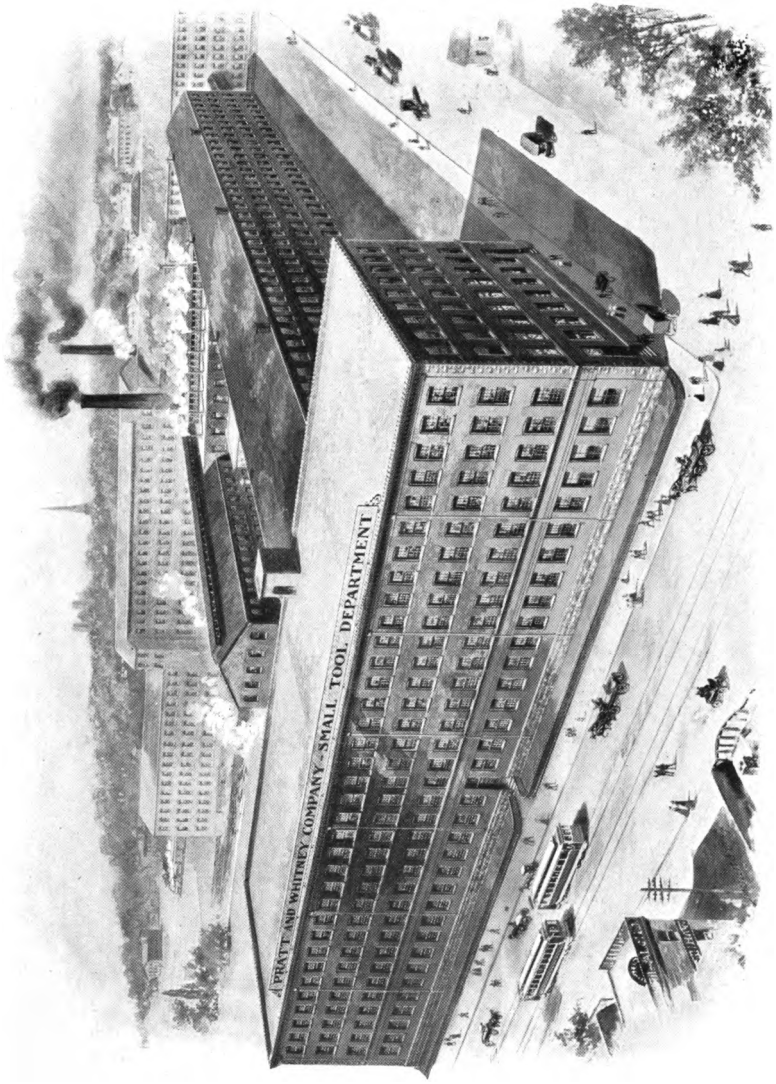


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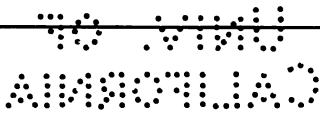








Small Tool Department



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
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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.
Argentina F. H. Bagge, 121 San Martin, Buenos Aires
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Canada The Canadian Fairbanks Company, Ltd., Montreal, Toronto,
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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

THE Pratt & Whitney Company invites attention to the Precision Machinery illustrated and described herein. A broad experience, unexcelled facilities and unflinching 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.

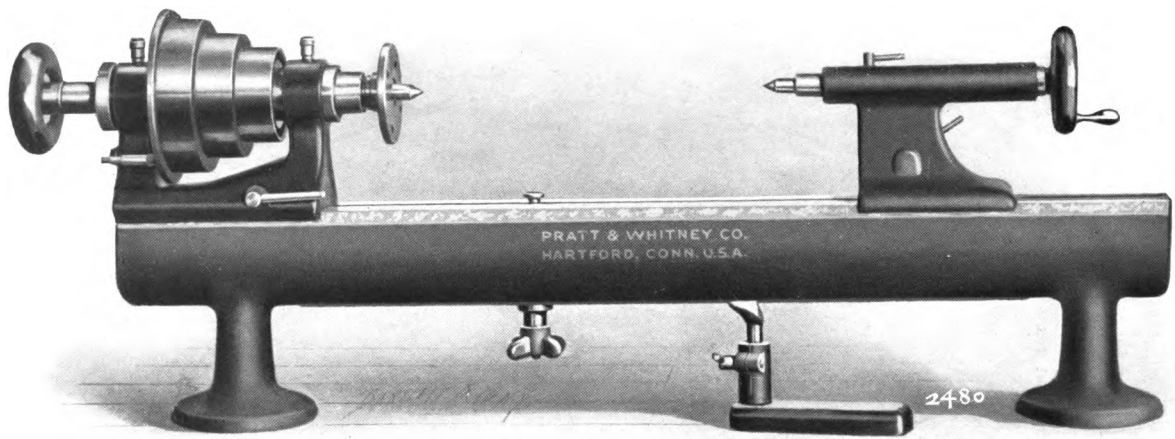
Inquiries All inquiries should be accompanied with detailed information regarding the matter in question, and where there is any doubt full dimensioned blue prints or samples should be furnished. Blue prints and samples will be returned when desired. If these suggestions are adhered to, the solution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

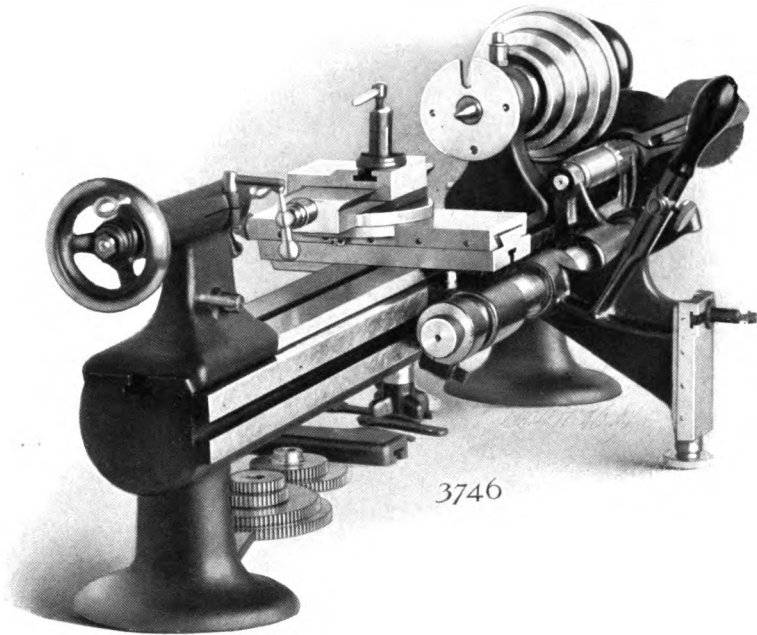
SPECIFICATIONS

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	$\frac{1}{2}'' \times \frac{1}{4}''$
	Collet Capacity	$\frac{1}{2}''$
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 $\frac{3}{8}$ ", 4 $\frac{3}{4}$ "
	Cone (Counter.), diameter (3 steps)	5 $\frac{1}{2}$ ", 6 $\frac{3}{8}$ ", 7 $\frac{1}{4}$ "
	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 $\frac{1}{4}$ "
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

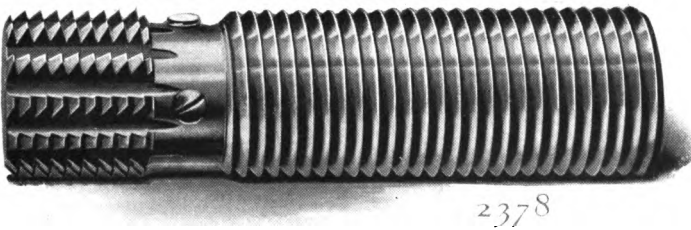
* For detailed information, see "Tapers", page 247.

† Index Holes in Cone Flange, 48 and 60.

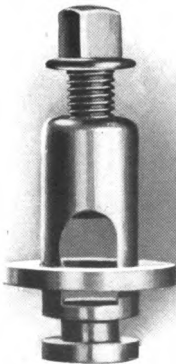
Code words, page 265.



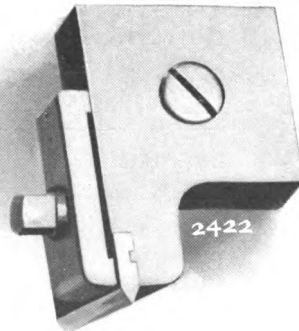
Rear View with Thread Cutting Attachment Thrown Back



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.

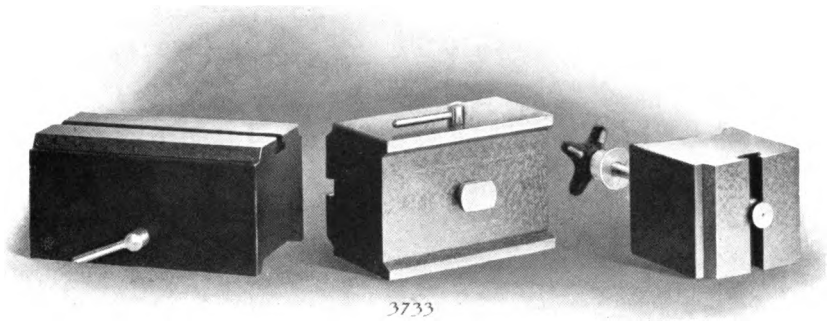
Regular Equipment Comprises: Bed with Rear Slide planed for Threading Attachment; Headstock with Face Plate, Center Collet and Center; Tailstock with Center; T-Rest with Binder.

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.

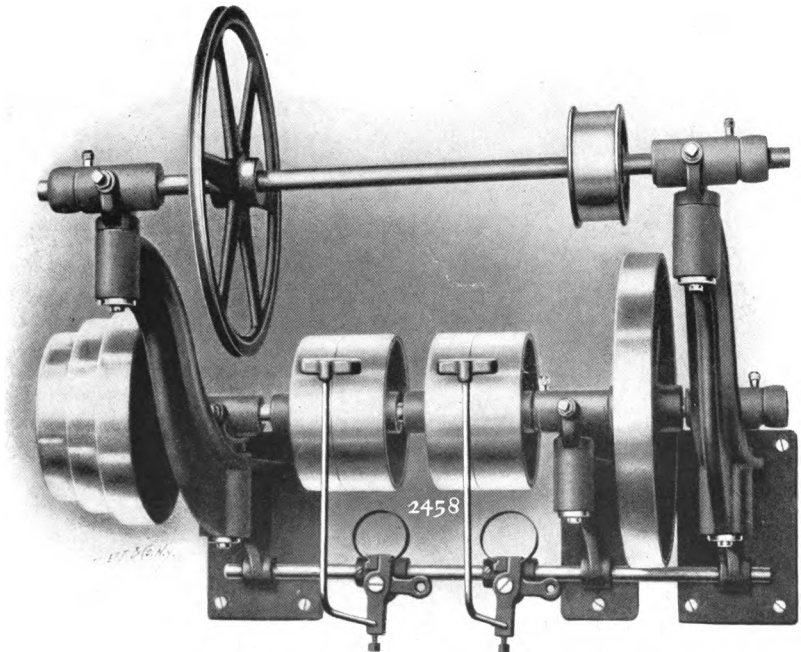
Special Threading Tool and Holder for Threading Attachment, furnished to order.

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



Raising Blocks

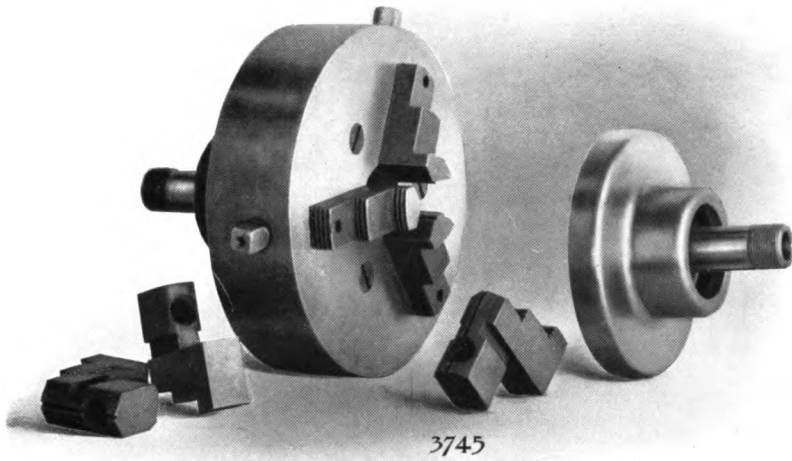
Raising Blocks 3 inches high, increasing swing of lathe to 13 inches ; 3 in set: one each for Head, Tailstock and one for Compound Rest or other attachments.



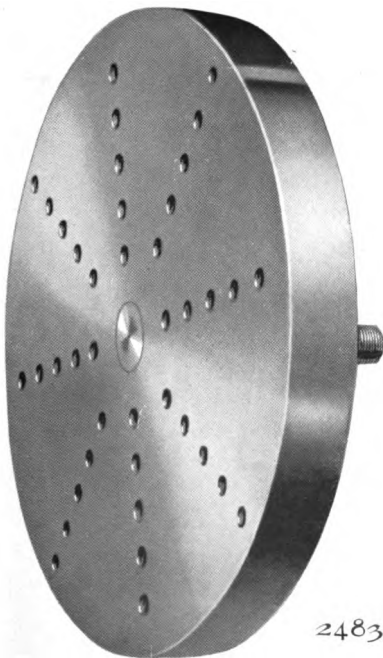
Two-speed Wall Countershaft with Grinding Attachment

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

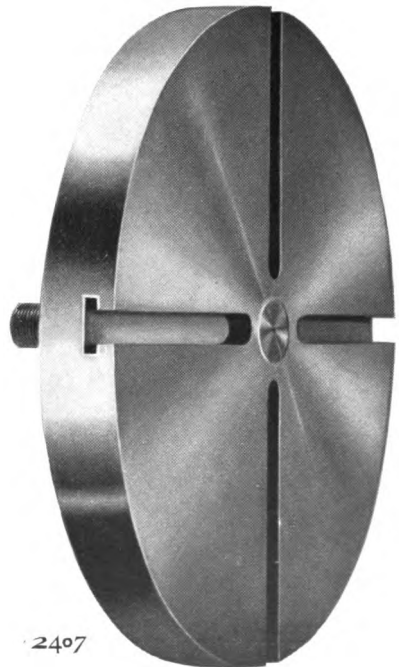
Wall Countershafts bolt directly to the wall ; Wall-rod Countershafts are bolted to Wall-rods, which is preferable when a number of lathes are used together or are placed in front of windows. Wall-rod Brackets and Wall-rods 1 inch diameter, are carried in stock and furnished to order.



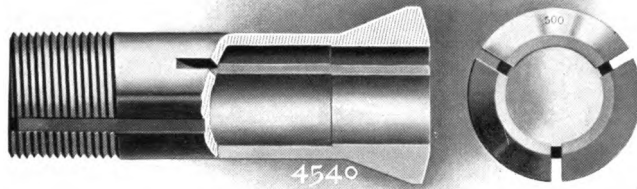
Combination Chucks: 4 and 6-inch with 2 sets of Jaws and Chuck-plate



7-inch Face-plate Chuck with Tapped Holes

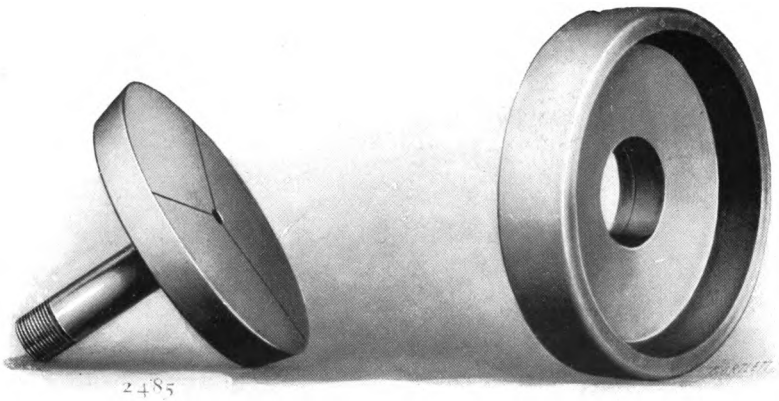


7-inch Face-plate Chuck with T-slots



Collet

Collets English sizes, $\frac{1}{64}$ " 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.

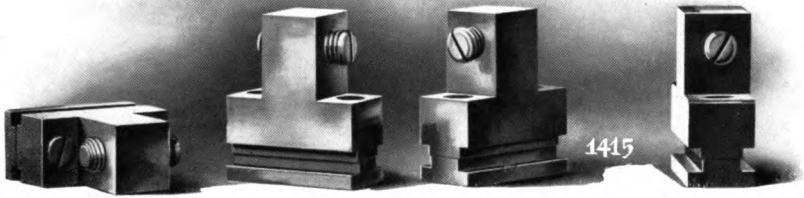


Blank Split Step-chuck and Closer

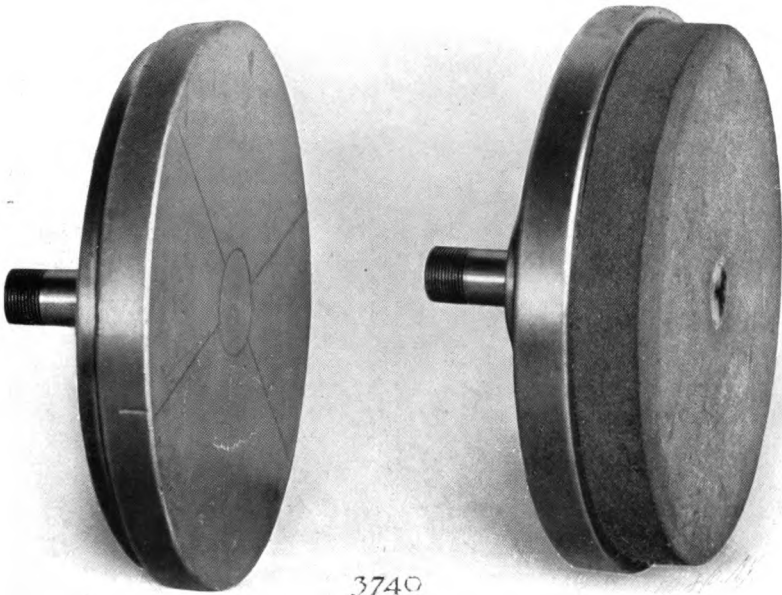
Step-chucks and Closers Made in five sizes.

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

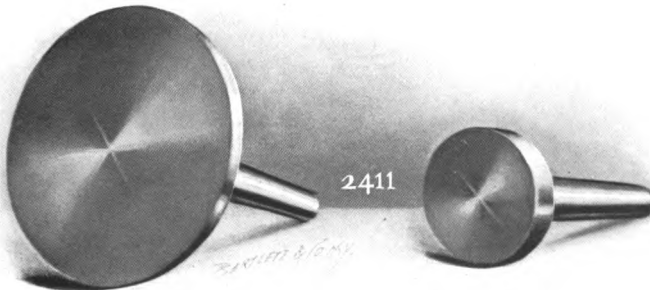
Closers A, B, C, D, E for above Chucks.



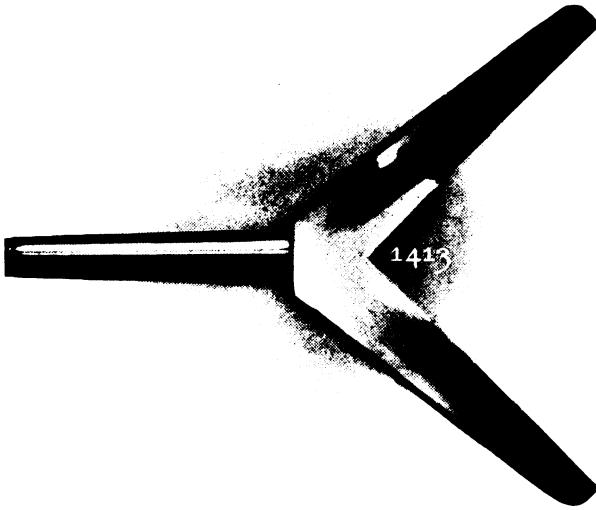
Chuck Jaws: For Face-plate Chucks with T-slots. Also used for Face-plate Quills with T-slots



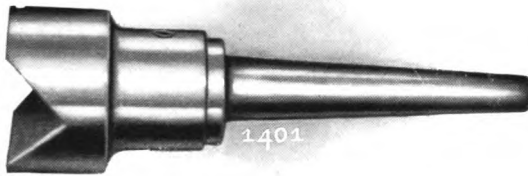
Face Emery Wheel and Face Lead Lap



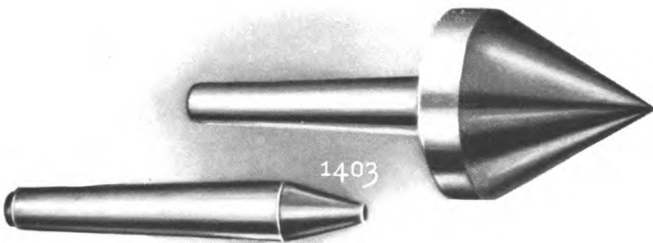
Drill Pads: 1, 2, 4 and 6-inch Diameter



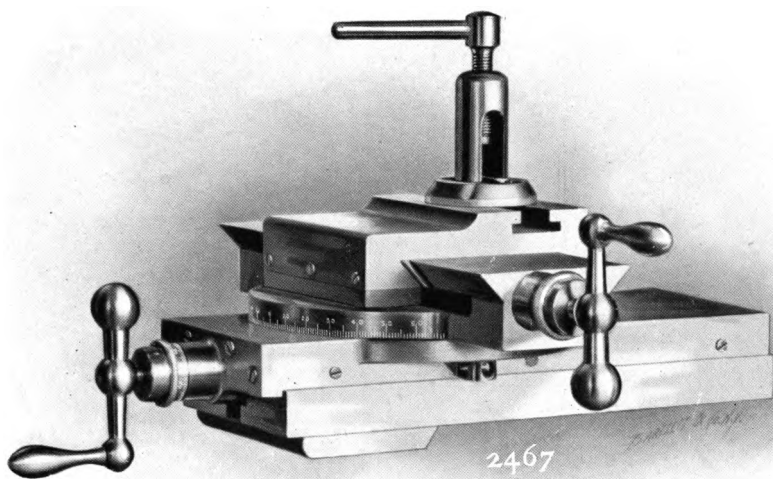
Plain V-center



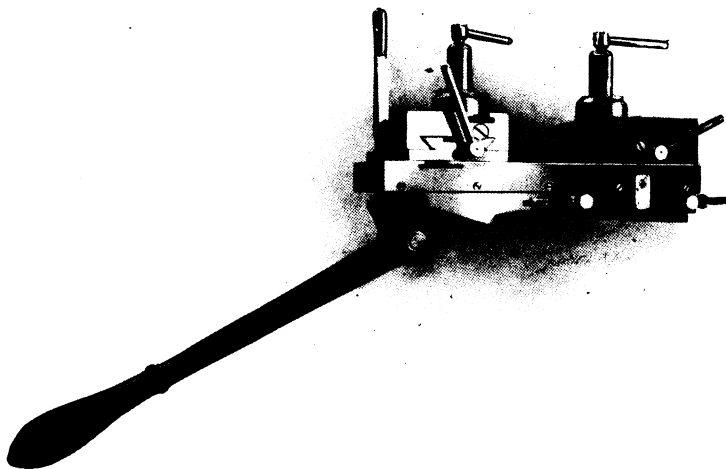
Swiveling V-center



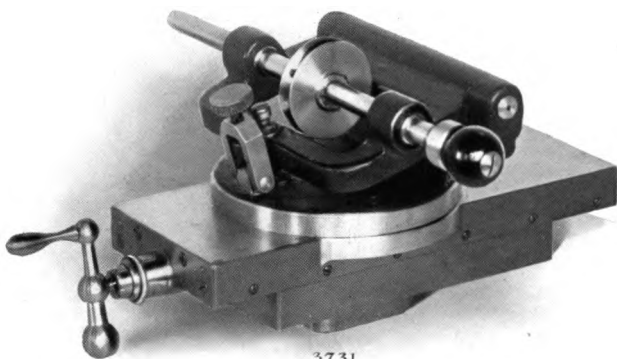
Large Plain Center and Female Center



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

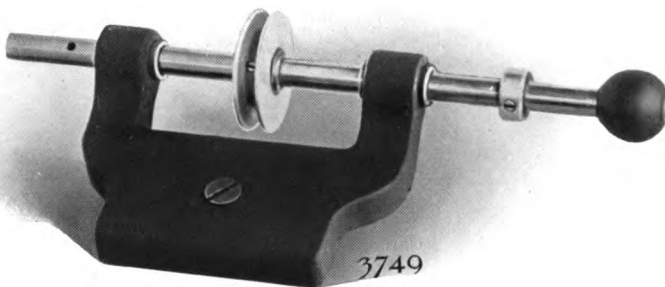


Double Slide-rest with Lever, Rack and Pinion Movement. Also made with Screw Movement



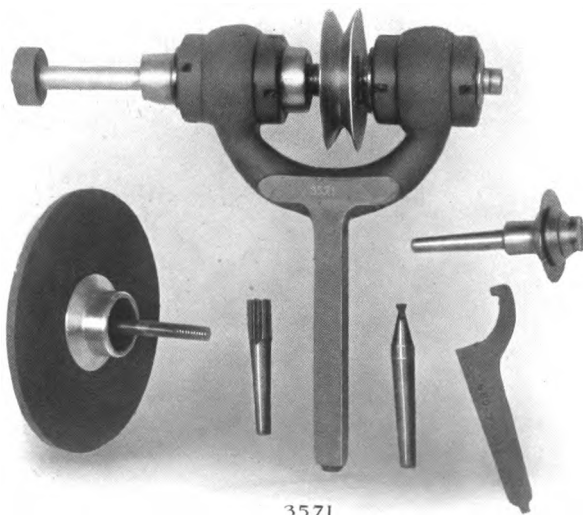
3731

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



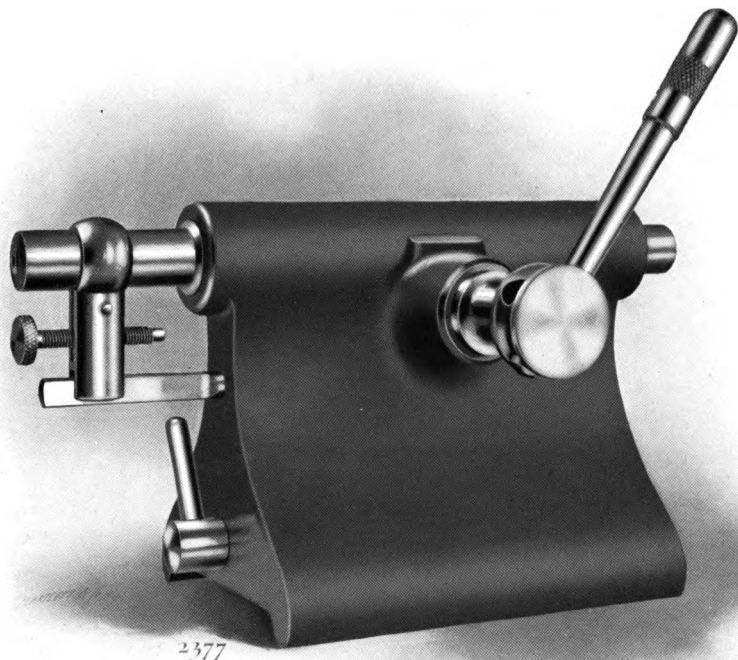
3749

Slide-rest Traverse-spindle Grinder

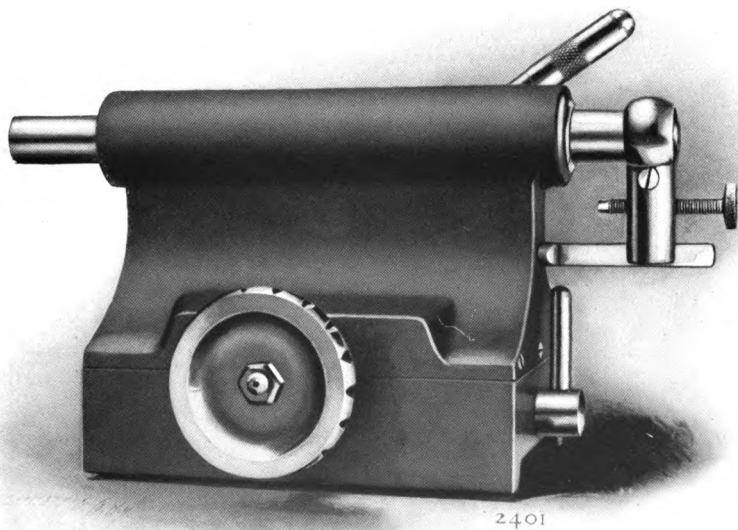


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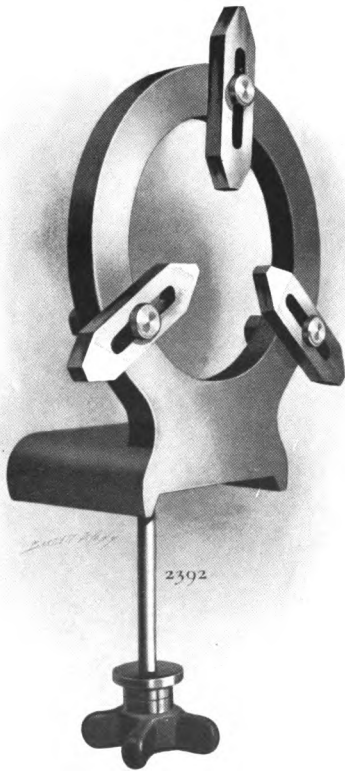
Tool-post Grinder and Appliances



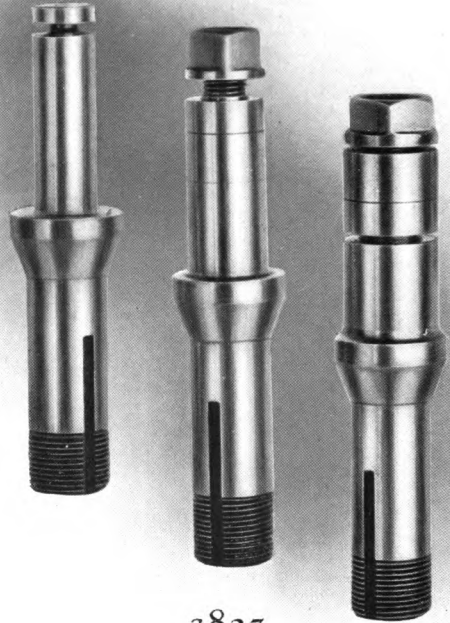
Plain Lever Tailstock



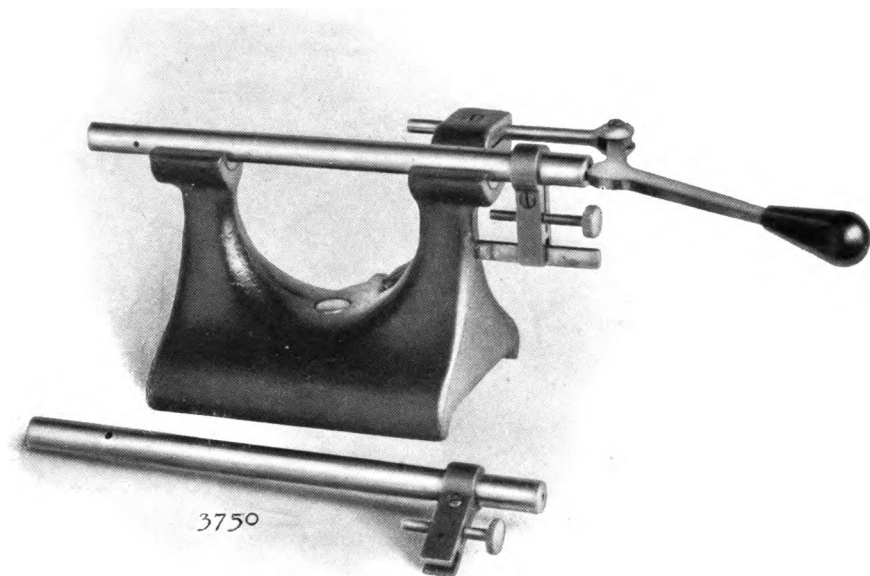
Lever Tailstock with Cross Slide



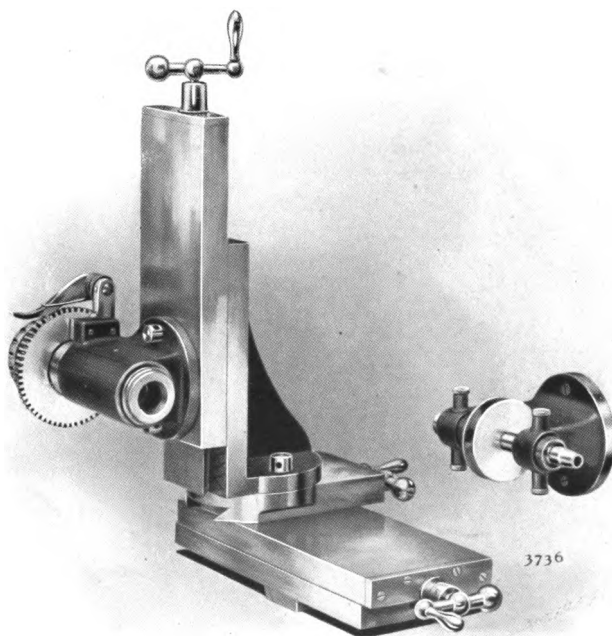
Back-rests: 3, 4, 5 and 6-inch Capacity



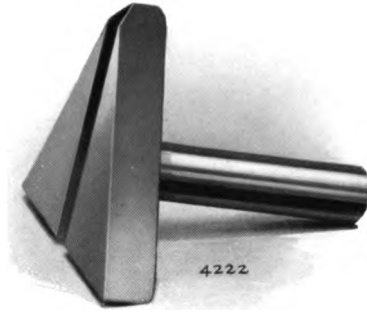
Arbors: $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch, for Milling Attachment



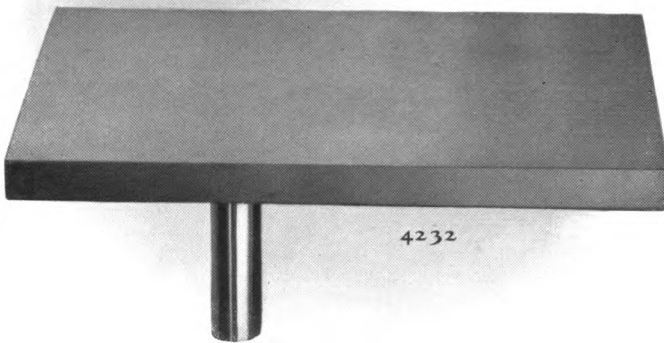
Open Tailstock with Extra Spindle and Dog. Also made with Full Bearings and Pulley on Spindle



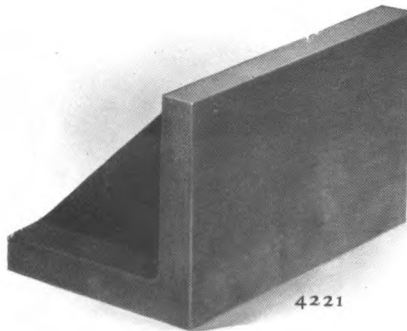
Milling Attachment with Extra Cutter Head



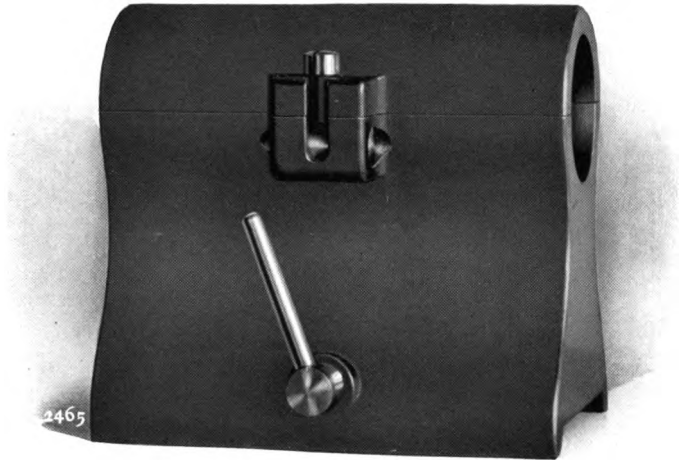
Triangular Table-rest, 2 $\frac{3}{8}$ -inch



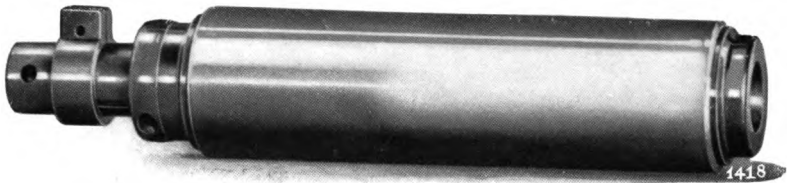
Rectangular Table-rest, 4 x 6-inch



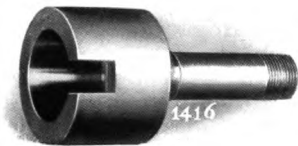
Angle Plate, 2 x 3 $\frac{1}{4}$ -inch



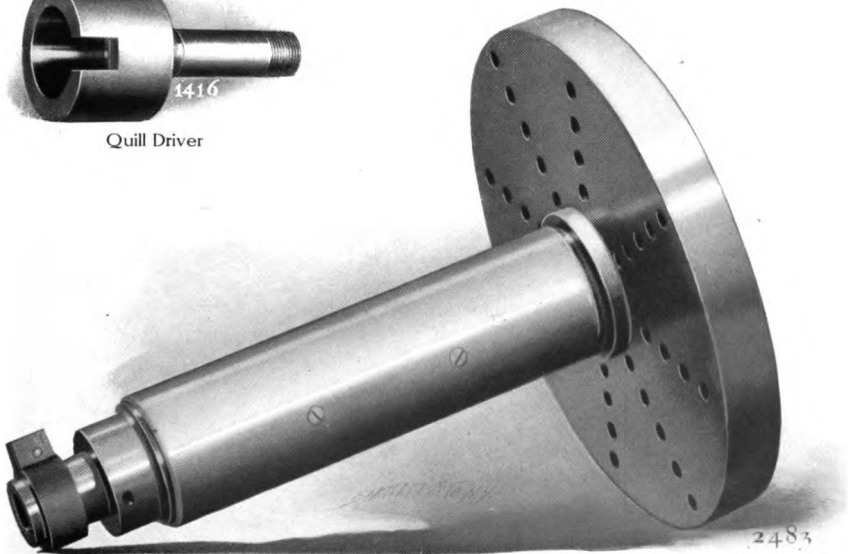
Quill-rest



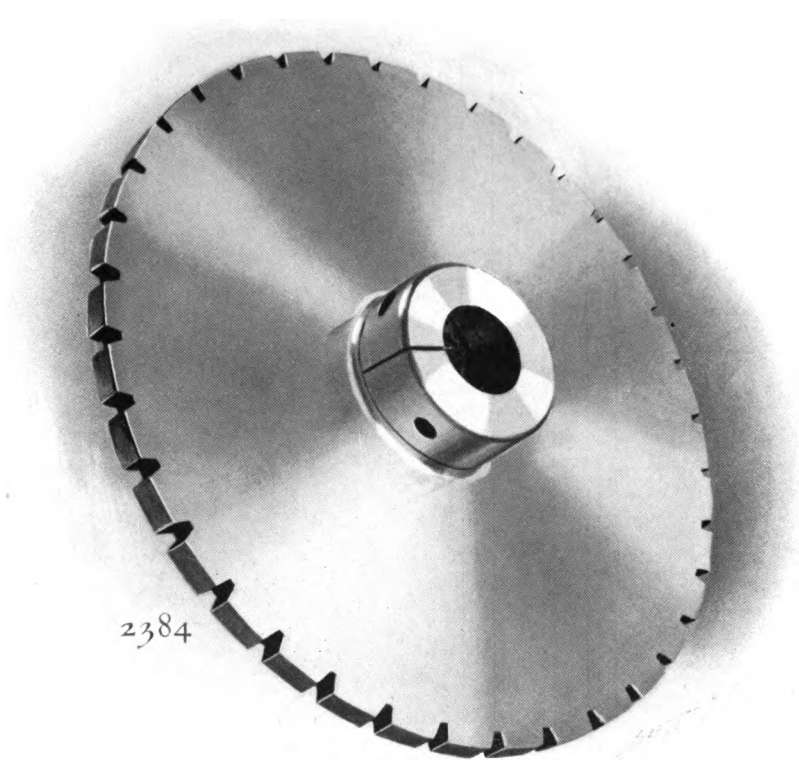
Chuck Quill



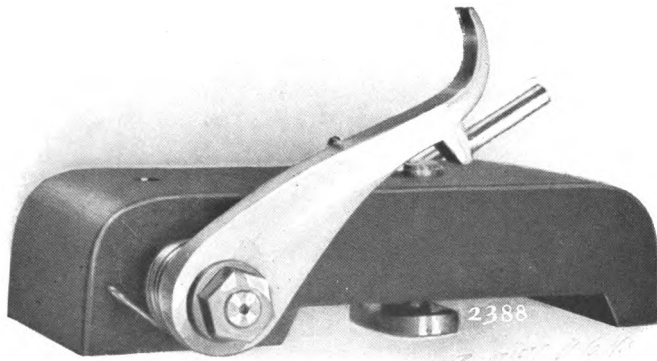
Quill Driver



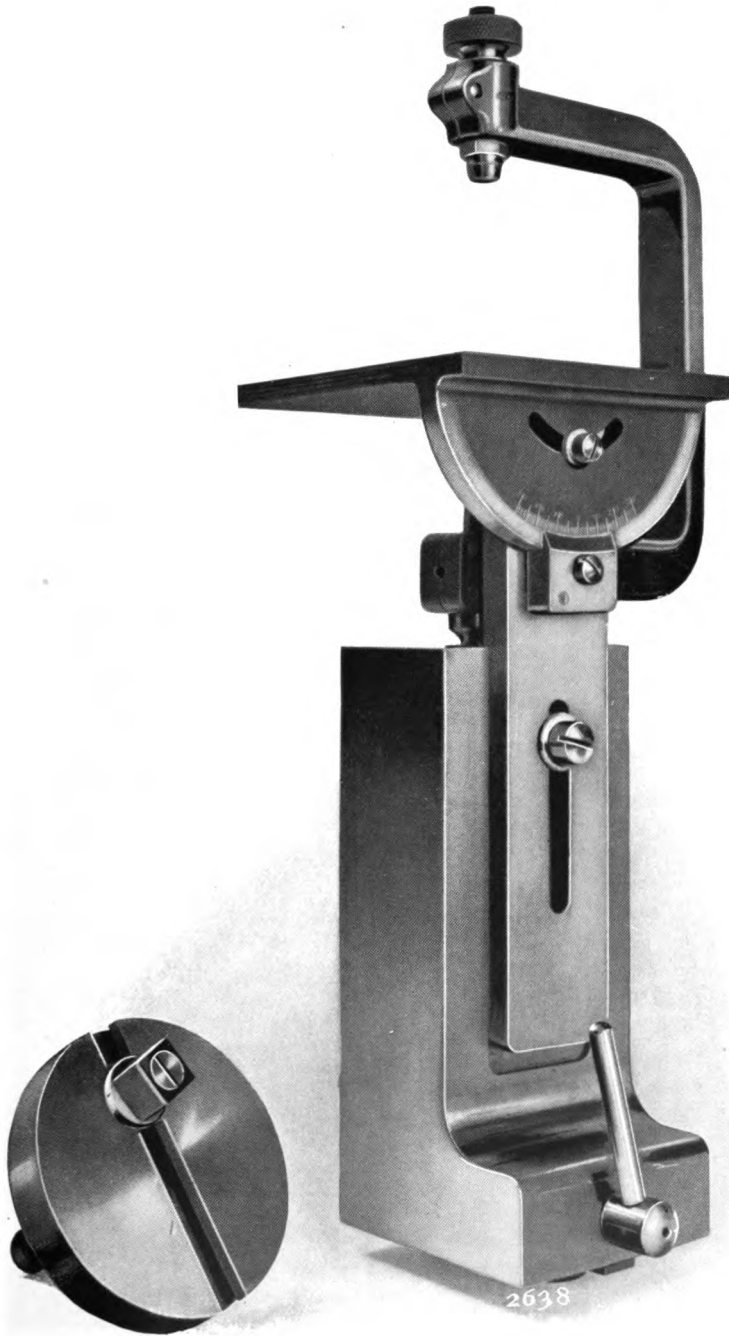
Face-plate Quill with Tapped Holes in Face-plate. Also made with T-slots in Face-plate



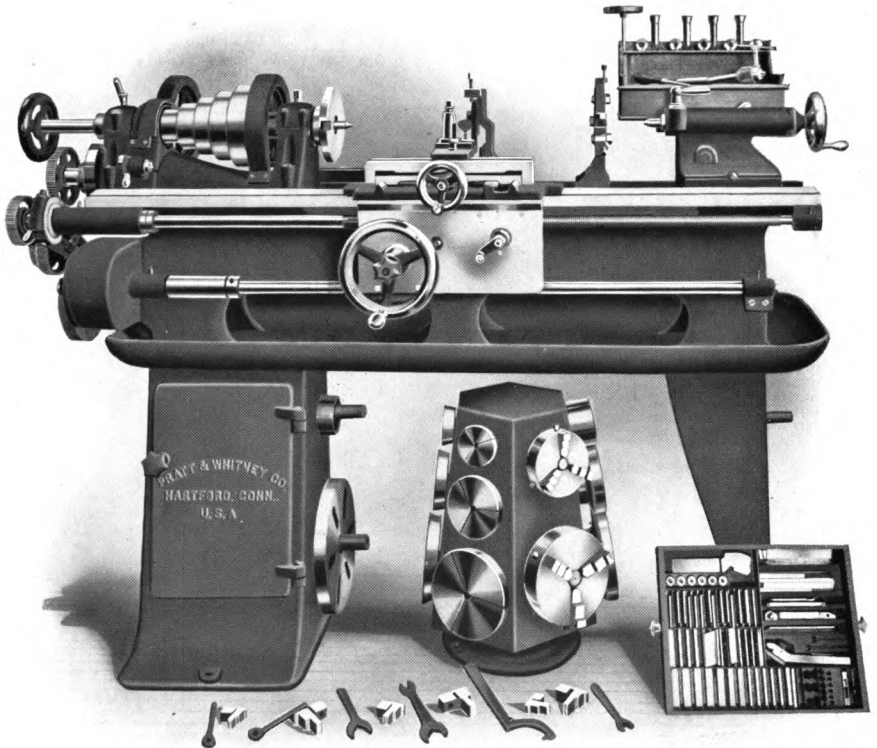
Index Plate: Number of Notches as Ordered



Index Pawl and Block



Filing Attachment and Driver
Files of various shapes furnished to order



2869

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

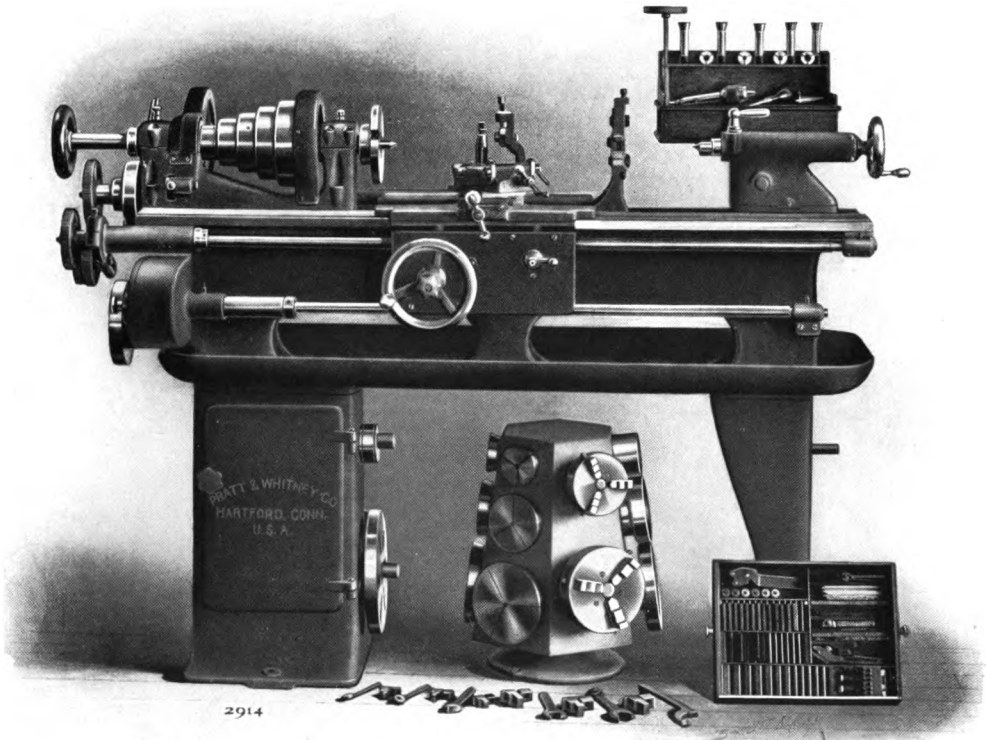
10-INCH LATHE—SPECIFICATIONS

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 1/8" 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 1/8" to 5/8" 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 7/8" x 2 1/2" Boxes, C. I., lined with Babbitt, adjustable for wear. Hole through 1 3/8" *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 1/10 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.

▲



2914

(Patented)

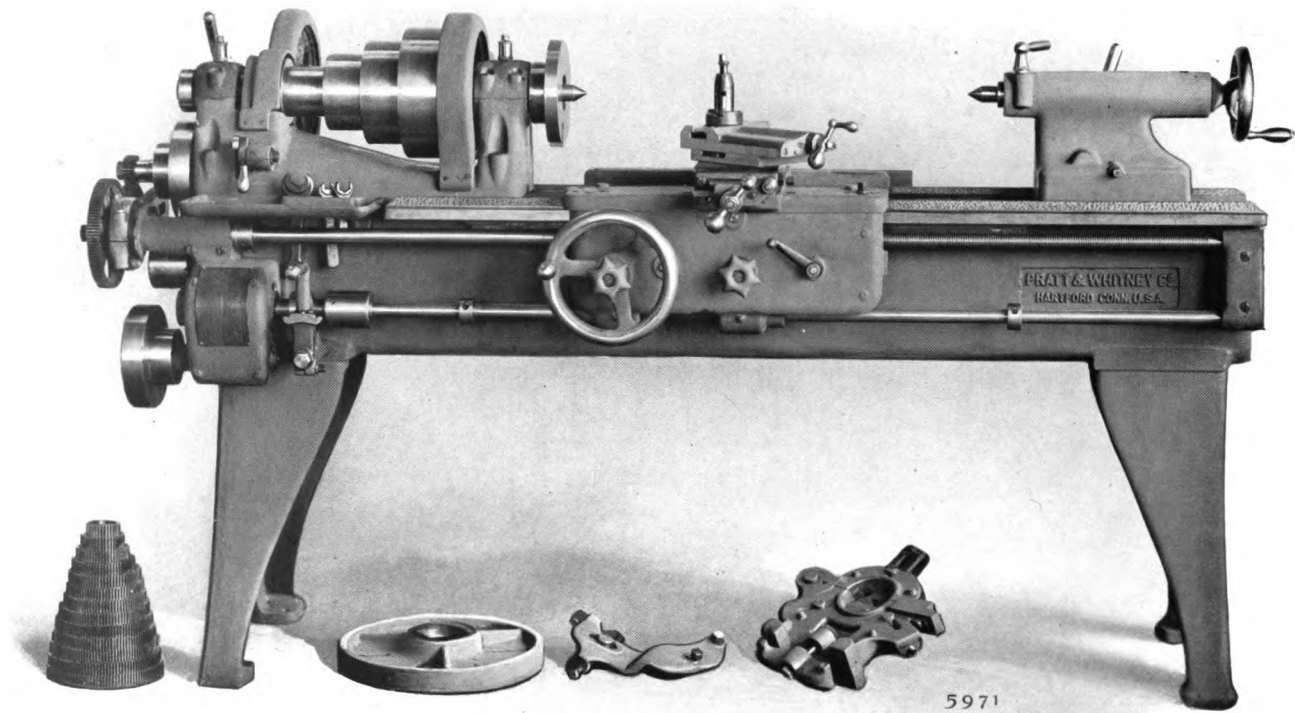
10-inch Toolmakers' Lathe with Compound Elevating Rest and Tool Equipment

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, $\frac{1}{8}$ to $\frac{3}{8}$ 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"> 1 4", 3-Jaw Combination, with 2 sets of Jaws. 1 6", 3-Jaw Combination, with 2 sets of Jaws. 1 Spanner Wrench, for above Chucks. 1 $\frac{5}{8}$" Drill Chuck, with stem. 1 $\frac{5}{8}$" Drill Holder, size "A", No. 60 to $\frac{5}{8}$" capacity.
STEP-CHUCK AND CLOSERS	<ul style="list-style-type: none"> 2 Step-chucks, $\frac{5}{8}$" to 2" capacity (steel, blank). 2 Step-chucks, 2" to 4" capacity (steel, blank). 2 Step-chucks, 4" to 6" capacity (steel, blank). 1 Closer for 2" Step-chucks. 1 Closer for 4" Step-chucks. 1 Closer for 6" Step-chucks.
TOOL HOLDERS	<ul style="list-style-type: none"> 1 Threading Tool Holder, No. 2 P. & W., with 1 Cutter, Sharp "V" single. 1 Cutter, Sharp "V" double off-set. 1 Cutter for Center Turning. 12 Cutters, U. S. S., from 6 to 20 Pi. (English Equipment). 12 Cutters, Int. Std., from 1 to 5.5 m/m P. (Metric Equipment). 12 Cutters, Whitworth Std., 5 to 20 Pi. (to order only). 1 Knurling Tool Holder, with 3 pairs of knurls; fine, medium and coarse. 1 Combination Tool Holder, with 13 High-speed Cutters; 2 Small Boring Bars and Holder; 1 Centering Tool; 1 Wrench. 1 Cutting-off Tool Holder, No. 0 Johnson, with 12 blades. 18 Center Reamers, 6 each $\frac{1}{4}$", $\frac{3}{8}$", and $\frac{1}{2}$". 1 Screw Pitch Gauge. 1 Center Gauge. 1 Female Center. 1 Cabinet for Tools. 1 Pyramid for Chucks, etc.



14-inch Engine Lathe

14-INCH LATHE—SPECIFICATIONS

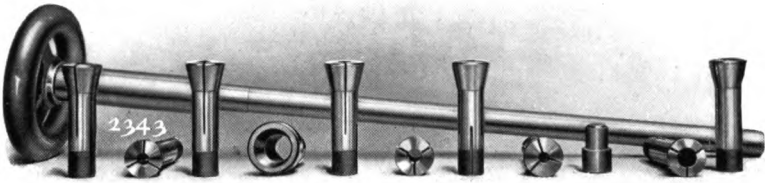
RANGE . . .	Length of Bed 6', 8', 10' Center Distance, maximum 36", 60", 84" Swing over Bed 15 7/8" Swing over Carriage 9 1/2" Steady Rest Capacity 4" Follow Rest Capacity 3" Tool Post takes Tool 5/8" x 1 1/4" Attachments (see description)
HEADSTOCK SPINDLE	Special Steel; Bearings, cylindrical; Front 2 7/8" x 4" Rear Bearings 2" x 3 5/8" Boxes, C. I., lined with Babbitt, adjustable for wear. Hole through 1 1/10" *Taper Hole in Spindle, No. 13 Jarno. *Taper Hole in Spindle Collet, No. 10 Jarno. Front End, cylindrical, 2 5/8" diameter; Thread 3 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 3/8 to 1 Cone Diameters (4), large and small 9 3/4" and 3 3/4" Countershaft Pulley, diameter 12" x 4 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. 1 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. 1 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.

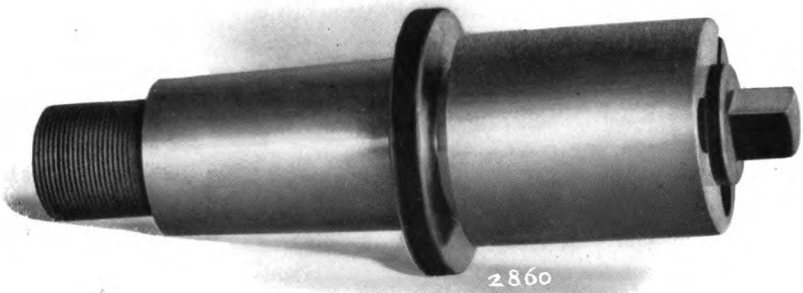
†For each additional 2' of bed add 200 pounds.

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

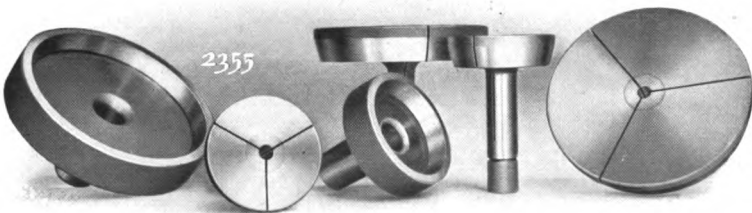
Code words, page 265.



Draw-back Collet Attachment



Expanding Arbor

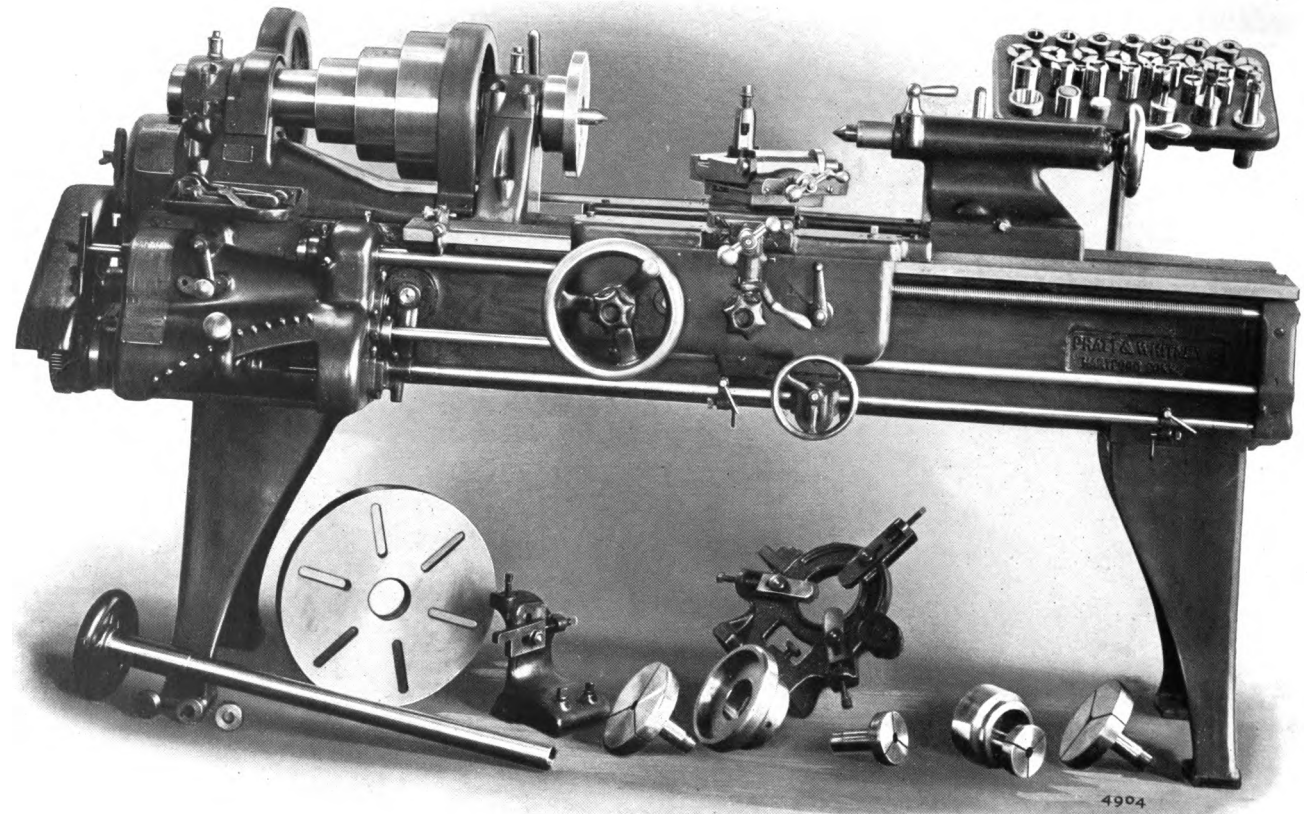


Step-chucks and Closers

14-INCH LATHE EQUIPMENT

REGULAR EQUIPMENT	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.
PAN AND OIL PUMP EQUIPMENT	Furnished for all lengths of Beds. (Similar to 16" Lathe shown on page 40).
COMPOUND ELEVATING REST	Furnished in place of Plain Compound Rest. (Similar to 16" Lathe shown on page 38).
PLAIN TURNING REST	Furnished in place of Plain Compound Rest.
QUICK WITH-DRAWING ATTACHMENT	For threading, furnished to order. (Similar to 16" Lathe shown on page 38).
TAPER ATTACHMENT	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).
RELIEVING ATTACHMENTS	See pages 47, 48 and 49.
COLLET ATTACHMENT	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).
TOOL RACK	For Collets and arbors (furnished to order).
EXPANSION ARBORS AND BUSHINGS	Consists of: 1 Arbor each, No. 1, No. 2 and No. 3. 4 Bushings (for No. 1 Arbor), $\frac{3}{4}$ ", $1\frac{1}{8}$ ", $\frac{7}{8}$ ", $1\frac{5}{8}$ ". 8 Bushings (for No. 2 Arbor), 1" 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).
METRIC BUSHINGS	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).
STEP-CHUCK AND CLOSER ATTACHMENT	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).
CHUCK-PLATES	$3\frac{1}{2}$ " and 7" diameter, blank, ready to receive Chuck.
TRANSLATING GEARS	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 3/4" 10" 5" 4" 3/8" x 1 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 1/4" diameter; 3/8 Pi., 3/8 Lead.	2 7/8" x 4 1/4" 2 3/8" x 3 1/8" 1 1/8"
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 1/2 63 1/2 to 440 9 1/10 to 1 10 3/4" to 4 3/4" 14 x 4 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" x 3 3/4" 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 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

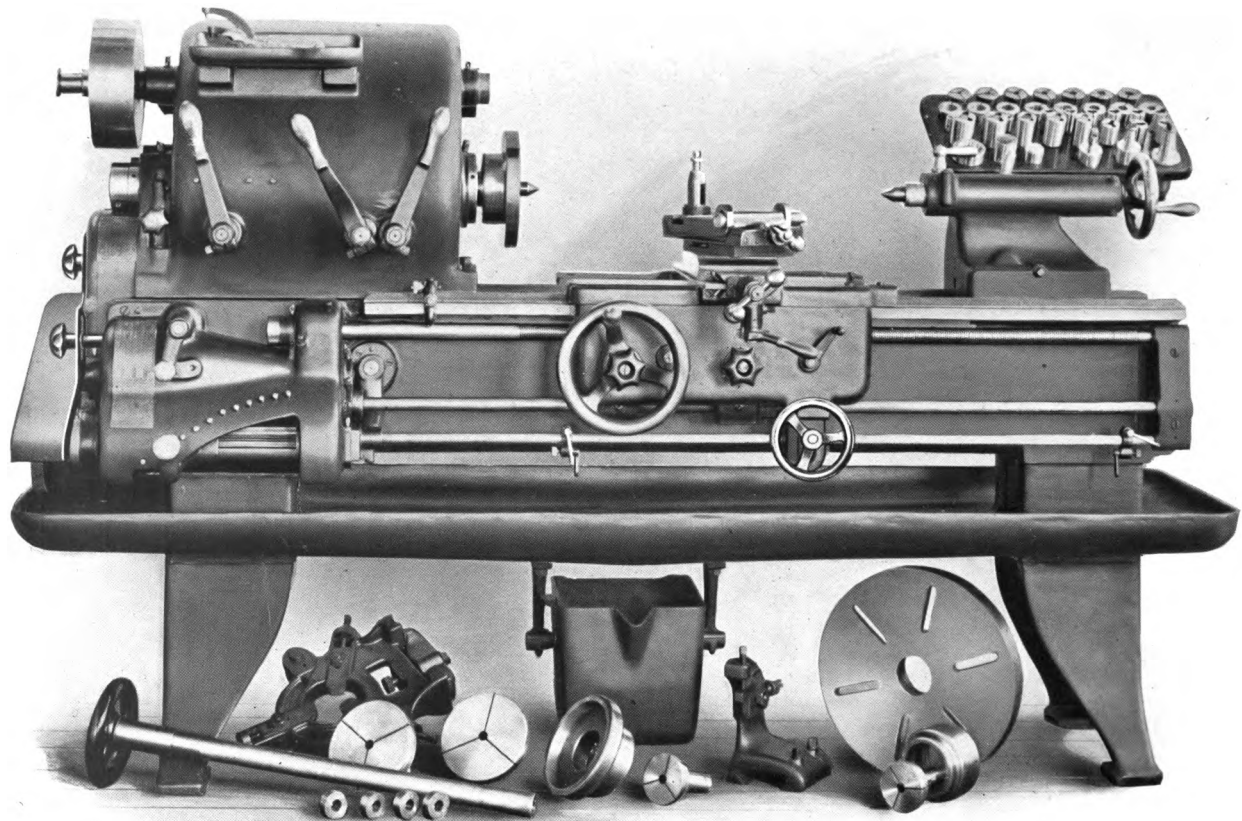
NOTE—Geared Head Machine with 6' Bed weighs 3500 pounds net.

*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.

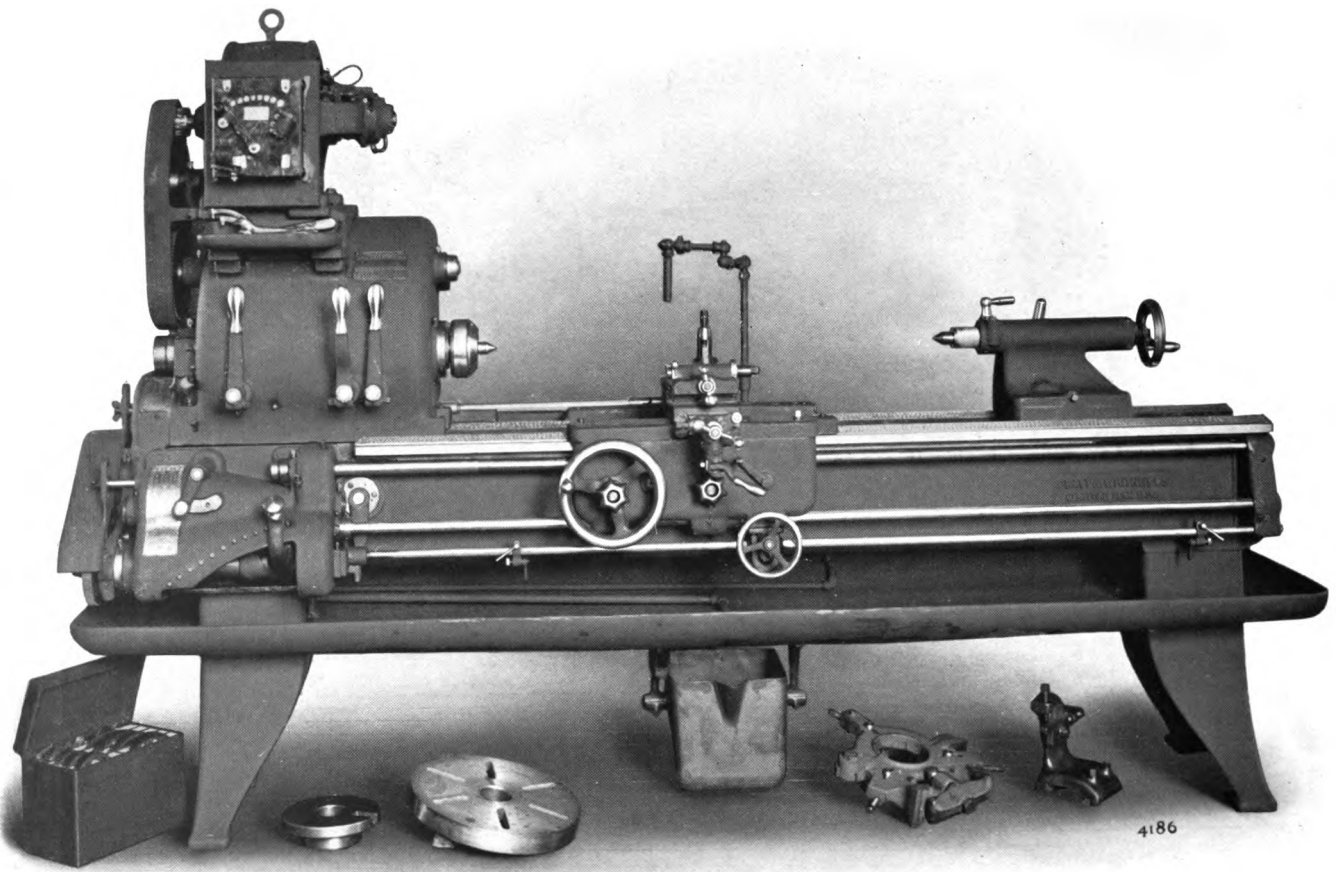


3659

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

16-INCH LATHE EQUIPMENT

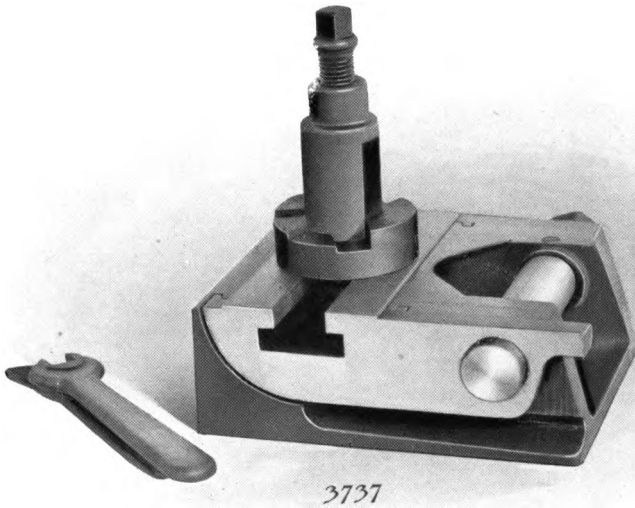
REGULAR EQUIPMENT	The machine with Cone Head; Compound Elevating Rest; English Lead, Cross Feed Screws, Dials and Gear Box (metric if ordered); Quick Withdrawing Attachment; Taper Attachment; Spindle Bushing; 2 Centers; Stationary Rest; Follow Rest; Face Plates, 16" and 9" diameter; 5-Change Gears; Countershaft (double friction); Set of Wrenches.
GEARED HEAD	Can be furnished in place of Cone Head.
PAN, OIL PUMP	Can be furnished for all lengths of Beds.
COMPOUND REST, PLAIN	Can be furnished in place of Compound Elevating Rest. (Same as 14" Lathe illustrated on page 34).
ELEVATING REST, PLAIN	Can be furnished in place of Compound Elevating Rest. (Cut on page 43).
BALL TURNING REST	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).
ROLLER BACK-REST	For high speed turning. Furnished in place of regular.
TAPER ATTACHMENT	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).
RELIEVING ATTACHMENTS	(See pages 47, 48 and 49).
COLLET ATTACHMENT	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.
TOOL RACK	For Collets and Arbors. (Furnished to order).
EXPANSION ARBORS AND BUSHINGS	Consists of: 1 Arbor each, No. 1, No. 2 and No. 3. 4 Bushings (for No. 1 Arbor), $\frac{3}{4}$ ", $1\frac{3}{8}$ ", $\frac{7}{8}$ ", $1\frac{5}{8}$ ". 8 Bushings (for No. 2 Arbor), 1" 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.
METRIC BUSHINGS	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.
STEP-CHUCK AND CLOSER ATTACHMENT	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.
CHUCK PLATES	$3\frac{1}{2}$ " and 7" diameter, blank, ready to receive Chuck.
MULTIPLE INDEXING FACE PLATE	For the cutting of Multiple Threads, as on Hobs, Taps, etc. Cut on page 46.
MICROMETER CLAMP	For accurately governing longitudinal movement of carriage. Cut on page 46.



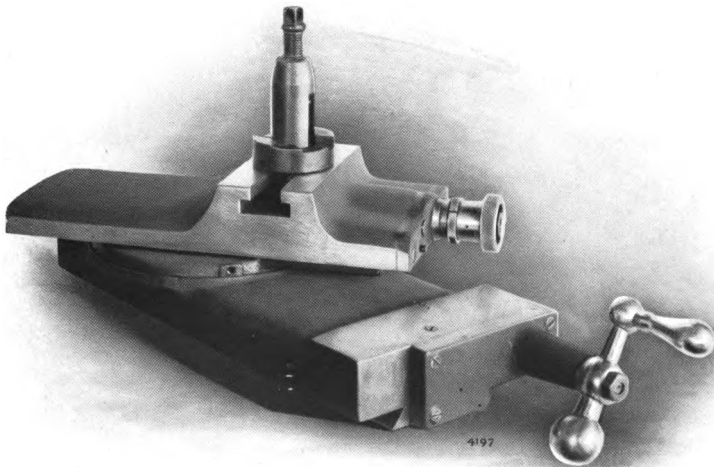
(Patented)
16-inch Lathe, All Geared Head, Motor Drive

MOTOR DRIVE

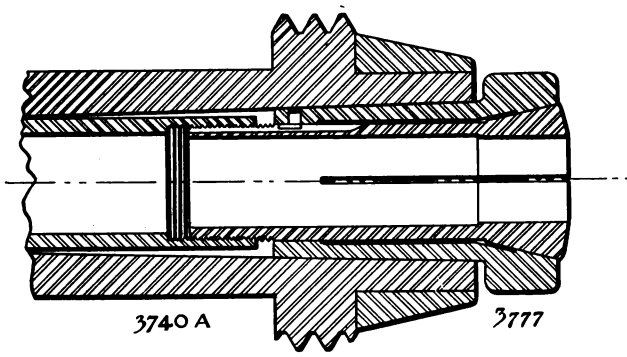
The Geared Head can be furnished with a Motor Base, as shown, suitable gears and guard in place of countershaft. Motor should be 3 to 5 horse-power (according to requirements), constant speed, with starting box, any standard make. If motor is furnished by customer, full specifications are required.



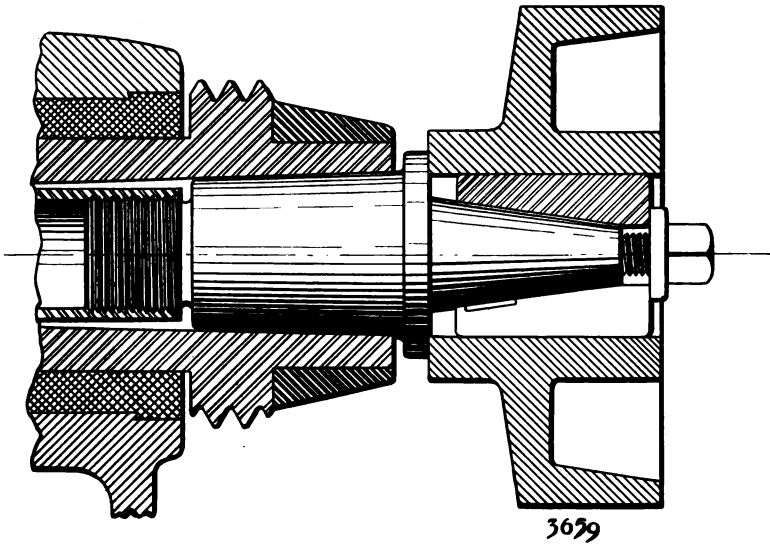
(Patented)
Plain Elevating Rest



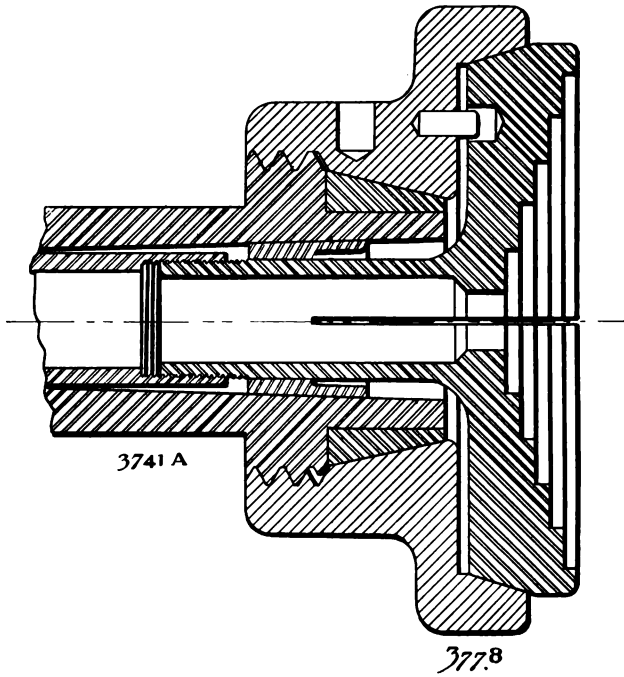
Ball-turning Rest for 16-inch Lathe



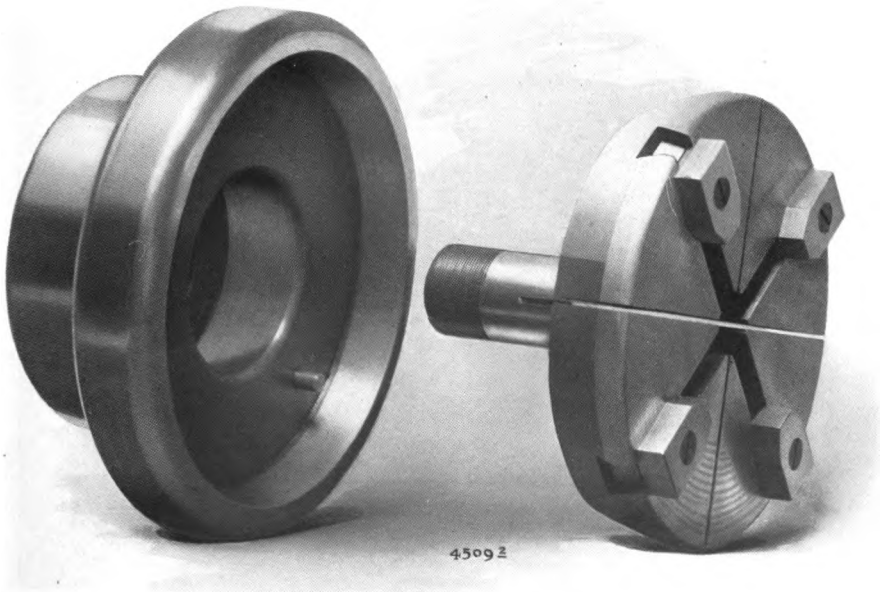
Section of Draw-back Collet Mechanism



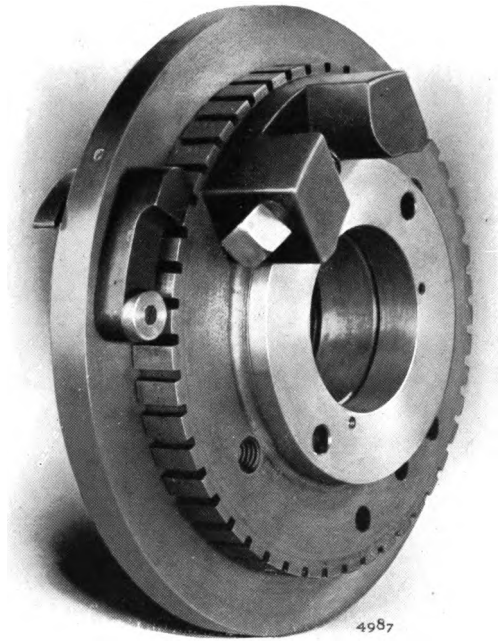
Expanding Arbor with Work in Position



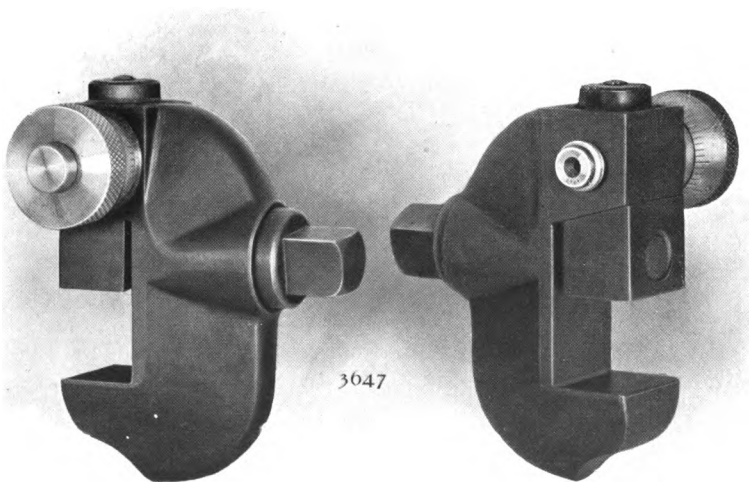
Section of Step-chuck and Closer



Step-chuck with Adjustable Jaws and Closer

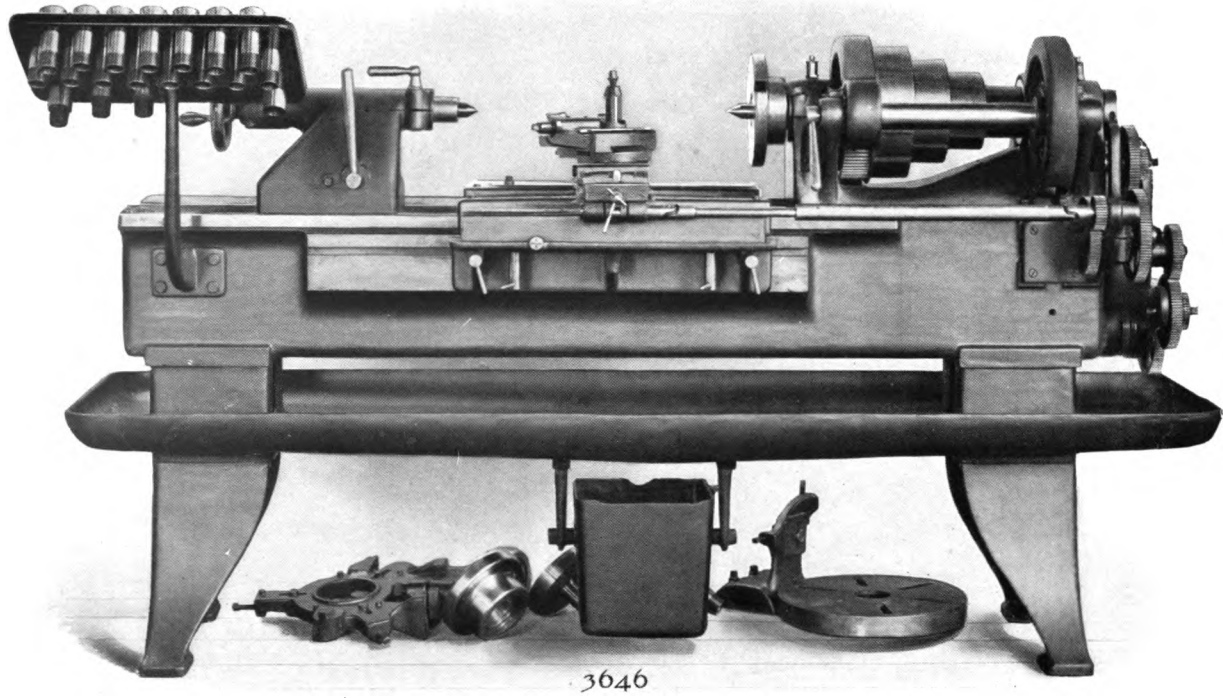


Indexing Face-plate for Cutting Multiple Threads



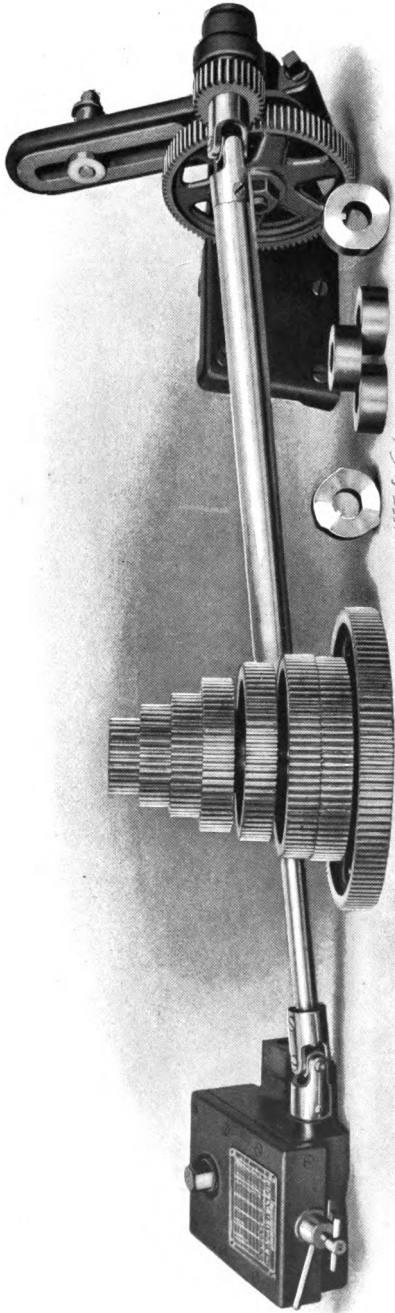
(Patented)

Micrometer Clamp



(Patented)

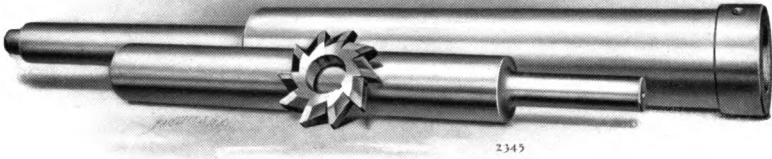
Relieving Attachment as applied to 14 and 16-inch Lathes



(Patented)

Regular Relieving Attachment

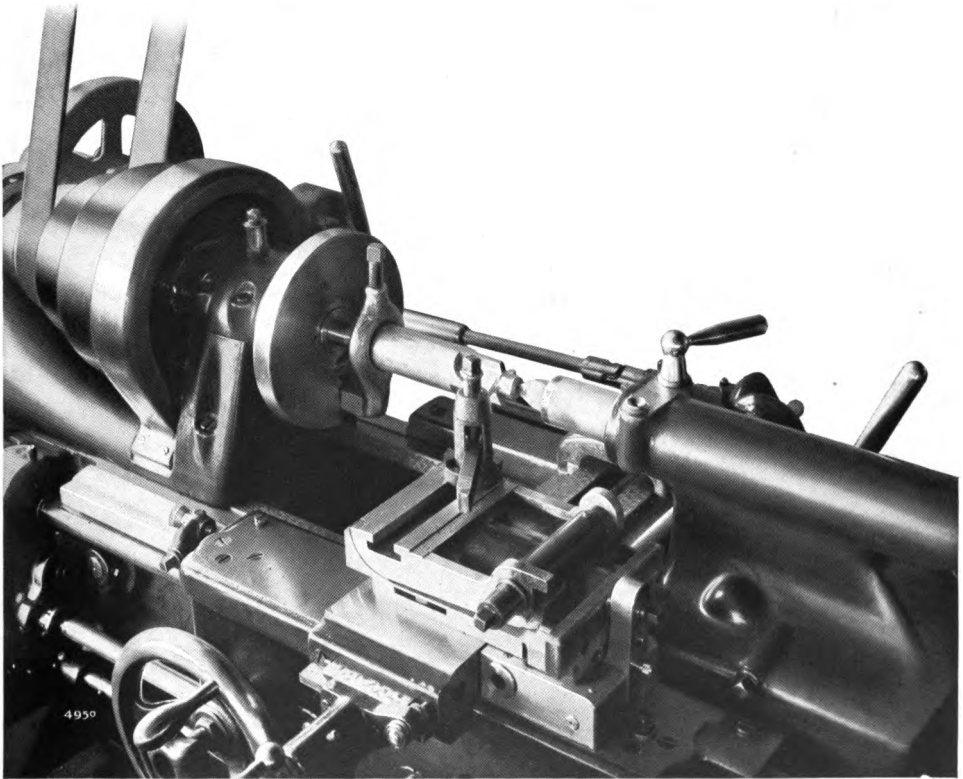
For radial relieving of any description, such as Hobs, Cutters, Taps, etc. It is furnished with 5 Cams; one each, single, double, triple, quadruple and one for Taps; also set of Change Gears, giving 19 changes, from 2 to 32 reliefs to revolution of the spindle



(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

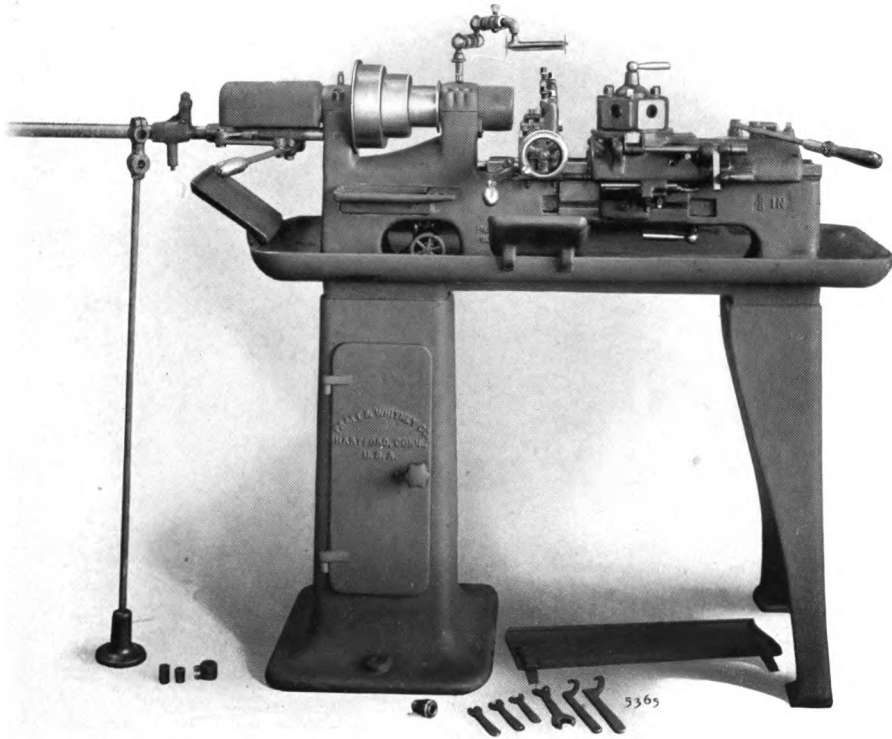


(Patented)

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)
 $\frac{3}{8}$ x 4 $\frac{1}{2}$ -inch Turret Lathe: Equipment "A"

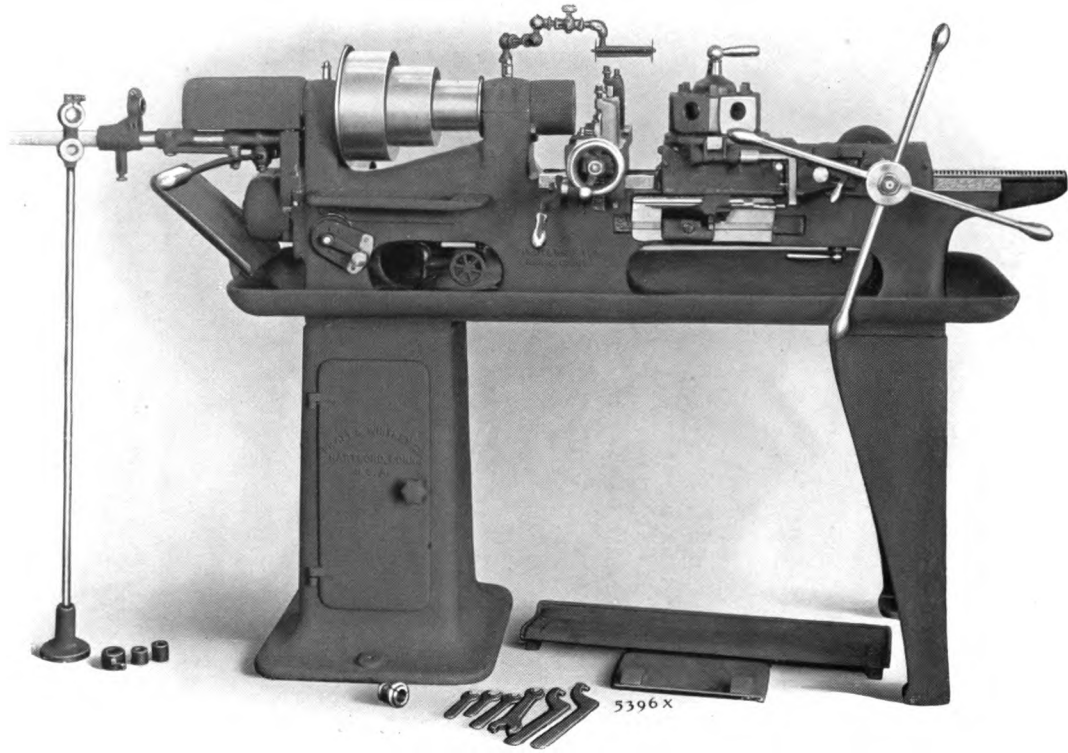
TURRET LATHE, $\frac{5}{8}$ X 4 $\frac{1}{2}$ -INCH

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)	$\frac{7}{8}$ "
	Chuck Capacity (hexagonal across flats)	$\frac{1}{2}$ "
	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 $\frac{1}{8}$ "
	Turret Hole Center to Top of Cross Slide	1 $\frac{3}{4}$ "
	Turret Face to Spindle End, maximum	10 $\frac{3}{8}$ "
SPINDLE . . .	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear.	1 $\frac{3}{4}$ " x 3 $\frac{1}{8}$ "
	Hole through Plunger	$\frac{1}{8}$ "
	Hole through Spindle	1"
	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 x 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" x 26 $\frac{1}{2}$ "
	With Rod Feed	85 $\frac{1}{2}$ " x 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

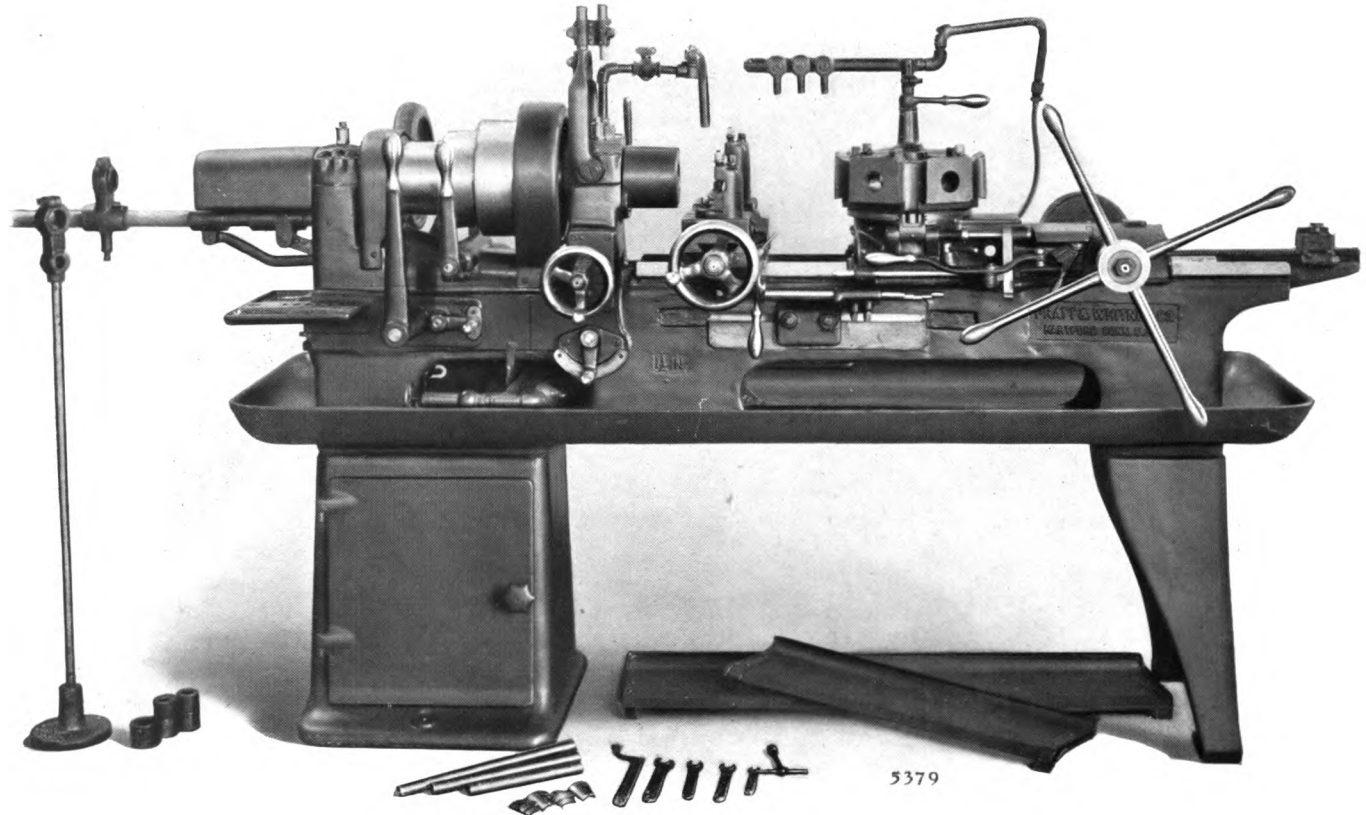
TURRET LATHE, 1 X 15-INCH

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)	⅞"
	Length; maximum turning	15"
	Swing over Bed	10¾"
	Swing over Cross Slide	5⅞"
	Threading Capacity	¾"
TURRET	Hexagon, Faces Flat; 6 holes, 1½" diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide	2½"
	Turret Hole Center to Top of Cross Slide.	2¼"
	Turret Face to Spindle End, maximum	18"
SPINDLE	Special Steel; Cylindrical Bearings; Front	2¼" x 4"
	Boxes, C. I., lined with Babbitt, adjustable for wear	
	Hole through Plunger	1⅛"
	Hole through Spindle	1⅜"
	Front End, 3⅞" diameter; Thread, 3⅜" diameter; 8 Pi., U. S. F.	
SPEEDS	Spindle Speed Changes (9), R. P. M.	112 to 1000
	Cone on Machine (3 steps), diameter	4", 6½" and 9"
	Pulleys (Countershaft)	12" x 4½"
	Belt Width (Cone)	3¼"
	Belt Width (Counter. Pulleys)	4¼"
	Countershaft Speeds, R. P. M.	200, 300, 400
FEEDS	Turret Slide, Hand Feed through rack, pinion and turnstile.	
	Power Feed Variations (3), P. R. Sp. . . . .	.005" to .0119"
	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	66" x 24"
	With Rod Feed	98" x 24"
WEIGHTS	Machine Equipment "A", net pounds	1300
	Crating Material (domestic), approximate pounds	250
	Boxing Material (foreign), approximate pounds	500
	Box, cubic feet	59

Code words, page 265.



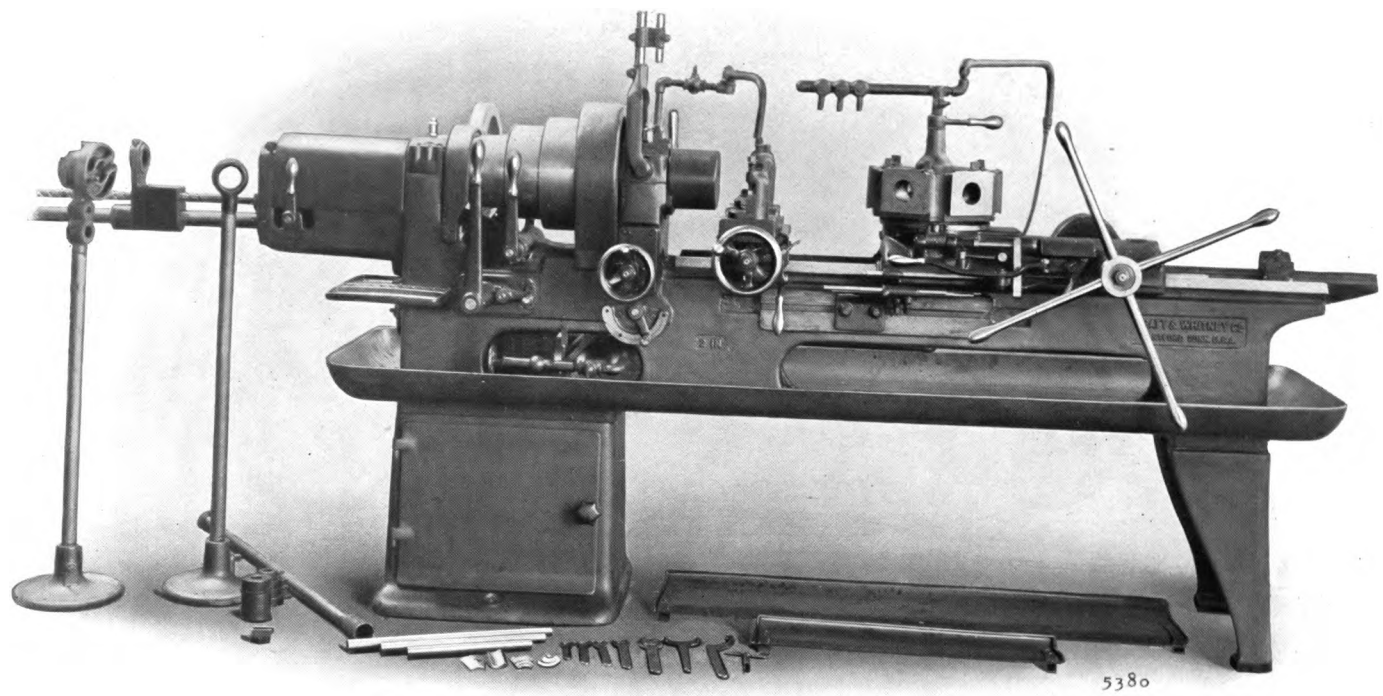
(Patented)
1 1/2 x 18-inch Turret Lathe: Equipment "A"

5379

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	25½"
SPINDLE	Special Steel; Cylindrical Bearings; Front	21⅜" x 4½"
	Boxes, C. I., lined with Babbitt, adjustable for wear	
	Hole through Plunger	1⅝"
	Hole through Spindle	1⅜"
	Front End, 31⅜" 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	6⅞", 7⅞", 9⅝"
	Pulleys (Countershaft)	12" x 4½"
	Belt Width (Cone)	3"
	Belt Width (Counter. Pulleys)	4¼"
	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.

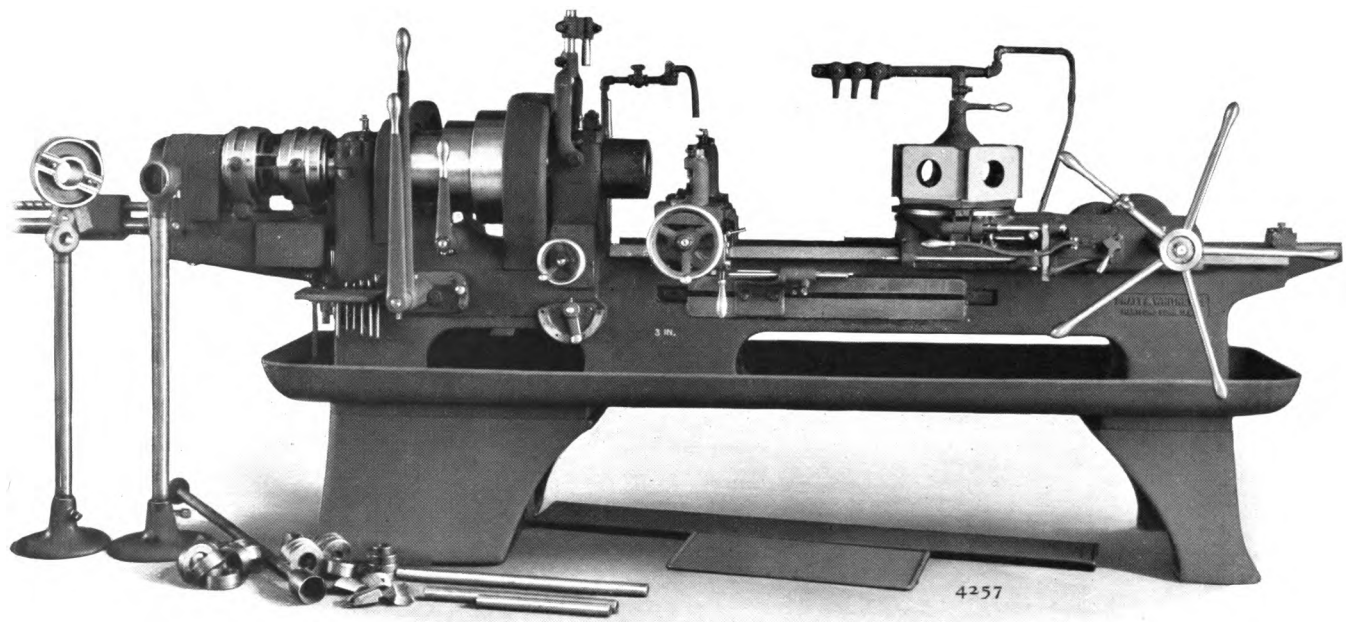


(Patented)
2 x 26-inch Turret Lathe: Equipment "A"

TURRET LATHE, 2 X 26-INCH—SPECIFICATIONS

RANGE	Chuck Capacity (round) 2" Chuck Capacity (square across flats) 1 ³ / ₈ " Chuck Capacity (hexagonal across flats) 1 ³ / ₄ " Length; maximum turning 26" Swing over Bed 16" Swing over Cross Slide 8 ³ / ₄ " Threading Capacity 2"	
TURRET.	Hexagon, Faces Dovetailed; 6 holes, 2 ¹ / ₄ " diameter. Stock can be fed through Turret. Turret Hole Center to Top of Turret Slide 3 ³ / ₄ " Turret Hole Center to Top of Cross Slide 3" Turret Face to Spindle End, maximum 33 ³ / ₈ "	
SPINDLE	Special Steel; Cylindrical Bearings; Front 3 ³ / ₈ " x 5" Boxes, C. I., lined with Babbitt, adjustable for wear. Hole through Plunger 2 ¹ / ₈ " Hole through Spindle 2 ⁷ / ₁₆ " Front End, 4 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 ¹ / ₂ ", 9 ¹ / ₂ ", 11 ¹ / ₂ " Pulleys (Countershaft) 14" x 4 ¹ / ₂ " Belt Width (Cone) 3 ¹ / ₂ " Belt Width (Counter. Pulleys) 4 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 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 back- ward 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"

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TURRET LATHE, 3 X 36-INCH—SPECIFICATIONS

RANGE . . .	Chuck Capacity (round)	3"
	Chuck Capacity (square across flats)	2 1/8"
	Chuck Capacity (hexagonal across flats)	2 3/8"
	Length; maximum turning	36"
	Swing over Bed	19 1/2"
	Swing over Cross Slide	10 1/4"
	Threading Capacity	3"
TURRET . . .	Hexagon, Faces Dovetailed; 6 holes, 3 3/8" diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide	5 1/8"
	Turret Hole Center to Top of Cross Slide	3 3/4"
	Turret Face to Spindle End, maximum	46"
SPINDLE . . .	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear.	4 7/8" x 6 1/4"
	Hole through Plunger	3 1/8"
	Hole through Spindle	3 1/8"
	Front End, 6 3/8" diameter; Thread, 6 3/4" diameter; 4 Pi., U. S. F.	
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 1/2", 14"
	Pulleys (Countershaft)	16" x 4 3/4"
	Belt Width (Cone)	4"
	Belt Width (Counter. Pulleys)	4 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 1/16" 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: $\frac{3}{8}$ x 4 $\frac{1}{2}$ -inch Turret Lathe

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

"A" MACHINE
ARRANGED
FOR ROD WORK
WITHOUT
TOOLS

- 1 $\frac{5}{8}$ " x $4\frac{1}{2}$ " 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 Collet), and
- 1 Collet (round), $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and $\frac{1}{2}$ ".
 - 3 Collet (hexagon), $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{1}{2}$ " across flats.
 - 2 Collet (square), $\frac{3}{8}$ " and $\frac{1}{2}$ " across flats.
- Turret Rod Stop.
- 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 Parting Tool.
 - 1 $\frac{1}{2}$ " Style "D" Self-opening Diehead, with
 - 1 Set of Chasers, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", $\frac{1}{2}$ " and $\frac{1}{2}$ " U. S. S.
 - 1 Box for Chasers and Chasers.

METRIC
EQUIPMENT "B"

- Includes Regular Equipment "B", with these modifications:
- 1 Collet (round), 6, 8, 10, 12, 14 and 16 mm diameter.
 - 3 Collet (hexagon), 8, 12 and 16 mm across flats.
 - 2 Collet (square), 8 and 10 mm across flats.
 - 1 Set of Chasers, 6, 8, 10, 12 and 16 mm International Standards.

WHITNEY
EQUIPMENT "B"

- Includes Regular Equipment "B", with these modifications:
- 3 Collet (round), 1.25", 1.5" and 1.75" diameter across flats.
 - 1 Diehead for Self-opening Diehead, Whitworth Standard.



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(Patented)

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

TURRET LATHE, 1 X 15-INCH—EQUIPMENTS

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

- 1 1" x 15" Turret Lathe with or without power feed to Turret Slide.
- 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 (1" 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 Collet) and
 - 11 Collets (round), $\frac{3}{8}$ " to 1" inclusive by 16ths.
 - 4 Collets (hexagon), $\frac{1}{2}$ ", $\frac{11}{16}$ ", $\frac{13}{32}$ " and $\frac{3}{8}$ " across flats.
 - 3 Collets (square), $\frac{1}{2}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ " across flats.
- Turret Rod Stop.
 - 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 Pointing Tool.
 - 1 $\frac{3}{4}$ ", Self-opening Die-head, with roughing and finishing attachments and
 - 8 Sets of Chasers, $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{9}{16}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ ", U. S. S.
 - 1 Box for Collets and Chasers.

**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.



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

TURRET LATHE, 1½ X 18-INCH—EQUIPMENTS

<p>"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS</p>	<p>1 1½" x 18" 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 (1½" Round if not specified). Rod Feed, Improved Lever Type, with 1 Rod Support. 3 Stock Collars. 6 Stock Bushings. Rod Stop on Headstock, with 3 Rods.</p>
<p>METRIC EQUIPMENT "A"</p>	<p>Differs from the above only in that Metric Chuck Jaws are substituted. (See Equipment "B" for sizes).</p>
<p>"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS</p>	<p>Includes Equipment "A" (minus set of Chuck Jaws), and 15 Sets of Chuck Jaws (round), ⅝" to 1½" inclusive by 16ths. 4 Sets of Chuck Jaws (hexagon), ⅞", ⅜", 1⅛" and 1¼" across flats. 3 Sets of Chuck Jaws (square), ¾", ⅞" and 1" 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 1¼" Self-opening Die-head, with roughing and finishing attachment, and 8 Sets of Chasers, ½", ⅝", ⅞", ¾", ⅞", 1", 1⅞" and 1¼", U. S. S. 1 Box for Chuck Jaws and Chasers.</p>
<p>METRIC EQUIPMENT "B"</p>	<p>Includes Regular Equipment "B", with these modifications: 15 Sets of Chuck Jaws (round), 14, 15, 16, 17, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36 and 38 m/m. 4 Sets of Chuck Jaws (hexagon), 20, 24, 28 and 32 m/m across corners. 3 Sets of Chuck Jaws (square), 16, 20 and 24 m/m across flats. 8 Sets of Chasers for Self-opening Die-head, 12, 14, 16, 18, 20, 22, 24 and 28 m/m, International Standard.</p>
<p>WHITWORTH EQUIPMENT "B"</p>	<p>Includes Regular Equipment "B", with these modifications: 4 Sets of Chuck Jaws (hexagon), .919", 1.011", 1.101", 1.301" diameter across flats. Chasers for Self-opening Die-head, Whitworth Standard.</p>



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

TURRET LATHE, 2 X 26-INCH—EQUIPMENTS

<p>"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS</p>	<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>
<p>METRIC EQUIPMENT "A"</p>	<p>Differs from the above only in that Metric Chuck Jaws are substituted. (See Equipment "B" for sizes).</p>
<p>"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS</p>	<p>Includes Equipment "A" (minus set of Chuck Jaws), and 17 Sets of Chuck Jaws (round), $\frac{3}{4}$" to $1\frac{1}{8}$" by 16ths, and $1\frac{1}{2}$" to 2" by 8ths. 5 Sets of Chuck Jaws (hexagon), $\frac{3}{8}$", $1\frac{1}{8}$", $1\frac{1}{4}$", $1\frac{7}{8}$" and $1\frac{5}{8}$" across flats. 4 Sets of Chuck Jaws (square), $\frac{7}{8}$", 1", $1\frac{1}{8}$" and $1\frac{1}{4}$" 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 $1\frac{1}{2}$", Self-opening Die-head, with roughing and finishing attachment, and 8 Sets of Chasers, $\frac{5}{8}$", $\frac{3}{4}$", $\frac{7}{8}$", 1", $1\frac{1}{8}$", $1\frac{1}{4}$", $1\frac{3}{8}$" and $1\frac{1}{2}$", U. S. S. 1 Box for Chuck Jaws and Chasers.</p>
<p>METRIC EQUIPMENT "B"</p>	<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>
<p>WHITWORTH EQUIPMENT "B"</p>	<p>Includes Regular Equipment "B", with these modifications: 5 Sets of Chuck Jaws (hexagon), 1.011", 1.101", 1.301", 1.479", 1.670" diameter across flats. Chasers for Self-opening Die-head, Whitworth Standard.</p>



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

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

"C" X 26-INCH
LOCOMOTIVE
EQUIPMENT

- Includes Equipment "A" (minus Chuck Jaws and Power Feed to Cross Slide), and
- 11 Sets of Chuck Jaws (round), $\frac{3}{4}$ " to 2" inclusive, by 8ths.
 - 3 Sets of Chuck Jaws (hexagon), 1 $\frac{1}{8}$ ", 1 $\frac{1}{4}$ " and 1 $\frac{7}{8}$ " across flats.
 - 3 Sets of Chuck Jaws (square), 1", 1 $\frac{1}{8}$ " and 1 $\frac{1}{4}$ " across flats.
 - 1 12", 3-Jaw, Geared Scroll Chuck, with 2 sets of Jaws, for inside and outside gripping.
 - 1 Forging Chuck, with 2" Shank.
 - 1 6" Lever Scroll Chuck, fitted to Turret.
 - 2 Universal Turners, with "V" Back-rests.
 - 1 Universal Turner, with Roller Back-rests.
 - 1 Open-side Turner.
 - 1 Taper Turner (Bar $\frac{1}{8}$ " Taper to foot. Specify if otherwise).
 - 1 Bell-mouth Pointing Tool.
 - 1 $\frac{1}{4}$ " Self-opening Die, with roughing and finishing attachment, and
 - 8 Sets of Chasers, $\frac{1}{2}$ ", 1 $\frac{1}{8}$ ", $\frac{3}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ " 1", 1 $\frac{1}{8}$ ", 1 $\frac{1}{4}$ ", U. S. S.
 - 1 Box for Chuck Jaws and Chasers.

METRIC
EQUIPMENT "C"

- Includes Regular Equipment "C", with these modifications:
- 11 Sets of Chuck Jaws (round), 30, 32, 34, 36, 38, 40, 42, 44, 46, 48 and 50 m/m.
 - 3 Sets of Chuck Jaws (hexagon), 32, 40 and 48 m/m across flats.
 - 3 Sets of Chuck Jaws (square), 24, 28 and 32 m/m across flats.
 - 8 Sets of Chasers, 12, 14, 16, 18, 20, 22, 24 and 28 m/m, International Standard.

WHITWORTH
EQUIPMENT "C"

- Includes Regular Equipment "C", with these modifications:
- 3 Sets of Chuck Jaws (hexagon), 1.301", 1.479", 1.670" diameter across flats.
 - Chasers for Self-opening Die-head, Whitworth Standard.

Code words, page 265.



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

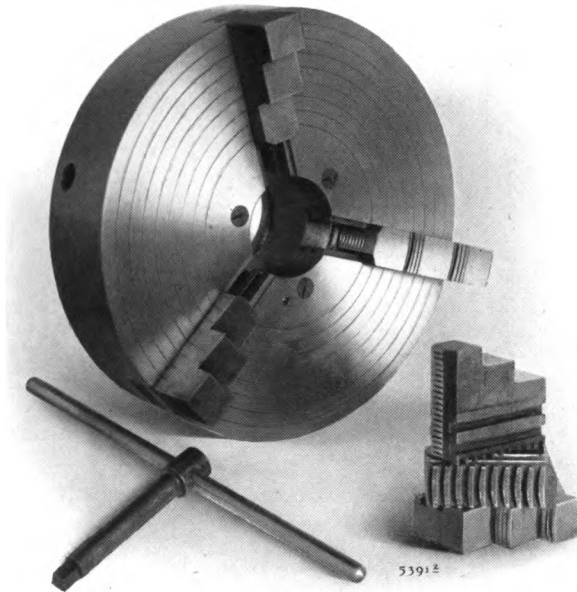
TURRET LATHES, 3 X 36-INCH—EQUIPMENTS

<p>"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS</p>	<p>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.</p>
<p>METRIC EQUIPMENT "A"</p>	<p>Differs from the above only in that Metric Chuck Jaws are substituted. (See Equipment "B" for sizes).</p>
<p>"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS</p>	<p>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$\frac{3}{8}$", 2$\frac{3}{4}$" and 2$\frac{9}{8}$" 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.</p>
<p>METRIC EQUIPMENT "B"</p>	<p>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.</p>
<p>WHITWORTH EQUIPMENT "B"</p>	<p>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.</p>

Code words, page 265.

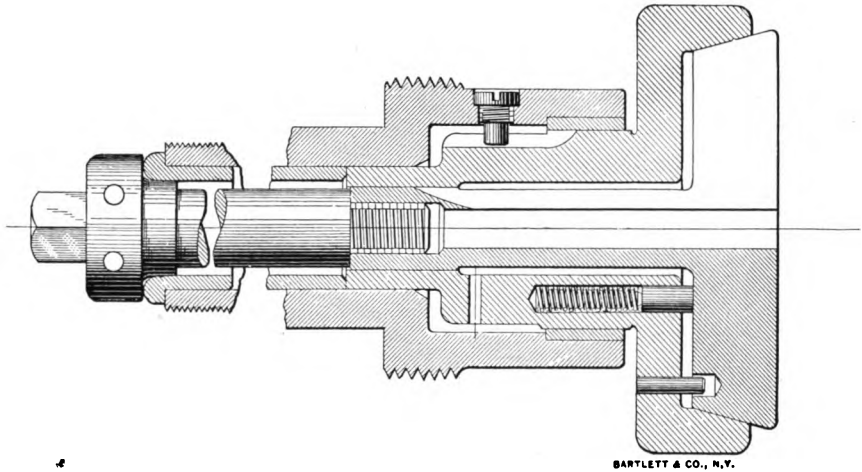
TURRET LATHE TOOLS AND APPLIANCES

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



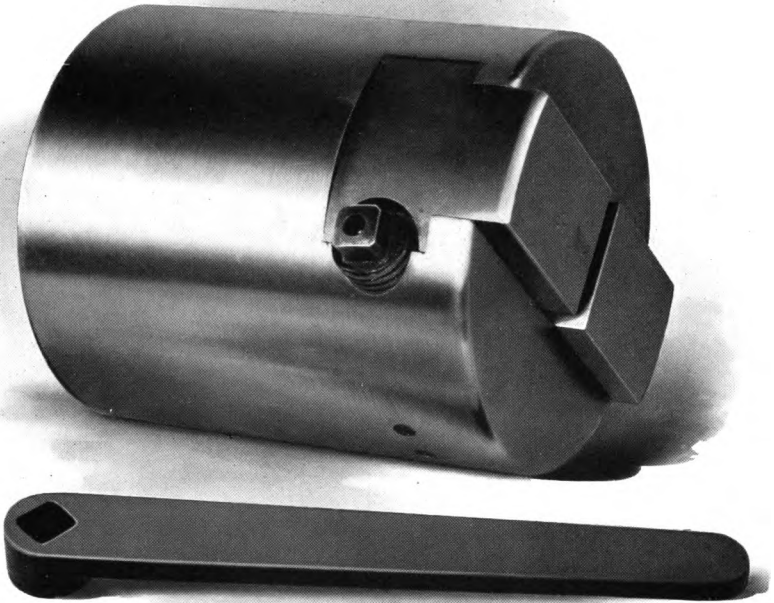
Step-chuck and Closer

CAPACITY OF STEP-CHUCK REGULARLY FURNISHED

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

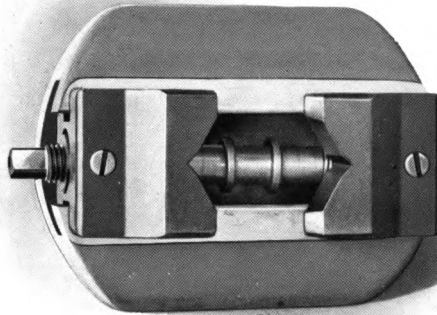
These chucks are made in the most substantial manner possible, steel forgings being used in their construction throughout, with the exception of the jaw screw, which is made of tool-steel. They are furnished either with solid jaws flat or grooved, or with inserted jaws flat or grooved. Jaws are also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

SIZES

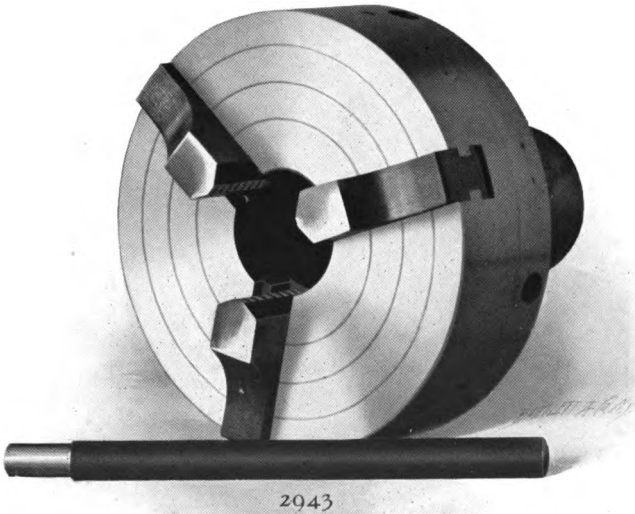
Machine used on	$\frac{5}{8}$ x 4 $\frac{1}{2}$ -inch Inches	1 x 1 $\frac{1}{2}$ -inch Inches	1 $\frac{1}{2}$ x 1 8-inch Inches	2 x 2 $\frac{1}{2}$ x 26-inch Inches	3 x 3 $\frac{1}{2}$ x 26-inch Inches
Diameter of Body or Hub	3 $\frac{1}{2}$	4 $\frac{1}{4}$	5 $\frac{1}{8}$	6 $\frac{1}{4}$	8 $\frac{3}{4}$
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 $\frac{1}{2}$	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.

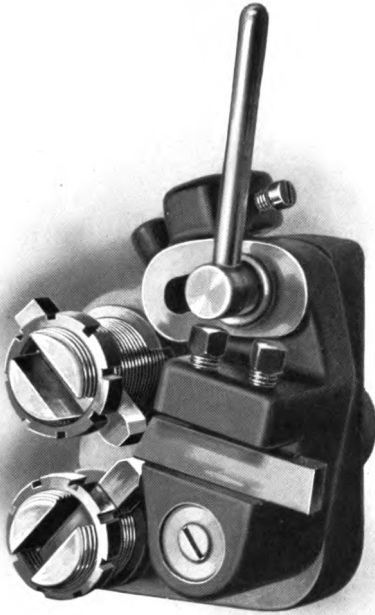


Forging Chuck



Lever Scroll Chuck

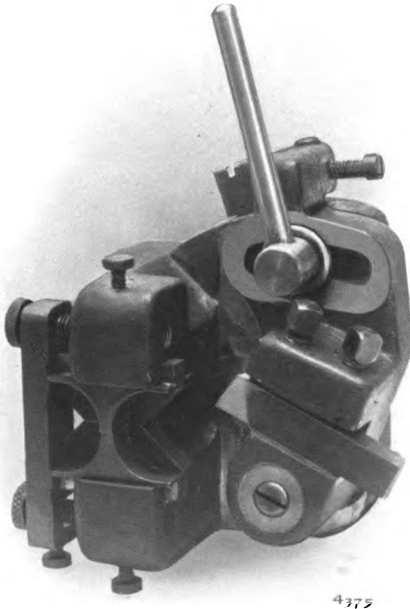
TURRET LATHE TOOLS AND APPLIANCES—Continued



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.

(Patented)

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



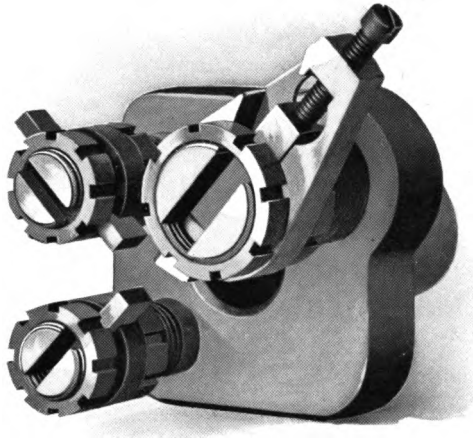
Single Turner with Tangent Cutter and "V" Back-rests This tool is similar to the single tool with tangent cutter, with the exception that "V" back-rests are furnished. Made for the 1-inch machine only.

(Patented)

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TURRET LATHE TOOLS AND APPLIANCES—Continued

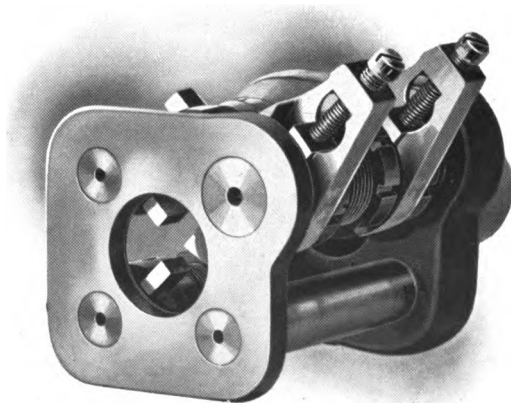
Single Turner with Radial Cutter A sizing or finishing tool in which the cutter is located radially, and both cutter and back-rests are capable of very fine adjustment. Made for the $\frac{5}{8}$ and 1-inch machines only.



(Patented)

Single Turner with Radial Cutter, $\frac{5}{8}$ x $4\frac{1}{2}$ 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.



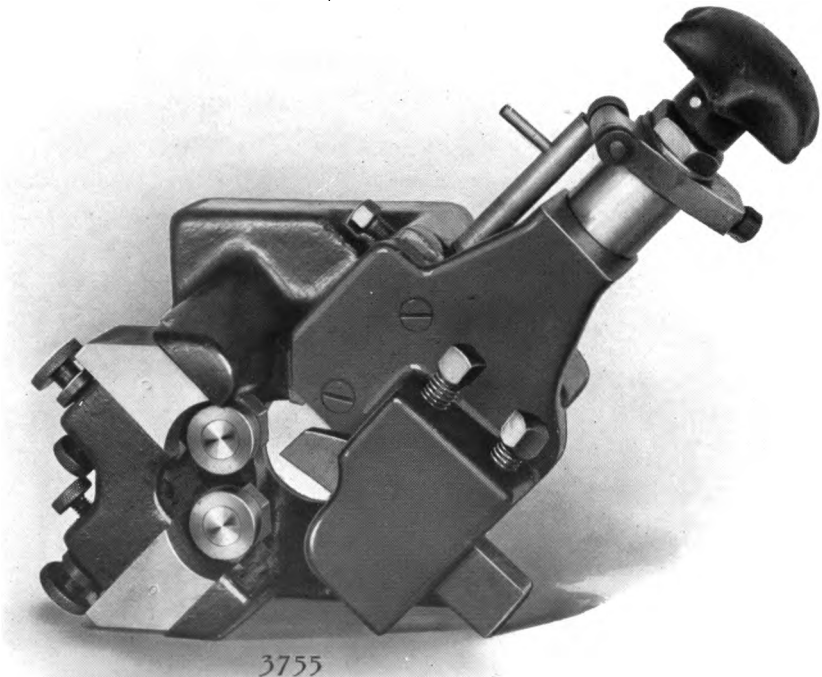
(Patented)

Multiple Turner with Radial Cutters, $\frac{5}{8}$ x $4\frac{1}{2}$ 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 1½, 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 1½, 2 and 3-inch machines only.



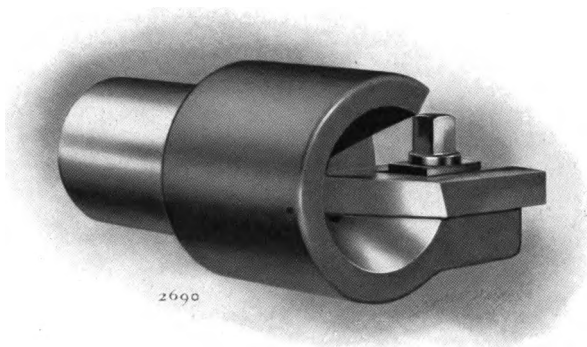
(Patented)

Universal Turner with Roller Back-rests, for 1½ x 18, 2 x 26 and 3 x 36 Turret Lathes. This tool is particularly adapted for quick turning

TURRET LATHE TOOLS AND APPLIANCES—Continued

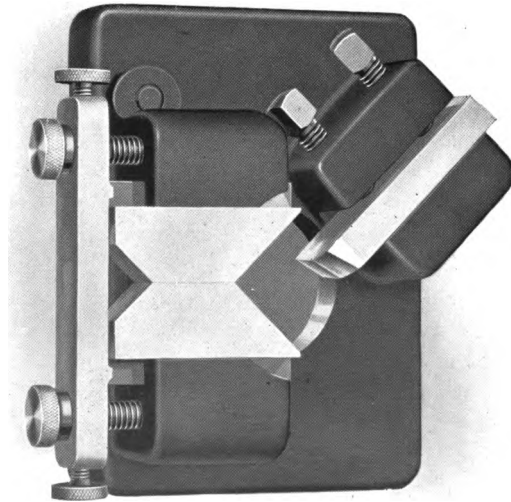
Open Side Turner Recommended for turning short work beyond the capacity of the universal turner. It is similar in construction to the universal turner previously described, with the exception that no provision is made for back-resting the work. Made for the 1½, 2 and 3-inch turret lathes.

Bell-mouth Pointing Tool Used for chamfering the ends of rough work preparatory to turning. The 1½ 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, 1½ x 18 and 2 x 26 Turret Lathes

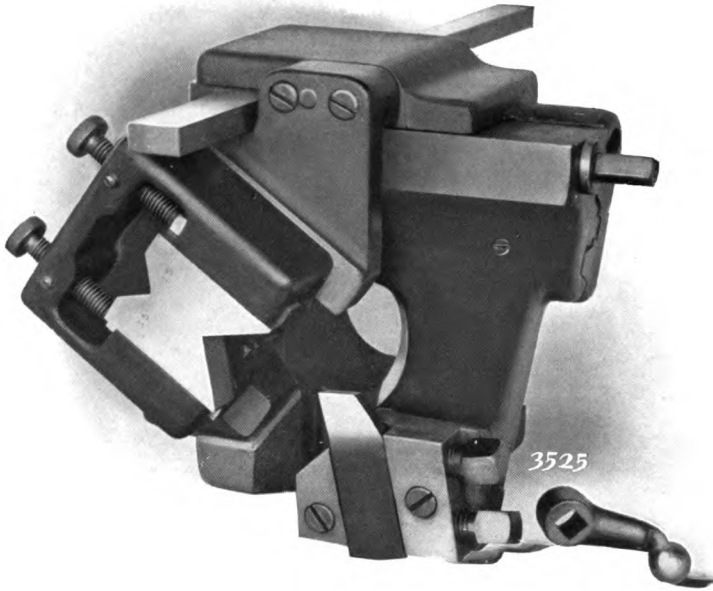
End Forming and Pointing Tool Adapted for general end forming and pointing work on finished bars, and for this purpose it is provided with adjustable back-rests. Both jaws and cutters are made of high-speed steel. Made for all size machines.



(Patented)

End Forming and Pointing Tool, 1½ x 18, 2 x 26 and 3 x 36 Turret Lathes

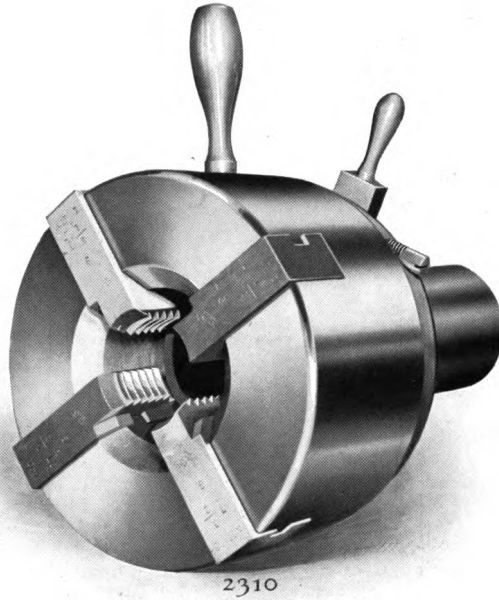
TURRET LATHE TOOLS AND APPLIANCES—Continued



(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 $\frac{1}{16}$ 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.

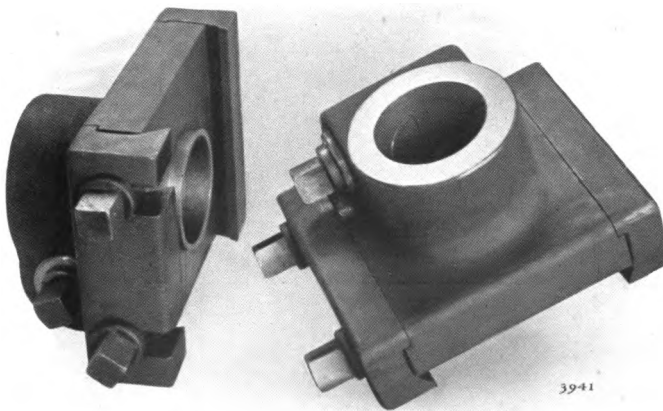


SELF-OPENING DIE—SPECIFICATIONS

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

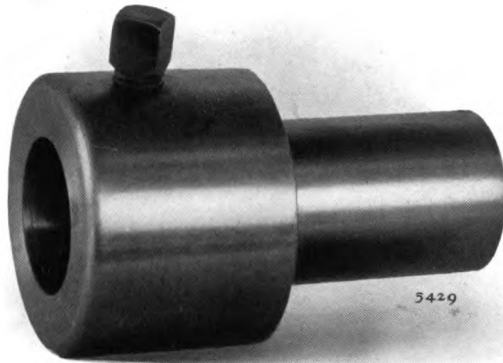
*Special Holders required.

† Also used on Turntable Lathe.



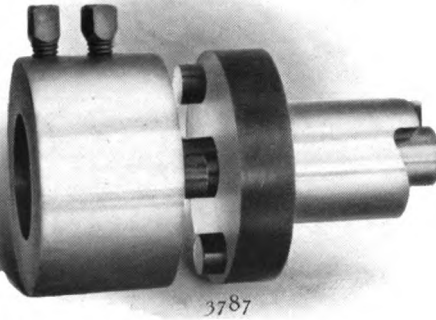
Round Tool Holder Is used for holding round shank tools in the 3 x 36-inch machine, also for holding $1\frac{1}{2}$ -in. die-head to the $1\frac{1}{2}$ x 18-inch machine, and the 2-inch die-head to the 2 x 26-inch machine.

TURRET LATHE TOOLS AND APPLIANCES—Continued



DRILL AND COUNTERBORE HOLDERS

Turret Lathe Inches	Bushing Hole Diameter Inches	Shank	
		Diameter Inches	Hole Inches
$\frac{5}{8}$ x $4\frac{1}{2}$	1	$1\frac{1}{8}$	$\frac{3}{4}$
1 x 15	$1\frac{3}{8}$	$1\frac{1}{2}$	1
$1\frac{1}{2}$ x 18	$1\frac{1}{2}$	$1\frac{3}{4}$	1

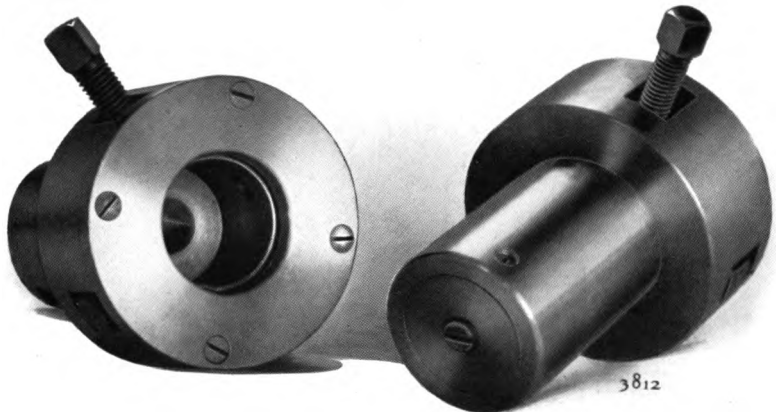


RELEASING TAP AND DIE HOLDER—SPECIFICATIONS

Turret Lathe, Inches	Shank, Diameter, Inches	Hole, Diameter, Inches
$\frac{5}{8}$ x $4\frac{1}{2}$	$1\frac{1}{8}$	$1\frac{1}{8}$
1 x 15	$1\frac{1}{2}$	$1\frac{3}{8}$ or $1\frac{5}{8}$
$1\frac{1}{2}$ x 18	$1\frac{3}{4}$	2
*2 x 26	$2\frac{1}{4}$	$2\frac{1}{4}$
*3 x 36	3	†2

* Also used on Turntable Lathe

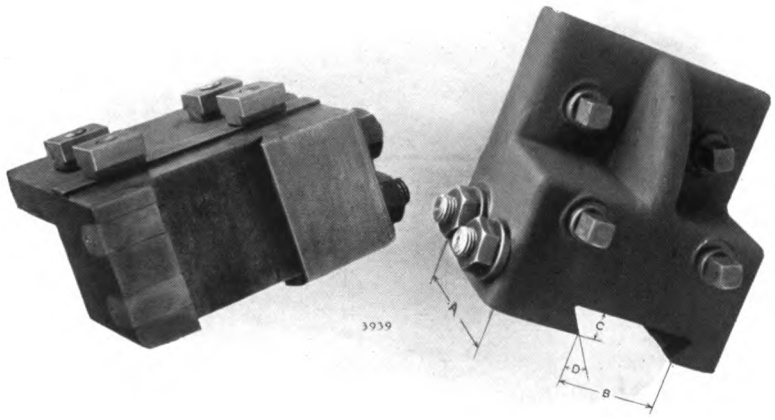
† May be enlarged to 3 inches



FLOATING REAMER HOLDER—SPECIFICATIONS

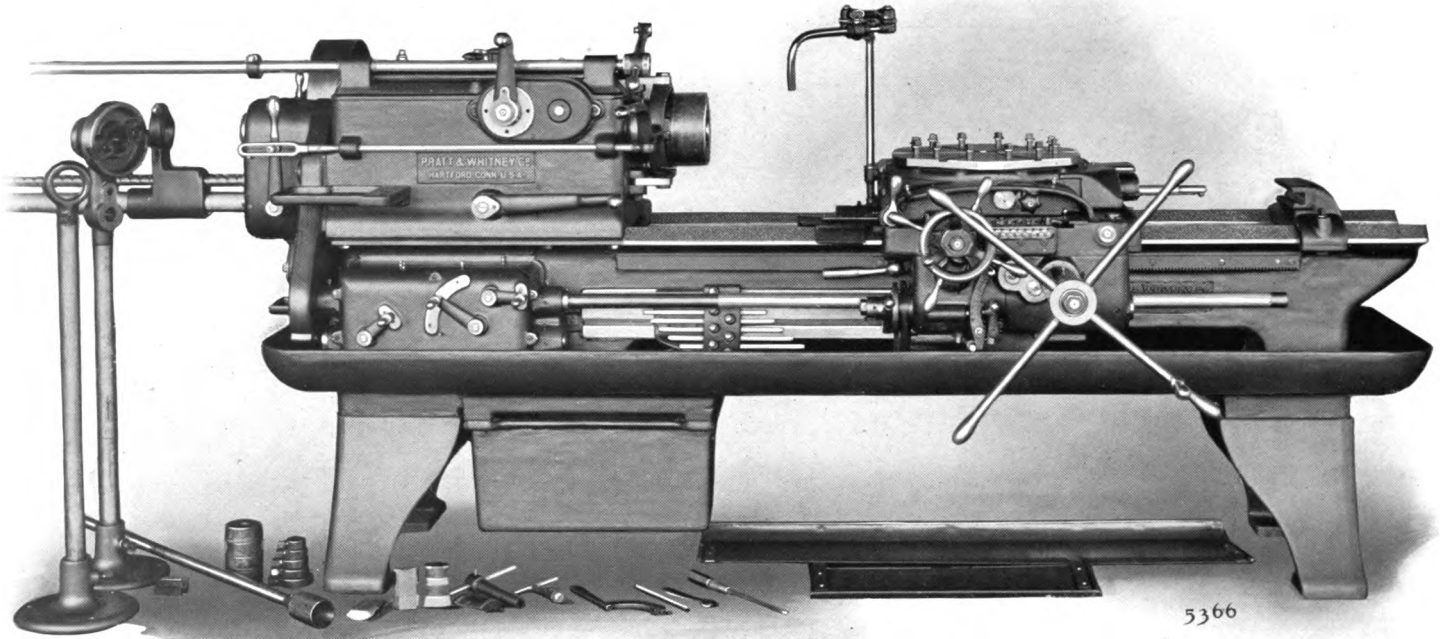
Turret Lathe, Inches	Shank, Diameter, Inches	Driving Ring Hole, Inches
$\frac{5}{8}$ x $4\frac{1}{2}$	$1\frac{1}{8}$	$\frac{13}{16}$
1 x 15	$1\frac{1}{2}$	$1\frac{1}{8}$
$1\frac{1}{2}$ x 18	$1\frac{3}{4}$	$1\frac{3}{8}$
*2 x 26	$2\frac{1}{4}$	$1\frac{5}{8}$
*3 x 36	3	$2\frac{1}{16}$

* Also used on Turntable Lathe



DOVETAIL FORMING TOOL HOLDER—FOR ALL SIZE MACHINES

$\frac{5}{8}$ x $4\frac{1}{2}$ inches	A $1\frac{3}{4}$ inches	B $1\frac{7}{8}$ inches	C $\frac{5}{8}$ inch	D 350
1 x 15 inches	A $2\frac{1}{4}$ inches	B $1\frac{7}{8}$ inches	C $\frac{5}{8}$ inch	D 350
$1\frac{1}{2}$ x 18 inches	A $2\frac{1}{2}$ inches	B 3 inches	C $\frac{3}{4}$ inch	D 350
2 x 26 inches	A 3 inches	B 3 inches	C $\frac{3}{4}$ inch	D 350
3 x 36 inches	A $3\frac{1}{2}$ inches	B 3 inches	C $\frac{3}{4}$ inch	D 350



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(Patented)
2 1/2 x 26-inch Turntable Lathe: Equipment "A"

TURNTABLE LATHE, 2½ X 26-INCH

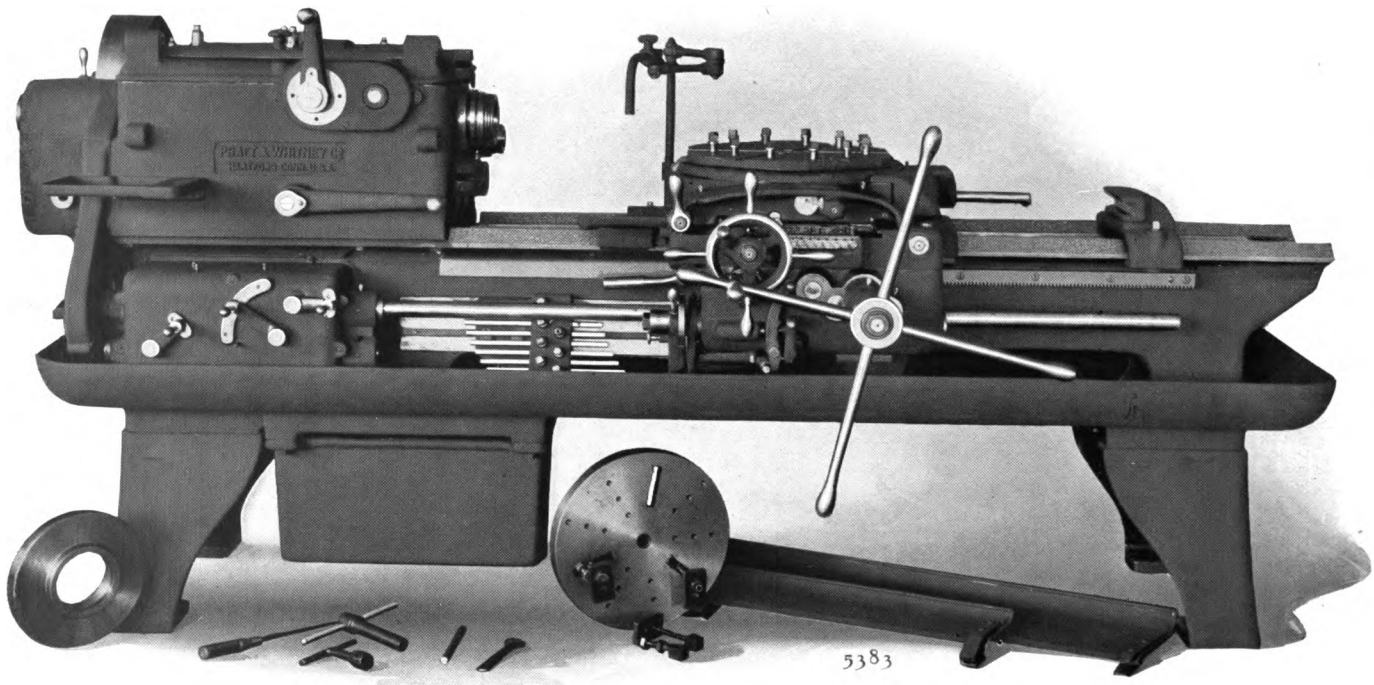
A new machine in which is embodied every required refinement known for easy, convenient, rapid and accurate operation. It is provided with a Constant-Speed, All-Geared Head and a Cross-Feeding Turntable. It is practically universal in adaptability and is suitable for an endless variety of work on castings, 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 2⅜" 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 1⅜" Turntable Edge to Spindle End, maximum 38"	
SPINDLE . . .	Bearings (3), all cylindrical, diameter 3⅝" Boxes, Bronze; conical on O. D., adjustable for wear. Front End, 4⅜" diameter; Thread, 4⅞" diameter; 4 Pi., U. S. F. Hole through 2⅝"	
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 4⅝" Belt Width (Driving Pulley) 3¾" Belt Width (Counter. Friction Pulleys) 4½" 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 48½" x 9' 6½" Machine, with Rod Feed 48½" 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.



5383

(Patented)
2 1/2 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 2⅜" (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.



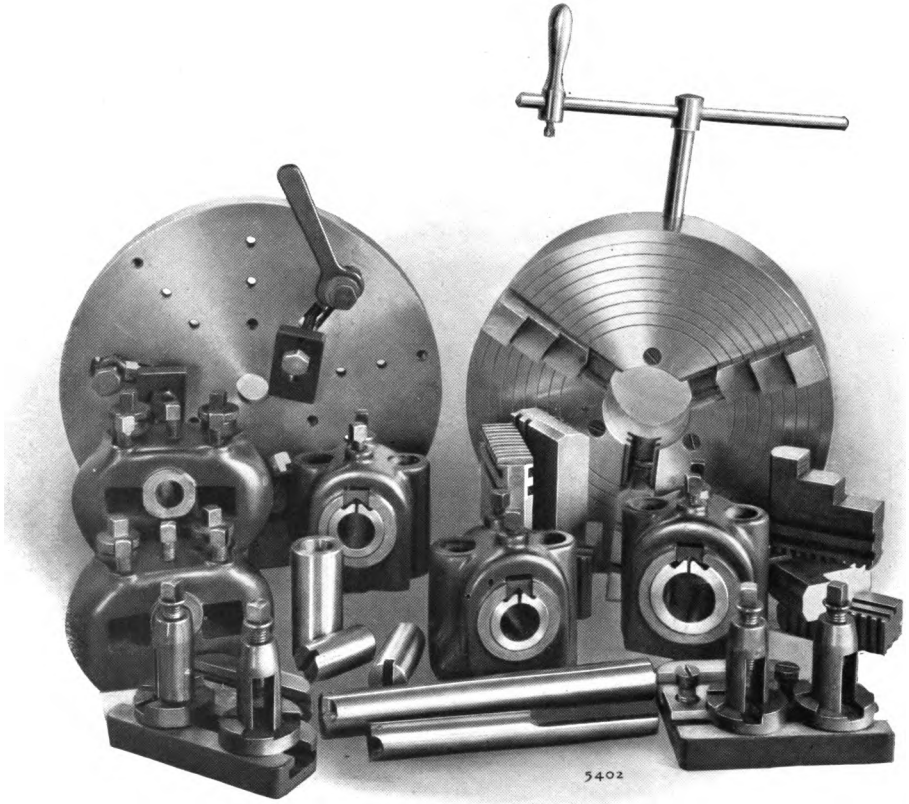
(Patented)
Equipment "B" Tools: 2½ x 26-inch Turntable Lathe

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

<p>"D" MACHINE ARRANGED FOR CASTING AND FORGING WORK WITH TOOLS</p>	<p>Includes Equipment "C" (minus Blank Chuck Plate), and</p> <ul style="list-style-type: none"> 1 15", 3-Jaw, Geared Scroll Chuck (extra heavy), with <ul style="list-style-type: none"> 2 Sets of Jaws for outside and inside gripping. <ul style="list-style-type: none"> 1 Set of Jaws (soft, blank), for special work. 2 Triple Tool Holders. 2 Tool Post Holders, with 2 Tool Posts each. 1 3" Round Tool Holder, with 2" Bushing. 2 2¼" Round Tool Holders, with 1½" Bushing. 1 1⅛" x 10" Boring Bar, with Adjustable Cutter. 1 1½" x 12" Boring Bar, with Adjustable Cutter. 3 Taper Adapters.
<p>"E" MACHINE ARRANGED FOR ROD WORK, CASTINGS AND FORGINGS WITH TOOLS</p>	<p>Includes Equipment "A" (minus Chuck Jaws), and</p> <ul style="list-style-type: none"> *15 Sets of Jaws, suitable for <ul style="list-style-type: none"> Round Rod, ¾" to 2½" (19 to 64 m/m). Square Rod, ¾" to 1¾" (19 to 44 m/m) across flats. Hexagon Rod, ¾" to 2⅜" (19 to 55 m/m) across flats. 1 15", 3-Jaw, Geared Scroll Chuck (extra heavy), with <ul style="list-style-type: none"> 2 Sets of Jaws, for outside and inside gripping. <ul style="list-style-type: none"> 1 Set of Jaws (soft, blank), for special work. 1 16" Face Plate Equipment. 3 Universal Turners (2 regular, 1 with open-side slide), and <ul style="list-style-type: none"> 2 Pairs of Roller Back-rests (following). <ul style="list-style-type: none"> 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 End Forming and Pointing Tool. 1 Bell-mouth Pointing Tool. 1 Turntable Cut-off and Forming Tool. 2 Triple Tool Holders. 2 Tool Post Holders, with 2 Tool Posts each. 1 3" Round Tool Holder, with 1 each 2" and 2½" Bushings. 2 2¼" Round Tool Holders, with 1½" Bushings each. 1 1⅛" x 10" Boring Bar, with Adjustable Cutter. 1 1½" x 12" Boring Bar, with Adjustable Cutter. 3 Taper Adapters (1 each No. 2, 3, 4, Morse Taper). 1 1½", Self-opening Die-head, with roughing and finishing attachment, and <ul style="list-style-type: none"> 1 Set of Chasers each, ⅝", ¾", ⅞", 1", 1⅛", 1¼", 1⅜" and 1½", U. S. S. (Specify if otherwise than U. S. S.). 1 Box for Collet Jaws and Chasers.
<p>METRIC EQUIPMENT "E"</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.

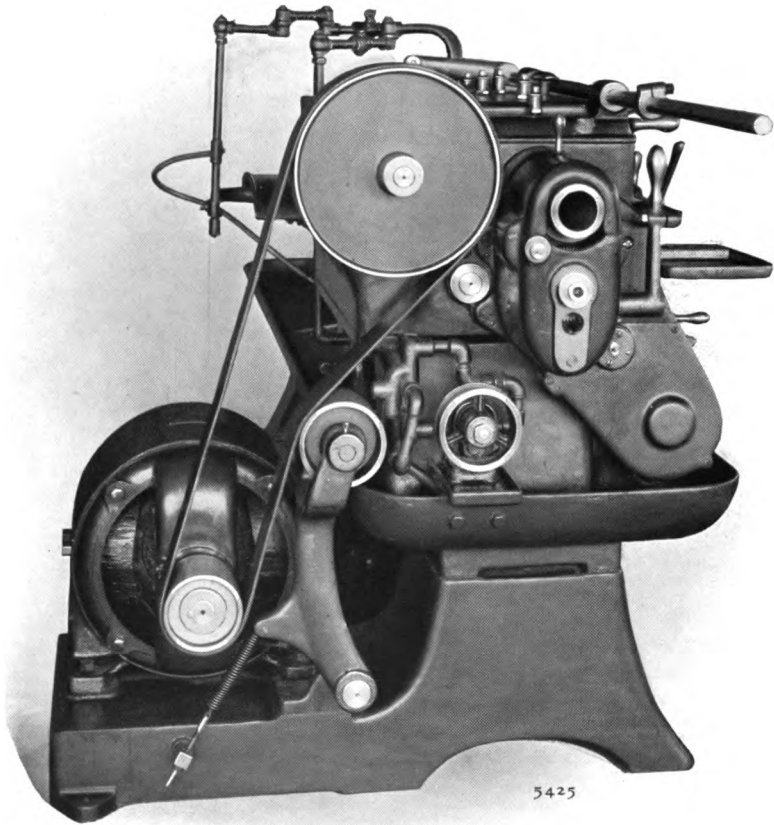
Code words, page 265.



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



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



Turntable Lathe Arranged with Motor Drive

TURNTABLE LATHE APPLIANCES AND TOOLS

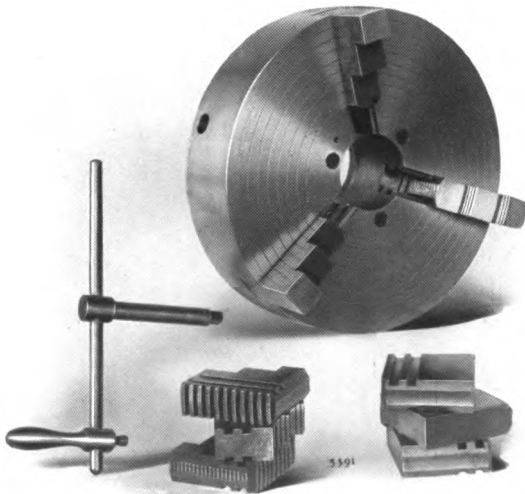
Motor Drive Motor base is cast integral with front pedestal. It is provided with an automatic belt tightener and will accommodate any standard motor. Motor should be $7\frac{1}{2}$ horse-power, constant speed not over 1200 revolutions per minute. If motor is furnished by customer full specifications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

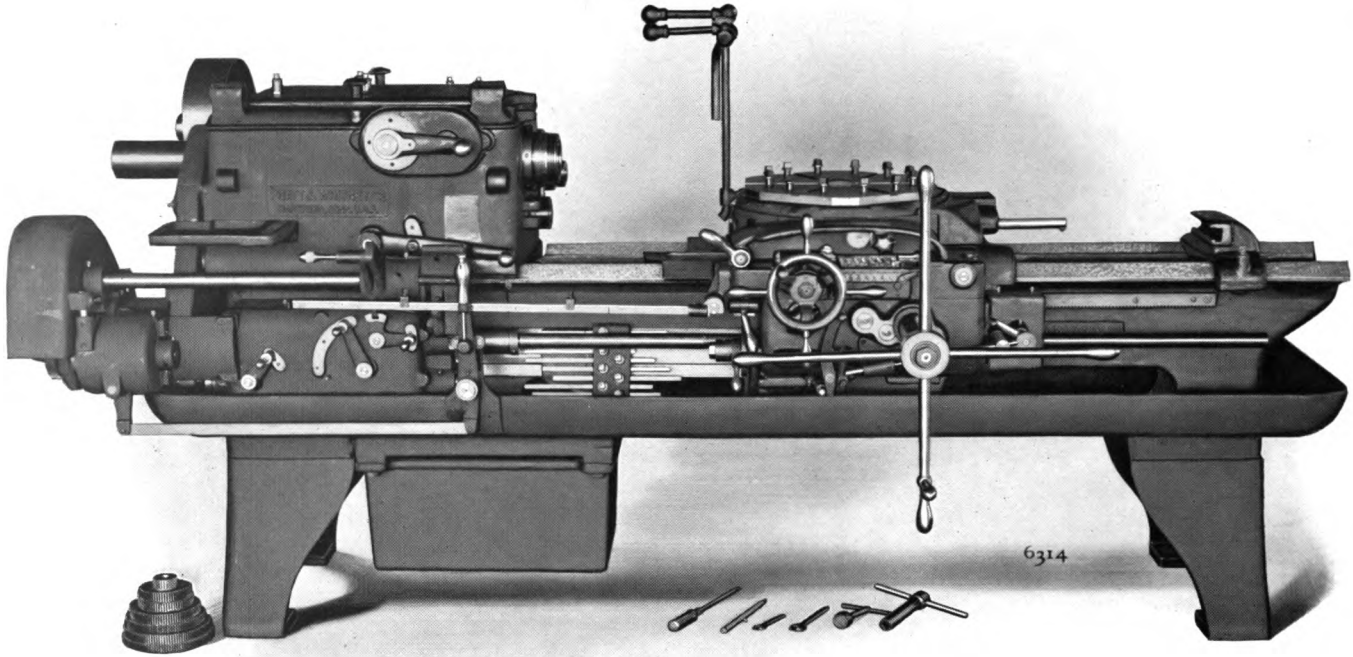
Threading Attachment An attachment extremely simple in design, attached to the machine proper in a most convenient manner. It is equally well suited and efficient on either long or short, external or internal work. Longitudinal travel of carriage is automatically controlled in either direction by means 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

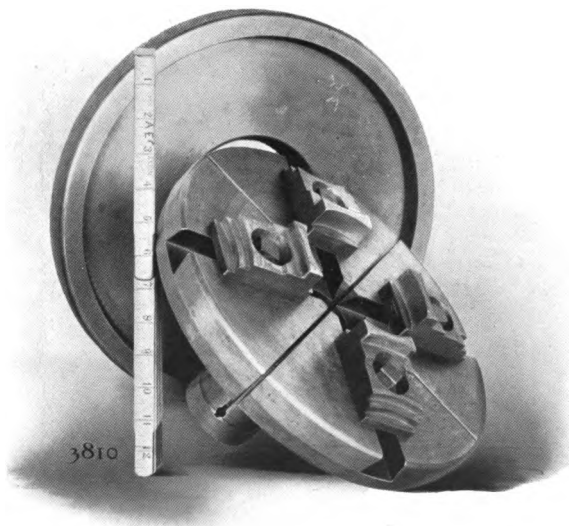
Two-jaw Chuck (See Two-jaw Chucks, page 74).

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.

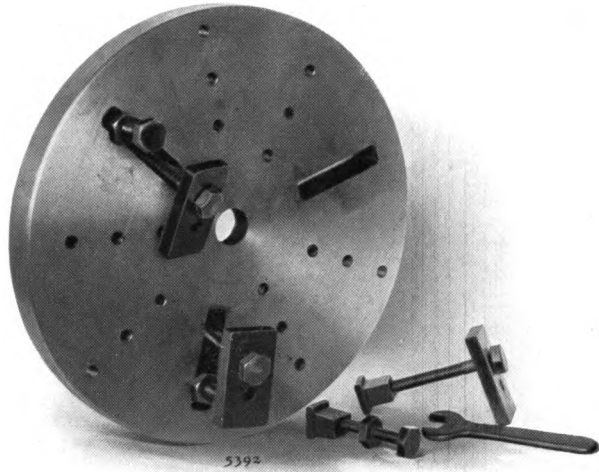
Step-chuck with Adjustable Jaws and Closer Closer is made of gun iron; step-chuck is made of steel and provided with four adjustable jaws with a maximum capacity of 12 inches. The closing mechanism is controlled by means of an eccentric, which is operated by a crank wrench. For second operation work, 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

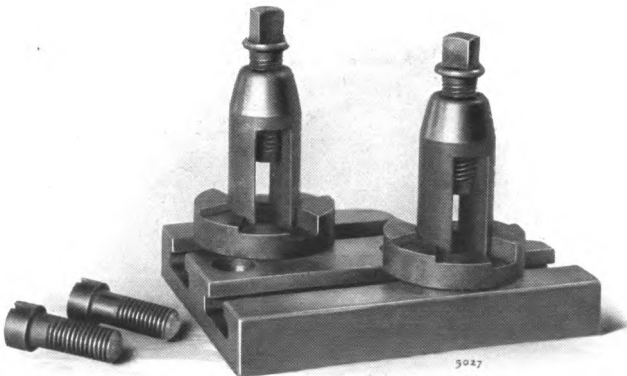
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

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

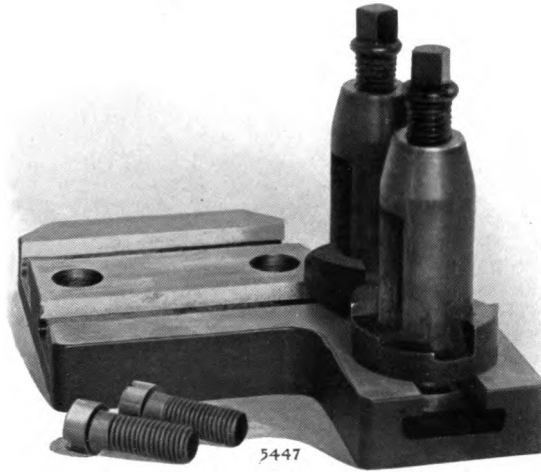
Tool Post Holder Is of low construction, made of steel and is provided with T-slots which permit the use of the same reliable type of tool posts as used on the engine lathe. Two tool posts are furnished with each holder.



Tool Post Holder

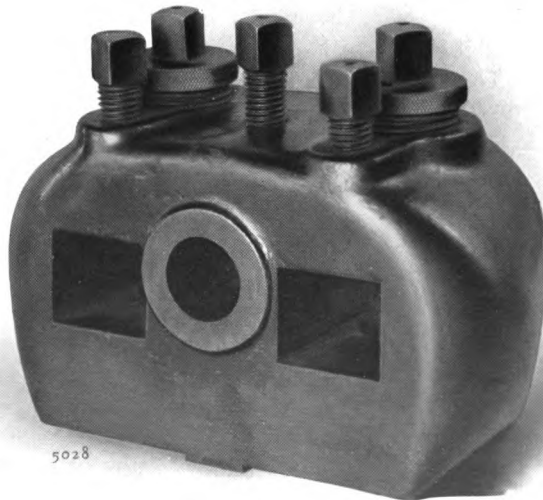
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

Off-set Tool Post Holder Similar 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

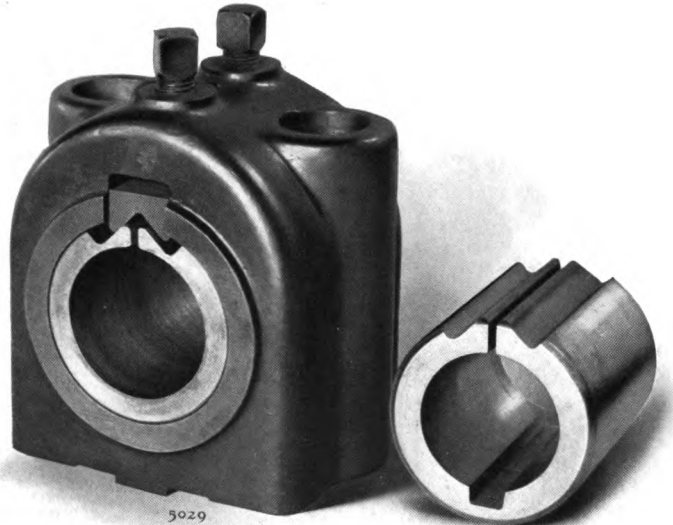
Triple Tool Holder For holding two rectangular and one round shank tool simultaneously. Round hole is $1\frac{1}{8}$ -inch diameter to accommodate the regular boring bar.



Triple Tool Holder

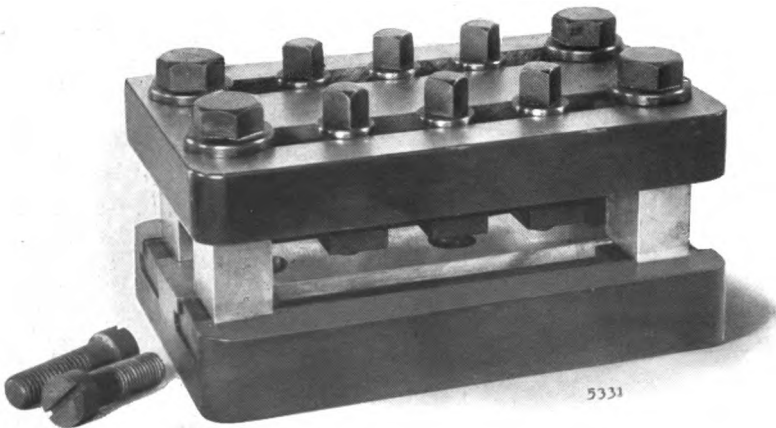
TURNABLE LATHE APPLIANCES AND TOOLS—Continued

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

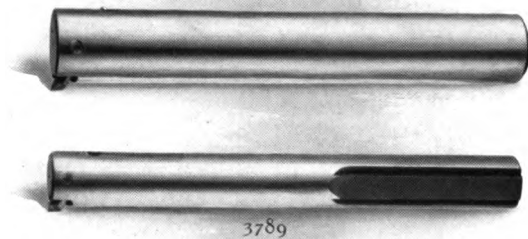
Multiple Tool Holder For the accommodation of several tools at once which may be freely adjusted laterly in any desired relation to one another and still be rigidly held in their adjusted positions. Tool accommodating space is $6\frac{1}{2}$ x $1\frac{1}{4}$ -inch. (Furnished to order).



(Patented)
Multiple Tool Holder

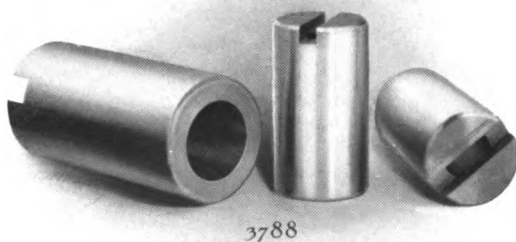
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

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.



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.



Taper Drill and Reamer Adapters

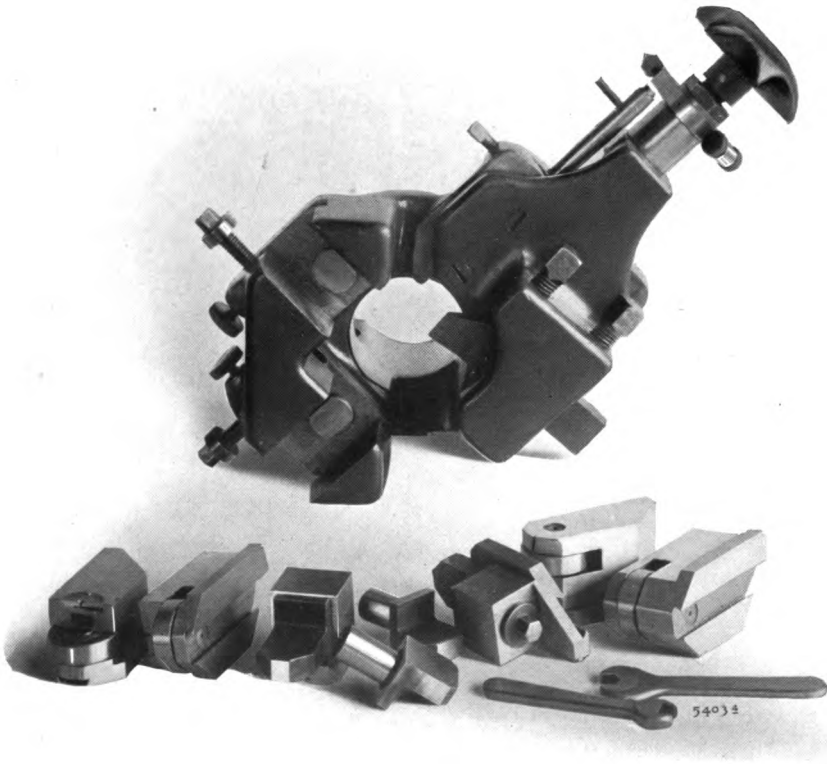
Floating Reamer Holder (See specifications on page 83).

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.



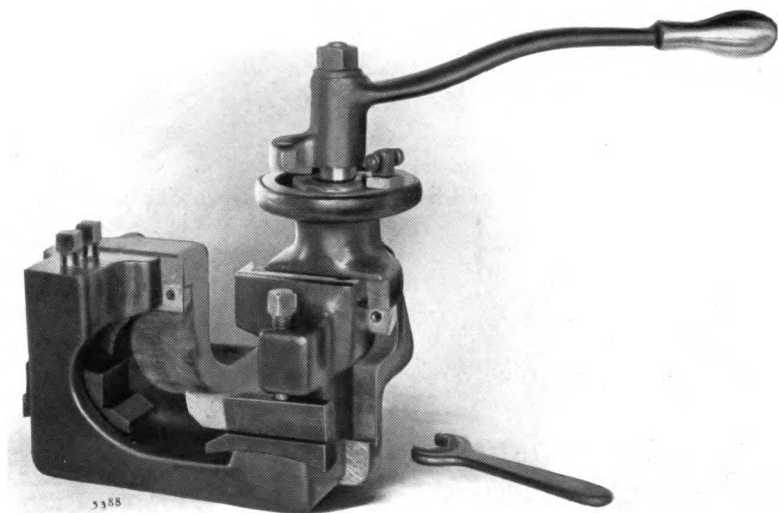
(Patented)

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.

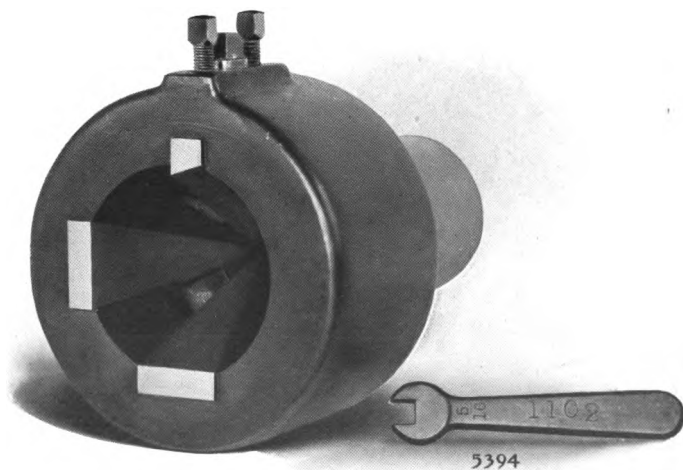
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

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

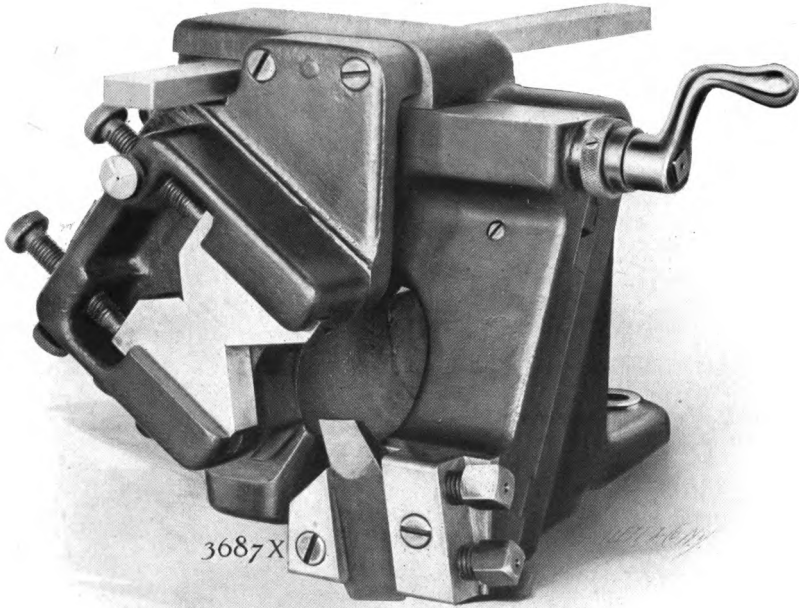
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

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 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 1/8 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 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

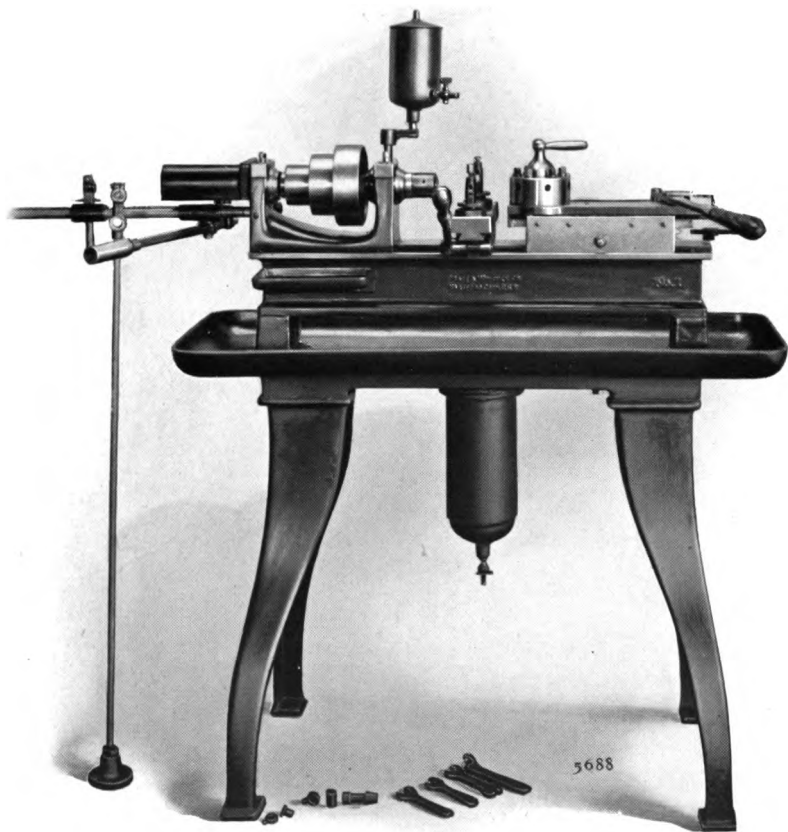
English Sizes

Nominal Sizes	Will Take Stock		
	Round	Hexagon	Square
¾	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 1/8	5/8 to 1 1/8	5/8 to 1 1/8
1	6/8 to 1 1/8	6/8 to 1 1/8	6/8 to 1 1/8
1 1/8	1 5/8 to 1 7/8	1 5/8 to 1 7/8	1 5/8 to 1 7/8
1 1/4	1 1/4 to 1 5/8	1 1/4 to 1 5/8	1 1/4 to 1 5/8
1 3/8	1 2/4 to 1 7/8	1 2/4 to 1 7/8	1 2/4 to 1 7/8
1 1/2	1 2/2 to 1 9/8	1 2/2 to 1 9/8	1 2/2 to 1 9/8
1 5/8	1 3/4 to 1 11/8	1 3/4 to 1 11/8	1 3/4 to 1 11/8
1 3/4	1 4/4 to 1 3/8	1 4/4 to 1 3/8	1 4/4 to 1 3/8
1 7/8	1 5/4 to 1 5/8	1 5/4 to 1 5/8	. . . .
2	1 6/4 to 2 1/8	1 6/4 to 2 1/8	. . . .
2 1/8	2 5/4 to 2 3/8	2 5/4 to 2 3/8	. . . .
2 1/4	2 1/2 to 2 5/8	. . . .	. . . .
2 3/8	2 2/4 to 2 7/8	. . . .	. . . .
2 1/2	2 3/4 to 2 9/8	. . . .	. . . .

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	46.0 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.

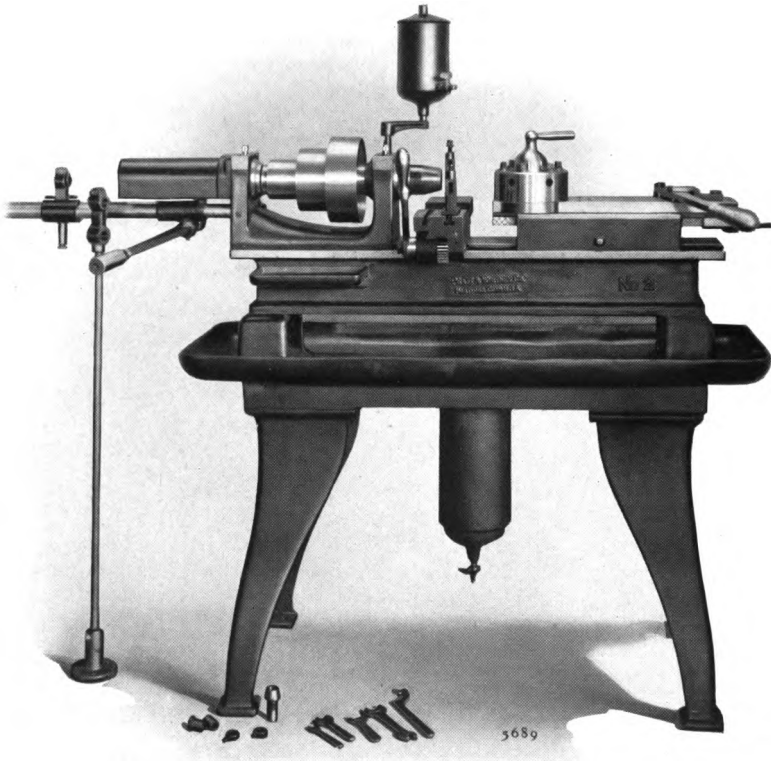


No. 1 Hand Screw Machine

NO. 1 HAND SCREW MACHINE—SPECIFICATIONS

RANGE . . .	Collet Capacity (round)	7 ⁷ / ₈ "
	Collet Capacity (square across flats)	9 ³ / ₈ "
	Collet Capacity (hexagonal across flats)	3 ³ / ₈ "
	Length, maximum turning	2 1/2"
	Swing over Bed	8 3/8"
	Swing over Cut-off Slide	3 1/2"
	Threading Capacity	3/8"
TURRET . . .	Diameter (round)	4 3/8"
	Holes (6), 3/8" diameter (4 or 8 holes to order).	
	Turret Hole Center to Top of Turret Slide	1 5/16"
SPINDLE . . .	Special Steel; Cylindrical Bearings; Front	1 3/8" x 2 3/4"
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through Plunger	1 5/8"
	Hole through Spindle	3/4"
	Front End, 1 7/8" diameter; Thread, 1 1/4"; 14 Pi., U. S. F.	
SPEEDS . . .	Spindle Speeds (3), R. P. M.	310 to 865
	Cone Diameters (3), large diameter	6"
	Pulleys (Friction on Counter.)	8" x 2 3/4"
	Belt Width (Cone)	1 3/4"
	Belt Width (Counter. Pulleys)	2 1/2"
	Countershaft Speed, R. P. M.	310
FEEDS	Turret Slide, Hand Lever Feed.	
	Cross Slide, Hand Lever Feed.	
	Rod Feed, Lever Type.	
FLOOR SPACE	With Rod Feed	30" x 6'
	Without Rod Feed	30" x 4'
WEIGHTS . .	Machine, with Regular Equipment, net pounds	500
	Crating Material (domestic), approximate pounds	150
	Boxing Material (foreign), approximate pounds	300
	Box, cubic feet	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.

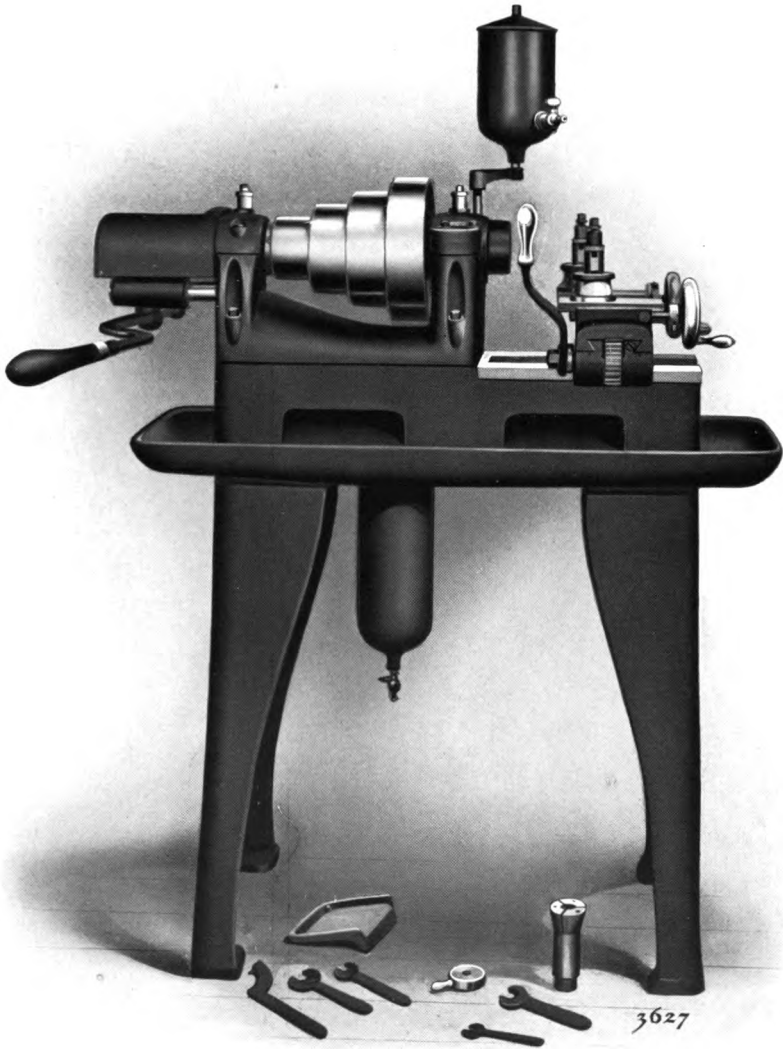


No. 2 Hand Screw Machine

NO. 2 HAND SCREW MACHINE—SPECIFICATIONS

		Regular	No. 2 Head
RANGE	Collet Capacity (round)	5/8"	1"
	Collet Capacity (square across flats)	7/8"	1 1/2"
	Collet Capacity (hexagon across flats)	1 1/2"	1 3/4"
	Length; maximum turning	4 1/2"	4 1/2"
	Swing over Bed	10 1/2"	10 1/2"
	Swing over Cut-off Slide	6"	6"
	Threading Capacity	5/8"	5/8"
TURRET	Diameter (round)	6 1/4"	6 1/4"
	Holes (6), size (4 or 8 holes to order)	1 1/8"	1 1/8"
	Turret Hole center to top of Turret Slide	1 11/16"	1 11/16"
SPINDLE	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear.	1 3/4" x 3 1/4"	2 1/4" x 3 1/2"
	Hole through Plunger	2 1/8"	1 1/2"
	Hole through Spindle	1 5/8"	1 5/8"
	Front End, diameter	1 1/8"	2 5/8"
	Thread Diameter and Pi., U. S. F.	1 5/8", 12 Pi.	2 1/2", 12 Pi.
SPEEDS	Spindle Speeds (3), R. P. M.	241 to 754	241 to 754
	Cone Diameters (3), large	7 1/2"	7 1/2"
	Pulleys (Friction on Counter.)	9" x 3 1/4"	9" x 3 1/4"
	Belt Width (Cone)	2 1/2"	2 1/2"
	Belt Width (Counter. Pulleys)	3"	3"
	Countershaft Speed, R. P. M.	220	220
FEEDS	Turret Slide, Hand Lever Feed. Cross Slide, Hand Lever. Rod Feed, Lever Type.		
FLOOR SPACE	With Rod Feed	31" x 7' 9"	31" x 7' 9"
	Without Rod Feed	31" x 4' 9"	31" x 4' 9"
WEIGHTS	Machine, with Regular Equipment, net pounds	875	875
	Crating Material (domestic), approximate pounds	200	200
	Boxing Material (foreign), approximate pounds	350	350
	Box, cubic feet	45	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

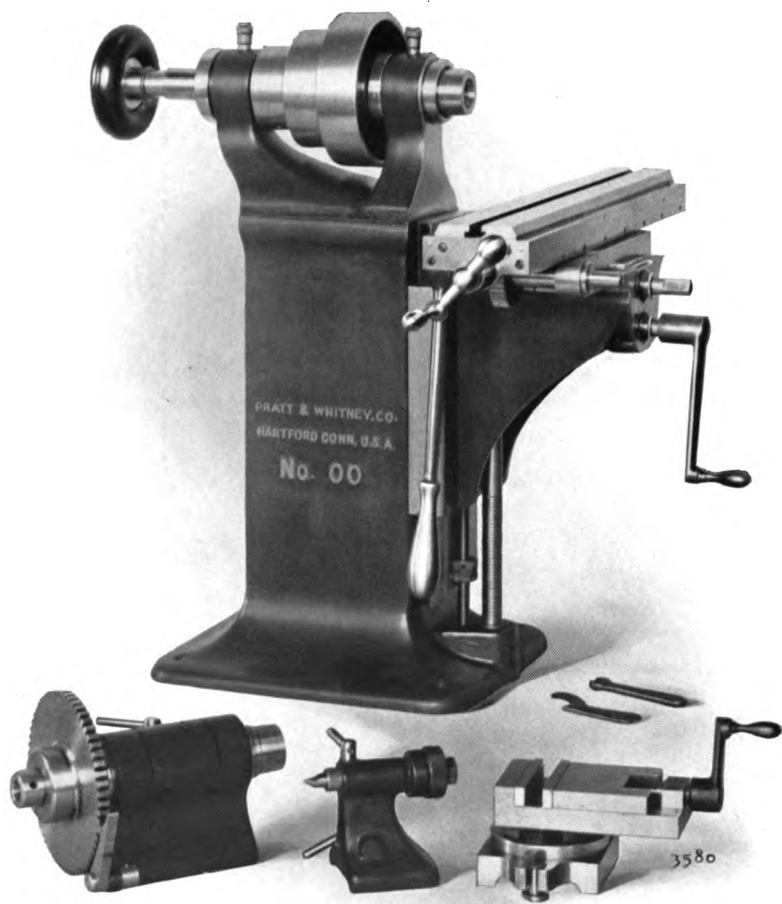
NO. 2 SHAVING MACHINE

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 1/2"
	Longitudinal Movement of Base	10"
	Transverse Movement of Tool Slide	5 1/2"
	Collet Capacity (Drawback Type)	1 3/8"
	Step-chuck Capacity	6"
SPINDLE . . .	Special Steel; Bearing Portion, cylindrical; 2 7/16" diameter. Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through Plunger	1 3/8"
	Hole through Spindle	1 3/4"
SPEEDS . . .	Spindle Speeds (8), R. P. M.	97 to 569
	Cone Diameters (4), large diameter	9 5/8"
	Pulleys (Counter. Friction)	10" x 3 3/8"
	Belt Width (Cone)	2 1/2"
	Belt Width (Counter. Friction Pulleys)	3 1/4"
Countershaft Speeds, R. P. M.	150 and 200	
FLOOR SPACE	Floor Space	46" x 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 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, 7/16" to 5/8" by 16ths, 3/8" to 1 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.

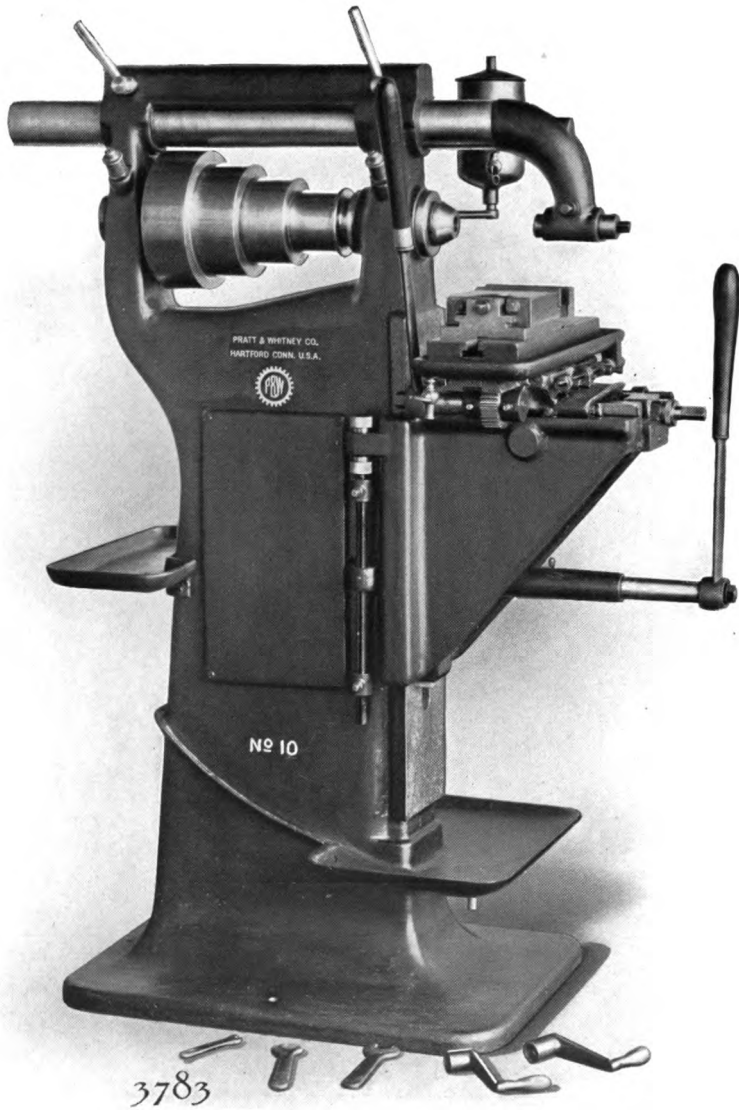
SPECIFICATIONS

RANGE	Table — Working Surface (Sides, 30 degrees angle)	14½" x 2"
	,, Longitudinal Travel (combination lever and screw)	7"
	,, Center to End of Spindle, maximum	3⅝"
	,, Transverse Adjustment (by screw)	2½"
	,, Top to Center of Spindle, maximum	5½"
	,, Vertical Adjustment (by screw)	5"
	,, T-slot, .35" wide.	
MICROMETER DIALS	Graduated in thousandths.	
VISE	(Swivel graduated in degrees), total height	2⅝"
	Width, depth and opening of Jaws	2½", 1½", 1¼"
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 Seat650" Front End, conical.	
SPEEDS	Spindle Speeds (6), R. P. M.	113 to 1228
	Cone Diameters (3)	2½", 3½", 4½"
	Pulleys (Countershaft, tight and loose), diameter	5"
	Belt Width (Cone)	1⅞"
	Belt Width (Counter. Pulley)	1¼"
	Countershaft Speed, R. P. M.	128 and 512
BENCH SPACE	Bench Space	17⅞" x 24⅞"
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

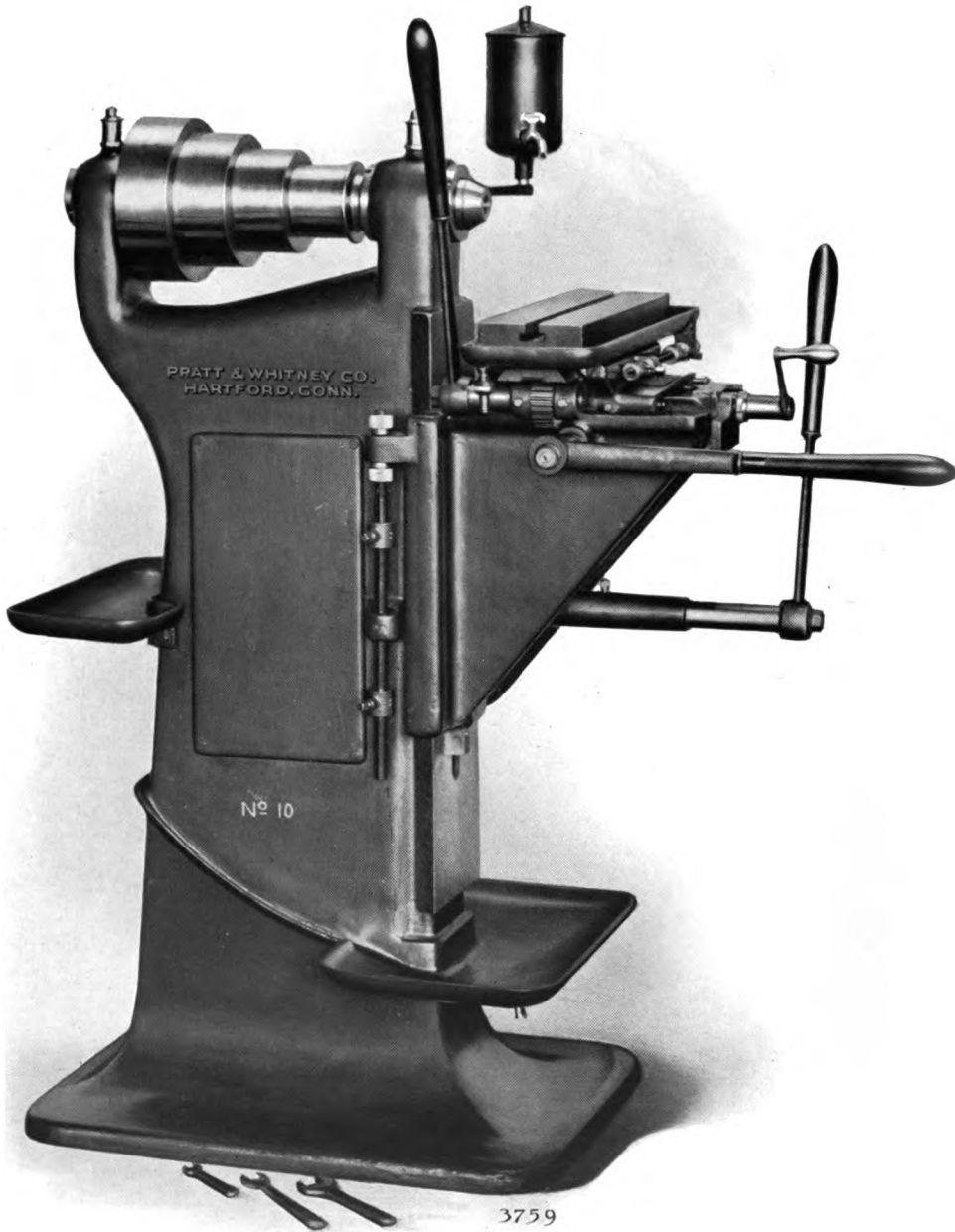
These machines are modern tools in every respect and are peculiarly adapted for milling small parts of guns, sewing machines, typewriters, automobiles, etc. Knees and slides are all mounted upon long dovetailed bearings and are provided with taper gibs for maintaining proper relation between bearing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

SPECIFICATIONS

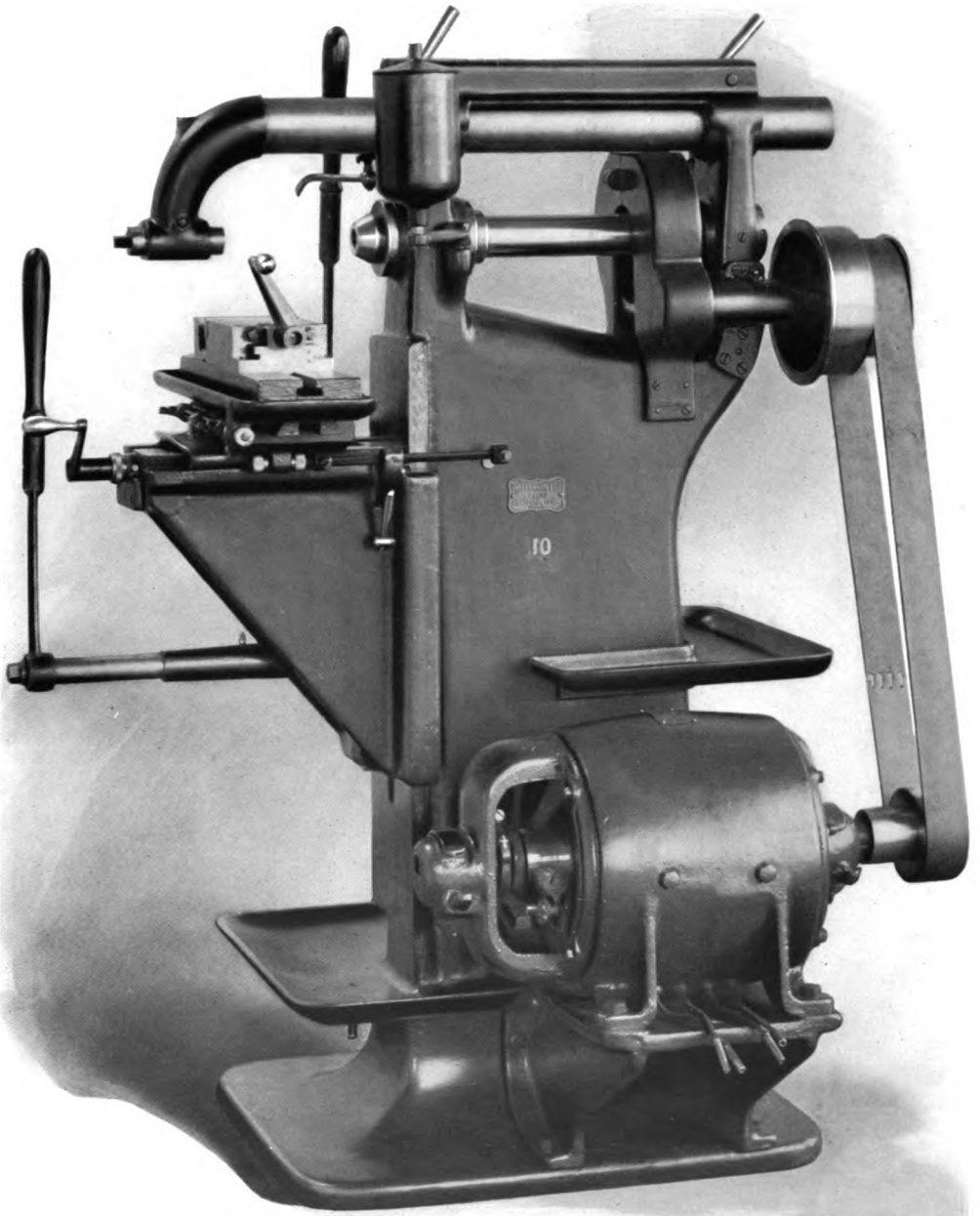
RANGE	Table — Working Surface 4 3/4" x 16" " Longitudinal Travel (by lever) 4" " Center to End of Spindle, maximum 6 3/8" " Transverse Adjustment (by screw) 5" " Top to Centre of Spindle, maximum 9" " Vertical Adjustment (by lever) 8" " Top to Underside of Arm, minimum 5 1/8" " T-slot (1), width 3/8"
VISE	Size, No. 2 1/2. Width, depth and opening of Jaws 4 5/8", 7/8," 2 5/8"
MICROMETER DIALS	Graduated in thousandths.
SPINDLE	Special Steel; Bearings, cylindrical; Front 1 5/8" x 4 7/8" Boxes, Bronze; O. D., conical, adjustable for wear. Hole through 3/8" *Taper Hole, No. o Power m/m.
SPEEDS	Spindle Speeds (4), R. P. M. 76 to 400 Cone Diameters (4), large 8" Pulley (Counter.) 10" x 3" Belt Width (Cone) 2 1/2" Belt Width (Countershaft Pulley) 2 7/8" Countershaft Speed, R. P. M. 175
FLOOR SPACE	Floor Space 27" x 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.



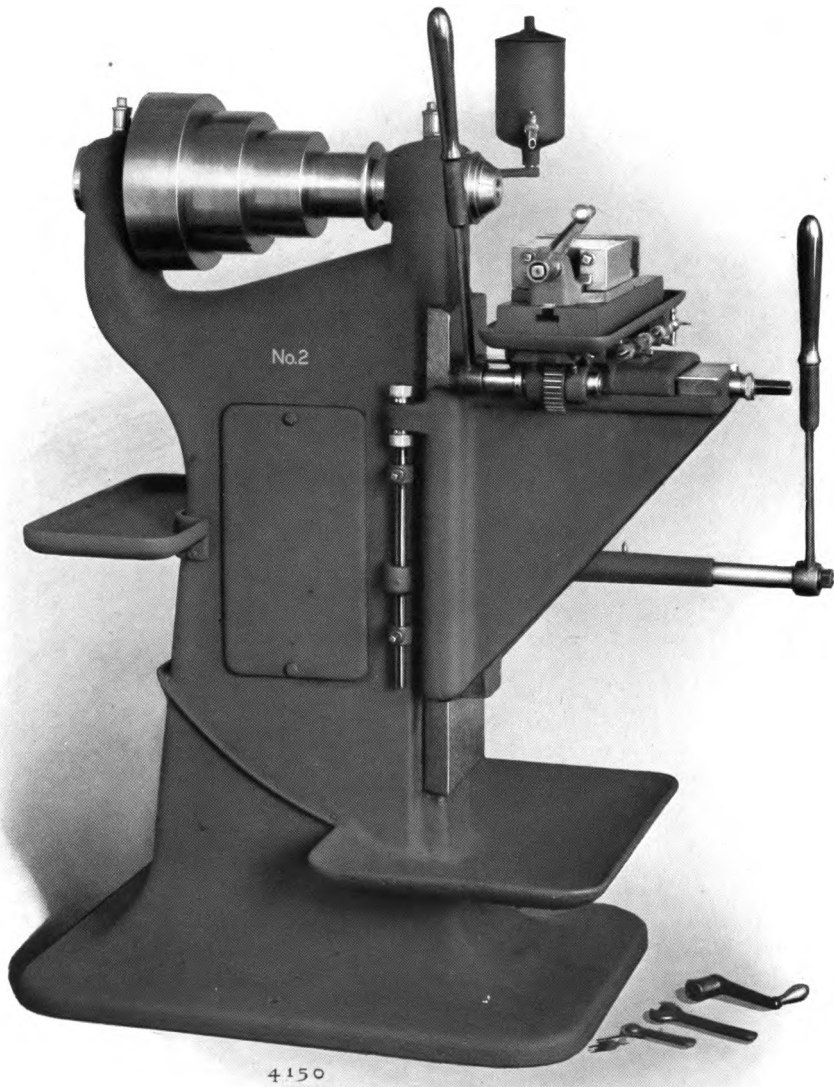
No. 10 Hand Milling Machine with Combination Lever and Screw, Transverse Movement



3853



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

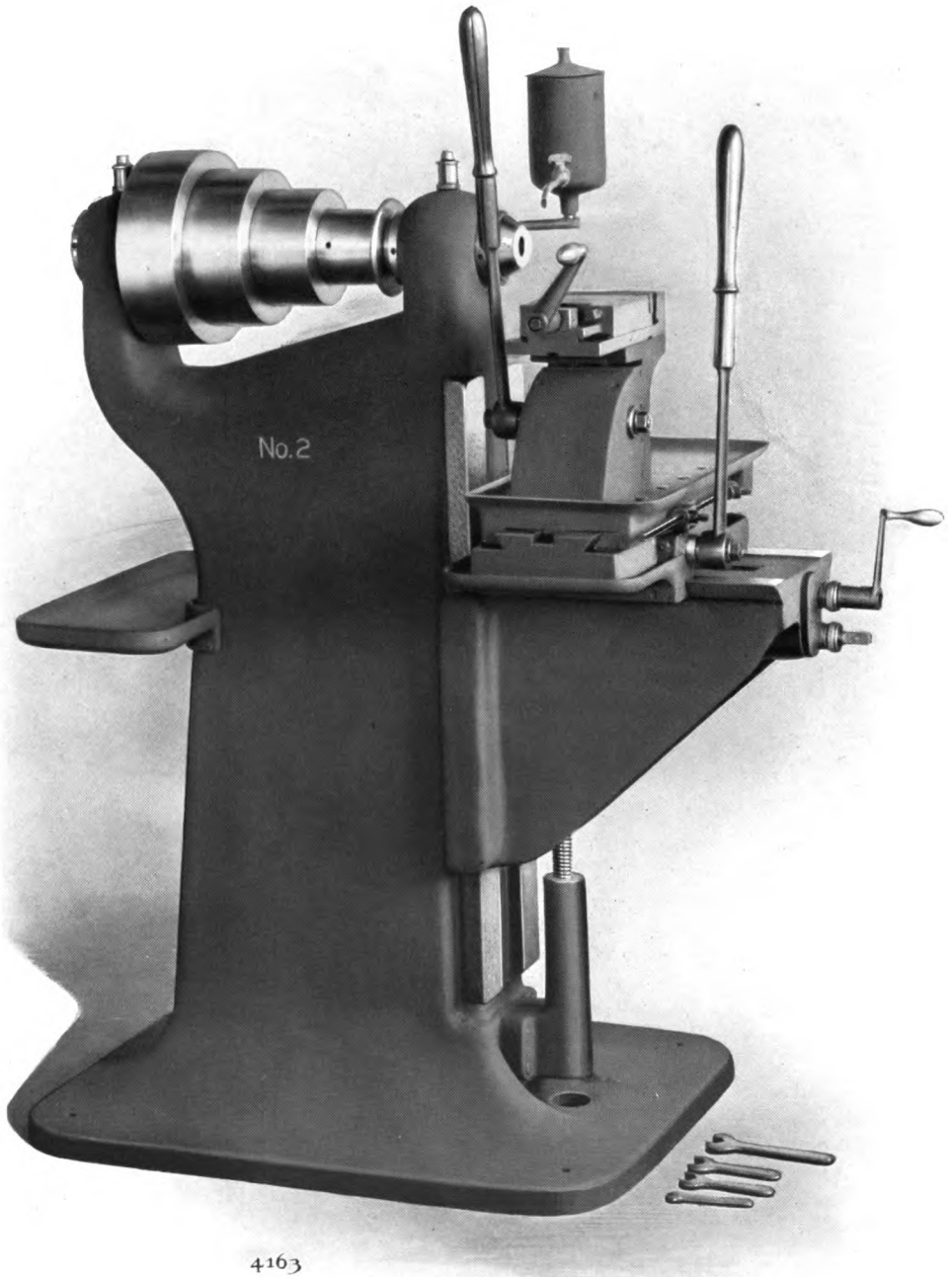
This machine is similar in design to the No. 10, its wider range, however, making it suitable for a class of work beyond the capacity of the smaller machine.

SPECIFICATIONS

RANGE . . .	Table— Working Surface	5 1/8" x 17 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 5/8"
	" T-slot (1), width	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 Boxes, Bronze; O. D., conical, adjustable for wear. Hole through	2" x 5 3/8" 5/8"
	*Taper Hole, No. 1 Power m/m.	
SPEEDS . . .	Spindle Speeds (4), R. P. M. Cone Diameters (4), large Pulley (Countershaft) Belt Width (Cone) Belt Width (Countershaft Pulley) Countershaft Speed, R. P. M.	75 to 375 10" 12" x 3 1/4" 3" 3 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	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

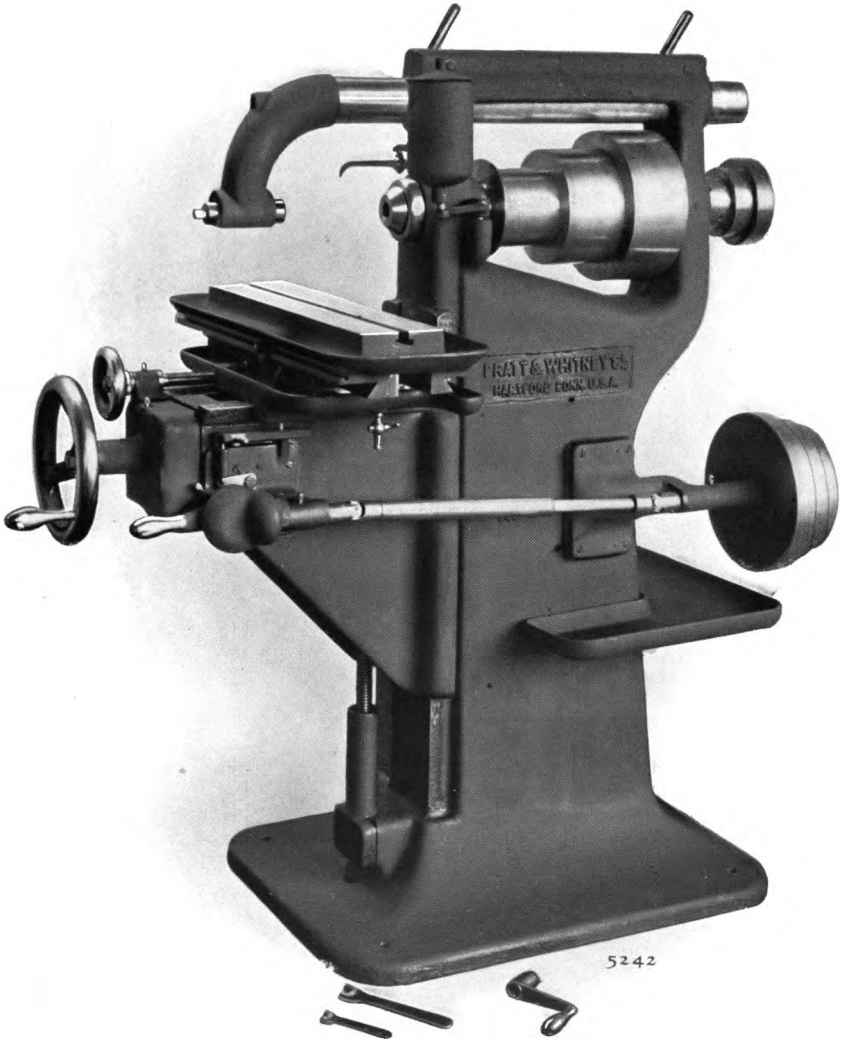
NO. 2 HAND MILLING MACHINE WITH VERTICAL VISE SLIDE SPECIFICATIONS

RANGE	Table— Working Surface $4\frac{3}{4}'' \times 6''$ " Longitudinal Travel (by lever) 6" " Center to End of Spindle, maximum $8\frac{1}{4}''$ " Transverse Adjustment (by screw) 5" " Top to Center of Spindle, maximum 11" " Vertical Adjustment by Lever 2" " Vertical Adjustment by Screw 11" " T-slot (1), width $\frac{3}{8}''$
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 $2'' \times 5\frac{3}{8}''$ 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 (Counter) $12'' \times 3\frac{1}{4}''$ 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	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

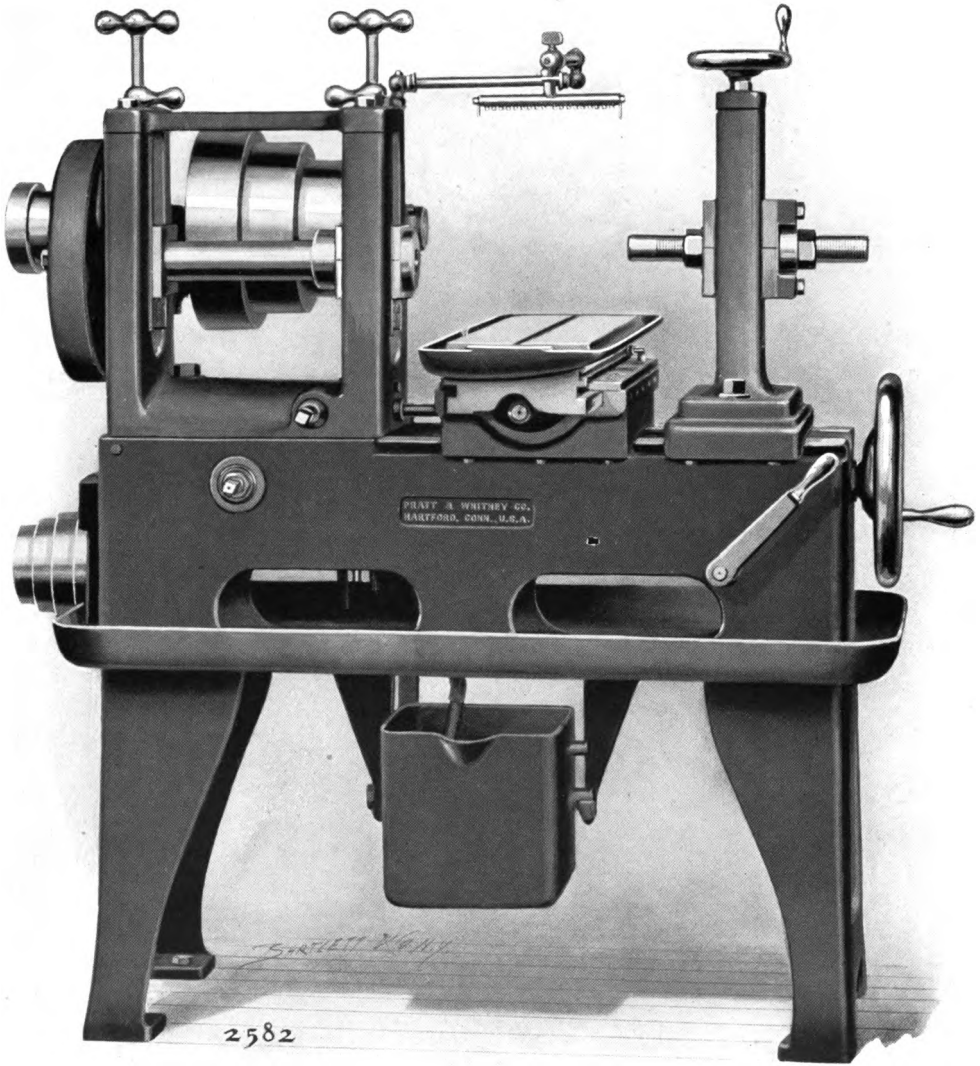
This machine is particularly adapted for various milling operations on guns, typewriters, sewing machines, automobiles, etc. The quick return of table by hand, coupled with the simple construction and convenient arrangement of the other operating requirements, enables one operator to take care of several 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)	12½"
	" Top to Underside of Arm, minimum	5⅝"
	" T-slot (1), ⅝" wide.	
VISE	Size, No. 11.	
	Width, depth and opening of Jaws	5", 1", 3"
SPINDLE	Special Steel; Cylindrical Bearings; Front.	2" x 5⅜"
	Boxes, Bronze; conical on O. D., adjustable for wear.	
	*Taper Hole, No 1 Power m/m.	
	Hole through	⅝"
SPEEDS	Spindle Speeds (3), R. P. M.	94 to 300
	Cone Diameters (3)	5", 7⅜", 9¾"
	Pulley (Counter., tight and loose)	14" x 4½"
	Belt Width (Cone)	4"
	Belt Width (Counter. Pulleys)	4¼"
	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).	
VISE 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

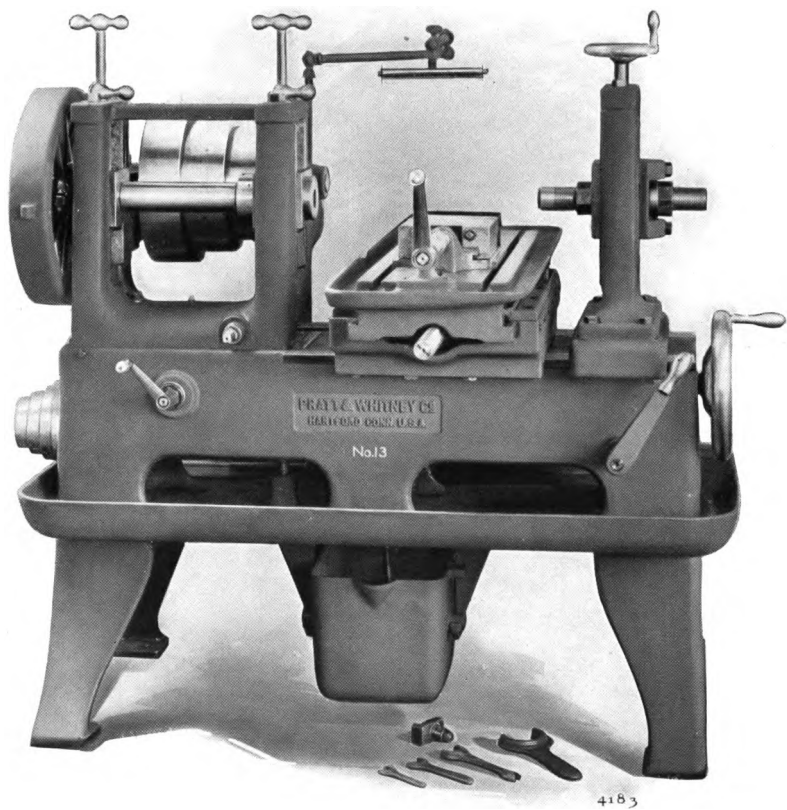
These machines have recently been re-designed and, while retaining the general characteristics of the Lincoln Type, differ from the original in the following manner : Machines are far more rigid and powerful ; Oil Pans surround and are cast integral with the bed and table ; Tables are provided with T-slots ; 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	7½" x 32"
	" Longitudinal Travel	15"
	" Center to End of Spindle, minimum	4½"
	" Transverse Adjustment	6½"
	" Top to Center of Spindle, maximum	8½"
	Vertical Adjustment of Spindle	7"
	Table Top to Top of Bed	6¼"
	Head Spindle to Tailstock Spindle, maximum	15½"
	T-slots ; number, size, distance apart	3", 5/8", 2½"
VISE	Size, No. 12	
	Width, depth and opening of Jaws	7", 1¼", 3¾"
SPINDLE	Special Steel ; Bearings, cylindrical ; Front	2¾" x 3¼"
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through	9/16"
	*Taper Hole, No. 11 Jarno.	
SPEEDS	Spindle Speeds (3), R. P. M.	22 to 50
	Gearing Ratio	4½ to 1
	Cone Diameters (3), large	12"
	Pulleys (Countershaft)	12" x 3¼"
	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" x 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

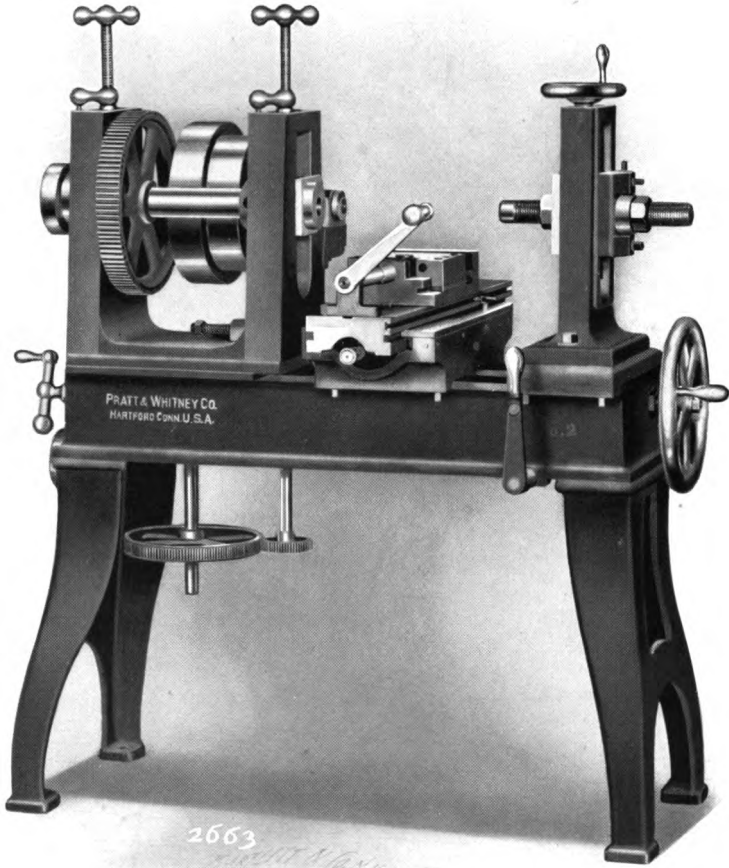
The machine is similar in design to the No. 12, its wider range making it suitable for the heavier class of work beyond the capacity of the smaller machines.

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

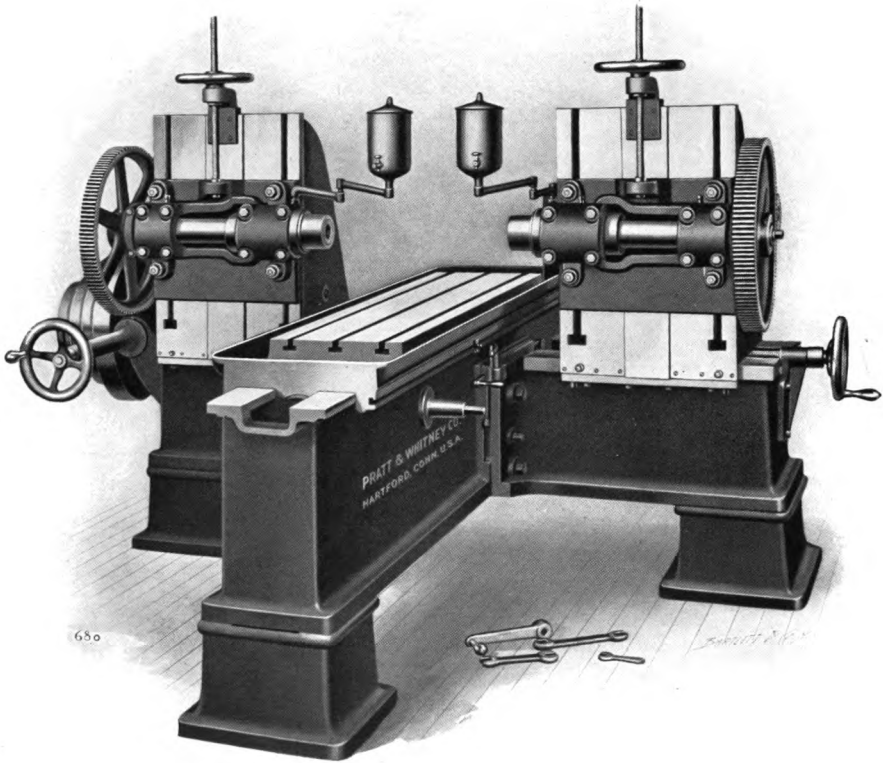
These machines are peculiarly adapted and extensively used in the manufacture of small arms sewing machines, automobiles, typewriters and on a large variety of other duplicate milling work.

SPECIFICATIONS

RANGE . . .	Table— Working Surface	6" x 32"
	" Longitudinal Travel	12"
	" Center to End of Spindle, minimum	3 ⁵ / ₈ "
	" Transverse Adjustment	6"
	" Top to Center of Spindle, maximum	9 ³ / ₄ "
	Vertical Adjustment of Spindle	7"
	Table Top to Top of Bed	5 ¹ / ₈ "
	Head Spindle to Tailstock Spindle, maximum	16"
VISE	Size, No. 4. Width, depth and opening of Jaws	7", 1 ¹ / ₄ ", 3 ¹ / ₄ "
SPINDLE . . .	Special Steel; Bearings, cylindrical; Front Boxes, C. I., lined with Babbitt, adjustable for wear. *Taper Hole, No. 2 Power m/m.	2 ¹ / ₄ " x 3 ³ / ₄ "
SPEEDS . . .	Spindle Speeds (3), R. P. M. Gearing Ratio Cone Diameters (3), large Pulleys (Countershaft) Belt Width (Cone) Belt Width (Countershaft Pulley) Countershaft Speeds, R. P. M.	18 to 40 4 ¹ / ₂ to 1 12" 11" x 3 ¹ / ₂ " 2 ¹ / ₂ " 3 ³ / ₄ " 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 Crating Material (domestic), approximate pounds Boxing Material (foreign), approximate pounds Box, cubic feet	1425 100 400 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

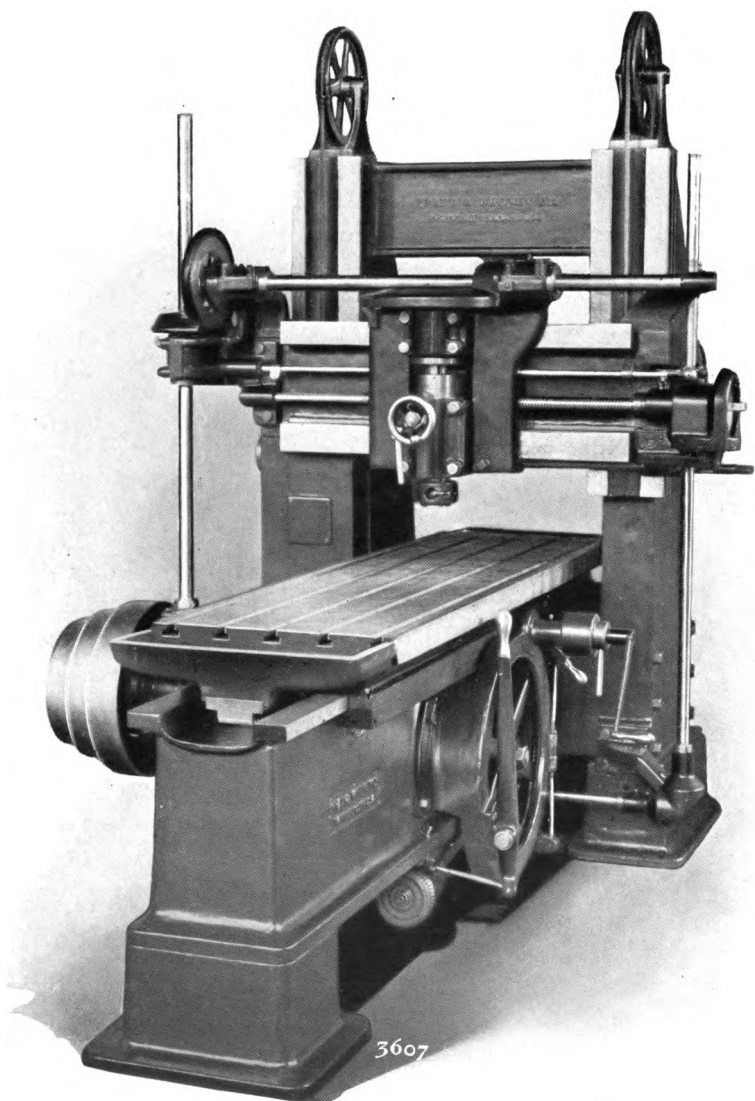
Bed is made in lengths to accommodate tables from 4 to 14 feet. Machine has two heads, which have both vertical and longitudinal adjustment. Table is driven by large worm and worm rack and is provided with quick power return.

SPECIFICATIONS

RANGE	Table—Length 4' to 14' „ Width 14½" „ Travel 4' to 14' „ Top to Center of Spindle, minimum 2⅞" „ 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 3⅜" x 7½" Boxes, Bronze; adjustable for wear. Hole through 1⅝" *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

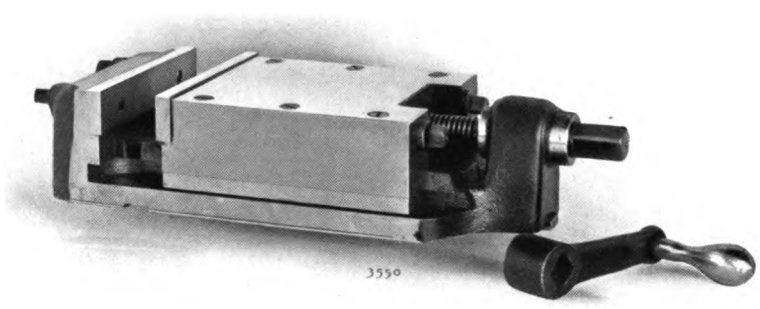
Made in one size, with either one or two spindles. Table is made in various lengths; both table and spindles are provided with power feed in either direction.

SPECIFICATIONS

		One Sp.	Two Sps.
RANGE	Table—Length	6'	6'
	" Width	22"	22"
	" Travel	6'	6'
	" Top to End of Spindle, minimum	$\frac{3}{4}$ "	$\frac{3}{4}$ "
	" Top to End of Spindle, maximum	25"	25"
	Distance between Uprights	$24\frac{1}{2}$ "	$24\frac{1}{2}$ "
	T-slots (5); size, $\frac{3}{4}$ "; distance apart, $4\frac{5}{8}$ ".		
SPINDLE	Special Steel; Bearings, cylindrical; Front	$2\frac{3}{4}$ " x 8"	$2\frac{3}{4}$ " x 8"
	Hole through	$\frac{5}{8}$ "	$\frac{5}{8}$ "
	*Taper Hole (Power Milling Machine)	No. 3	No. 3
	Front End	$2\frac{3}{4}$ ", 5 Pi., R. H.	$2\frac{3}{4}$ ", 5 Pi., R. H.
SPEEDS	Spindle Speeds (6), R. P. M.	11 $\frac{1}{2}$ to 61	11 $\frac{1}{2}$ 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 $\frac{1}{4}$ " and 14" x 7"
	Belt Width (Cone)	$3\frac{1}{4}$ "	4"
	Belt Width (Counter. Pulleys)	$3\frac{3}{4}$ " and $4\frac{3}{4}$ "	4" and $6\frac{3}{4}$ "
	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	$6\frac{1}{4}$ ' x $13\frac{1}{2}$ '	$8\frac{1}{4}$ ' x $13\frac{1}{2}$ '
WEIGHTS	Machine, with Countershaft, net pounds	8800	11900
	Additional, per foot of Table	500	500
	Crating Material (domestic), approximate pounds	800	800
	Boxing Material (foreign), approximate pounds	2000	2700
	Box, cubic feet	276	370

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

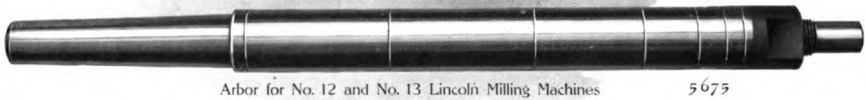
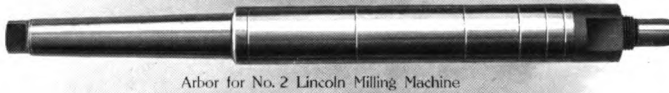
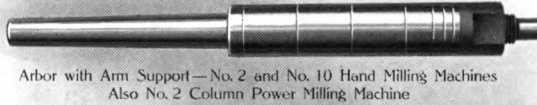
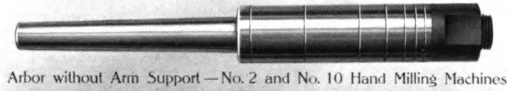
Code words, page 265.



VICES 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 } No. 2. Vertical Vise Slide }	2 ½	4 ⅝	⅞	2 ⅝	21
	No. 2. Regular No. 2. Column Power }	11	5	1	3	29
LINCOLN MILLING MACHINE	No. 2 }	4	7	1 ¼	3 ¼	52
	No. 12 } }	12	7	1 ¼	3 ⅜	62
	No. 13 }					



ARBORS FOR MILLING MACHINES

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

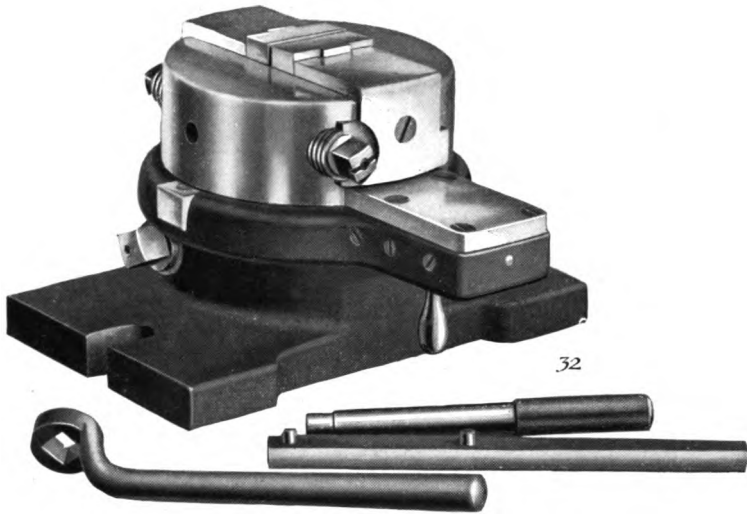
Lincoln Milling Machine Arbors are made in one style only, with Arm Support ; the No. 2 is provided with tang, and the Nos. 12 and 13 drilled and tapped for Pull-back ; Arbors are splined for cutters.

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	$\left\{ \begin{array}{l} \frac{3}{8} \\ \frac{7}{8} \\ 1 \end{array} \right.$	2 and 3½	2 and 4	No. 0. Power M. M.
			3 and 5	4 and 6	No. 0. Power M. M.
			3 and 5	4 and 6	No. 0. Power M. M.
	2	$\left\{ \begin{array}{l} \frac{3}{8} \\ \frac{7}{8} \\ 1 \end{array} \right.$	2 and 3½	†2 and 4	No. 1. Power M. M.
			3 and 5	†4 and 6	No. 1. Power M. M.
			3 and 5	†4 and 6	No. 1. Power M. M.
LINCOLN MILLING MACHINE	2	$\left\{ \begin{array}{l} 1 \\ 1\frac{1}{4} \end{array} \right.$		6 and 9	No. 2. Power M. M.
				6 and 9	No. 2. Power M. M.
	12	$\left\{ \begin{array}{l} 1 \\ 1\frac{1}{4} \end{array} \right.$		6 and 9	No. 11. Jarno
				6 and 9	No. 11. Jarno
	13	$\left\{ \begin{array}{l} 1 \\ 1\frac{1}{4} \\ 1\frac{1}{2} \end{array} \right.$		10 and 14	No. 12. Jarno
				10 and 14	No. 12. Jarno
			10 and 14	No. 12. Jarno	

* For detailed information, see Tapers, page 247.

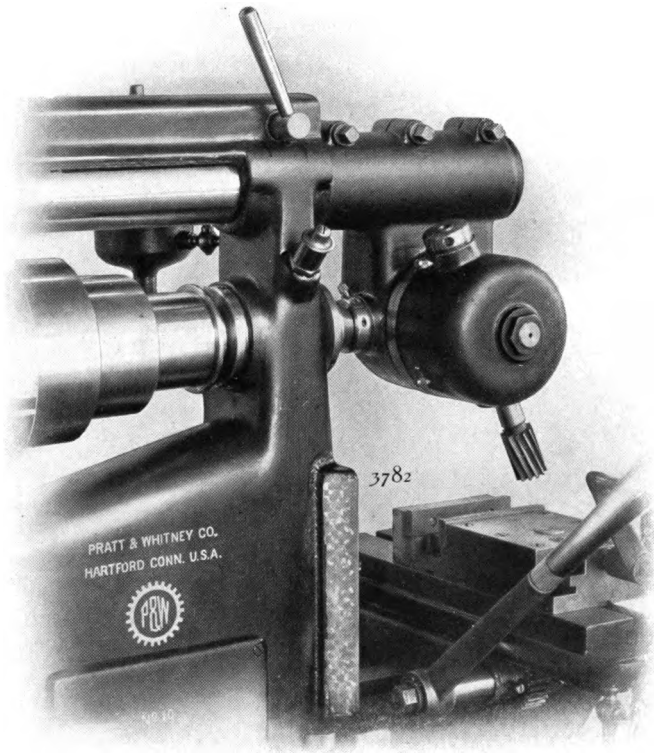
† Are also used on No. 2 Column Power Milling Machine.



INDEX MILLING FIXTURE

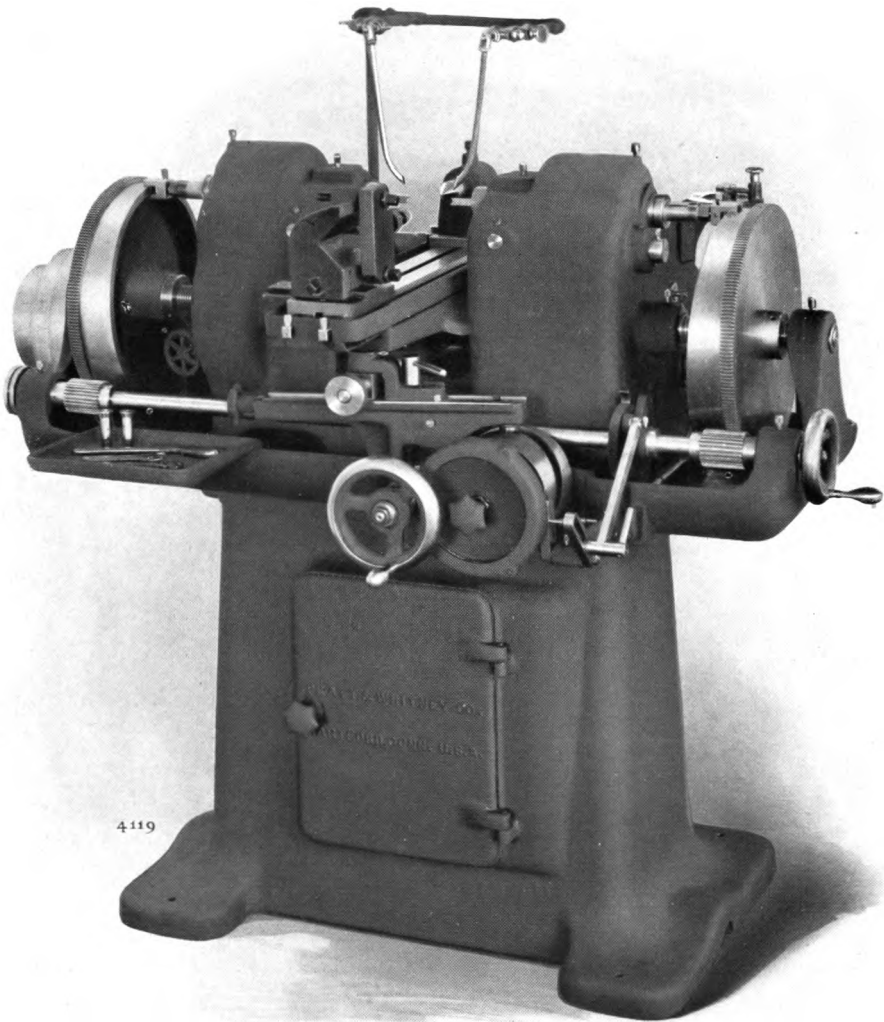
Made in one size. Regularly furnished with 8-Notch Index Ring, tool steel (hardened and ground); 2-Jaw Chuck with Blank Inserted Jaws and suitable Wrenches.

	No. 2
Hole through	1 1/2"
Jaws, width	1 1/8"
Total height of fixture	5 1/2"
Base, dimensions	9 1/4" x 5 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

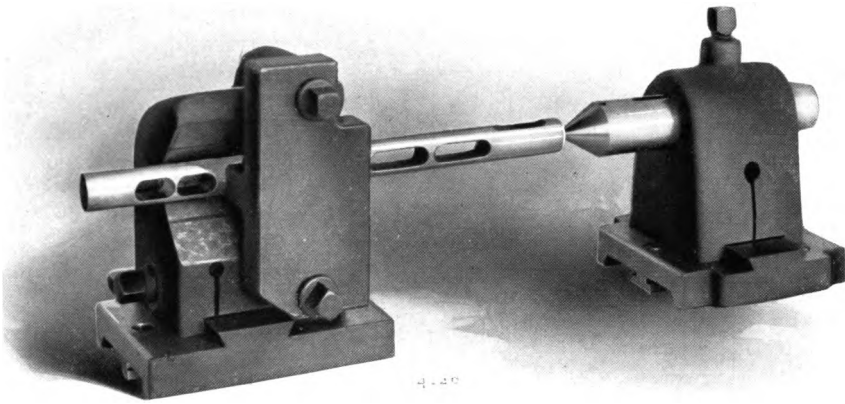
A new tool of exceptional merit, designed for the economical milling of slots and splines with closed ends, such as gun receivers, adjustable sights, tang-slots in collets, etc. Machine can be furnished with special fixtures for milling circular, spiral or irregular grooves.

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.

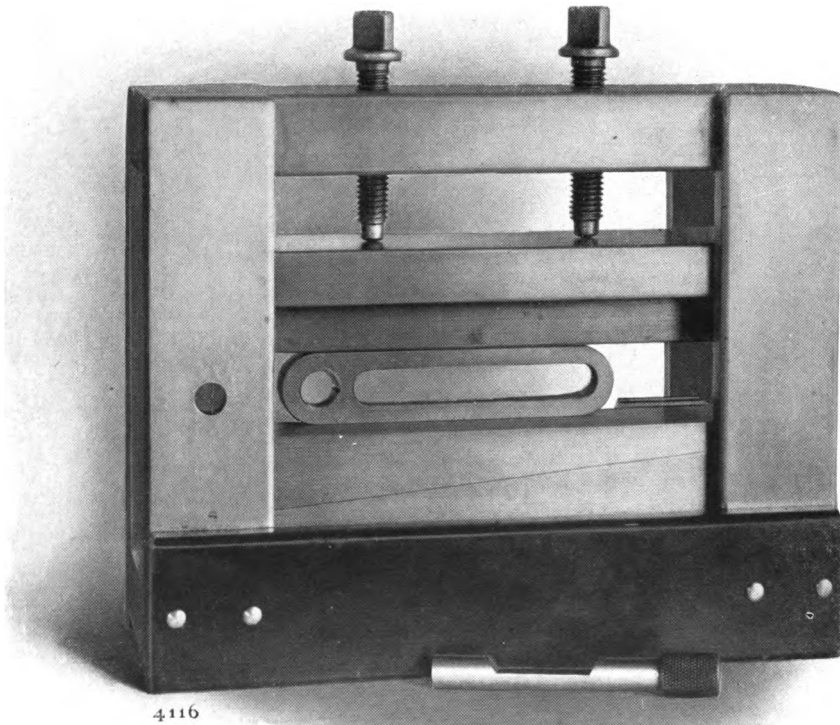
SPECIFICATIONS

RANGE	Table Travel 0" to 4" Table Top to Center of Cutter Spindles 3 1/2" 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 4 1/4" Belt Width (Cone) 2" Belt Width (Counter. Pulley) 4 1/8" Countershaft Speeds, R. P. M. 250 and 325
FEEDS	Table Feeds (5), P. R. Sp. 1/4" stroke0007" to .0057" Table Feeds (5), P. R. Sp. 4" stroke0112" to .092" Spindle Feed, per notch of Feed Ratchet0028"
FLOOR SPACE	Floor Space 56 1/2" x 43 1/2"
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, 1/4" and 7/8"). 2 Cutters, any size, with 2 or 4 lips. Countershaft (2-speed Friction). Set of Wrenches. (See attachments on following pages).

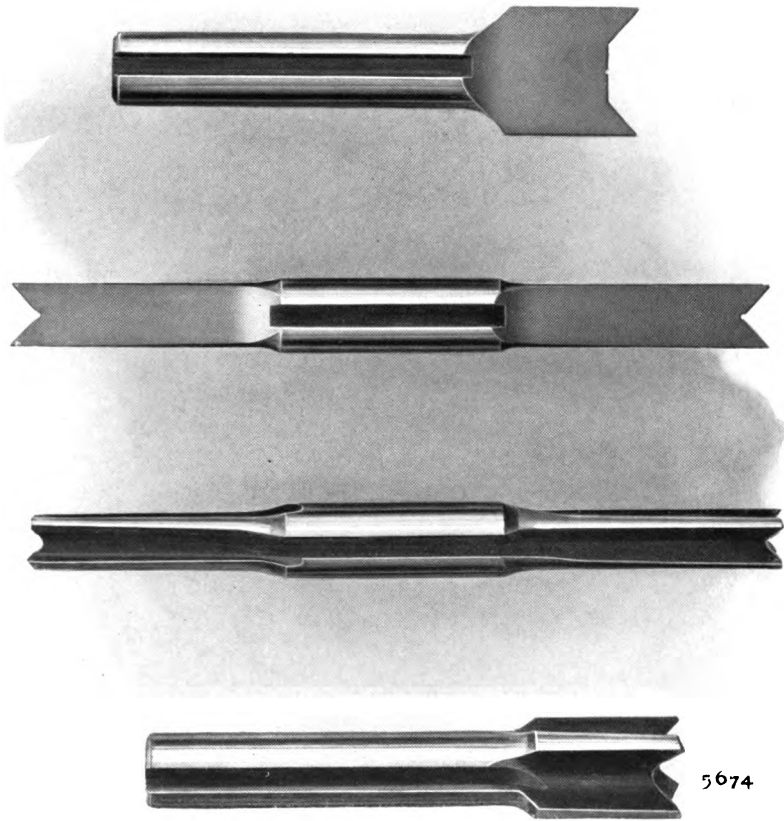
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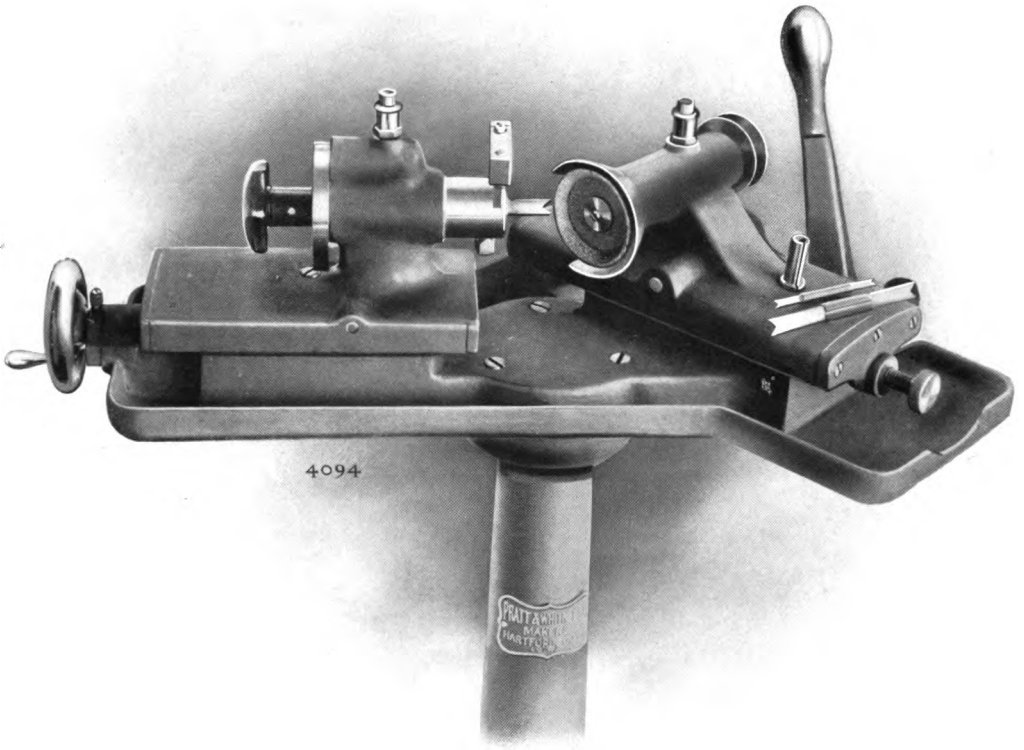
Universal Vise and Foot Stock for Round Work-- Sample of Work Shown in Place



Universal Vise for Square and Flat Stock with Work in Place



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



(Patented)

Grinding Machine for Fish-tail Cutters

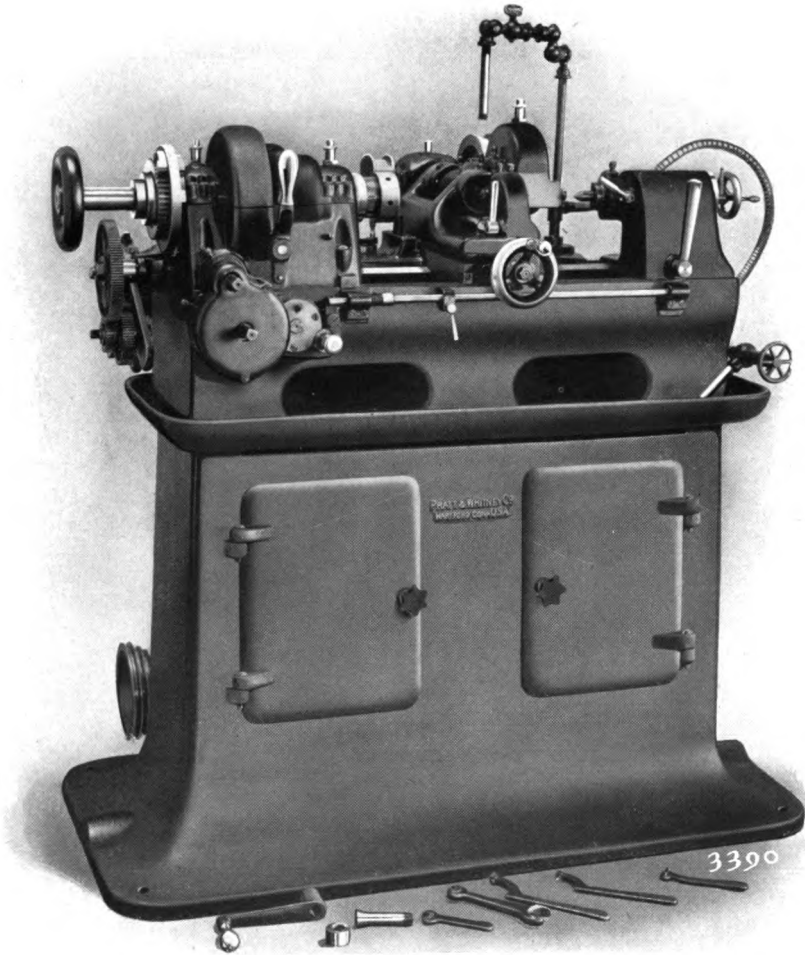
FISH-TAIL CUTTER GRINDER

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 7/8") and Countershaft.	

Code words, page 265.



(Patented)

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

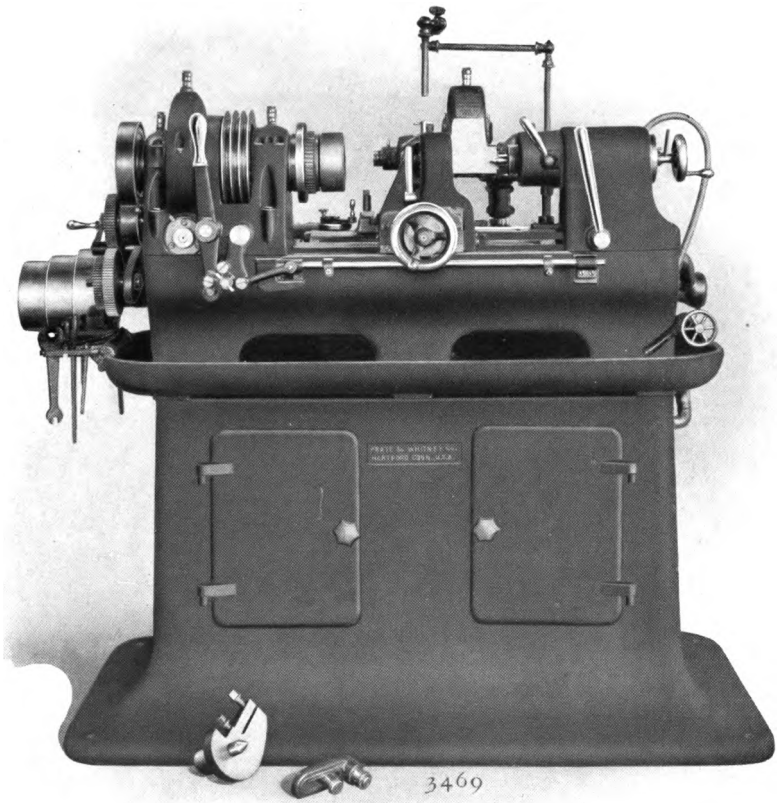
4½ X 12-INCH THREAD MILLING MACHINE

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

RANGE	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	3⁄8"
	Collet Capacity (Spindle)	1"
	Collet Capacity (Draw-back Attachment)	5⁄8"
	Hole through Spindle	1 1⁄8"
	Follow Rest Capacity	1 3⁄4"
	Index Ring (Regular), 48 notches	
Lead Screw (Regular), 2 Pi.; (Metric), 12 m/m P.		
CUTTERS	Diameters	1 ¼" and 1 5⁄8"
	Hole	7⁄8"
SPEEDS	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"	
FLOOR SPACE	Floor Space	29" x 52"
WEIGHTS	Machine, with Regular Equipment	1850
	Crating Material (domestic), approximate pounds	200
	Boxing Material (foreign), approximate pounds	550
	Box, cubic feet	65
REGULAR EQUIPMENT	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.		
INTERNAL MILLING	The Machine can be arranged for internal milling, to order.	
CUTTERS	Cutters either U. S., V., International or Whitworth Standards, 1 ¼" and 1 5⁄8" diameters, are carried in stock.	
DRAW-BACK COLLET MECHANISM	With Collets, any size from 3⁄8" to 5⁄8" inclusive, by 16th, can be furnished to order.	

Code words, page 265.



(Patented)

6 x 14-inch Thread Milling Machine

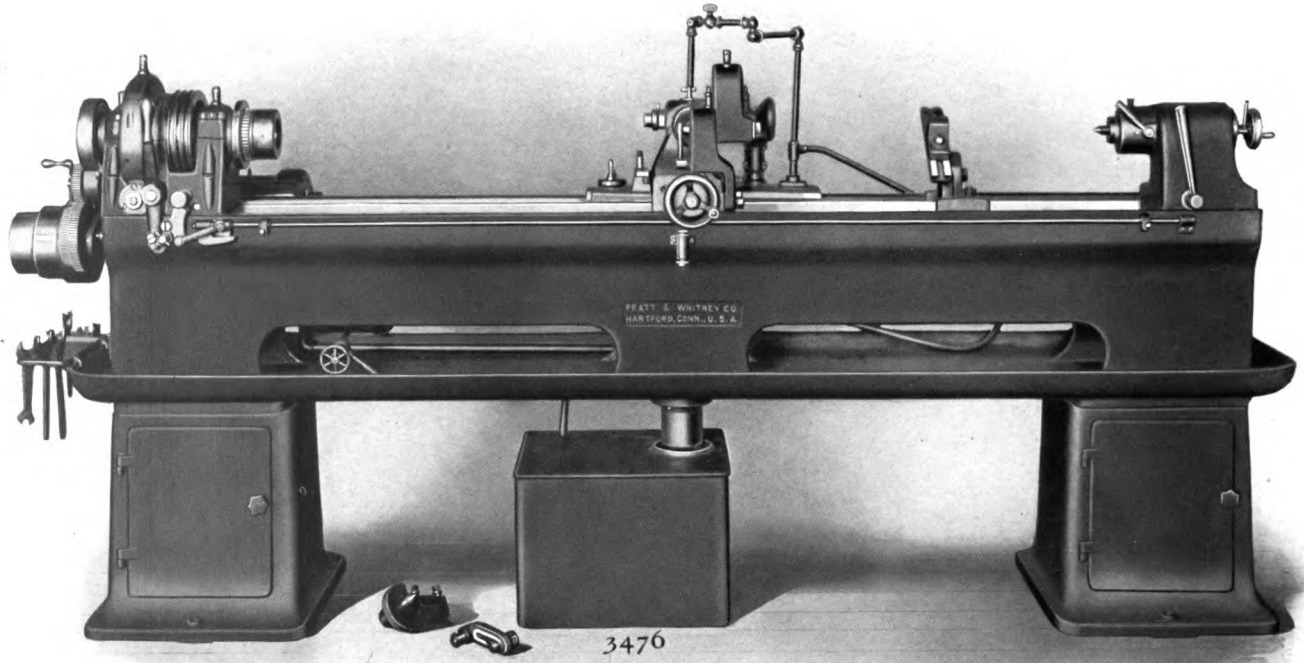
6-INCH THREAD MILLING MACHINE

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) $\frac{7}{8}$ " Depth that can be cut (Oversize Cutter Head) $\frac{5}{8}$ " Collet Capacity, Spindle (Regular Head) 2" Collet Capacity, Spindle (Oversize Head) 3" Collet Capacity, Drawback (Regular and Oversize) $\frac{7}{8}$ " 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", $2\frac{1}{4}$ ", $2\frac{3}{8}$ " Diameter for Oversize Cutter Head $2\frac{5}{8}$ " and $3\frac{1}{4}$ " Hole for Regular Cutter Head $\frac{3}{4}$ " 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) $5\frac{3}{8}$ 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 $4\frac{3}{4}$ "																										
FLOOR SPACE	<table style="width: 100%; border: none;"> <tr> <td style="border: none;">Machine</td> <td style="border: none;">6" x 14"</td> <td style="border: none;">6" x 48"</td> <td style="border: none;">6" x 80"</td> <td style="border: none;">6" x 132"</td> </tr> <tr> <td style="border: none;">Floor Space</td> <td style="border: none;">41" x 61",</td> <td style="border: none;">41" x 7'11",</td> <td style="border: none;">41" x 10'7",</td> <td style="border: none;">41" x 14'11"</td> </tr> </table>	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"																
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 . . .	<table style="width: 100%; border: none;"> <tr> <td style="border: none;"></td> <td style="border: none;">6" x 14"</td> <td style="border: none;">6" x 48"</td> <td style="border: none;">6" x 80"</td> <td style="border: none;">6" x 132"</td> </tr> <tr> <td style="border: none;">Machine, Regular Equipment, net pounds</td> <td style="border: none;">2650</td> <td style="border: none;">3200</td> <td style="border: none;">3800</td> <td style="border: none;">5125</td> </tr> <tr> <td style="border: none;">Crating Material (domestic), approximate pounds</td> <td style="border: none;">300</td> <td style="border: none;">350</td> <td style="border: none;">600</td> <td style="border: none;">1000</td> </tr> <tr> <td style="border: none;">Boxing Material (foreign), approximate pounds</td> <td style="border: none;">900</td> <td style="border: none;">1000</td> <td style="border: none;">1200</td> <td style="border: none;">2000</td> </tr> <tr> <td style="border: none;">Box, cubic feet</td> <td style="border: none;">117</td> <td style="border: none;">153</td> <td style="border: none;">195</td> <td style="border: none;">275</td> </tr> </table>		6" x 14"	6" x 48"	6" x 80"	6" x 132"	Machine, Regular Equipment, net pounds	2650	3200	3800	5125	Crating Material (domestic), approximate pounds	300	350	600	1000	Boxing Material (foreign), approximate pounds	900	1000	1200	2000	Box, cubic feet	117	153	195	275	
	6" x 14"	6" x 48"	6" x 80"	6" x 132"																							
Machine, Regular Equipment, net pounds	2650	3200	3800	5125																							
Crating Material (domestic), approximate pounds	300	350	600	1000																							
Boxing Material (foreign), approximate pounds	900	1000	1200	2000																							
Box, cubic feet	117	153	195	275																							

Code words, page 265.

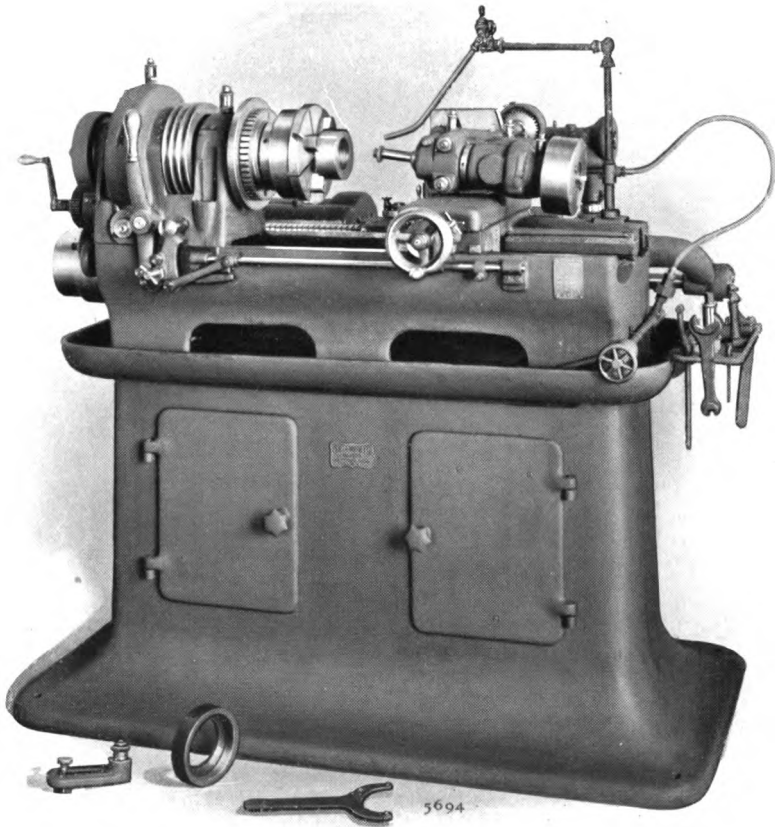


(Patented)
6 x 80-inch Thread Milling Machine

6-INCH THREAD MILLING MACHINE

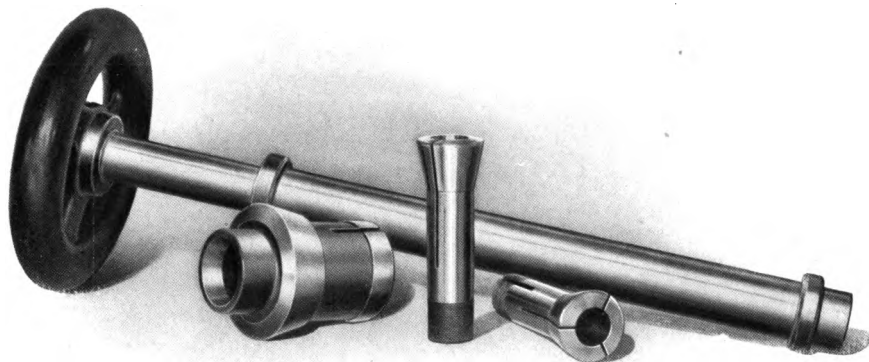
<p>REGULAR EQUIPMENT</p>	<p>The Machine, with Oil Pump, Tank and Piping. 1 Spindle Collet, 2" hole. 1 Spindle Collet Bushing (round), any size up to 1 3/4". 1 Follow Rest, with 1 Bushing, any size up to 2". 1 Stationary Rest (on 6" x 80" and 6" x 132" Machines). 1 Live Center and Work Driver. 1 Index 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.</p>
<p>OVERSIZE HEAD TAILSTOCK AND FOLLOW REST</p>	<p>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.</p>
<p>SPECIAL HEAVY CUTTER HEAD</p>	<p>Designed for Cutters up to 3 1/4" diameter, 1" hole, and is capable of milling a thread 3/8" deep at one cut. Furnished to order in place of regular cutter head and especially recommended in connection with oversize head parts.</p>
<p>INTERNAL MILLING</p>	<p>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.</p>
<p>BACKING-OUT ATTACHMENT</p>	<p>To enable depth of cut to be tapered out to zero in three turns of spindle. (Furnished to order).</p>
<p>COMPOUND TAPER ATTACHMENT</p>	<p>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.</p>
<p>POWER QUICK RETURN DEVICE</p>	<p>Furnished to order on 6" x 80" and 6" x 132" machines.</p>
<p>DRAW-BACK COLLET ATTACHMENT</p>	<p>With Collets from 3/8" to 7/8" inclusive by 16th. (Furnished to order). Cut on page 149.</p>
<p>CUTTERS . . .</p>	<p>U. S., V., International, Worm and Acme Standards are carried in stock.</p>
<p>SPECIAL EQUIPMENTS</p>	<p>These machines may be furnished with special equipments to meet demands out of the ordinary. Full information furnished upon receipt of drawings or samples.</p>

Code words, page 265.



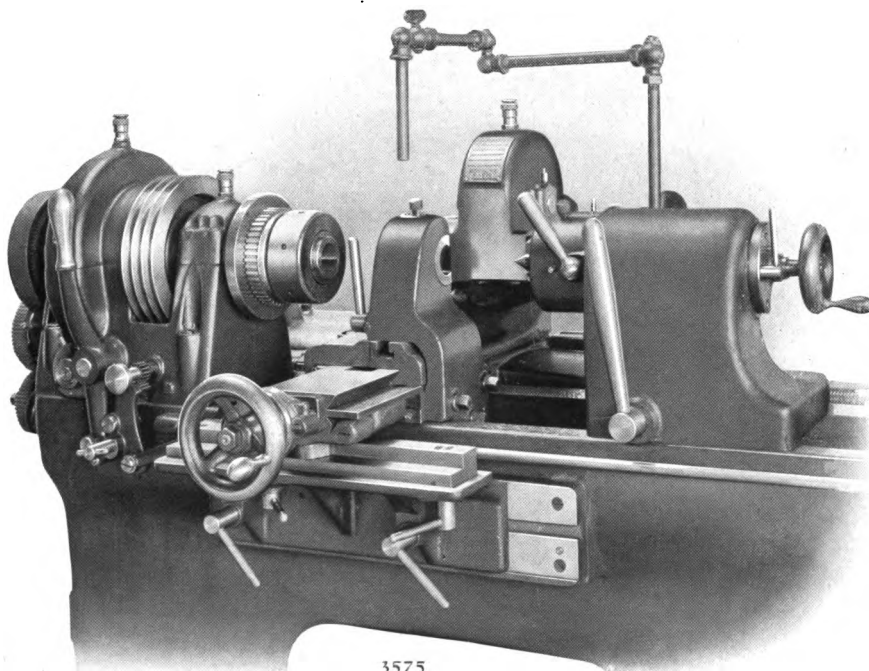
(Patented)

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



3606

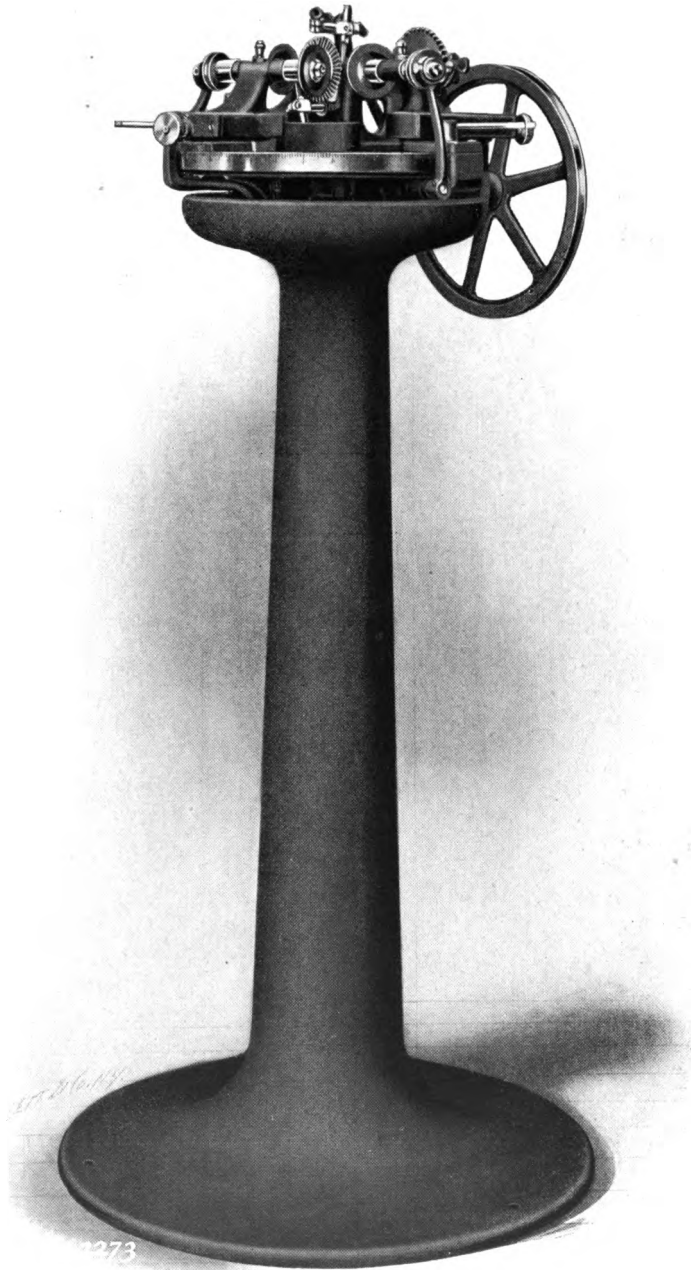
Draw-back Collet Attachment



3575

(Patented)

Taper Milling Attachment



Wm. H. ...

2273

(Patented)

Automatic Cutter Grinder

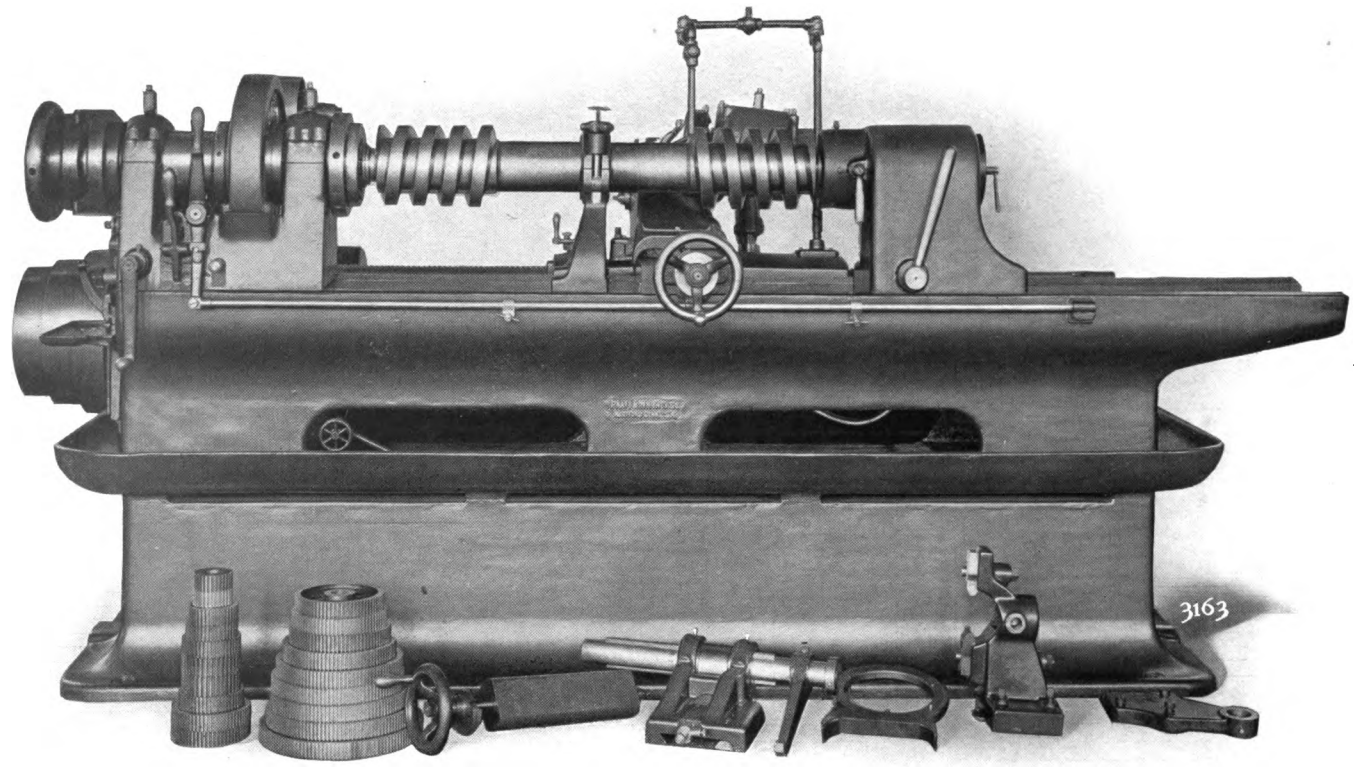
AUTOMATIC GRINDER FOR THREAD MILLING. CUTTERS

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) $6'' \times 1\frac{3}{8}''$ 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 $\frac{1}{8}''$, $\frac{3}{4}''$ 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

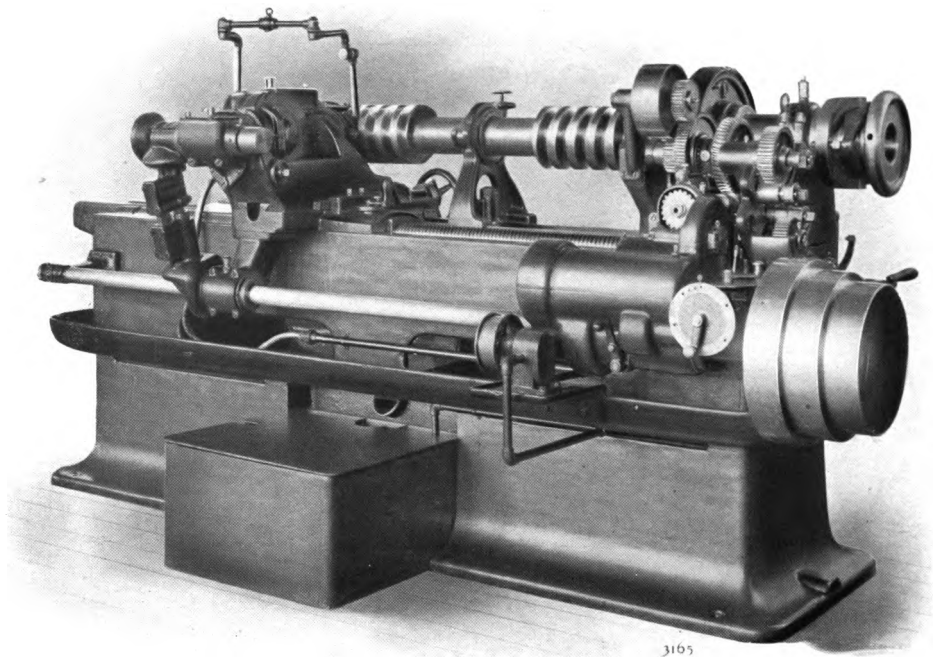
12 X 48-INCH THREAD MILLING MACHINE

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.

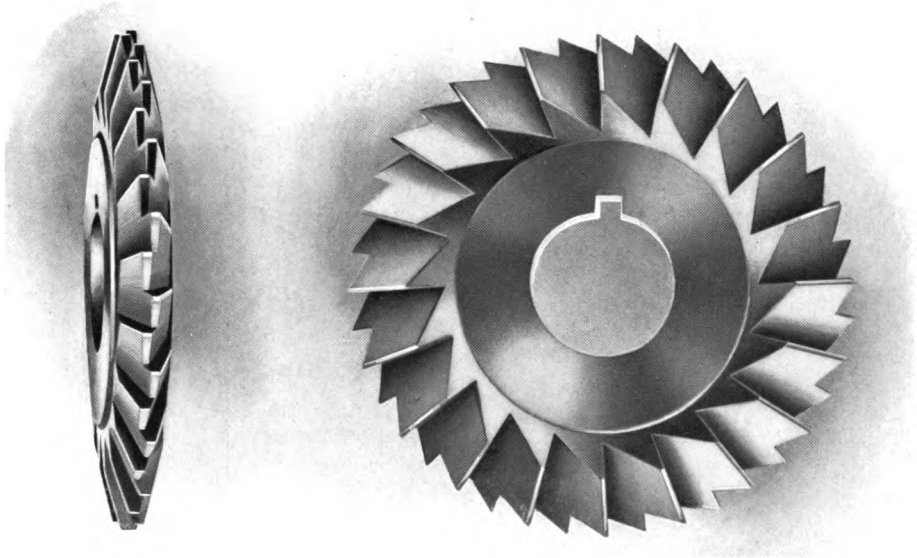
SPECIFICATIONS

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 5/8"
	Collet Capacity	3 1/2"
	Hole through Spindle	3 9/8"
	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 1/2", 5", 5 1/2", 6"
	Diameters, Oversize Cutter Head, maximum	6 1/2"
	Hole, Regular Cutter Head	1 3/8"
	Hole, Oversize Cutter Head	1 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 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 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 1/2" diameter. 1 Collet Bushing (round), any size up to 3 1/4" diameter. 1 Tailstock Bushing, any size up to 3 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.	

Code words, page 265.

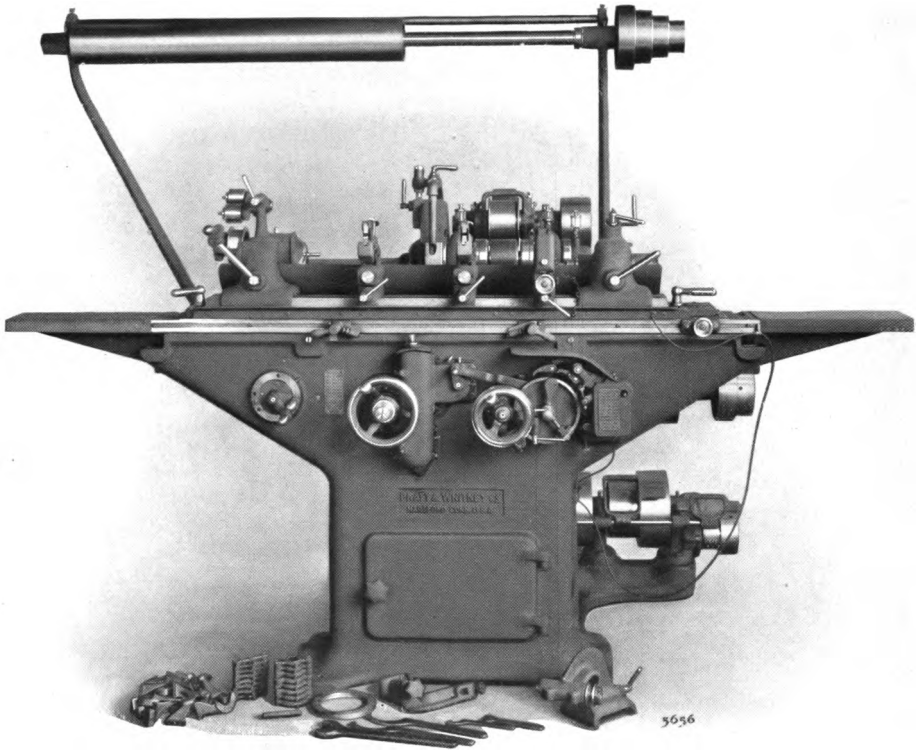


Rear View: 12 x 48-inch Thread Milling Machine



(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.

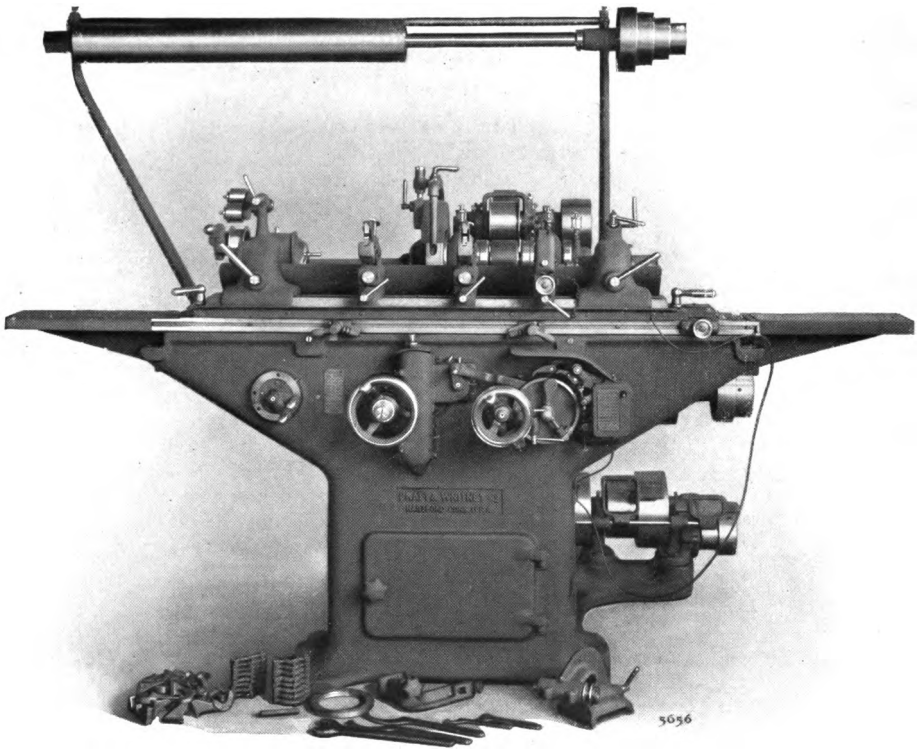
Overhead Driving Mechanism Consists of but a tight and loose pulley countershaft. The other necessary driving parts have been simplified and placed within easy reach of the operator by being made a part of the machine proper.

SPECIFICATIONS

RANGE	Center Distance, maximum	30"
	Swing over Table	4"
	Taper, per foot, maximum	2"
GRINDING WHEELS	Diameter	12"
	Width	1/2" to 1 3/4"
	Hole	5"
WHEEL SPINDLE	Tool Steel (H. & G.); Cylindrical Bearings, diameter	1 3/4" and 1 1/8" 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 5 1/4"
	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, 1/2 to 12 teeth feed, reducing diameter of work . . . . .	.000125" to .003"
FLOOR SPACE	Floor Space	10' 8" x 46 1/4"
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, 1/4" to 2").	
	16 Work Dogs (1/4" to 2 1/4").	
	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"

GRINDING WHEELS	Diameter	12"
	Width	1" to 2½"
	Hole	5"

WHEEL SPINDLE	Tool Steel (H. & G.) ; Cylindrical Bearings, diameter . . . 1 ¾" and 1 ⅓" x 5" Boxes, Bronze; conical on O. D., adjustable for wear. *Taper Hole in Head and Tailstock Spindles, Jarno Taper, No. 8.	

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 5 ¼"
	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"	

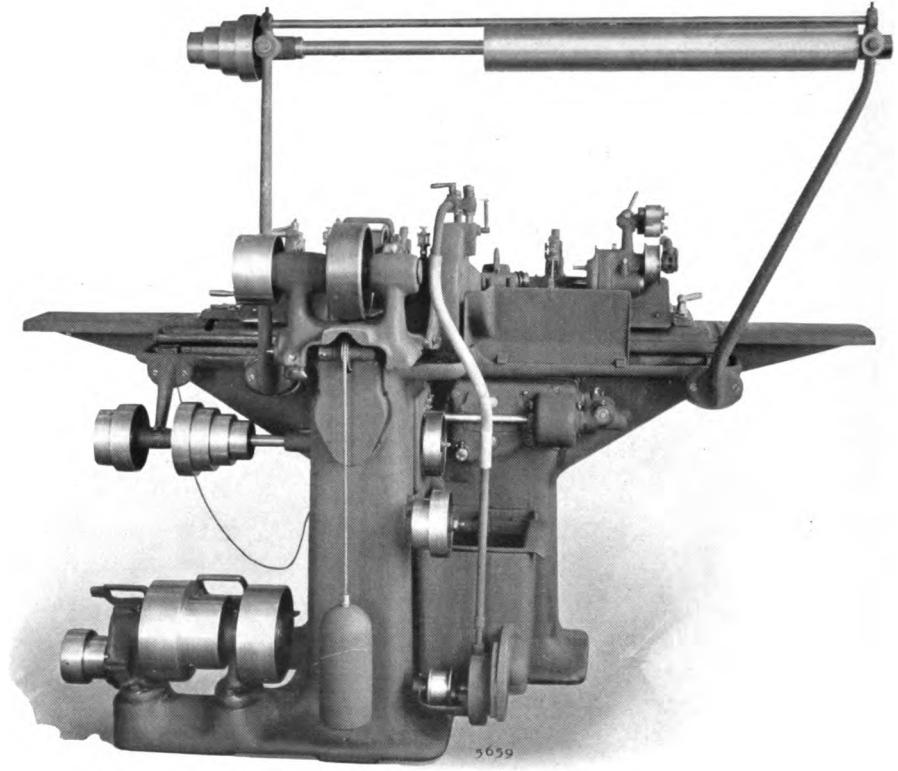
FLOOR SPACE	Floor Space	13' 3" x 50 ⅜"

WEIGHTS	Machine, with Regular Equipment, net pounds	4400
	Crating Material (domestic), approximate pounds	400
	Boxing Material (foreign), approximate pounds	1200
	Box, cubic feet	190

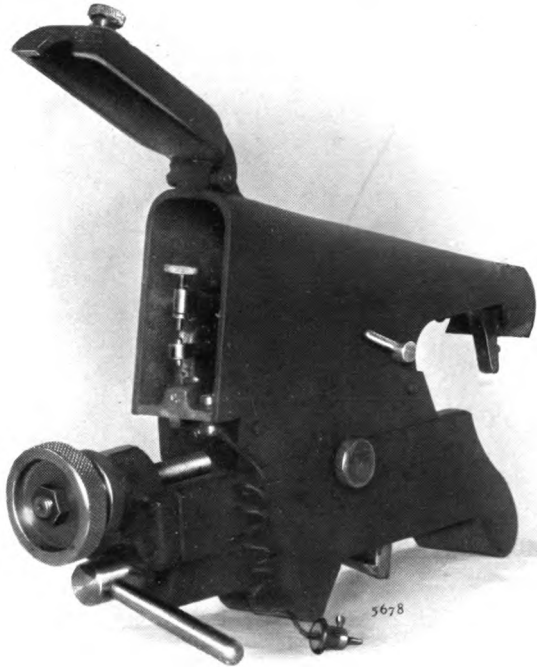
REGULAR EQUIPMENT	The Machine, with Automatic Sizing Device. 1 Grinding Wheel. 1 Wheel Truing Device. 1 Center Grinding Attachment. 2 Universal Back-rests. 36 Back-rest Shoes (2 each, ¼" to 2"). 18 Work Dogs (¼" to 2 ¾"). Set of Wrenches and Countershaft.	

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

Code words, page 265.

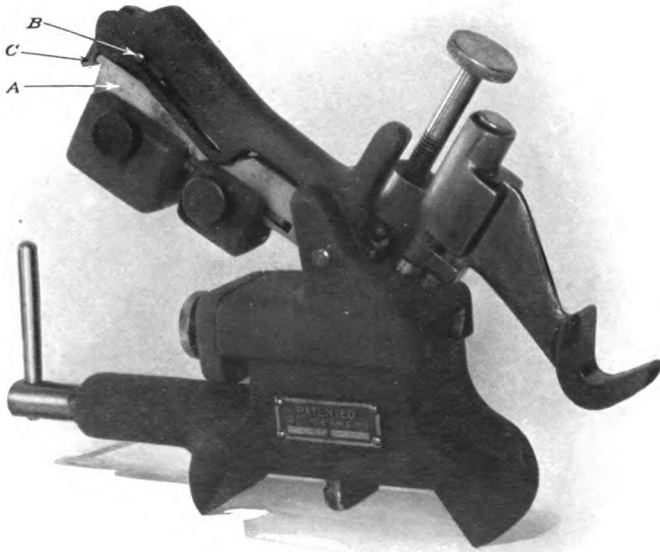


Cylindrical Grinder: Rear View

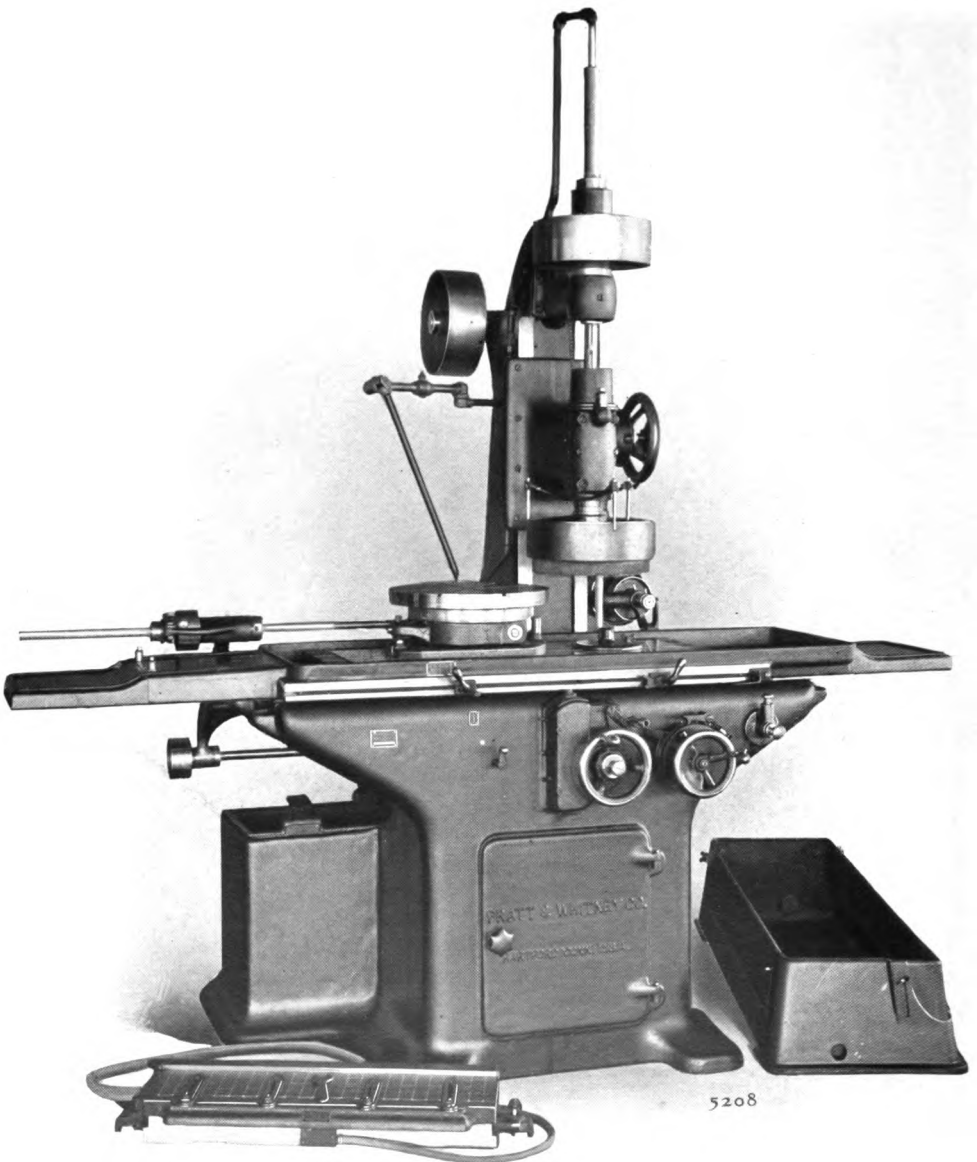


(Patented)

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



Automatic Positive Feeding Back-rests for Cylindrical Grinders



(Patented)

3-foot Vertical Surface Grinder

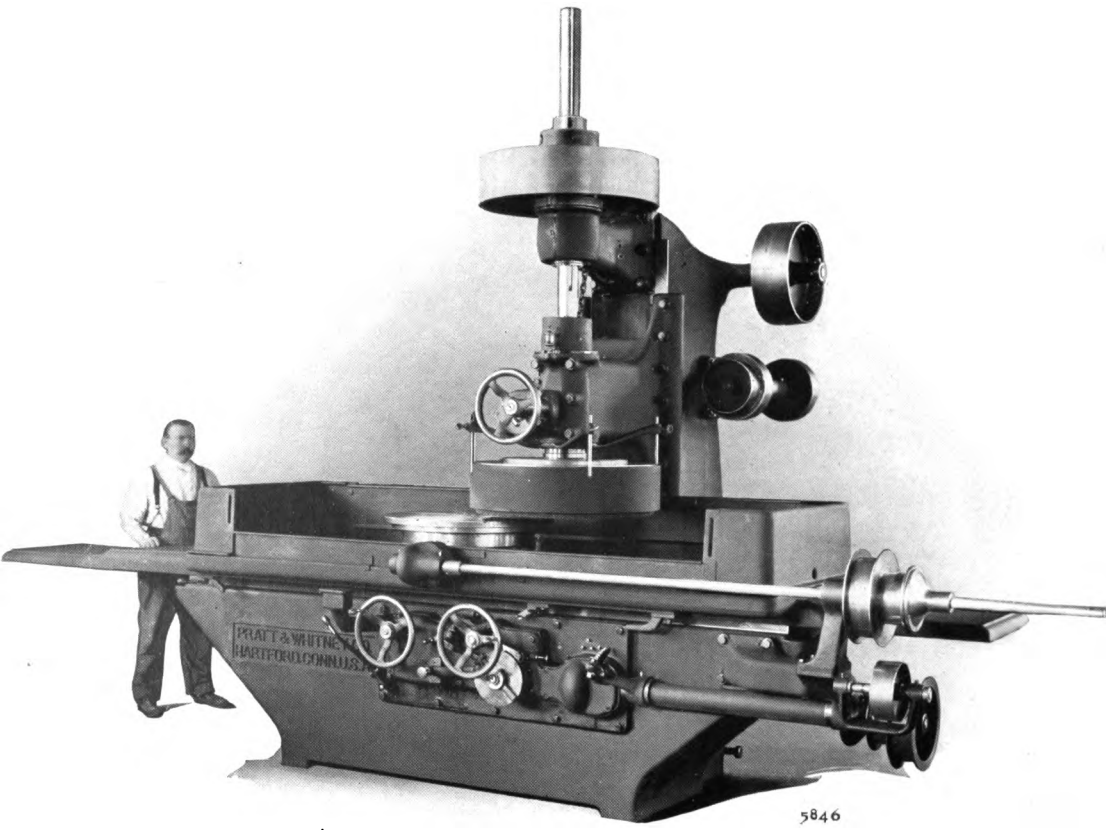
3-FOOT VERTICAL SURFACE GRINDER

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 $\frac{3}{4}$ " x 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 $\frac{1}{4}$ " x 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" x 4 $\frac{1}{4}$ "
	Pulley (Driving on Counter.)	20" x 6 $\frac{1}{4}$ "
	Pulleys (Counter., tight and loose)	14" x 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 $\frac{1}{2}$ " x 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.



(Patented)
6-foot Vertical Surface Grinder

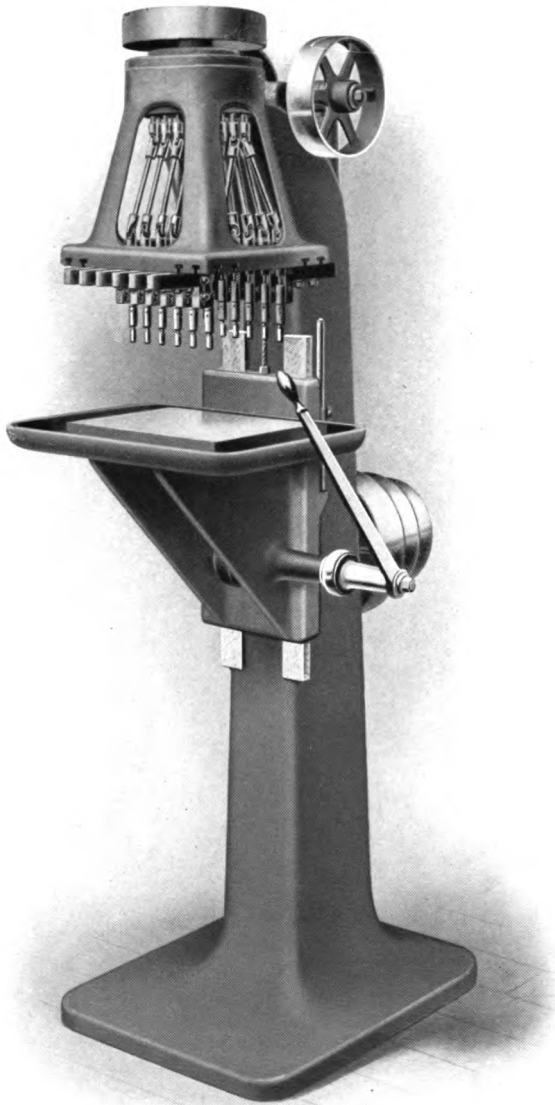
6-FOOT VERTICAL SURFACE GRINDER

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, 3⅜".	
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. Countershaft and wrenches are furnished with all machines.

SPECIFICATIONS

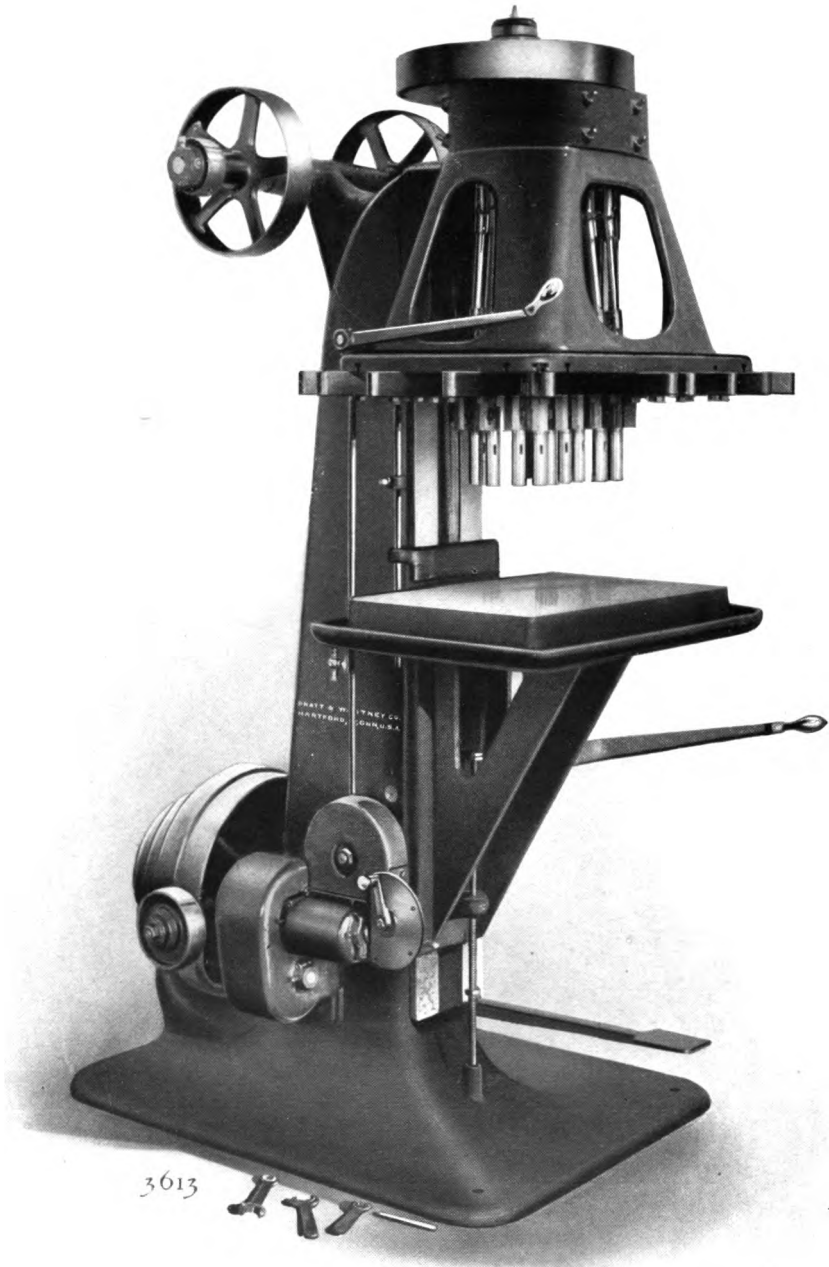
RANGE	Table Working Surface (Square Head) Table Working Surface (Rectangular Head) *Table Top to ($\frac{3}{4}$ " Spindle Ends, minimum) *Table Top to ($\frac{3}{4}$ " Spindle Ends, maximum) Vertical Travel of Knee on Column Column Face to Head Center (Square Head) Column Face to Head Center (Rectangular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

SPECIFICATIONS

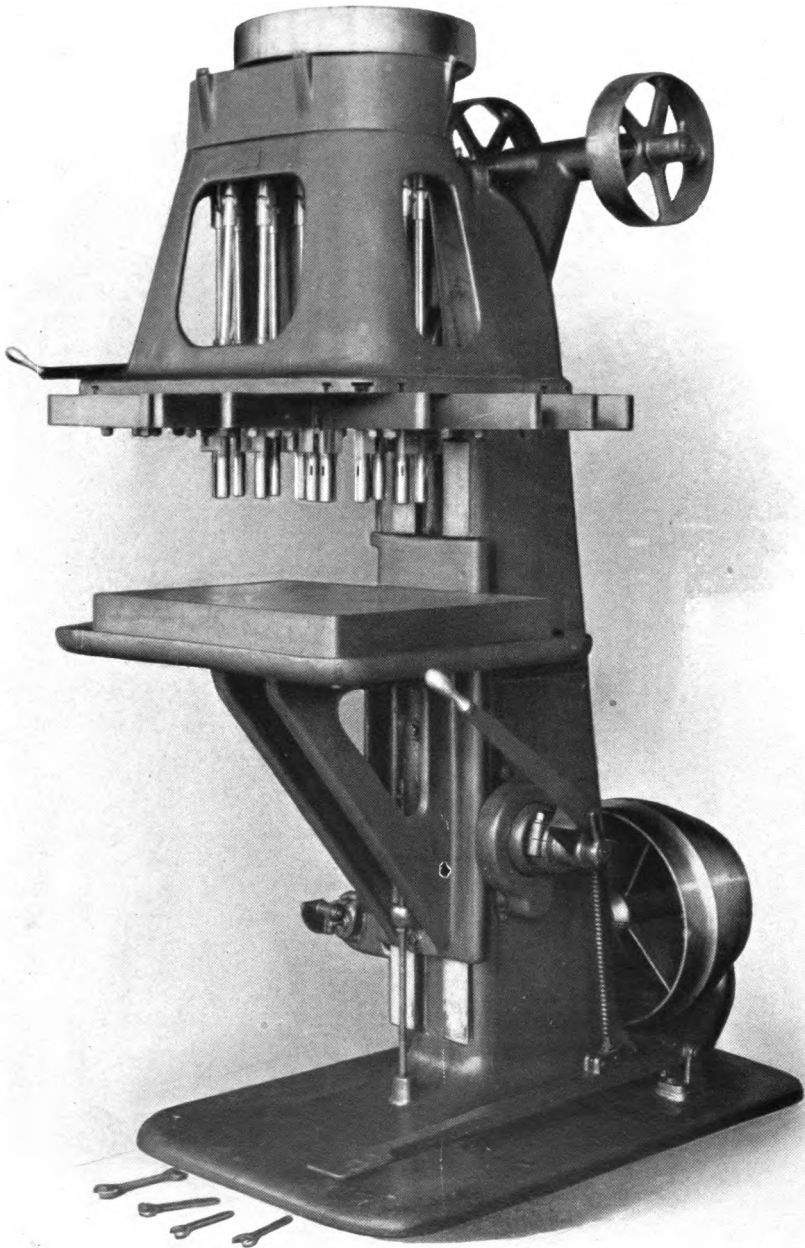
RANGE	Table Working Surface (Square Head)	23½" x 20¾"
	Table Working Surface (Rectangular Head)	29½" x 18¾"
	*Table Top to (1¼") Spindle Ends, minimum	4½"
	*Table Top to (1¼") Spindle Ends, maximum	34"
	Vertical Travel of Knee on Column	18½"
	Vertical Adjustment of Table in Knee	10⅞"
	Column Face to Head Center (Square Head)	11¾"
	Column Face to Head Center (Rectangular Head)	10⅝"
	Drilling Capacity (diameter, Drills)	⅛" to ⅜"
SPINDLES . . .	Spindle Center Distance, minimum diameter of Spindle plus	⅜"
	Spindle Center Distance, maximum (Square Head)	10" x 10"
	Spindle Center Distance, maximum (Rectangular Head)	8" x 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	1¼"
	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" x 2½"
	Pulley (Countershaft)	10" x 4¼"
	Belt Width (Driving Pulley)	2¼"
	Belt Width (Counter. Pulleys)	4"
	Countershaft 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" x 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

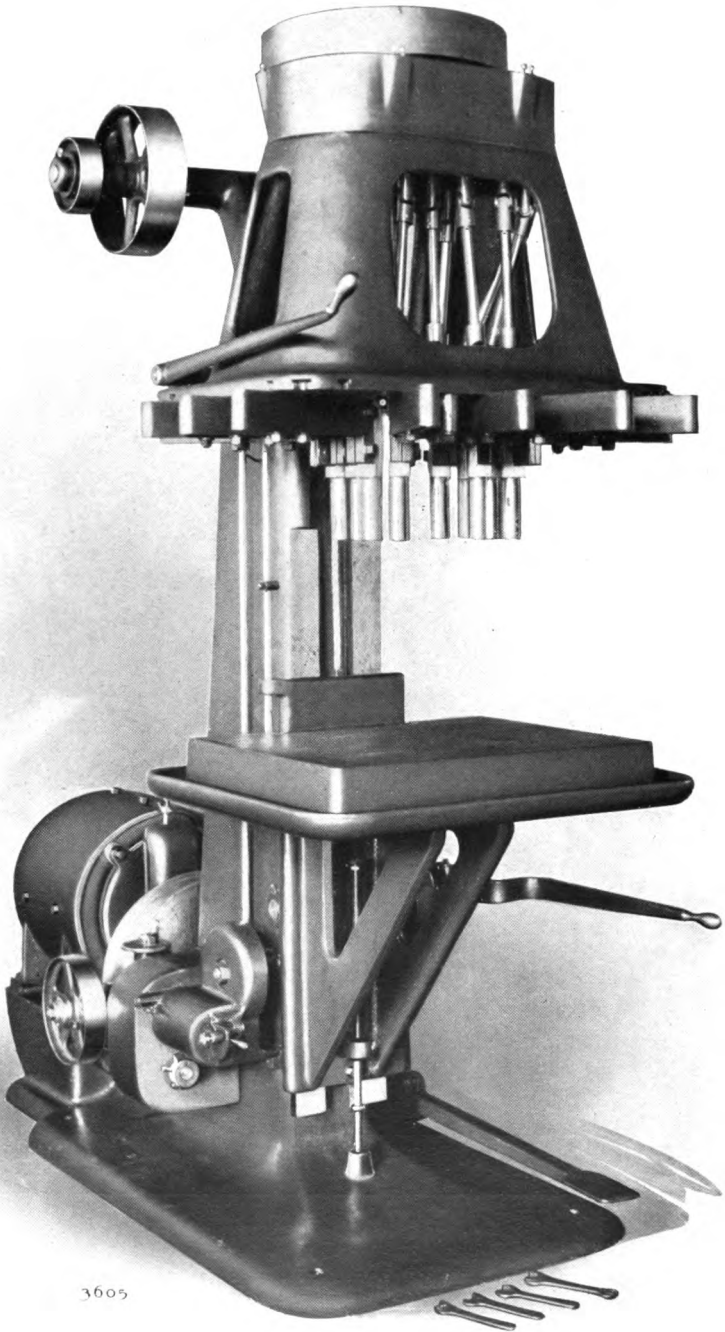
RANGE	Table Working Surface (Square Head)	29 1/4" x 26 1/4"
	Table Working Surface (Rectangular Head)	34 3/4" x 26 1/4"
	*Table Top to (1 1/4") Spindle Ends, minimum	7"
	*Table Top to (1 1/4") Spindle Ends, maximum	36 1/2"
	Vertical Travel of Knee on Column	17 1/4"
	Vertical Adjustment of Table in Knee	12 1/4"
	Column Face to Head Center (Square Head)	15 1/4"
	Column Face to Head Center (Rectangular Head)	14 1/4"
	Drilling Capacity (diameter, Drills)	3/8" to 1/2"
SPINDLES	Spindle Center Distance, minimum diameter of Spindle plus	1 3/8"
	Spindle Center Distance, maximum (Square Head)	13" x 13"
	Spindle Center Distance, maximum (Rectangular Head)	9" x 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 1/2"
	Spindles, Taper Hole (see page 173).	
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" x 3 1/2"
	Pulley (Countershaft)	12" x 4 3/4"
	Belt Width (Driving Pulley)	3 1/4"
	Belt Width (Counter. Pulleys)	4 1/2"
	Countershaft Speed, R. P. M.	550
† 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"
FLOOR SPACE	Floor Space	44" x 65"
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.



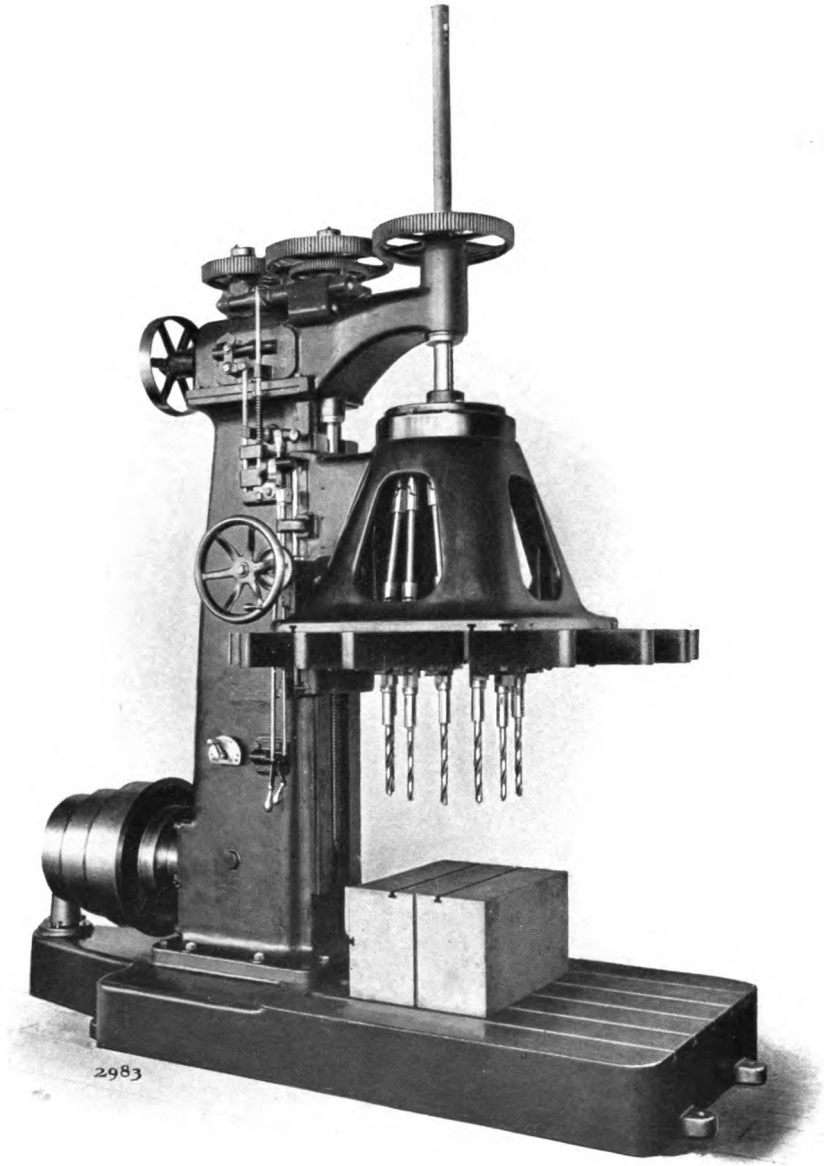
3605

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	$2\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{16}$
$\frac{1}{2}$	11, 12	4	$2\frac{1}{4}$	$\frac{5}{32}$	$\frac{3}{16}$	$\frac{1}{4}$
$\frac{5}{8}$	11, 12, 13	5	$2\frac{1}{4}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{5}{16}$
$\frac{3}{4}$	11, 12, 13	5	$2\frac{1}{4}$	$\frac{9}{32}$	$\frac{5}{16}$	$\frac{3}{8}$
$\frac{7}{8}$	12, 13	1	$2\frac{7}{8}$	$\frac{11}{32}$	$\frac{3}{8}$	$\frac{7}{16}$
1	12, 13	1	$2\frac{7}{8}$	$\frac{13}{32}$	$\frac{7}{16}$	$\frac{1}{2}$
$1\frac{1}{8}$	12, 13	1	$2\frac{5}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$
$1\frac{1}{4}$	12, 13	2	$3\frac{1}{8}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{3}{4}$
$1\frac{1}{2}$	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.



(Patented)

No. 14 Adjustable Multiple Spindle Drill

NO. 14 MULTIPLE SPINDLE DRILL

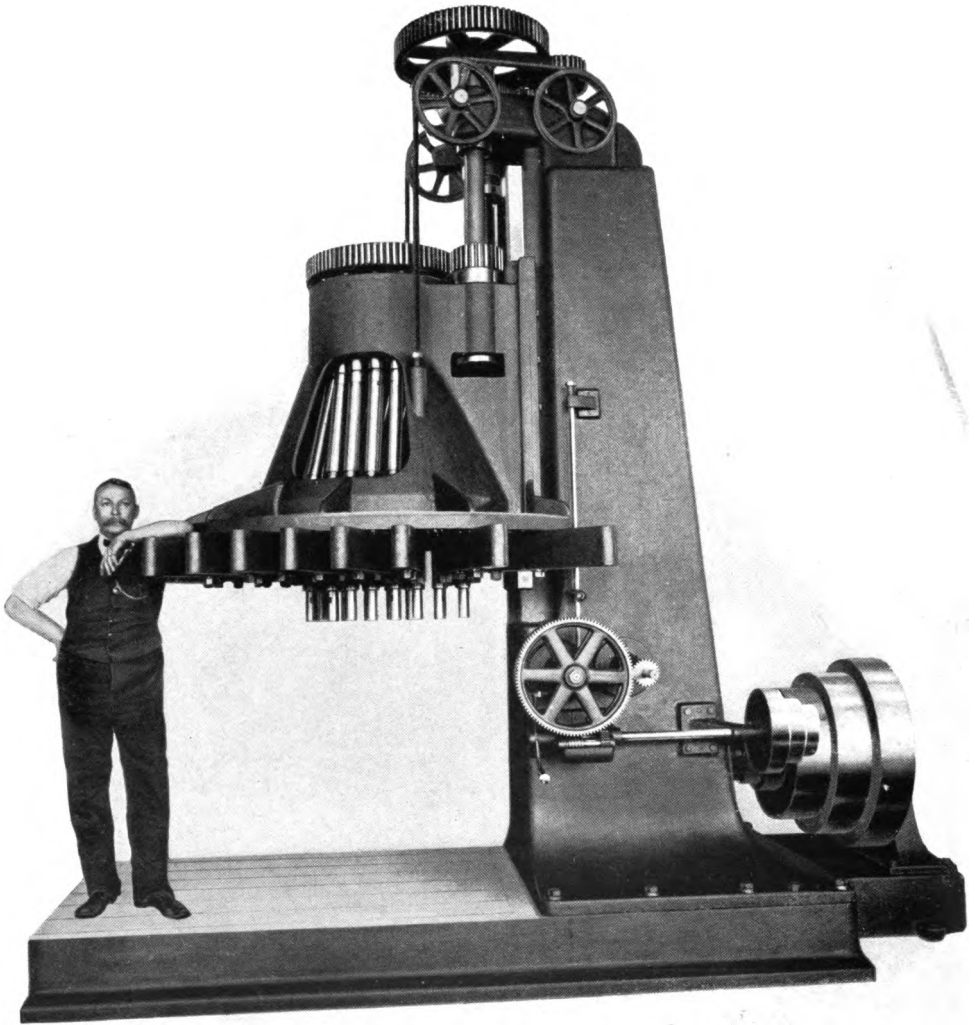
MADE TO ORDER

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 Base Top to (largest) Spindle Ends, maximum Vertical Travel of Head on Column Column Face to Head Center (Square Head) Column Face to Head Center (Rectangular Head) Drilling Capacity (diameter, Drills) T-slots in Base (5); $\frac{7}{8}$ " wide; $7\frac{1}{2}$ " apart.	45" x 52" 40" 32" 18" 18" $\frac{1}{2}$ " to 1"
BOX TABLE	(To order only), dimensions T-slots, $\frac{1}{8}$ " wide.	15" x 21" x 27"
SPINDLES	Spindle Center Distance, minimum diameter of Sps. plus Spindle Center Distance, maximum (Square Heads) Spindle Center Distance, maximum (Rectangular Heads) Spindles in Square Head, maximum number Spindles in Rectangular Head, maximum number Spindle, Vertical Adjustment ($2\frac{1}{4}$ " Spindle) Spindle Diameters, largest regularly used Spindle Taper Hole, No. 3 Morse.	$\frac{1}{8}$ " 20" x 20" and 26" x 26" 20" x 32" 12 16 3" $2\frac{1}{4}$ "
SPEEDS	Spindle Speeds (6), R. P. M. Cone Diameters (3), largest diameter Pulley (Counter., tight and loose) Belt Width (Cone) Belt Width (Counter. Pulleys) Countershaft Speed, R. P. M.	239 to 464 $23\frac{3}{4}$ " 18" x 8" 6" $7\frac{3}{4}$ " 280, 320
FEEDS	Power to Head (4), R. P. Sp. (Quick return by power or hand in either direction).	.004" to 0.123"
FLOOR SPACE	Floor Space	7' $2\frac{1}{2}$ " x 9' $11\frac{3}{8}$ "
WEIGHTS	Machine, with Square Head, net pounds Crating Material (domestic), approximate pounds Boxing Material (foreign), approximate pounds Box, cubic feet	14000 1000 3000 511

Code words, page 265.



2029

(Patented)

No. 7, Type G, Adjustable Multiple Spindle Drill

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

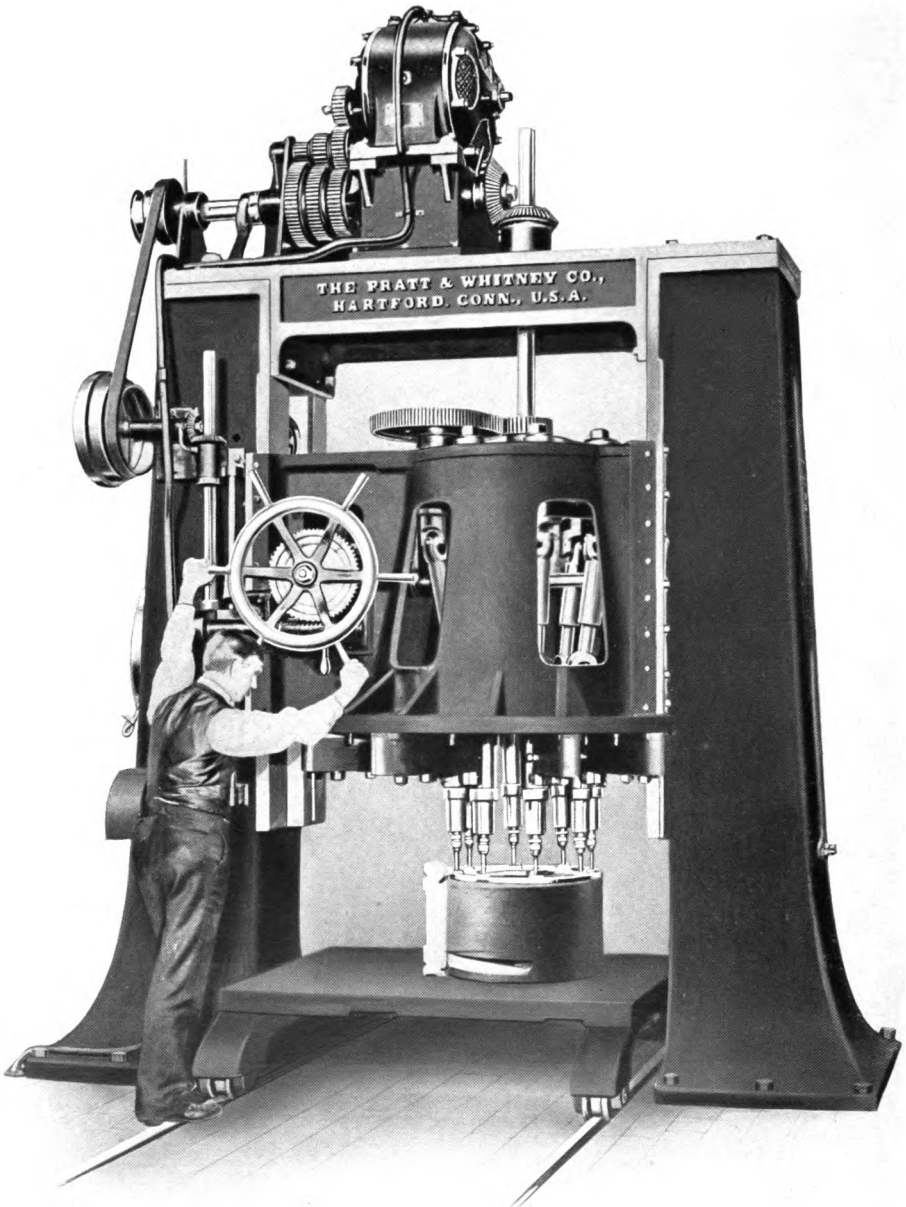
MADE TO ORDER

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	61 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)	5/8" 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

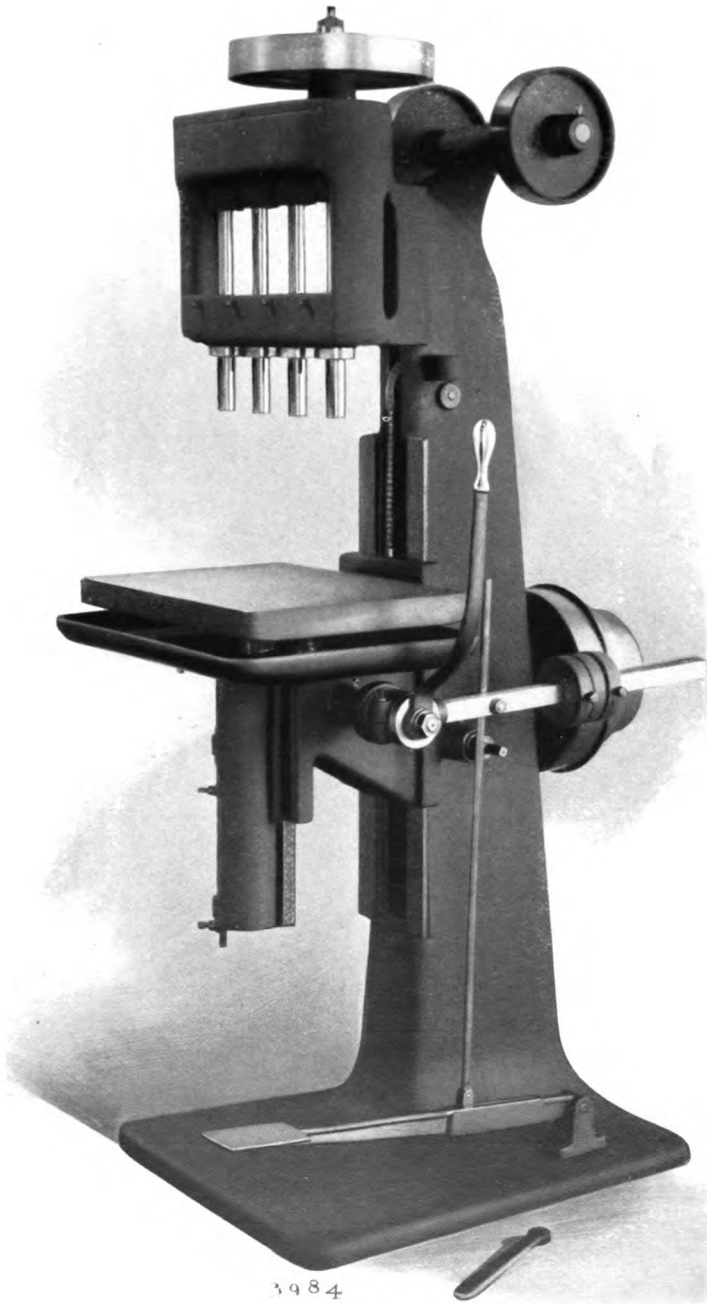
MADE TO ORDER

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	72½"
	Drilling Capacity (diameter, Drills)	1 5/8"
SPINDLES	Spindle Center Distance, minimum	4½"
	Spindle Center Distance (Rectangular Head), minimum	24 5/8" x 13 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	3½"
	Spindle, Vertical Adjustment	4½"
	Spindle Taper Hole, No. 4 Morse.	
SPEEDS	Spindle Speeds vary; approximate, R. P. M.	65 to 244
	Cone Diameters (3), large diameter	28"
	Pulley (Counter., tight and loose)	22" x 6½"
	Belt Width (Cone)	4"
	Belt Width (Counter. Pulleys)	6¼"
	Countershaft Speed, R. P. M.	385
FEEDS	Power to Head, R. P. Sp., varies; approximate (Quick return by power or hand in either direction).	.002" to .007"
FLOOR SPACE	Floor Space	150" x 61"
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

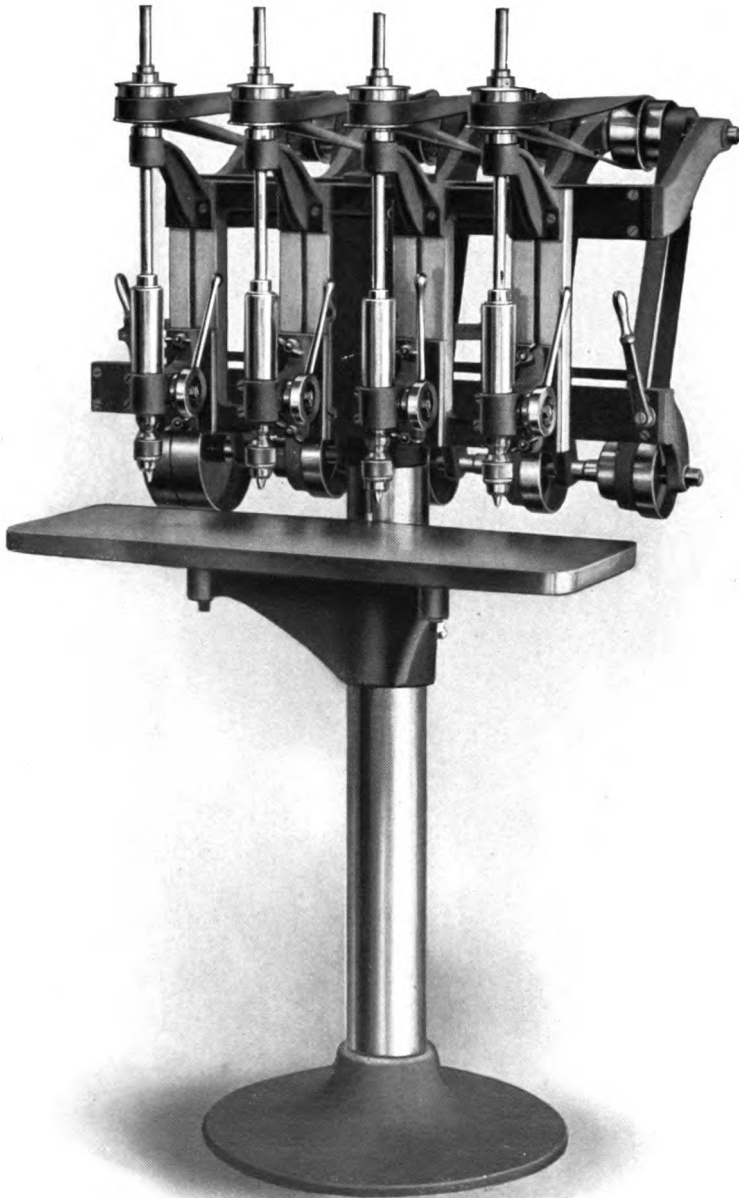
NO. 11 GANG DRILL

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 Table Top to Spindle Ends, maximum Vertical Movement of Table Vertical Adjustment of Knee on Column Column Face to Spindle Center Drilling Capacity (diameter, Drills)	15" x 20" 19" 7" 12" 8" ¾"
SPINDLES . .	Number (4); Tool Steel; Bearings, cylindrical; Lower Spindles Gear Driven. Boxes, Bronze. Taper Hole, No. 2 Morse. Center Distance between Spindles	1 ⅛" x 2 ¼" 4"
SPEEDS . . .	Spindle Speeds, 2 Central Spindles (4), R. P. M. Spindle Speeds, L. H. Outer Spindle (4), R. P. M. Spindle Speeds, R. H. Outer Spindle (4), R. P. M. Pulley (Head) Cone Diameters (2) Pulleys (Counter. Friction) Belt Width (Head Pulley) Belt Width (Cone) Belt Width (Counter. Pulleys) Countershaft Speeds, R. P. M.	289 to 477 463 to 764 723 to 1193 12" 8 ¼", 9 ⅜" 8" x 3 ¼" 2" 2 ⅞" 3" 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 Crating Material (domestic), approximate pounds Boxing Material (foreign), approximate pounds Box, cubic feet	1175 150 450 53
REGULAR EQUIPMENT	Machine, with Set of Wrenches. Countershaft (two-speed double friction). (Power Feed to Table to order).	

Code words, page 265.



2792

Four-spindle Sensitive Drill

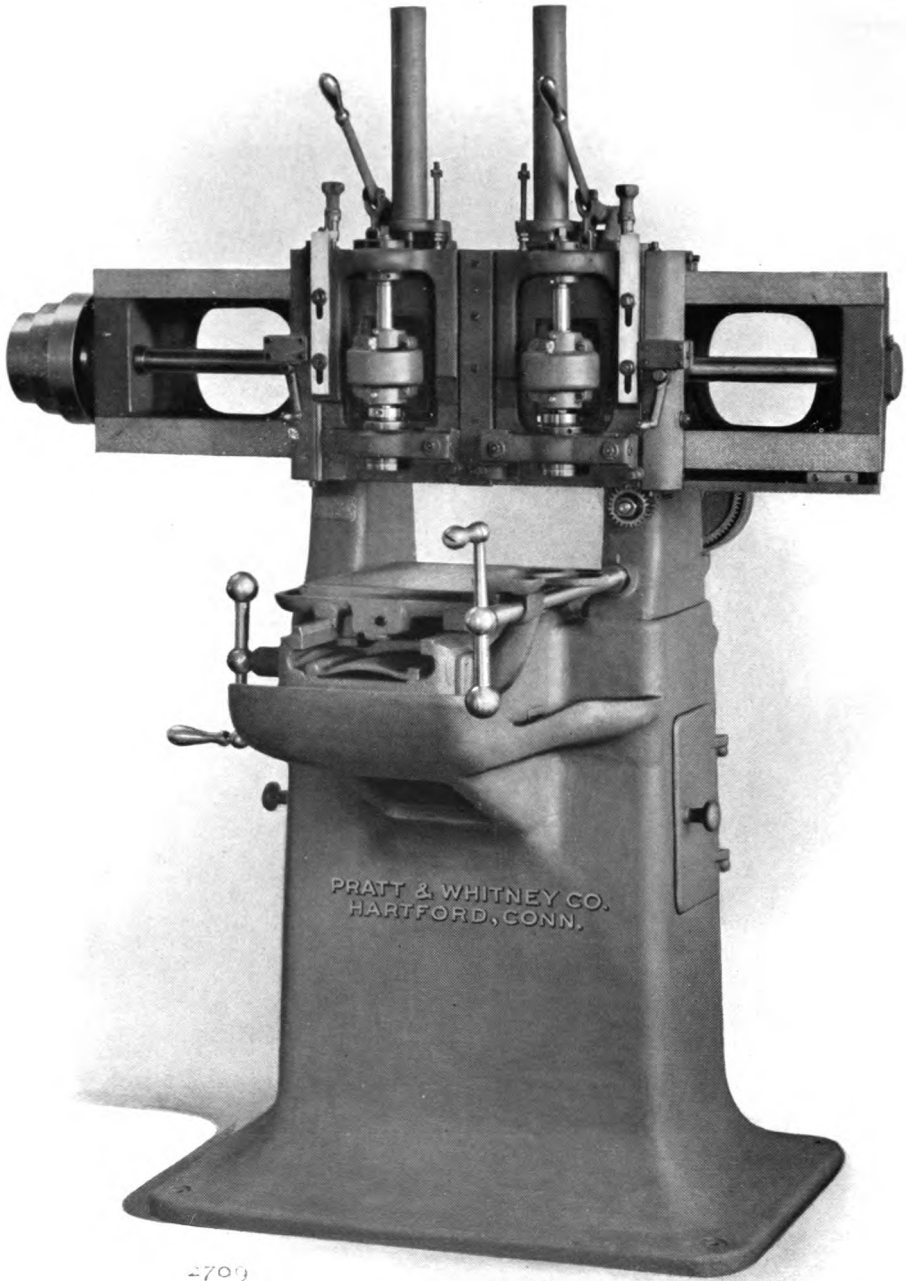
SENSITIVE DRILLS—SPECIFICATIONS

	One Spindle	Two Spindle	Three Spindle	Four Spindle	Bench Drill
Table Working Surface	9½" x 12½"	9½" x 19½"	10" x 27½"	12" x 34"	10½" x 14"
Table Top to Chuck, maximum distance	33"	32"	30¼"	30¼"	8¾"
Table, Vertical Adjustment Heads, Vertical Adjustment	30"	30"	26"	26"	6"
Drilling Capacity (*diameter Drills)	0" to ⅝"	0" to ⅝"	0" to ⅝"	0" to ⅝"	0" to ⅝"
Drilling Capacity, diameter work (Outer Spindle)	12"	14"	18"	23"	13"
Drilling Capacity, diameter work (Center Spindle)			12"	14"	
Spindles, Vertical Movement	2¼"	2¼"	2¼"	2¼"	2¼"
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
FLOOR SPACE					
Floor Space	22" x 30"	22" x 31½"	29¾" x 31½"	38" x 33½"	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.
 * ⅜-inch Drills are often used, in which case drill chuck is removed and taper hole in spindle utilized.
 Code words, page 265.



2709

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

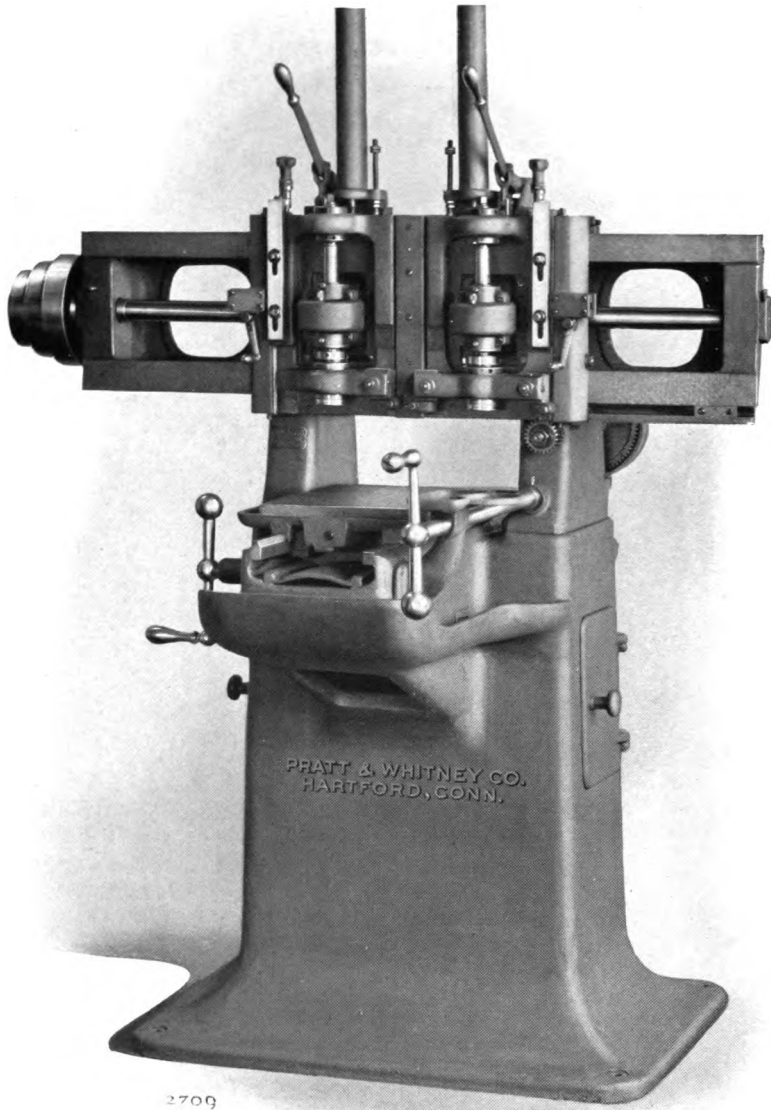
*Raising Blocks to increase this distance furnished to order.

†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 1/8" 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).	

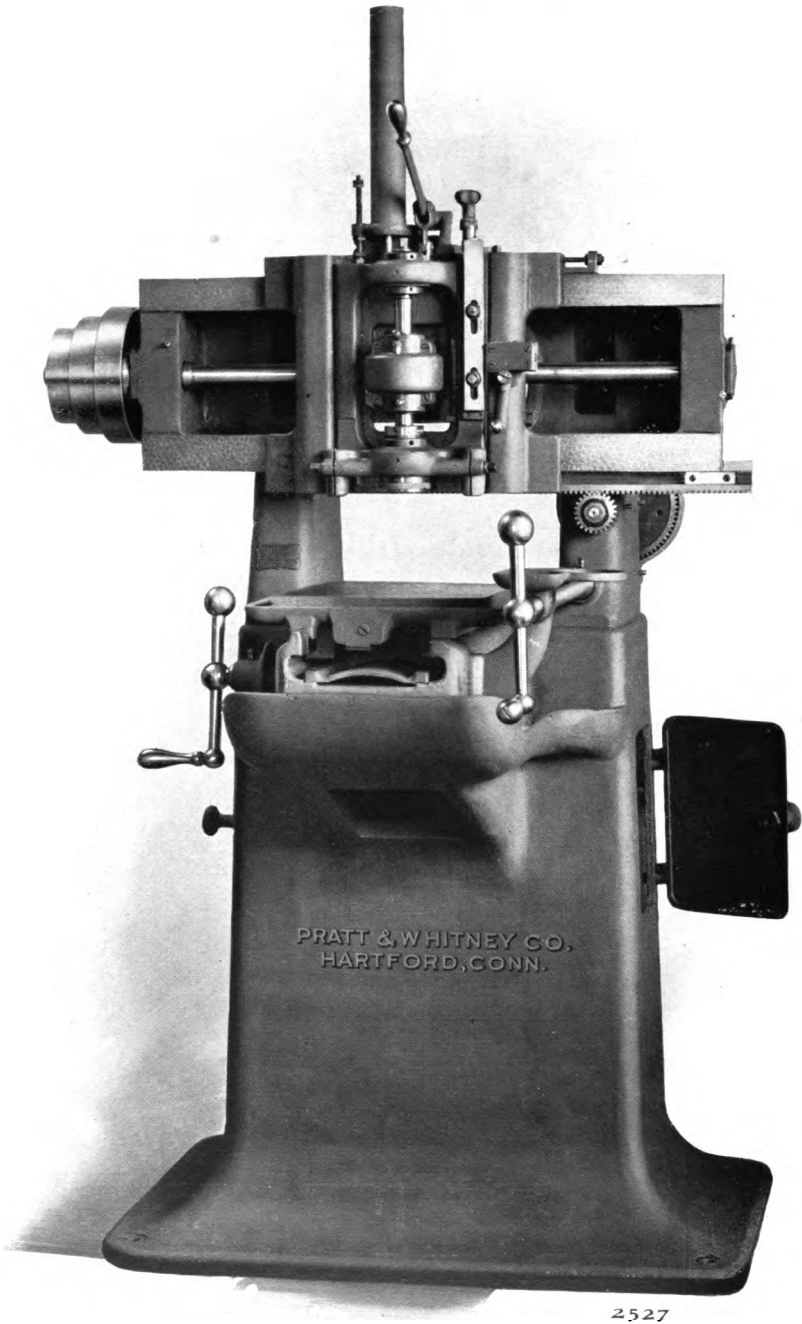
*Raising Blocks to increase this distance furnished to order.

†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.



(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 *Table Top to Bottom of Cross Slide Table Longitudinal Movement Cross Slide, Transverse Movement Head, Vertical Movement Uprights, distance between	12" x 15" 5 1/4" 19" 18" 3" 15 1/2"
SPINDLES	One Spindle, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear †Center Distance between Spindle and Guide-pin Center Distance, maximum adjustment of Guide-pin ‡Taper Hole, Jarno Taper, No. 5. Pull-back Rod provided.	1 1/3" x 2 9/8" 4 1/8" 1 1/8"
SPEEDS	Spindle Speed, Gear Driven (3), R. P. M. Spindle Speed, Belt Driven (3), R. P. M. Counter Speed, Gear Driven, R. P. M. Counter Speed, Belt Driven, R. P. M. Cone Diameters (3), large diameter and width Pulleys (Countershaft), Gear Driven Pulleys (Countershaft), Belt Driven	435 to 860 1165 to 2300 450 480 8 1/4" x 2 1/8" 9" x 2 1/4" 7" x 2 3/4"
FLOOR SPACE	Gear Driven Machine Belt Driven Machine	55" x 49" 58" x 65"
WEIGHTS	Machine, Regular Equipment, net pounds Crating Material (domestic), approximate pounds Boxing Material (foreign), approximate pounds Box, cubic feet	1800 250 500 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).	

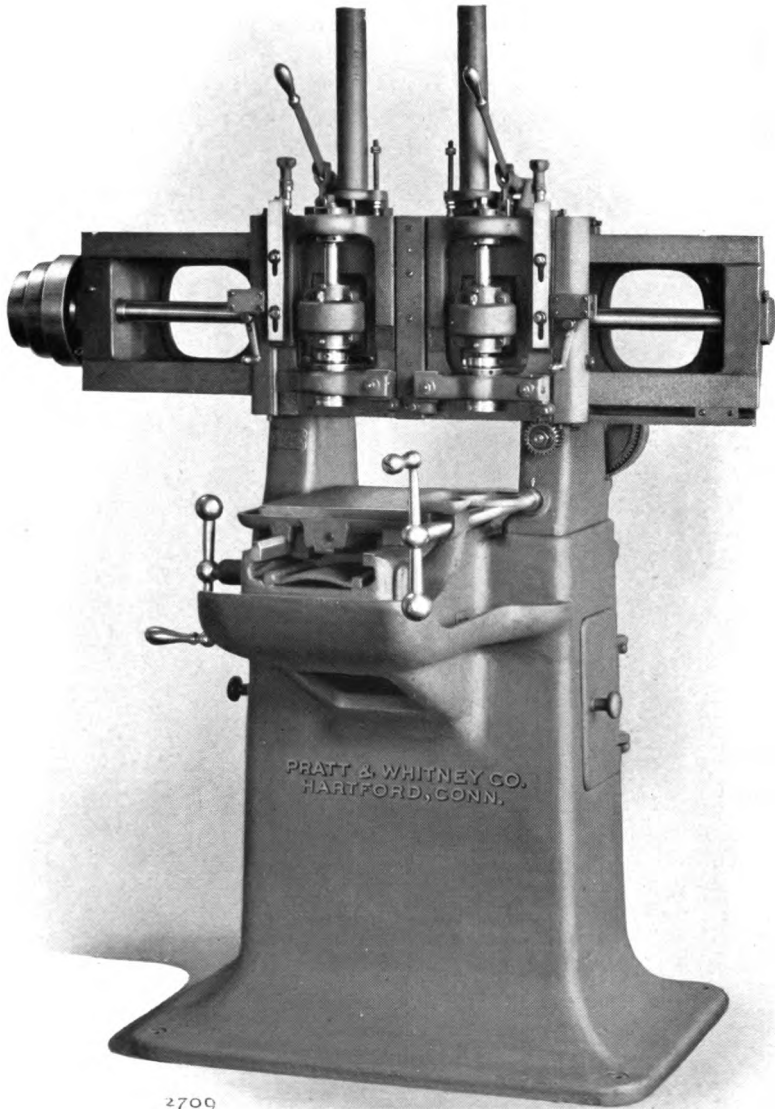
* Raising Blocks to increase this distance furnished to order.

† 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.



2709

(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

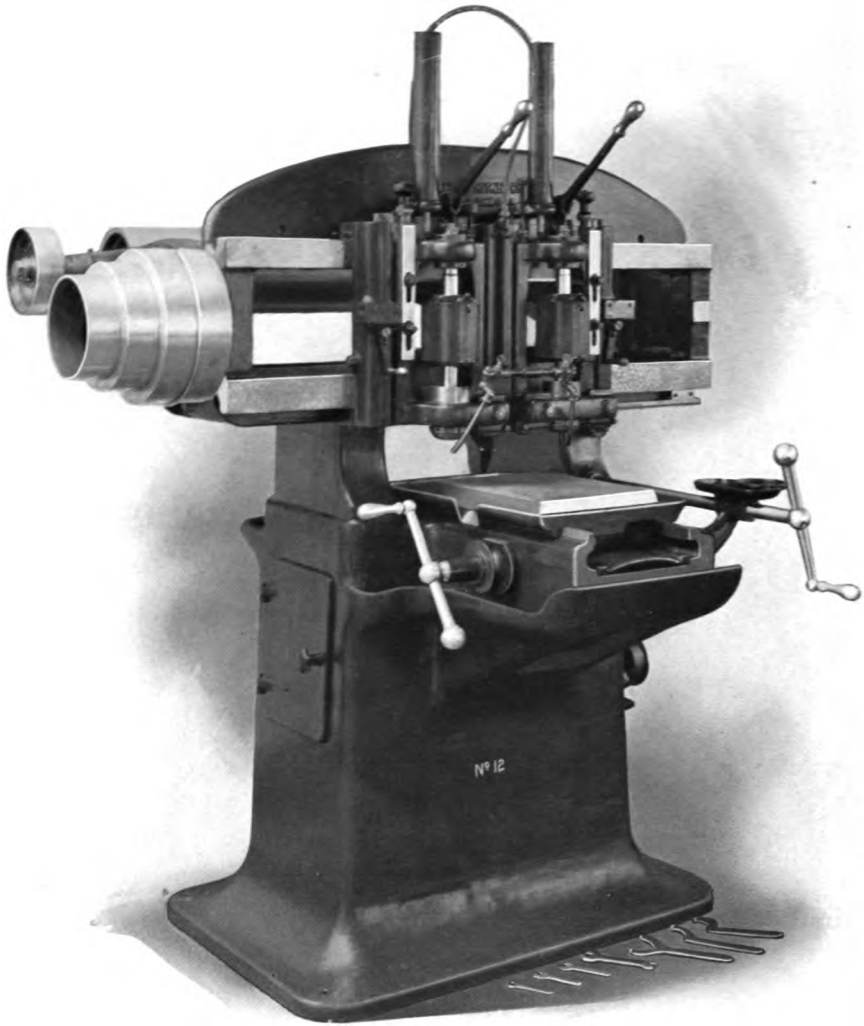
SPECIFICATIONS

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

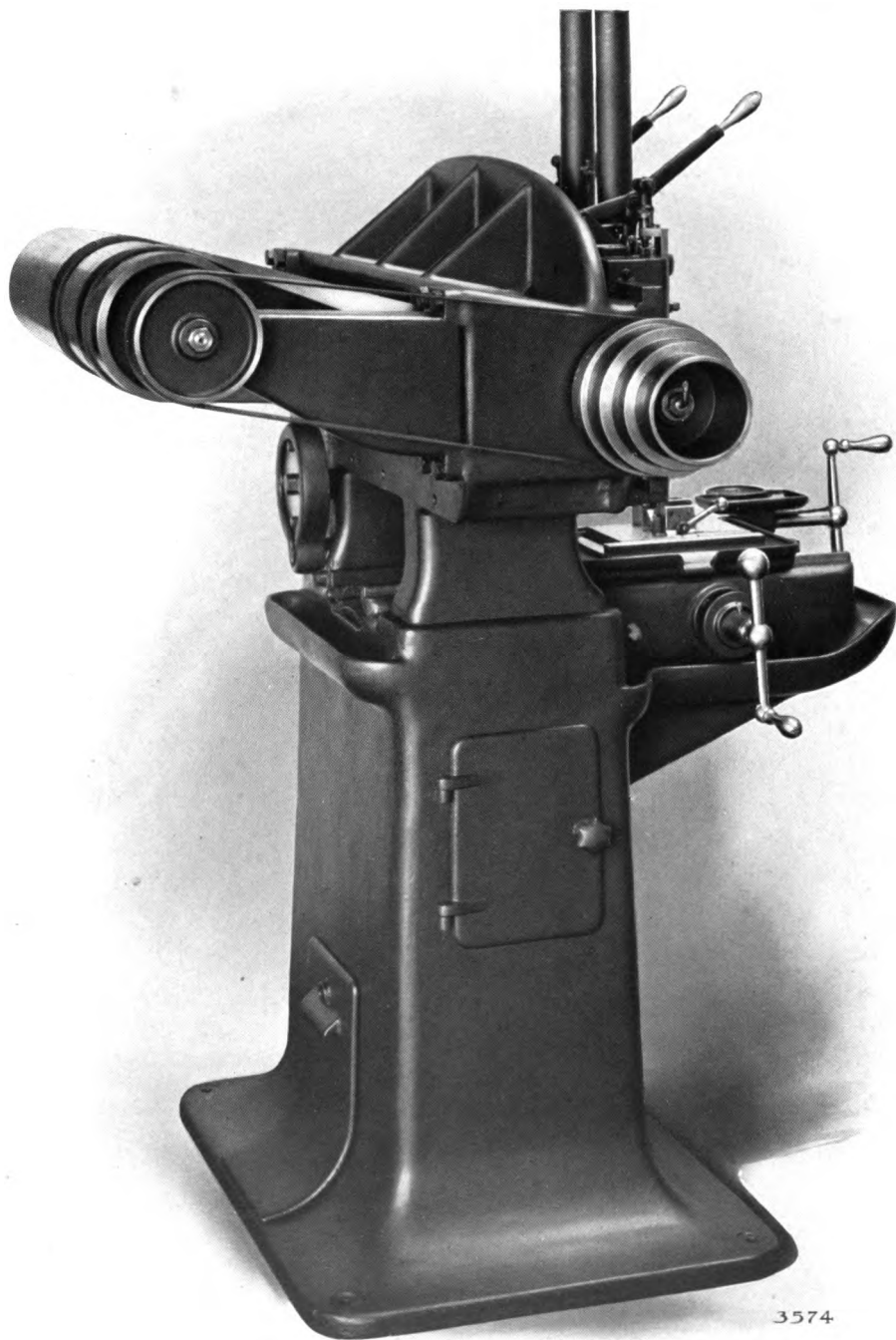
‡Spindles with special tapers furnished to order. For detailed information concerning Jarno Tapers, see "Tapers", page 247.



3900

(Patented)

Profiling Machine, Belt Drive

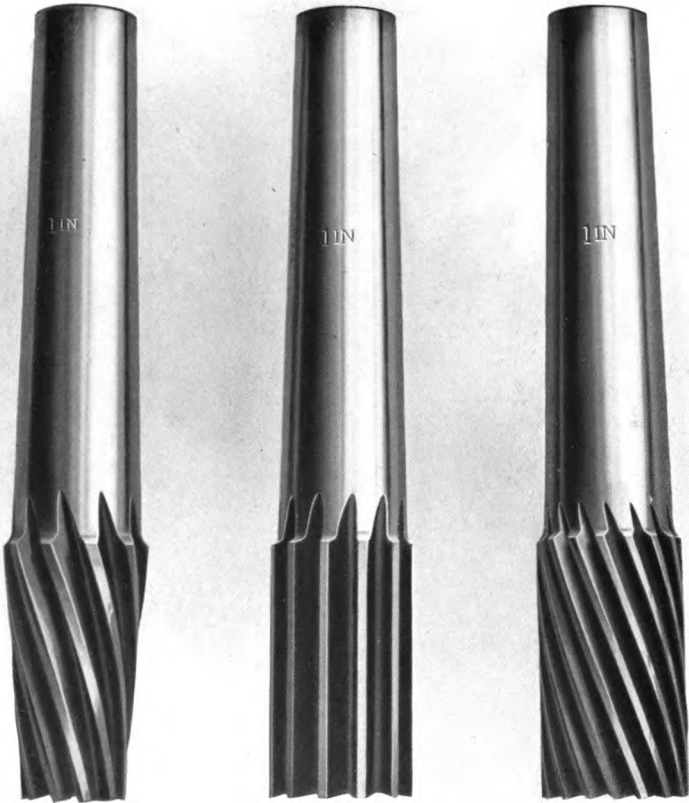


3574

(Patented)

Side View: Profiling Machine, Belt Drive

Cutters for Profiling Machines



5672

Five-degree Taper Cutter

Straight Cutter

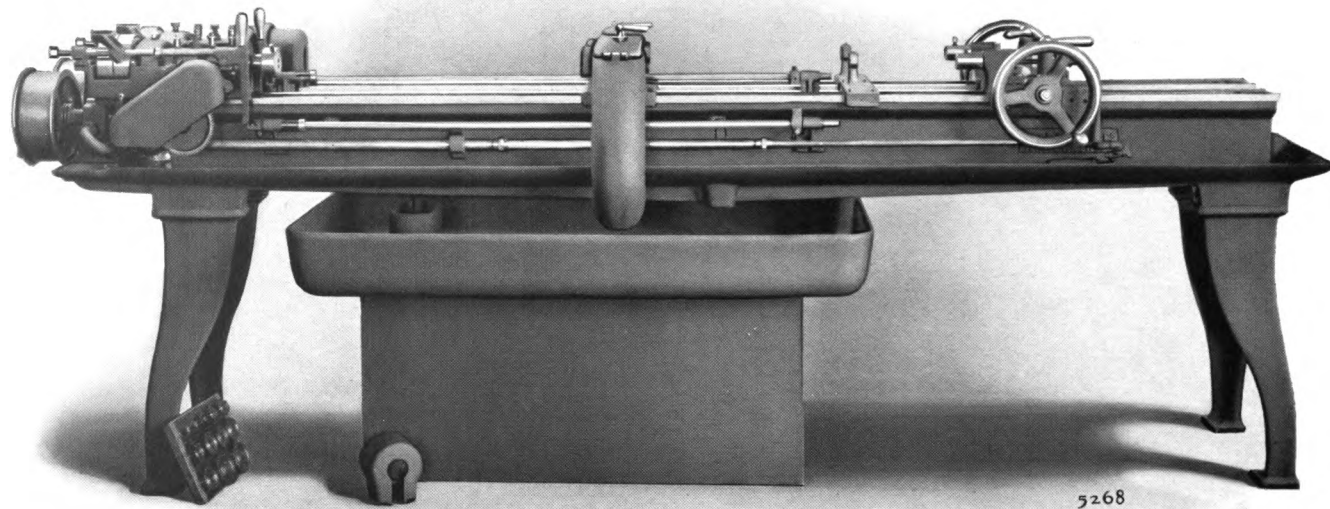
Facing Cutter

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

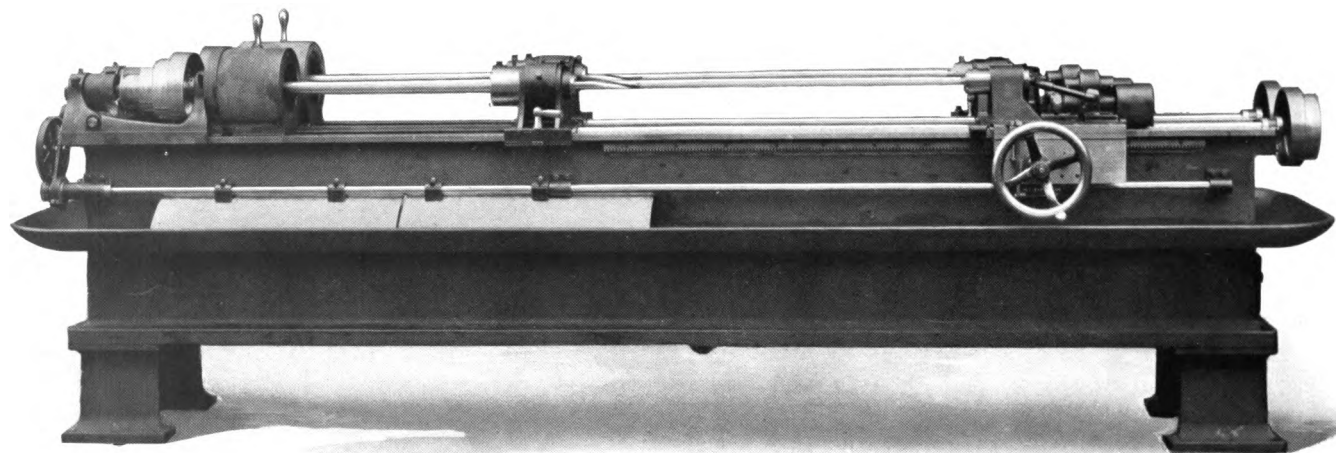
NO. 1 GUN BARREL AND TUBE DRILLING MACHINE

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)	$\left\{ \begin{array}{l} \text{(A) } 6' \text{ — (B) } 14\frac{1}{2}'' \\ \text{(A) } 9\frac{1}{2}' \text{ — (B) } 32\frac{1}{2}'' \\ \text{(A) } 13' \text{ — (B) } 53\frac{3}{4}'' \end{array} \right.$
	Drilling Capacity, length (B)	
	Drilling Capacity, diameter . . . . .		$1\frac{1}{8}''$
	Swing over Bed	$6\frac{1}{2}''$
SPEEDS	Spindle Speed Changes (3), R. P. M.	1250 to 2500
	Number of Spindles	2
	Driving Pulley	6" x $1\frac{1}{8}''$
	Pulleys (Counter., tight and loose)	7" x $3\frac{1}{4}''$
	Countershaft Speed, R. P. M.	750
FLOOR SPACE	Floor Space ($9\frac{1}{2}'$ Bed)	11' 3" x 28"
WEIGHTS	Machine, Regular Equipment ($9\frac{1}{2}'$ 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.



362

No. 1 1/2 Gun Barrel Drilling Machine, Belt Driven

NO. 1 1/2 GUN BARREL AND TUBE DRILLING MACHINE

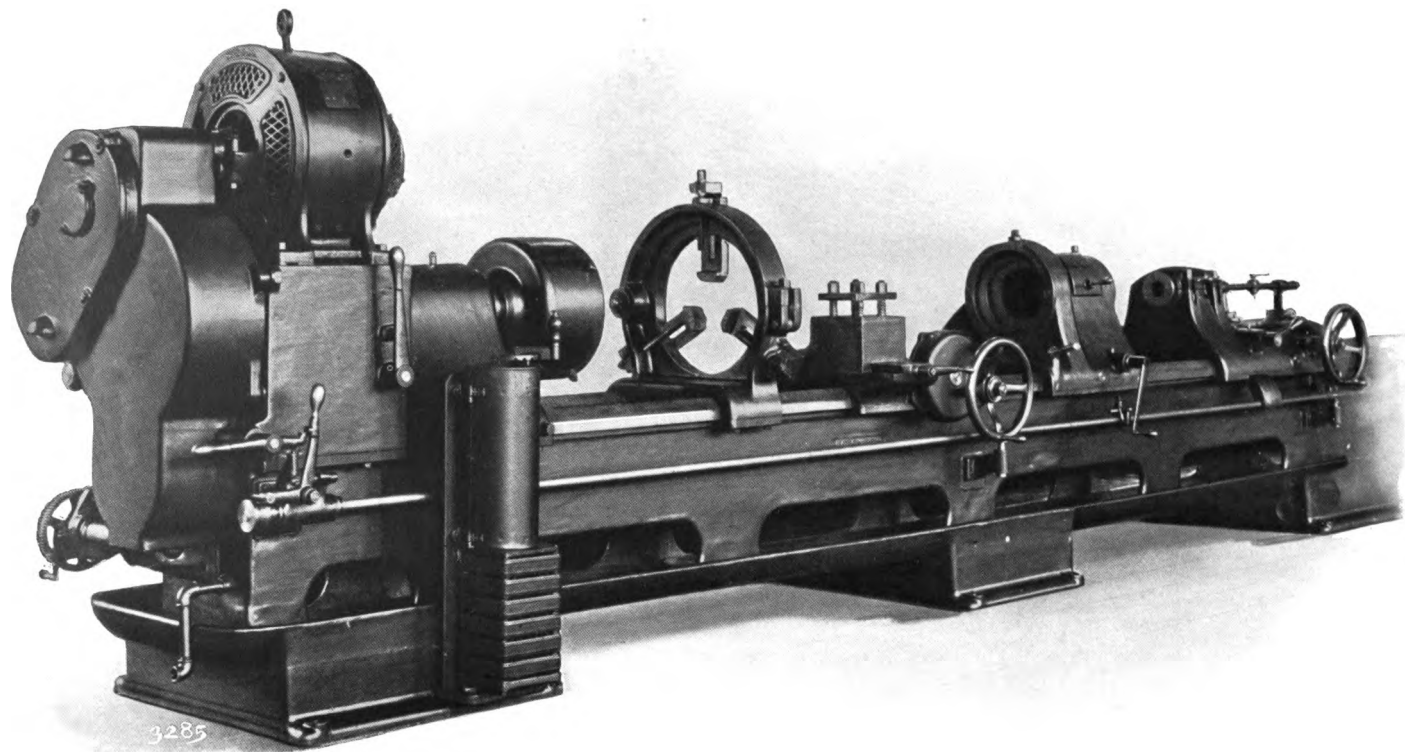
MADE TO ORDER ONLY

SPECIFICATIONS

RANGE	Length of Bed (A)	{ (A) 8'—(B) 9 7/8" (A) 12'—(B) 33 7/8" (A) 16'—(B) 57 7/8" (A) 20'—(B) 81 7/8" (A) 22'—(B) 93 7/8" (A) 24'—(B) 105 7/8"	
	Drilling Capacity, length (B)		
	Drilling Capacity, diameter		1 1/2"
	Swing over Bed		11"
SPEEDS	Spindle Speed Changes (4), R. P. M.	63 to 922	
	Number of Spindles	2	
	Gearing Ratio	3 3/10 to 1	
	Cone Diameters (4), largest	9"	
	Pulleys (Counter., tight and loose)	10" x 2 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.



204

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

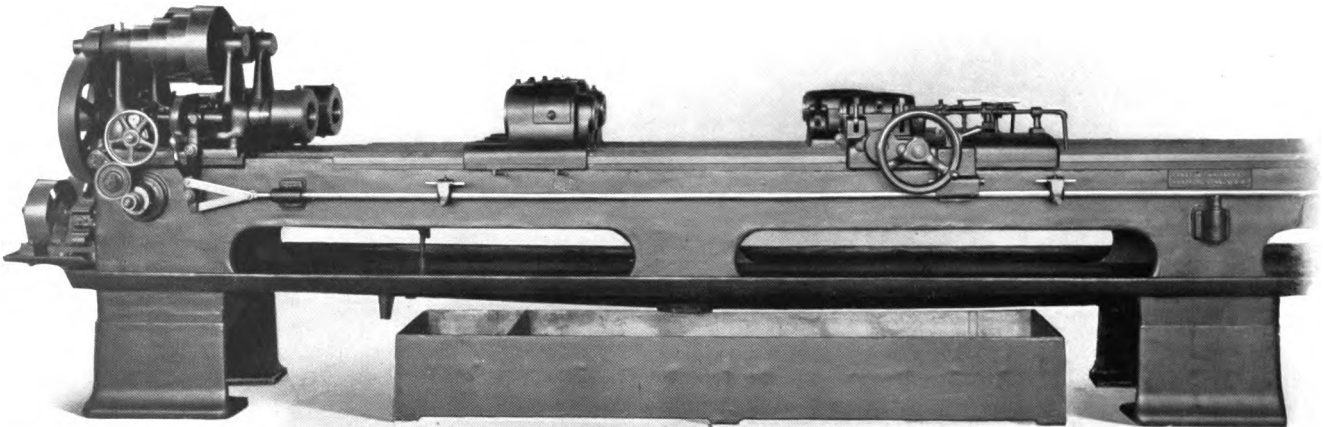
NO. 4 GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

SPECIFICATIONS

RANGE . . .	Length of Bed Drilling Capacity, length Drilling Capacity, diameter Swing over Bed	40' 171½" 9" 30"
SPEEDS . . .	Spindle Speed Changes (4), R. P. M. Number of Spindles Gearing Ratio Cone Diameters (4), largest Pulleys (Counter., tight and loose) Countershaft Speed, R. P. M.	5 to 80 1 8.24 to 1 18" 18" x 5¼" 200
FLOOR SPACE	Floor Space	42' x 52"
WEIGHTS . .	Machine, Regular Equipment, net pounds Crating Material (domestic), approximate pounds Boxing Material (foreign), approximate pounds Box, cubic feet	28000 800 5600 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.



3209

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

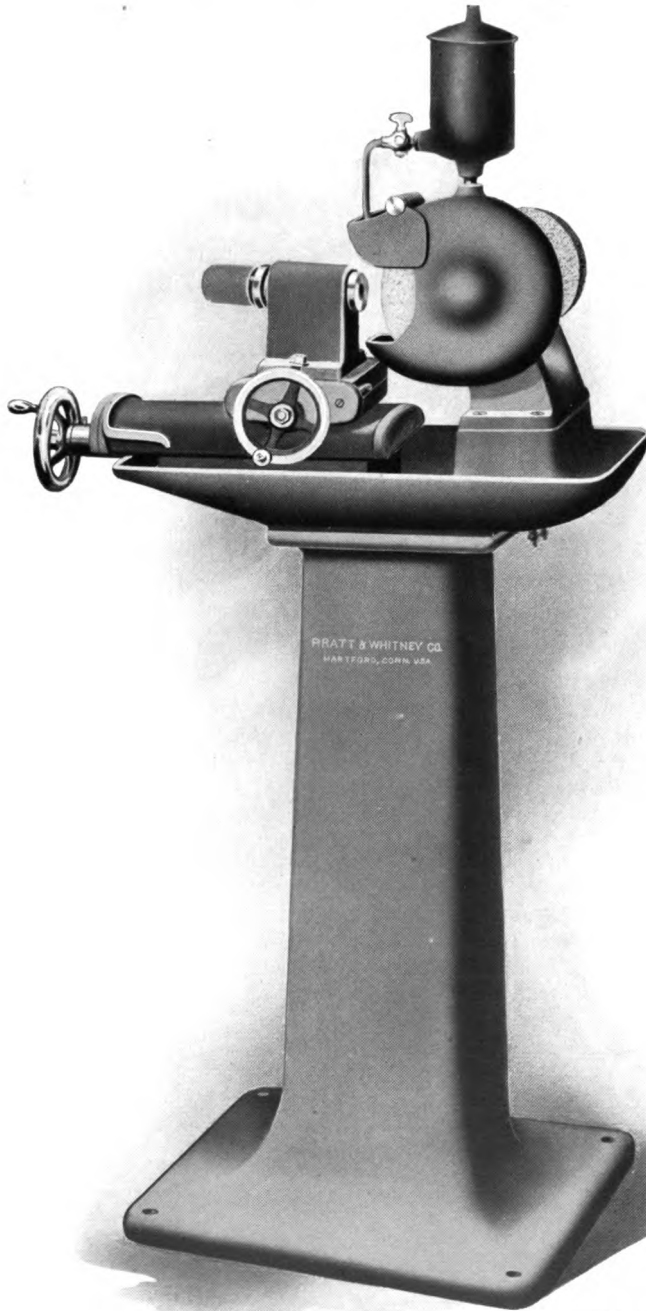
NO. 12 GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

SPECIFICATIONS

RANGE	Length of Bed (A) { (A) 16'—(B) 51 ⁵ / ₈ " Drilling Capacity, length (B) { (A) 27'—(B) 117 ⁵ / ₈ " Drilling Capacity, diameter (A) 33'—(B) 153 ⁵ / ₈ " Swing over Bed 3" 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 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

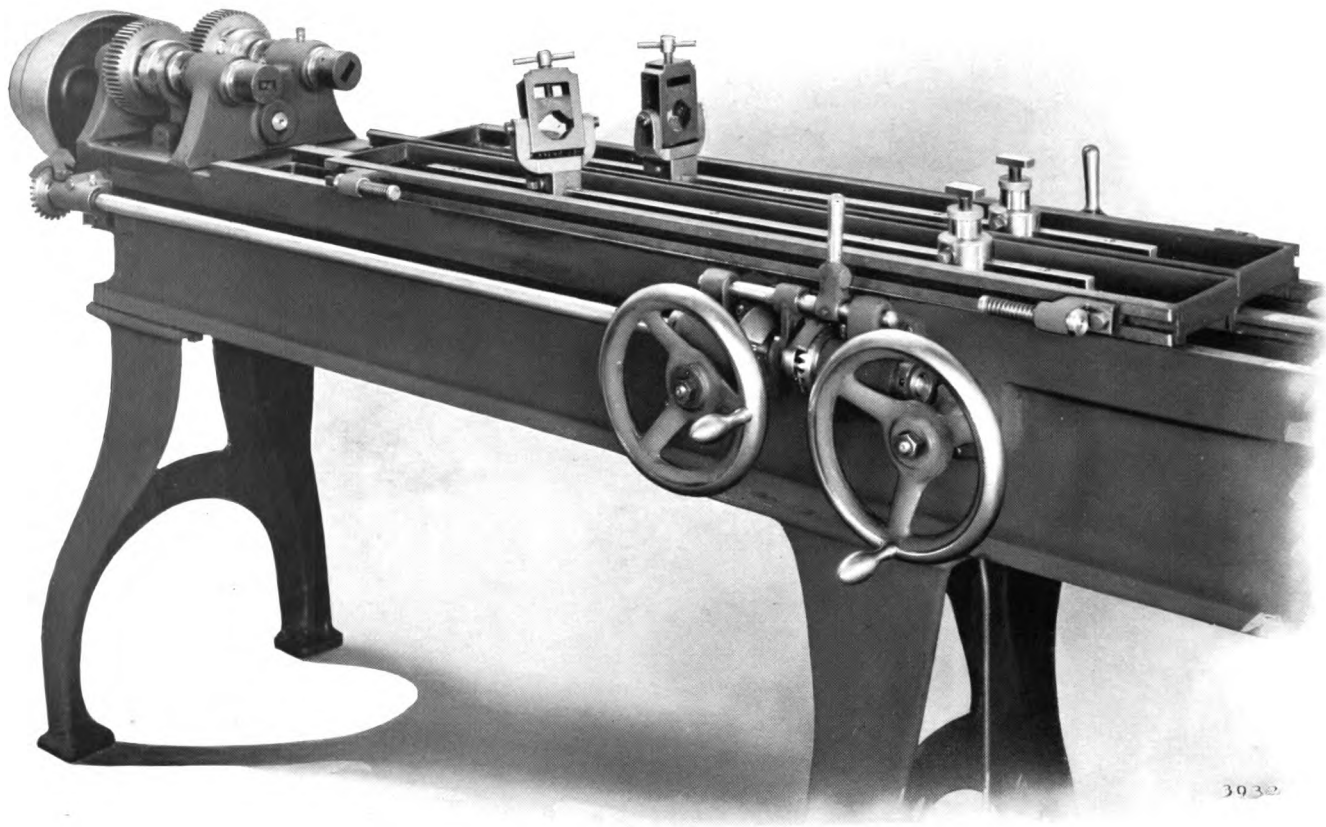
GUN BARREL DRILL GRINDER

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" x 1" — $\frac{5}{8}$ " hole Wheel (Back) $4\frac{1}{2}$ " x $\frac{7}{16}$ " — $\frac{7}{16}$ " hole
SPEEDS	Spindle Speed, R. P. M. 1326 Pulley (Spindle) $2\frac{3}{8}$ " x $1\frac{1}{4}$ " Pulley (Counter., tight and loose) 7" x $2\frac{1}{4}$ " Belt Width (Spindle Pulley) 1" Belt Width (Counter., Pulleys) 2" Countershaft Speed, R. P. M. 450
FLOOR SPACE	Floor Space 29" x 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

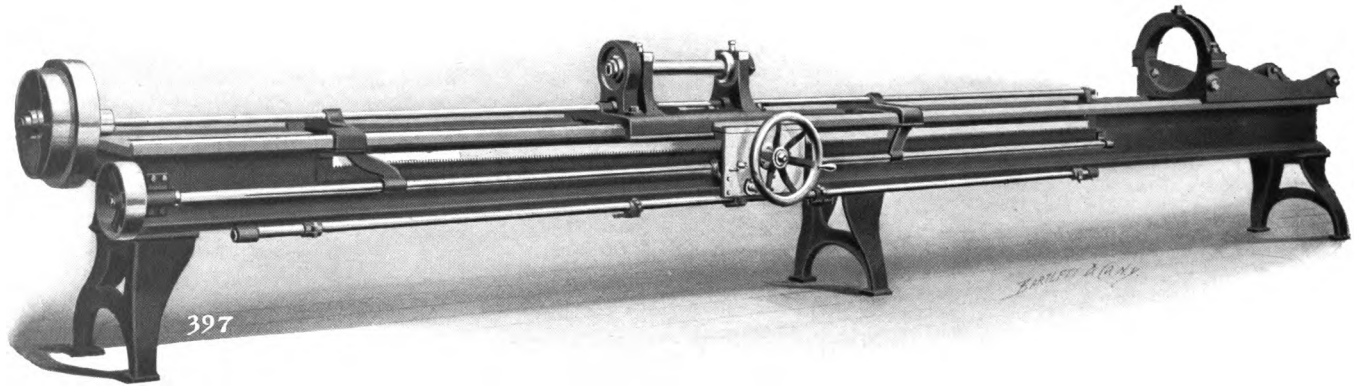
MADE TO ORDER ONLY

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

SPECIFICATIONS

RANGE	Length of Bed	8½'
	Capacity, length of Hole, maximum	36"
	Capacity, diameter of Hole, maximum	1⅜"
	Cone Diameters (3), largest	10½"
	Pulley (Counter, tight and loose)	12" x 2½"
	Belt Width (Cone)	2¼"
	Belt Width (Counter. Pulleys)	2¼"
	Countershaft Speed, R. P. M.	120
FLOOR SPACE	Floor Space	9' 4" x 26¾"
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.



397

No. 2 Tube and Gun Barrel Lapping Machine

GUN BARREL LAPPING MACHINE

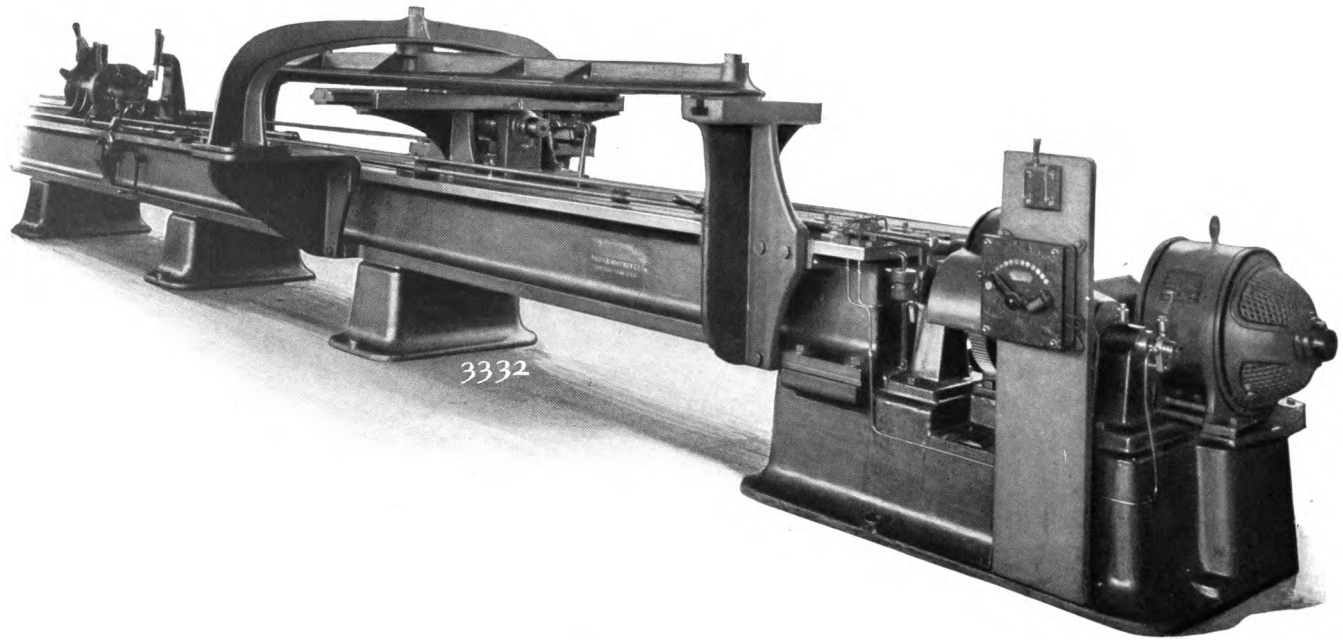
MADE TO ORDER

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 5 1/2" Belt Width (Cone) 3" Belt Width (Countershaft Pulley) 5 1/4" 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

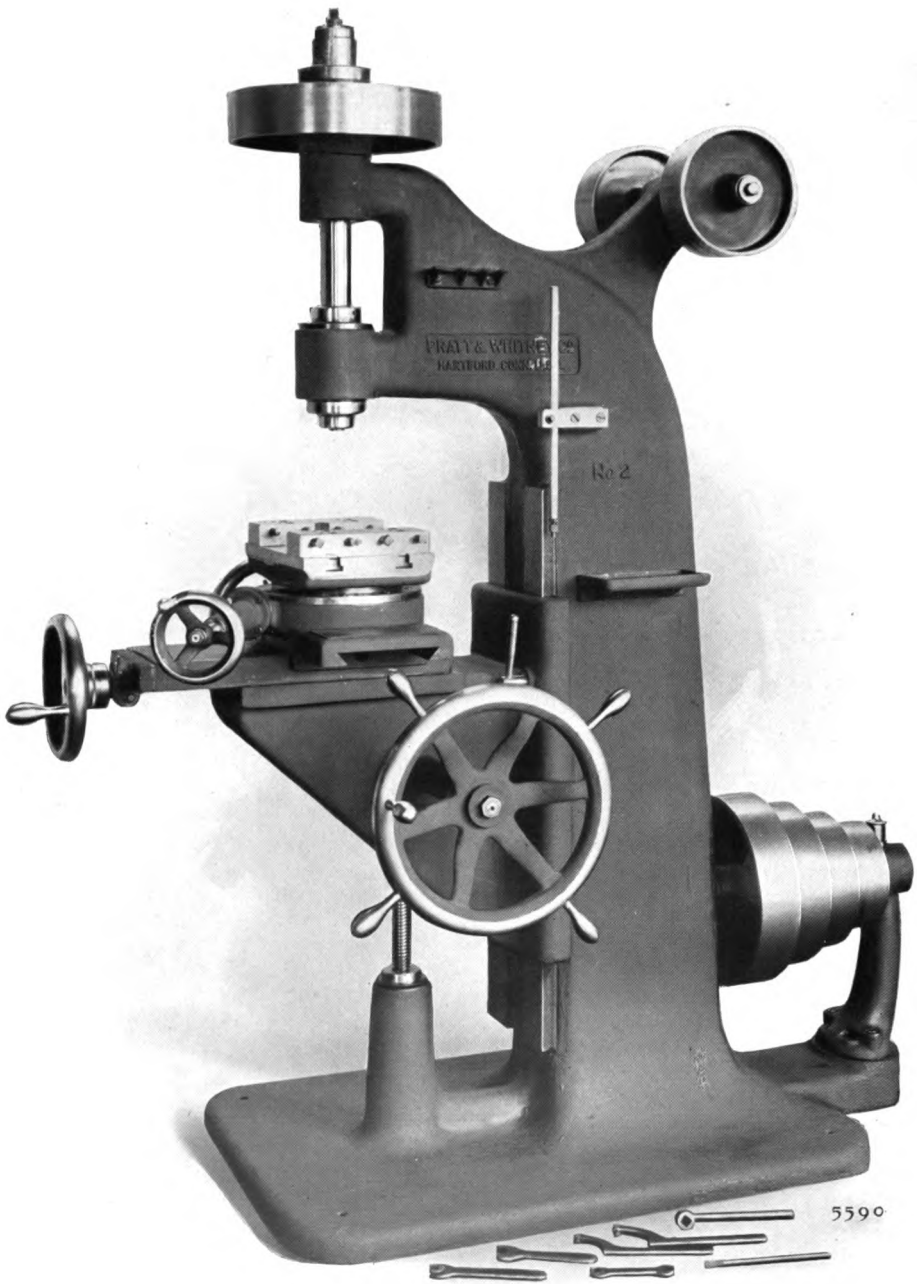
NO. 3 RIFLING MACHINE

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 1 1/2" Feed Screw, diameter and pitch 2", 1" Double Pulley (Driving on Machine) 9" x 1 1/2" Pulley (Counter., tight and loose) 10" x 2 3/4" Belt Width (Driving Pulley) 1 1/2" Belt Width (Counter. Pulley) 2 1/2" 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

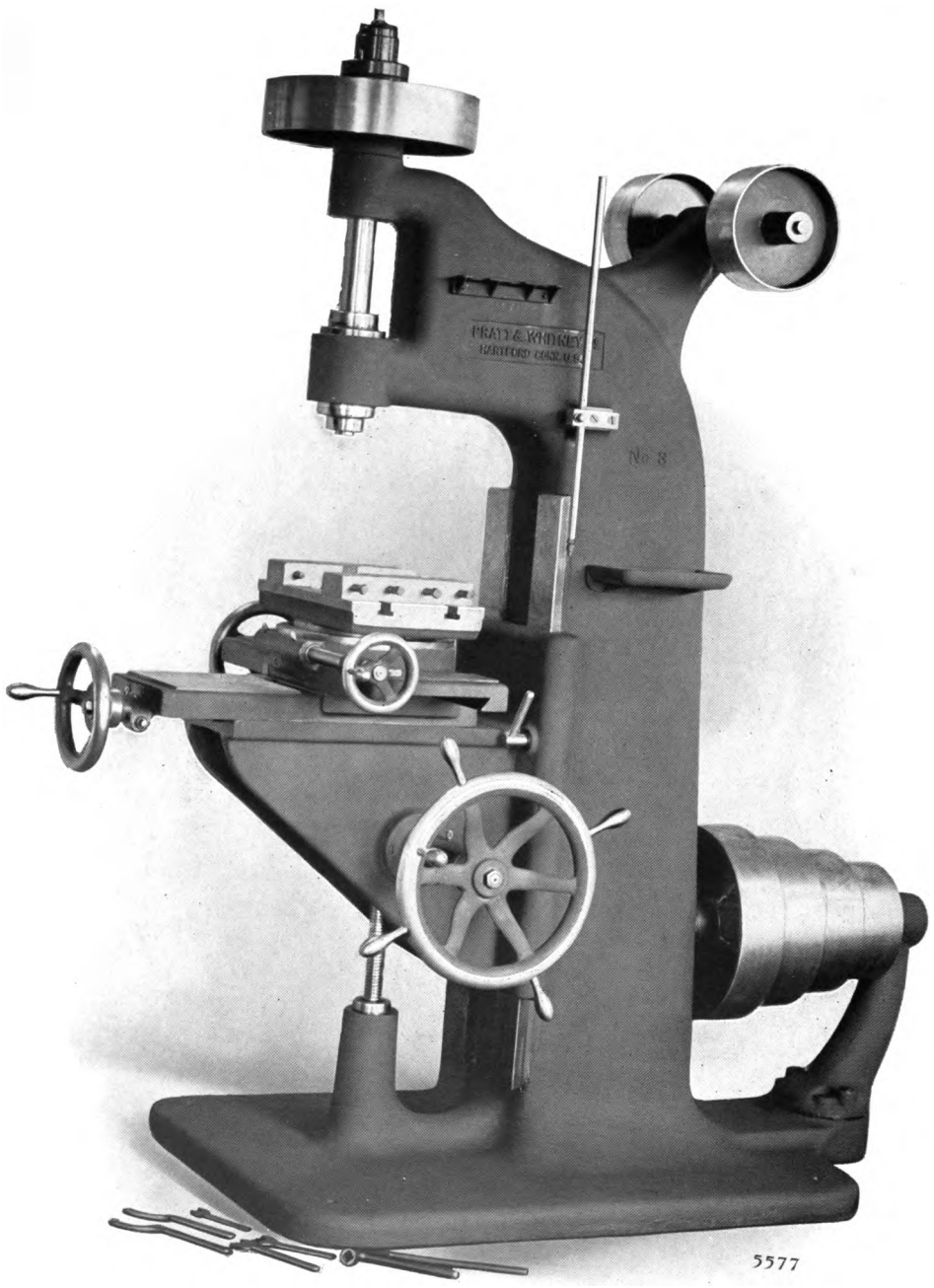
For sinking forging dies these machines have been proved to be indispensable in forging plants the world over. In their design are incorporated the necessary essentials of exceptional rigidity, accuracy, convenience and ease of operation. Knees and slide are all mounted upon long dovetail bearings, taper 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.



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.

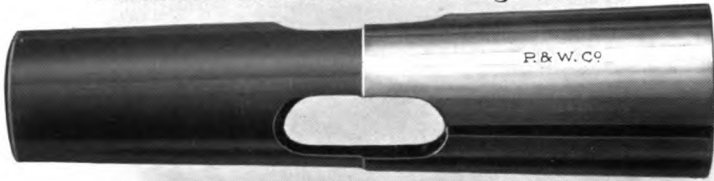
SPECIFICATIONS

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", 1¼", 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.)

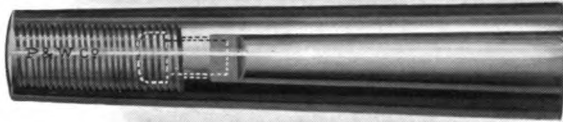
* For detailed information, see "Tapers", page 247.

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

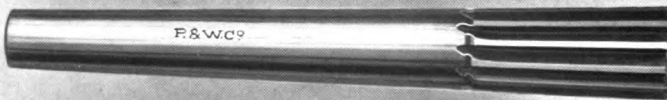
5673



Nos. 1 and 2 Spring Collets with Cutter



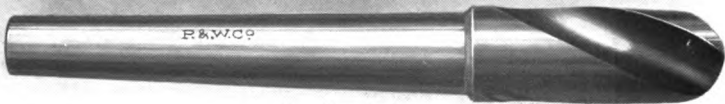
Straight Cutter



Trimming Cutter



Five-degree Taper Cutter



Roughing Cutter

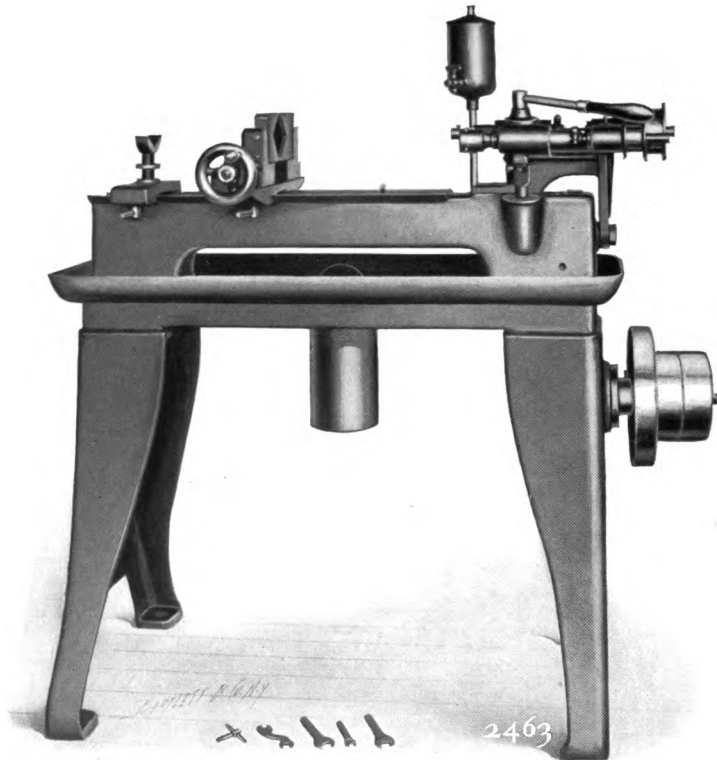
TOOL EQUIPMENT—DIE SINKING MACHINE

	Machine		Fit Collet
	No. 2	No. 3	
Collets — Number {	1	—	3
	2	—	3
	3	—	6 and 8
	5	—	Spindle
	*6	—	Spindle
	—	7	Spindle
	—	*8	Spindle
	—	9	Spindle
Cutters { Roughing, Straight | each †5° Taper, Trimming |	3/8"	—	1
	1/4"	—	1
	3/8"	—	2
	1/2"	1/2"	5 and 7
	5/8"	3/8"	5 and 7
	3/4"	3/4"	6 and 8
	7/8"	7/8"	6 and 8
	1"	1"	6 and 8

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
 Nos. 6 and 8 Collets, No. 2 Gang Drill

* Regularly furnished with machine.
 † Given diameter at small end.



4-inch Two-spindle Centering Machine

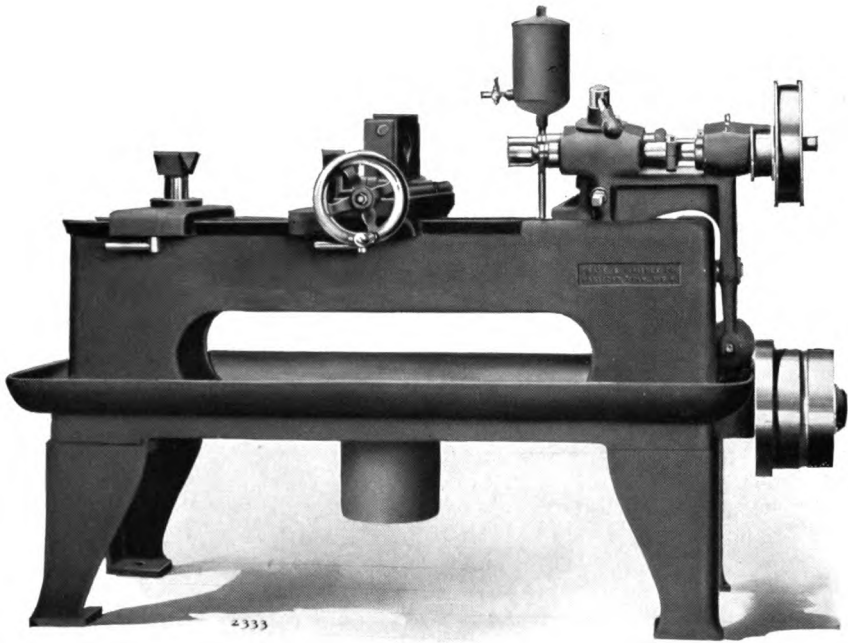
4-INCH CENTERING MACHINE

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

CAPACITY . . .	Capacity	4"
	Spindle Longitudinal Movement	1 1/2"
SPEEDS . . .	Drill Spindle, R. P. M.	1782
	Reamer Spindle, R. P. M.	770
	Counter. Pulleys	7" x 2 3/8"
	Counter. Speed, R. P. M.	225
FLOOR SPACE	Floor Space	23" x 50"
WEIGHTS . . .	Machine, Regular Equipment, net pounds	500
	Crating Material (domestic), approximate pounds	125
	Boxing Material (foreign), approximate pounds	250
	Box, cubic feet	23
REGULAR EQUIPMENT	<p>The Machine, with</p> <ul style="list-style-type: none"> 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). 	
REVOLVING CHUCK	<p>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.</p>	

Code words, page 265.



6-inch Two-spindle Centering Machine

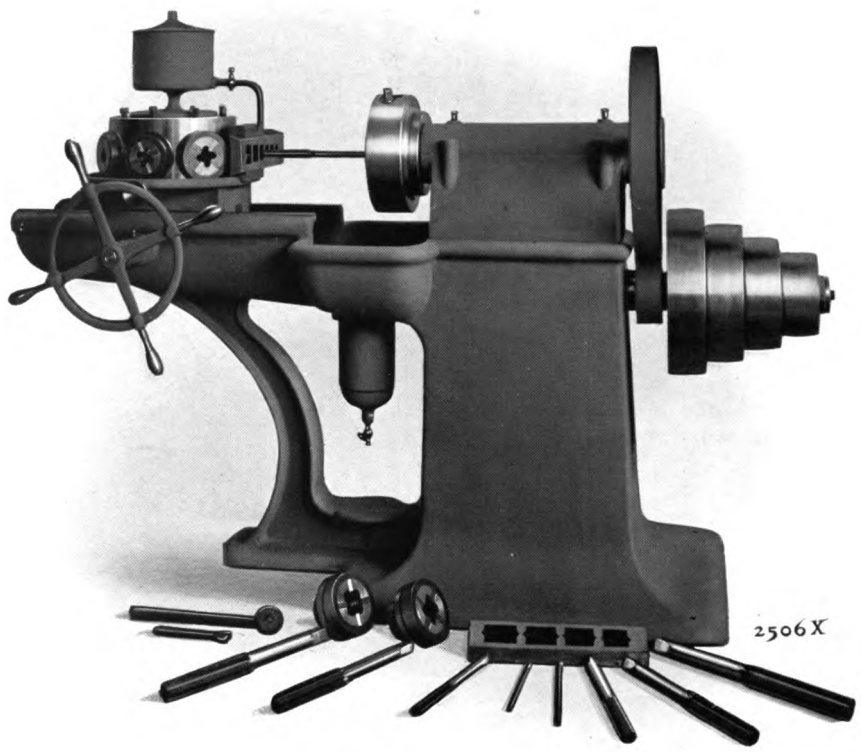
6-INCH CENTERING MACHINE

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

CAPACITY . . .	Capacity	6"
	Spindle Longitudinal Movement	3"
SPEEDS	Drill Spindle, R. P. M.	781
	Reamer Spindle, R. P. M.	267
	Counter. Pulleys	12" x 2 1/4"
	Counter. Speed, R. P. M.	200
FLOOR SPACE	Floor Space	28" x 5' 3"
WEIGHTS	Machine, Regular Equipment, net pounds	1000
	Crating Material (domestic), approximate pounds	160
	Boxing Material (foreign), approximate pounds	450
	Box, cubic feet	52
REGULAR EQUIPMENT	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.



No. 4 Turret Head Power Bolt Cutter

BOLT CUTTER, NO. 4 TURRET HEAD POWER

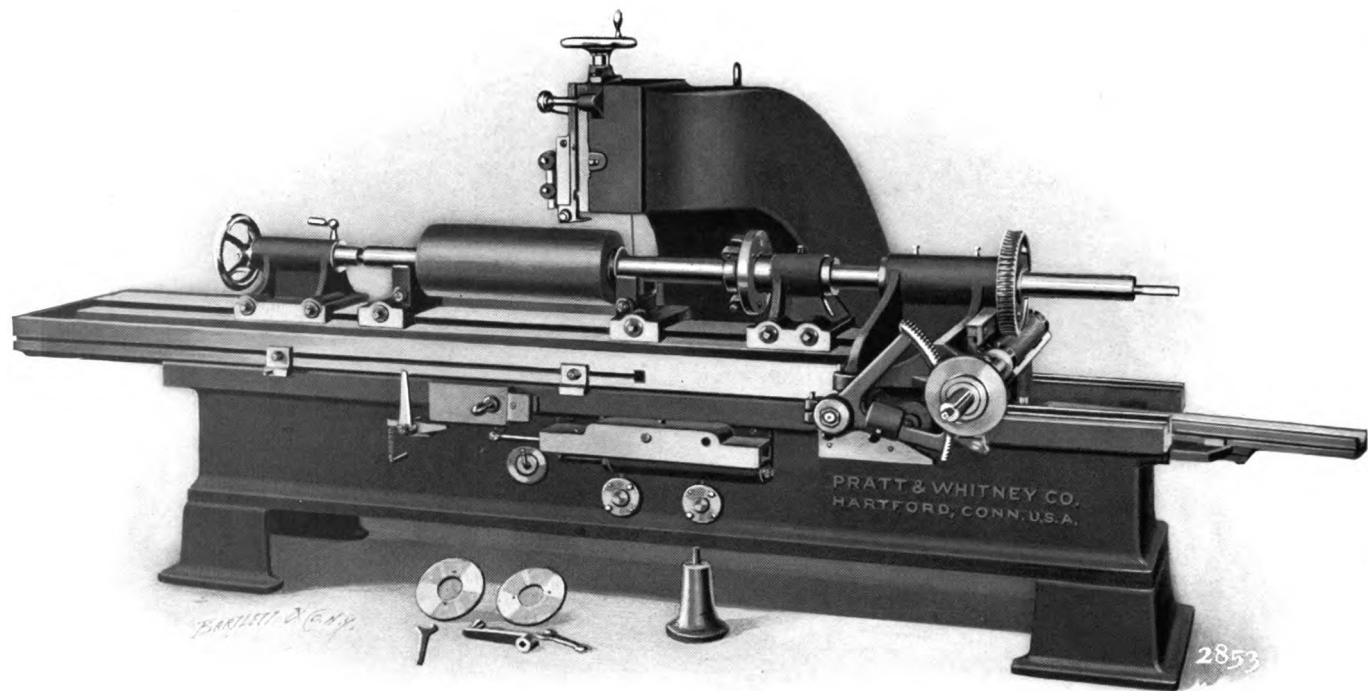
This machine is used extensively in car shops and is also found very convenient for jobbing purposes. When supplied with the various size dies, coupled with the convenient method of handling tapping operations, it is always ready for instant use and will effectively cover the general run of work.

SPECIFICATIONS

RANGE . . .	Threading or Tapping Capacity	1 1/2"
	Travel of Turret Slide	20"
TURRET . . .	Round; 8 holes, 3" diameter.	
SPINDLE . . .	C. I.; Bearing Portion, cylindrical; 4 3/8" diameter.	
	Boxes, C. I., adjustable for wear.	
	Hole through Spindle	3 1/4"
SPEEDS . . .	Spindle Speeds (4), R. P. M.	30 to 120
	Gearing Ratio	5 to 1
	Cone Diameters (4), large diameter	15"
	Pulleys (Counter. Friction)	14" x 4 1/2"
	Belt Width (Cone)	3 1/4"
	Belt Width (Counter. Pulleys)	4 1/4"
	Countershaft Speed, R. P. M.	300
FLOOR SPACE	Floor Space	77" x 27"
WEIGHTS . . .	Machine, Regular Equipment, net pounds	1500
	Crating Material (domestic), approximate pounds	125
	Boxing Material (foreign), approximate pounds	400
	Box, cubic feet	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, 1/2", 5/8", 3/4", 7/8", 1", 1 1/8", 1 1/4", 1 3/8" and 1 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

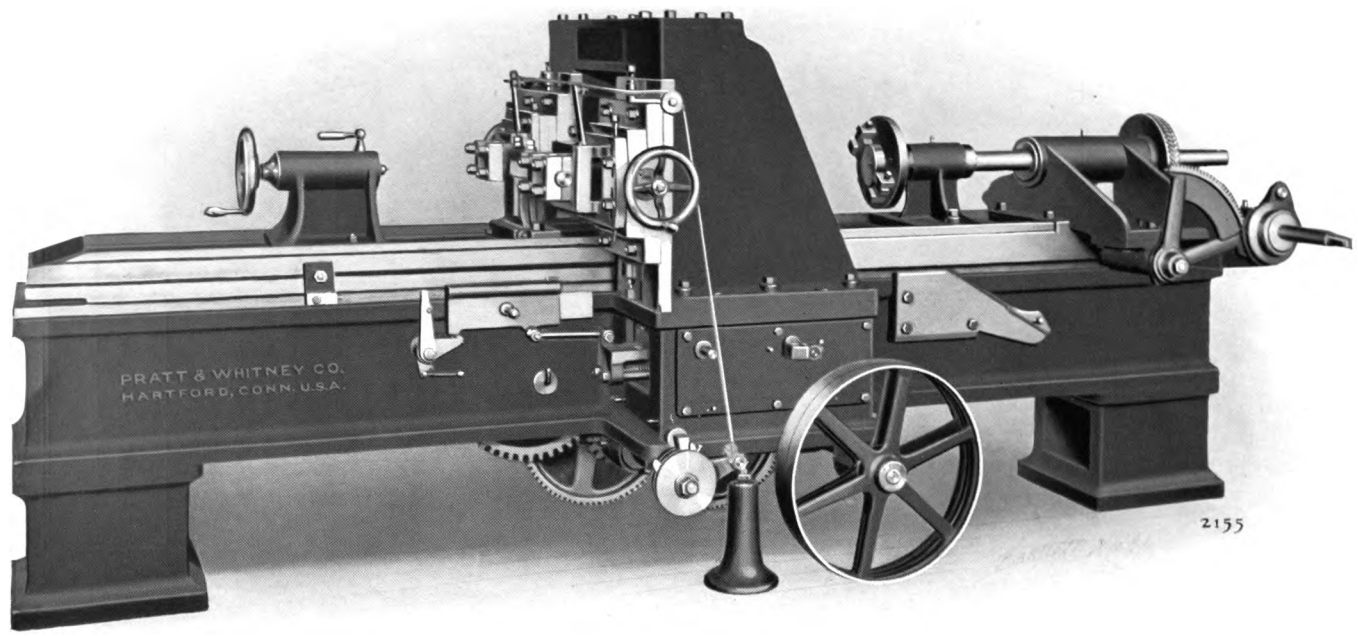
MADE TO ORDER ONLY

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 ³ / ₄ " Offset of Spiral, per foot 9" roll 0" to 2 ¹ / ₂ " Cutting Speed, per minute 24" Returning Speed, per minute 40" Countershaft Pulleys 28" x 4 ¹ / ₄ " Countershaft 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. 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.



No. 2 Roll Grooving Machine

236

NO. 2 ROLL GROOVING MACHINE

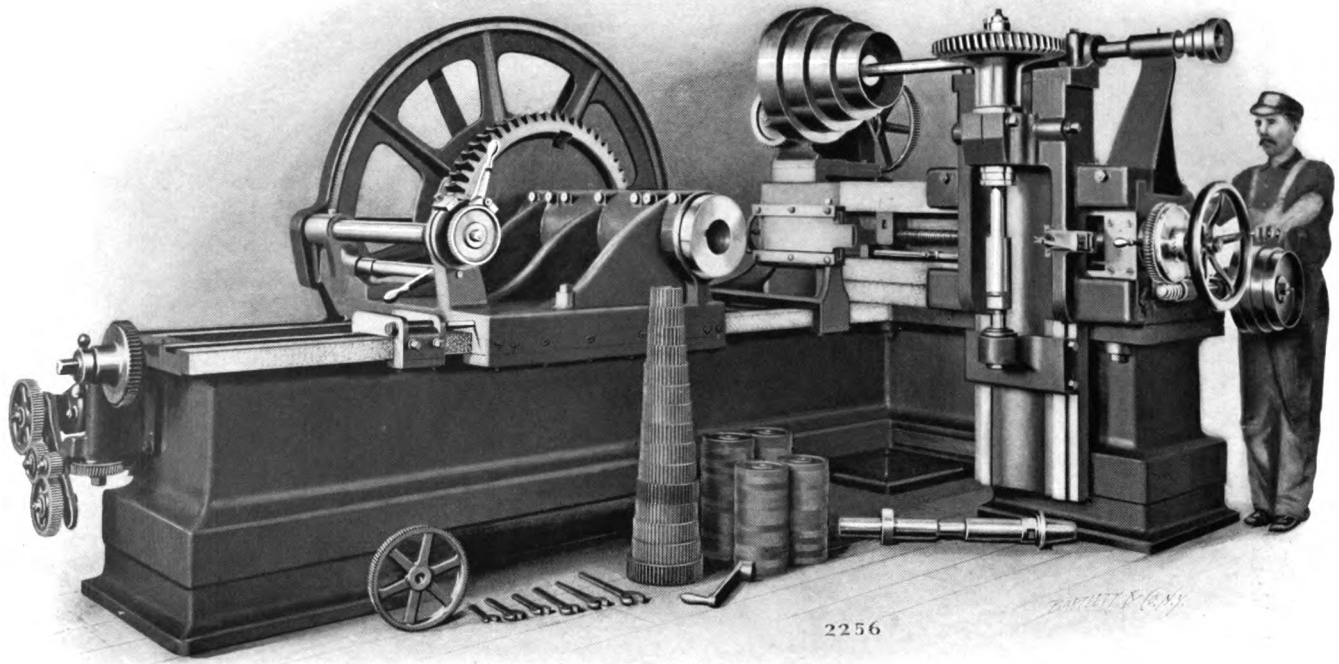
MADE TO ORDER ONLY

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 $3\frac{2}{16}$ "
	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.



2256

120-inch Gear Cutter

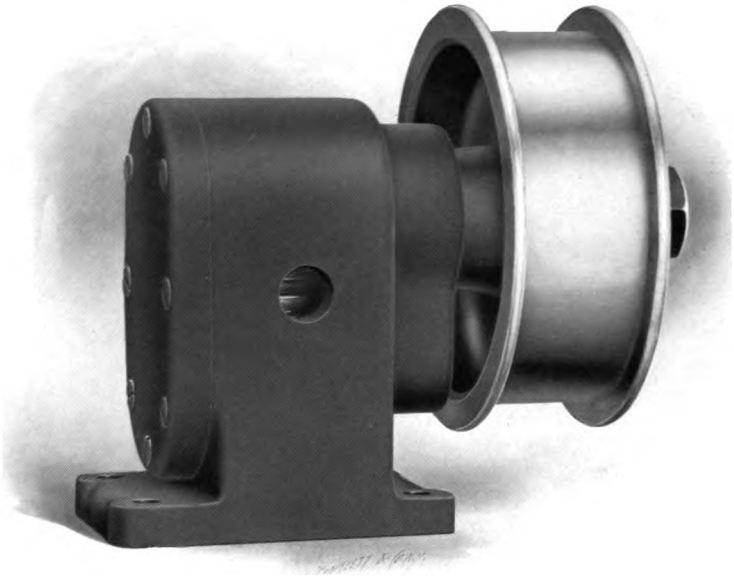
GEAR CUTTING MACHINES

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.

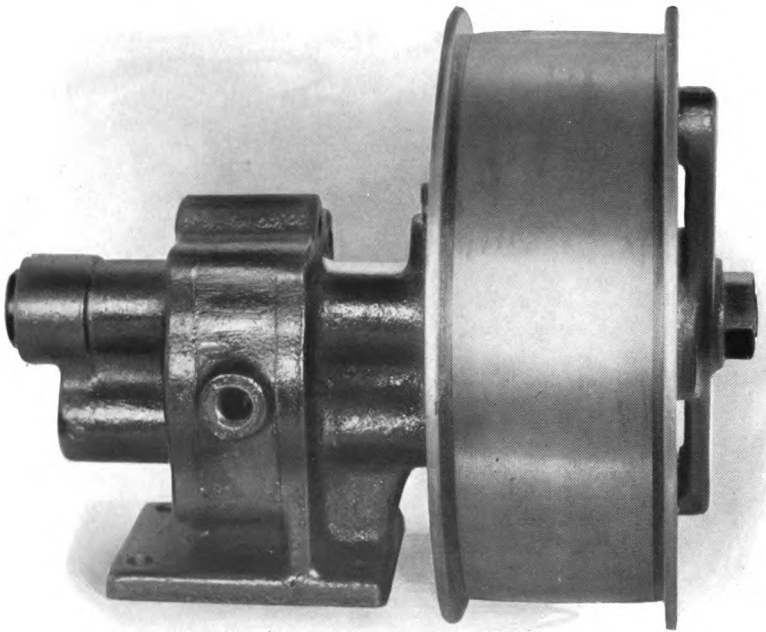
SPECIFICATIONS

		60"	90"	120"
RANGE	Largest Gear Machine will cut	60"	90"	120"
	Largest Cutter or Hob used . .	9"	12½"	15"
	Divisions in Circle, maximum	2148	3600	3720
	Index Ratchets furnished . . .	67	64	67
	Ratio of Index Gear and Pinion	12 to 1	20 to 1	20 to 1
	Work Spindle, diameter	4½"	5"	9"
	Cutter Spindle Bearings	2¾" x 11½"	3" x 13½"	3⅞" x 17⅜"
	Cutter Spindle, Vertical Ad- justment }	½"	1¼"	1¾"
	Cone, number of steps	3	3	4
	Cone, largest step	18"	18⅝"	25"
	Belt Width (Cone)	3½"	4"	4½"
	Countershaft Pulleys }	12" and 14" x 5¼"	12" and 16" x 5¼"	14" and 18" x 5¼"
	Countershaft Speeds, R. P. M.	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	6200	9800	
	Worm Machine, net pounds	6300	10000	
	Spur and Worm Machine, net pounds	7000	11500	26000
	Crating Material (domes- tic), approximate pounds }	1300	500	1000
	Boxing Material (foreign), approximate pounds . . . }	1800	3000	5000
	Box, cubic feet	260	300	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.		



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.

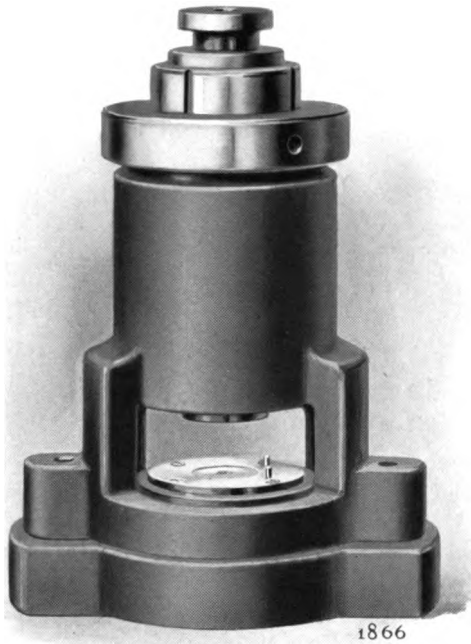
Special attention is directed to the No. 2, perfectly balanced, high pressure pump. In the design the usual stuffing box has been eliminated. Bearings are hardened and ground and, in fact, both design and workmanship ensure the highest possible efficiency in pump construction. It is used on the gun barrel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

SPECIFICATIONS

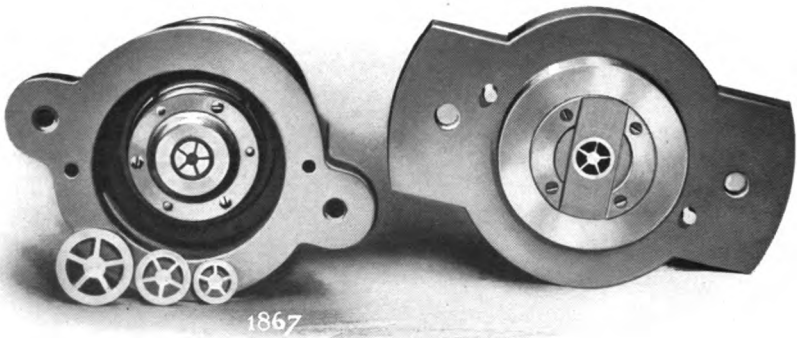
	No. 0	No. 2	No. 3	No. 12
*Capacity, quarts per minute	1 $\frac{7}{8}$	6	9	6
Pressure per square inch, pounds	100	500 to 1000	100	100
Pipes, inlet and delivery	$\frac{3}{8}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ "
Speed, R. P. M.	150	300	150	150
Driving Pulley, diameter	3"	9"	7"	5"
Belt Width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



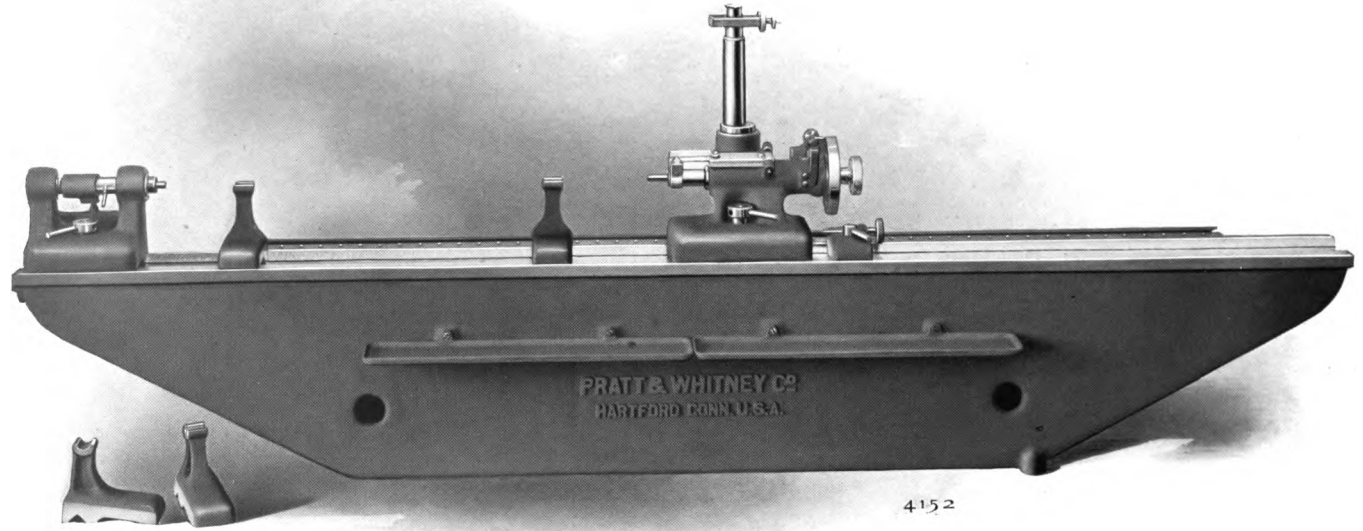
Sub-press Base Showing Dies and Blanks

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.

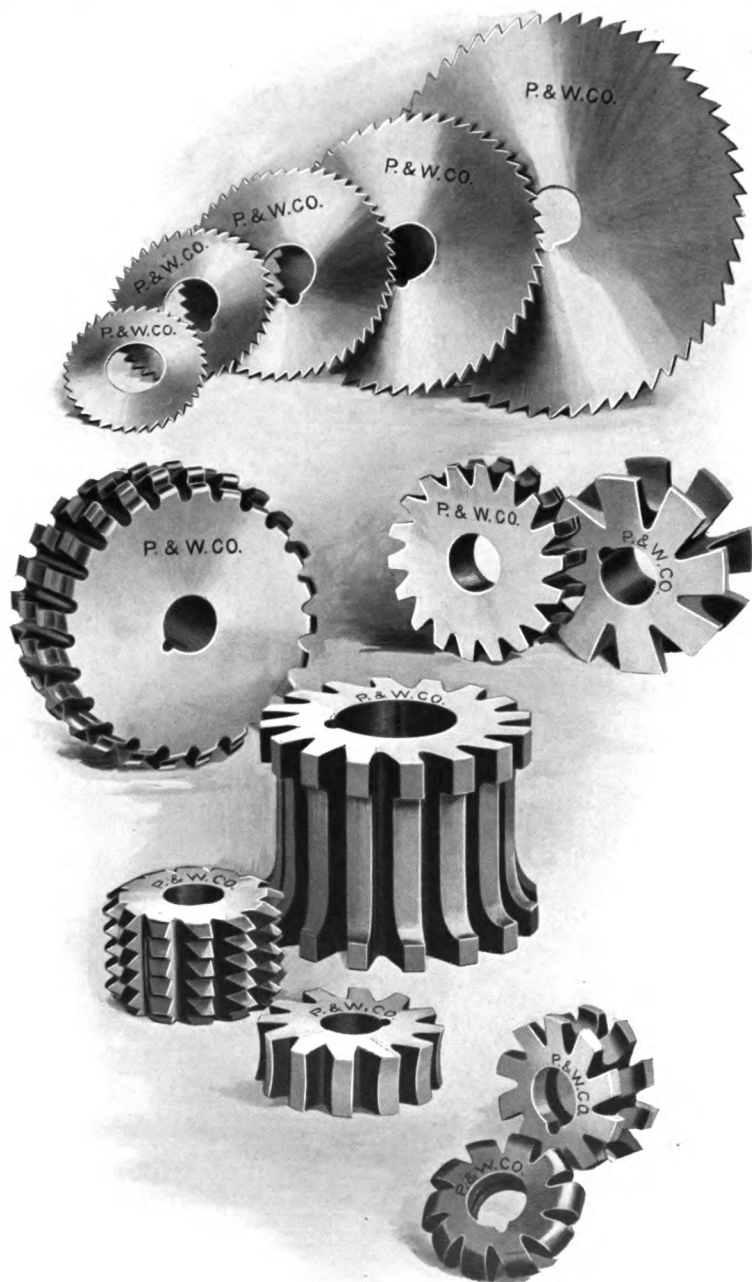


Pratt & Whitney Standard Measuring Machine. For Description, see Catalogue Devoted to Gauges and Standards



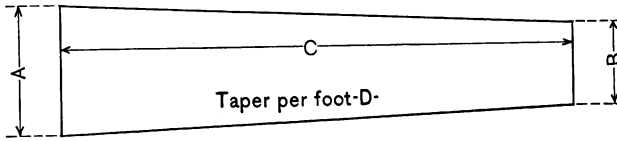
5375 2

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

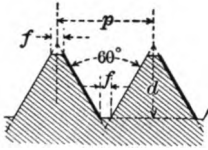


DETAIL OF TAPERS USED, SEE MACHINE SPECIFICATIONS FOR NUMBERS

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

All dimensions are in inches.

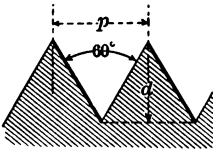
UNITED STATES STANDARD THREAD



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

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

SHARP "V" THREAD (THEORETICAL)

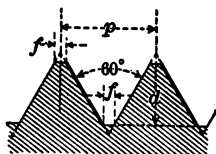


$$\text{Formula } \left\{ \begin{array}{l} p = \text{pitch} = \frac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .86603 \end{array} \right.$$

Diameter Inches	No. Threads per Inch	Diameter Inches	No. Threads per Inch	Diameter Inches	No. Threads per Inch	Diameter Inches	No. Threads per Inch
1/4	20	7/8	9	2	4 1/2	3 1/4	3 1/2
5/16	18	1 1/8	9	2 1/8	4 1/2	3 3/8	3 3/4
3/8	16	1	8	2 1/4	4 1/2	3 1/2	3 3/4
7/8	14	1 1/8	7	2 3/8	4 1/2	3 3/8	3 3/4
1 1/8	12	1 1/4	7	2 1/2	4	3 3/4	3
1 1/4	12	1 3/8	6	2 3/4	4	3 3/8	3
1 3/8	11	1 1/2	6	2 3/4	4	4	3
1 1/2	11	1 5/8	5	2 7/8	4		
1 5/8	10	1 3/4	5	3	3 1/2		
1 7/8	10	1 7/8	4 1/2	3 1/8	3 1/2		

INTERNATIONAL AND FRENCH STANDARD THREAD

(METRIC SYSTEM)



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

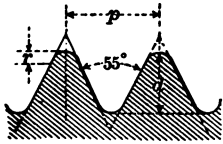
INTERNATIONAL STANDARD

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		

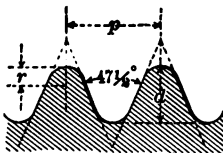
WHITWORTH STANDARD THREAD



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

Diameter Inches	No. Threads per Inch	Diameter Inches	No. Threads per Inch	Diameter Inches	No. Threads per Inch	Diameter Inches	No. Threads per Inch
1/4	20	7/8	9	2	4 1/2	3 1/4	3 1/4
5/8	18	1 1/8	9	2 1/8	4 1/2	3 3/8	3 1/4
3/8	16	1	8	2 1/4	4	3 1/2	3 1/4
7/8	14	1 1/8	7	2 3/8	4	3 5/8	3 3/4
1 1/2	12	1 1/4	7	2 1/2	4	3 3/4	3
9/8	12	1 3/8	6	2 5/8	4	3 7/8	3
5/8	11	1 1/2	6	2 3/4	3 1/2	4	3
1 1/8	11	1 5/8	5	2 7/8	3 1/2		
1 1/4	10	1 3/4	5	3	3 1/2		
1 3/8	10	1 7/8	4 1/2	3 1/8	3 1/2		

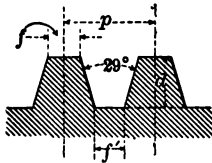
BRITISH ASSOCIATION STANDARD THREAD



$$\text{Formula } \left\{ \begin{aligned} p &= \text{pitch} \\ d &= \text{depth} = p \times .6 \\ r &= \text{radius} = \frac{2 \times p}{11} \end{aligned} \right.$$

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

$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = \frac{1}{2} p + .010$$

$$f = \text{flat on top of thread} = p \times .3707$$

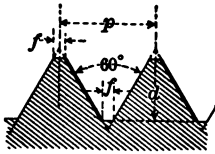
$$f' = \text{flat on bottom of thread} = p \times .3707 - .0052$$

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	$\frac{1}{2}$	1.010	.7414	.7362	1.2586	1.2637
$1\frac{1}{8}$	$\frac{8}{15}$	.9475	.6950	.6897	1.1799	1.1850
$1\frac{3}{8}$	$\frac{8}{15}$	.8850	.6487	.6435	1.1012	1.1064
$1\frac{5}{8}$	$\frac{8}{15}$	.8225	.6025	.5973	1.0226	1.0277
$1\frac{7}{8}$	$\frac{8}{15}$	.7600	.5560	.5508	.9439	.9491
$1\frac{7}{8}$	$\frac{8}{15}$	.7287	.5329	.5277	.9046	.9097
$1\frac{3}{8}$	$\frac{8}{15}$	.6975	.5097	.5045	.8652	.8704
$1\frac{5}{8}$	$\frac{8}{15}$	.6662	.4865	.4813	.8259	.8311
$1\frac{7}{8}$	$\frac{8}{15}$	.635	.4633	.4581	.7866	.7918
$1\frac{7}{8}$	$\frac{8}{15}$	.6037	.4402	.4350	.7472	.7525
$1\frac{1}{8}$	$\frac{8}{15}$	.5725	.4170	.4118	.7079	.7131
$1\frac{1}{8}$	$\frac{8}{15}$	.5412	.3938	.3886	.6686	.6739
1	1	.510	.3707	.3655	.6293	.6345
$1\frac{1}{8}$	$1\frac{1}{5}$	.4787	.3476	.3424	.5898	.5950
$1\frac{3}{8}$	$1\frac{1}{5}$	.4475	.3243	.3191	.5506	.5558
$1\frac{5}{8}$	$1\frac{1}{5}$	.4162	.3012	.2960	.5112	.5164
$1\frac{7}{8}$	$1\frac{1}{5}$	.385	.2780	.2728	.4720	.4772
$1\frac{7}{8}$	$1\frac{1}{5}$	.3537	.2548	.2496	.4327	.4379
$1\frac{3}{8}$	$1\frac{1}{5}$	.3433	.2471	.2419	.4194	.4246
$1\frac{5}{8}$	$1\frac{1}{5}$	.3225	.2316	.2264	.3934	.3986
$1\frac{7}{8}$	$1\frac{1}{5}$	.2912	.2085	.2033	.3539	.3591
$1\frac{7}{8}$	2	.260	.1853	.1801	.3147	.3199
$1\frac{7}{8}$	2	.2287	.1622	.1570	.2752	.2804
$1\frac{3}{8}$	$2\frac{1}{2}$	.210	.1482	.1430	.2518	.2570
$1\frac{5}{8}$	$2\frac{1}{2}$	.1975	.1390	.1338	.2359	.2411
$1\frac{7}{8}$	$2\frac{1}{2}$	.1766	.1235	.1183	.2098	.2150
$1\frac{7}{8}$	$3\frac{1}{2}$	.1662	.1158	.1106	.1966	.2018
$1\frac{7}{8}$	$3\frac{1}{2}$	.1528	.1059	.1007	.1797	.1849
$1\frac{7}{8}$	4	.1350	.0927	.0875	.1573	.1625
$1\frac{7}{8}$	$4\frac{1}{2}$	.1211	.0824	.0772	.1398	.1450
$1\frac{7}{8}$	5	.110	.0741	.0689	.1259	.1311
$1\frac{7}{8}$	$5\frac{1}{3}$	.1037	.0695	.0643	.1179	.1232
$1\frac{7}{8}$	6	.0933	.0617	.0565	.1049	.1101
$1\frac{7}{8}$	7	.0814	.0530	.0478	.0899	.0951
$1\frac{7}{8}$	8	.0725	.0463	.0411	.0787	.0839
$1\frac{7}{8}$	9	.0655	.0413	.0361	.0699	.0751
$1\frac{7}{8}$	10	.060	.0371	.0319	.0629	.0681
$1\frac{7}{8}$	16	.0412	.0232	.0180	.0392	.0444

A. S. M. E. STANDARD

FOR MACHINE SCREWS

United States Standard Form of Thread



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

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	.1696
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	.03608	.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.

D₁ = Diameter at bottom of thread.

D₁ = D - C.

EXAMPLE

Given outside diameter of U. S. S. screw thread, z inches; $4\frac{1}{2}$ threads per inch; find diameter at bottom of thread. $D = z$ inches; for $4\frac{1}{2}$ threads U. S. S., constant, $C = .2886$; then diameter at bottom of thread, $D_1 = z - .2886 = 1.7114$ inches.

TAP DRILLS

FOR U. S. STANDARD THREAD

Size Inches	Size of Drill	Size Inches	Size of Drill	Size Inches	Size of Drill
$\frac{1}{4}$	I 2 D N S 1 $\frac{3}{32}$ $\frac{1}{16}$ $\frac{3}{64}$ $\frac{1}{8}$ $\frac{1}{4}$	$\frac{5}{8}$	$\frac{3}{8}$ $\frac{7}{16}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{3}{4}$ $\frac{7}{8}$ 1 $1\frac{1}{8}$ $1\frac{1}{4}$ $1\frac{3}{8}$ $1\frac{1}{2}$ $1\frac{3}{4}$ 2	$1\frac{3}{8}$	$1\frac{1}{8}$ $1\frac{1}{4}$ $1\frac{3}{8}$ $1\frac{1}{2}$ $1\frac{5}{8}$ $1\frac{3}{4}$ $1\frac{7}{8}$ 2
$\frac{1}{8}$		$\frac{3}{4}$		$1\frac{1}{2}$	
$\frac{3}{8}$		$\frac{7}{8}$		$1\frac{5}{8}$	
$\frac{7}{8}$		1		$1\frac{3}{4}$	
$1\frac{1}{8}$		$1\frac{1}{8}$		$1\frac{7}{8}$	
$1\frac{1}{2}$		$1\frac{1}{4}$		2	
$1\frac{3}{4}$					
2					

FOR U. S. FORM OF THREAD $\frac{1}{16}$ TO $\frac{1}{8}$ -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
$\frac{1}{16}$	60	.041	57	$\frac{5}{8}$	56	.055	53
$\frac{1}{8}$	64	.042	56	$\frac{7}{8}$	60	.056	53
$\frac{3}{16}$	48	.067	50	$\frac{1}{2}$	40	.077	46
$\frac{1}{4}$	50	.068	50	$\frac{3}{4}$	44	.080	45
$\frac{5}{16}$	56	.071	49	$\frac{1}{2}$	48	.082	44
$\frac{3}{8}$	60	.072	48	$\frac{3}{4}$	32	.100	37
$\frac{7}{16}$	40	.093	41	$\frac{1}{2}$	36	.105	35
$\frac{1}{2}$	44	.096	40	$\frac{3}{4}$	40	.108	34
$\frac{5}{8}$	48	.098	39	$\frac{1}{2}$	32	.131	29
$\frac{3}{4}$	32	.116	31	$\frac{3}{4}$	36	.136	28
$\frac{7}{8}$	36	.120	$\frac{1}{8}$	$\frac{1}{2}$	40	.139	27
1	40	.124	30	$\frac{3}{4}$	24	.149	24
$1\frac{1}{16}$	24	.133	29	$\frac{1}{2}$	28	.157	20
$1\frac{1}{8}$	28	.141	27	$\frac{3}{4}$	32	.162	19
$1\frac{1}{4}$	30	.144	26	$\frac{1}{2}$	36	.167	18
$1\frac{3}{8}$	32	.147	25	$\frac{3}{4}$	24	.180	13
$1\frac{1}{2}$	36	.152	23	$\frac{1}{2}$	28	.188	10
$1\frac{3}{4}$	24	.164	19	$\frac{3}{4}$	32	.194	8
2	28	.172	16	$\frac{1}{2}$	36	.198	7
	32	.178	14	$\frac{3}{4}$	18	.193	9
	36	.183	12	$\frac{1}{2}$	20	.201	5
	18	.178	14	$\frac{3}{4}$	24	.211	3
	20	.185	12	$\frac{1}{2}$	26	.216	2
	22	.190	10	$\frac{3}{4}$	32	.225	1
	24	.196	8				
	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

Diameter of Tubes			Screwed Ends		
Nominal Inside Inches	Actual Inside Inches	Actual Outside Inches	Thickness of Metal Inches	No. of Threads per Inch	Length of Perfect Thread Inches
1/8	0.270	0.405	0.068	27	0.19
1/4	0.364	0.540	0.088	18	0.29
3/8	0.494	0.675	0.091	18	0.30
1/2	0.623	0.840	0.109	14	0.39
3/4	0.824	1.050	0.113	14	0.40
1	1.048	1.315	0.134	11 1/2	0.51
1 1/4	1.380	1.660	0.140	11 1/2	0.54
1 1/2	1.610	1.900	0.145	11 1/2	0.55
2	2.067	2.375	0.154	11 1/2	0.58
2 1/2	2.468	2.875	0.204	8	0.89
3	3.067	3.500	0.217	8	0.95
3 1/2	3.548	4.000	0.226	8	1.00
4	4.026	4.500	0.237	8	1.05
4 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 (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
1/8 inch	1 1/2 inch	1 1/4 inches	1 7/8 inches
1/4 inch	1 7/8 inch	1 1/2 inches	1 3/2 inches
3/8 inch	1 9/8 inch	2 inches	2 3/8 inches
1/2 inch	1 5/4 inch	2 1/2 inches	2 3/4 inches
3/4 inch	1 5/2 inch	3 inches	3 3/4 inches
1 inch	1 1/2 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	Bir- mingham 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	.012641	.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	.006640625	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	Thickness of Diameter in Inches	Weight of Square Bar One Foot Long	Weight of Round Bar One Foot Long	Thickness 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 $\frac{3}{8}$	96.30	75.64
$\frac{1}{16}$	.013	.010	$\frac{3}{4}$	25.21	19.80	$\frac{7}{8}$	98.55	77.40
$\frac{1}{8}$	.052	.041	$\frac{1}{2}$	26.37	20.71	$\frac{1}{2}$	100.8	79.19
$\frac{3}{16}$	.117	.092	$\frac{7}{8}$	27.55	21.64	$\frac{9}{16}$	103.1	81.00
$\frac{1}{4}$	.208	.164	$\frac{1}{8}$	28.76	22.59	$\frac{3}{8}$	105.5	82.83
$\frac{5}{16}$	.326	.256	3	30.00	23.56	$\frac{1}{4}$	107.8	84.69
$\frac{3}{8}$	.469	.368	$\frac{1}{16}$	31.26	24.55	$\frac{1}{8}$	110.2	86.56
$\frac{7}{16}$	.638	.501	$\frac{7}{8}$	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	$\frac{9}{16}$	36.58	28.73	6	120.0	94.25
$\frac{11}{16}$	1.576	1.237	$\frac{3}{8}$	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
$\frac{7}{8}$	2.201	1.728	$\frac{1}{2}$	40.83	32.07	$\frac{3}{8}$	135.5	106.4
$\frac{1}{8}$	2.552	2.004	$\frac{9}{16}$	42.30	33.23	$\frac{1}{2}$	140.8	110.6
$\frac{1}{8}$	2.930	2.301	$\frac{3}{8}$	43.80	34.40	$\frac{5}{8}$	146.3	114.9
I	3.333	2.618	$\frac{1}{8}$	45.33	35.60	$\frac{3}{4}$	151.9	119.3
$\frac{1}{16}$	3.763	2.955	$\frac{3}{4}$	46.88	36.82	$\frac{7}{8}$	157.6	123.7
$\frac{1}{8}$	4.219	3.313	$\frac{1}{8}$	48.45	38.05	7	163.3	128.3
$\frac{1}{8}$	4.701	3.692	$\frac{1}{8}$	50.05	39.31	$\frac{1}{8}$	169.2	132.9
$\frac{3}{16}$	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	$\frac{7}{8}$	56.72	44.55	$\frac{3}{8}$	193.8	152.2
$\frac{1}{2}$	7.500	5.890	$\frac{3}{8}$	58.45	45.91	$\frac{1}{4}$	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	$\frac{9}{16}$	61.99	48.69	8	213.3	167.6
$\frac{11}{16}$	9.492	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
$\frac{7}{8}$	10.95	8.601	$\frac{1}{2}$	67.50	53.01	$\frac{3}{4}$	255.2	200.4
$\frac{1}{8}$	11.72	9.204	$\frac{9}{16}$	69.39	54.50	9	270.0	212.1
$\frac{1}{8}$	12.51	9.828	$\frac{3}{8}$	71.30	56.00	$\frac{1}{4}$	285.2	224.0
2	13.33	10.47	$\frac{1}{4}$	73.24	57.52	$\frac{1}{2}$	300.8	236.3
$\frac{1}{16}$	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	$\frac{1}{8}$	77.20	60.63	10	333.3	261.8
$\frac{3}{16}$	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	$\frac{7}{8}$	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	$1\frac{1}{4}$
$\frac{1}{32}$	.0002	.0002	.0003	.0007	.0010	.0013	.0016	.0016	.0020	.0026	.0033
$\frac{1}{16}$	.0003	.0005	.0007	.0013	.0020	.0026	.0031	.0033	.0039	.0052	.0065
$\frac{3}{32}$	.0007	.0010	.0013	.0026	.0039	.0052	.0062	.0065	.0078	.0104	.0130
$\frac{1}{8}$	.0010	.0015	.0020	.0039	.0059	.0078	.0094	.0098	.0117	.0156	.0195
$\frac{3}{16}$	.0013	.0020	.0026	.0052	.0078	.0104	.0125	.0130	.0156	.0208	.0260
$\frac{1}{4}$	.0016	.0024	.0033	.0065	.0098	.0130	.0156	.0163	.0195	.0260	.0326
$\frac{5}{16}$	.0020	.0029	.0039	.0078	.0117	.0156	.0187	.0195	.0234	.0312	.0391
$\frac{3}{8}$	.0023	.0034	.0046	.0091	.0137	.0182	.0219	.0228	.0273	.0365	.0456
$\frac{7}{16}$	.0026	.0039	.0052	.0104	.0156	.0208	.0250	.0260	.0312	.0417	.0521
$\frac{1}{2}$	.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
$\frac{3}{4}$	.0036	.0054	.0072	.0143	.0215	.0286	.0344	.0358	.0430	.0573	.0716
$\frac{7}{8}$	.0039	.0059	.0078	.0156	.0234	.0312	.0375	.0391	.0469	.0625	.0781
$1\frac{1}{8}$	.0042	.0063	.0085	.0169	.0254	.0339	.0406	.0423	.0508	.0677	.0846
$1\frac{1}{4}$	.0046	.0068	.0091	.0182	.0273	.0365	.0437	.0456	.0547	.0729	.0911
$1\frac{3}{8}$	.0049	.0073	.0098	.0195	.0293	.0391	.0469	.0488	.0586	.0781	.0977
$1\frac{1}{2}$	.0052	.0078	.0104	.0208	.0312	.0417	.050	.0521	.0625	.0833	.1042
1	.0104	.0156	.0208	.0417	.0625	.0833	.100	.1042	.125	.1667	.2083
2	.0156	.0234	.0312	.0625	.0937	.1250	.150	.1562	.1875	.250	.3125
3	.0208	.0312	.0417	.0833	.125	.1667	.200	.2083	.250	.3333	.4167
4	.0260	.0391	.0521	.1042	.1562	.2083	.250	.2604	.3125	.4167	.5208
5	.0312	.0469	.0625	.125	.1875	.250	.300	.3125	.375	.500	.625
6	.0365	.0547	.0729	.1458	.2187	.2917	.350	.3646	.4375	.5833	.7292
7	.0417	.0625	.0833	.1667	.250	.3333	.400	.4167	.500	.6667	.8333
8	.0469	.0703	.0937	.1875	.2812	.375	.450	.4687	.5625	.750	.9375
9	.0521	.0781	.1042	.2083	.3125	.4167	.500	.5208	.625	.8333	1.0417
10	.0573	.0859	.1146	.2292	.3437	.4583	.550	.5729	.6875	.9167	1.1458
11	.0625	.0937	.125	.250	.375	.500	.600	.625	.750	1.000	1.250
12	.0677	.1016	.1354	.2708	.4062	.5417	.650	.6771	.8125	1.0833	1.3542
13	.0729	.1094	.1458	.2917	.4375	.5833	.700	.7292	.875	1.1667	1.4583
14	.0781	.1172	.1562	.3125	.4687	.625	.750	.7812	.9375	1.250	1.5625
15	.0833	.125	.1667	.3333	.500	.6667	.800	.8333	1.000	1.3333	1.6667
16	.0885	.1328	.1771	.3542	.5312	.7083	.850	.8854	1.0625	1.4167	1.7708
17	.0937	.1406	.1875	.3750	.5625	.750	.900	.9375	1.125	1.500	1.875
18	.0990	.1484	.1979	.3958	.5937	.7917	.950	.9890	1.1875	1.5833	1.9792
19	.1042	.1562	.2083	.4167	.625	.8333	1.000	1.0417	1.250	1.6667	2.0833
20	.1094	.1641	.2187	.4375	.6562	.875	1.050	1.0937	1.3125	1.750	2.1875
21	.1146	.1719	.2292	.4583	.6875	.9167	1.100	1.1458	1.375	1.8333	2.2917
22	.1198	.1797	.2396	.4792	.7187	.9583	1.150	1.1979	1.4375	1.9167	2.3958
23	.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
$\frac{1}{100} = .00039$	$\frac{3}{100} = .01299$	$\frac{64}{100} = .02520$	$\frac{95}{100} = .03740$
$\frac{2}{100} = .00079$	$\frac{4}{100} = .01339$	$\frac{65}{100} = .02559$	$\frac{96}{100} = .03780$
$\frac{3}{100} = .00118$	$\frac{5}{100} = .01378$	$\frac{66}{100} = .02598$	$\frac{97}{100} = .03819$
$\frac{4}{100} = .00157$	$\frac{6}{100} = .01417$	$\frac{67}{100} = .02638$	$\frac{98}{100} = .03858$
$\frac{5}{100} = .00197$	$\frac{7}{100} = .01457$	$\frac{68}{100} = .02677$	$\frac{99}{100} = .03898$
$\frac{6}{100} = .00236$	$\frac{8}{100} = .01496$	$\frac{69}{100} = .02717$	1 = .03937
$\frac{7}{100} = .00276$	$\frac{9}{100} = .01535$	$\frac{70}{100} = .02756$	2 = .07874
$\frac{8}{100} = .00315$	$\frac{10}{100} = .01575$	$\frac{71}{100} = .02795$	3 = .11811
$\frac{9}{100} = .00354$	$\frac{11}{100} = .01614$	$\frac{72}{100} = .02835$	4 = .15748
$\frac{10}{100} = .00394$	$\frac{12}{100} = .01654$	$\frac{73}{100} = .02874$	5 = .19685
$\frac{11}{100} = .00433$	$\frac{13}{100} = .01693$	$\frac{74}{100} = .02913$	6 = .23622
$\frac{12}{100} = .00472$	$\frac{14}{100} = .01732$	$\frac{75}{100} = .02953$	7 = .27559
$\frac{13}{100} = .00512$	$\frac{15}{100} = .01772$	$\frac{76}{100} = .02992$	8 = .31496
$\frac{14}{100} = .00551$	$\frac{16}{100} = .01811$	$\frac{77}{100} = .03032$	9 = .35433
$\frac{15}{100} = .00591$	$\frac{17}{100} = .01850$	$\frac{78}{100} = .03071$	10 = .39370
$\frac{16}{100} = .00630$	$\frac{18}{100} = .01890$	$\frac{79}{100} = .03110$	11 = .43307
$\frac{17}{100} = .00669$	$\frac{19}{100} = .01929$	$\frac{80}{100} = .03150$	12 = .47244
$\frac{18}{100} = .00709$	$\frac{20}{100} = .01969$	$\frac{81}{100} = .03189$	13 = .51181
$\frac{19}{100} = .00748$	$\frac{21}{100} = .02008$	$\frac{82}{100} = .03228$	14 = .55118
$\frac{20}{100} = .00787$	$\frac{22}{100} = .02047$	$\frac{83}{100} = .03268$	15 = .59055
$\frac{21}{100} = .00827$	$\frac{23}{100} = .02087$	$\frac{84}{100} = .03307$	16 = .62992
$\frac{22}{100} = .00866$	$\frac{24}{100} = .02126$	$\frac{85}{100} = .03346$	17 = .66929
$\frac{23}{100} = .00906$	$\frac{25}{100} = .02165$	$\frac{86}{100} = .03386$	18 = .70866
$\frac{24}{100} = .00945$	$\frac{26}{100} = .02205$	$\frac{87}{100} = .03425$	19 = .74803
$\frac{25}{100} = .00984$	$\frac{27}{100} = .02244$	$\frac{88}{100} = .03465$	20 = .78740
$\frac{26}{100} = .01024$	$\frac{28}{100} = .02283$	$\frac{89}{100} = .03504$	21 = .82677
$\frac{27}{100} = .01063$	$\frac{29}{100} = .02323$	$\frac{90}{100} = .03543$	22 = .86614
$\frac{28}{100} = .01102$	$\frac{30}{100} = .02362$	$\frac{91}{100} = .03583$	23 = .90551
$\frac{29}{100} = .01142$	$\frac{31}{100} = .02402$	$\frac{92}{100} = .03622$	24 = .94488
$\frac{30}{100} = .01181$	$\frac{32}{100} = .02441$	$\frac{93}{100} = .03661$	25 = .98425
$\frac{31}{100} = .01220$	$\frac{33}{100} = .02480$	$\frac{94}{100} = .03701$	26 = 1.02362
$\frac{32}{100} = .01260$			

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	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$1\frac{1}{8}$
0	0.0	1.6	3.2	4.8	6.4	7.9	9.5	11.1	12.7	14.3	17.5	20.6	23.8
1	25.4	27.0	28.6	30.2	31.7	33.3	34.9	36.5	38.1	39.7	42.9	46.0	49.2
2	50.8	52.4	54.0	55.6	57.1	58.7	60.3	61.9	63.5	65.1	68.3	71.4	74.6
3	76.2	77.8	79.4	81.0	82.5	84.1	85.7	87.3	88.9	90.5	93.7	96.8	100.0
4	101.6	103.2	104.8	106.4	108.0	109.5	111.1	112.7	114.3	115.9	120.7	122.2	125.4
5	127.0	128.6	130.2	131.8	133.4	134.9	136.5	138.1	139.7	141.3	144.5	147.6	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	173.0	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	198.4	201.6
8	203.2	204.8	206.4	208.0	209.6	211.1	212.7	214.3	215.9	217.5	220.7	223.8	227.0
9	228.6	230.2	231.8	233.4	235.0	236.5	238.1	239.7	241.3	242.9	246.1	249.2	252.4
10	254.0	255.6	257.2	258.8	260.4	261.9	263.5	265.1	266.7	268.3	271.5	274.6	277.8
11	279.4	281.0	282.6	284.2	285.7	287.3	288.9	290.5	292.1	293.7	296.9	298.4	303.2
12	304.8	306.4	308.0	309.6	311.1	312.7	314.3	315.9	317.5	319.1	322.3	325.4	328.6
13	330.2	331.8	333.4	335.0	336.5	338.1	339.7	341.3	342.9	344.5	347.7	350.8	354.0
14	359.6	357.2	358.8	360.4	361.9	363.5	365.1	366.7	368.3	369.9	373.1	376.2	379.4
15	381.0	382.6	384.2	385.8	387.3	388.9	390.5	392.1	393.7	395.3	398.5	401.6	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	427.0	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	452.4	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	477.8	481.0
19	482.6	484.2	485.8	487.4	488.9	490.5	492.1	493.7	495.3	496.9	500.1	503.2	506.4
20	508.0	509.6	511.2	512.8	514.3	515.9	517.5	519.1	520.7	522.3	525.5	528.6	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	554.0	557.2
22	558.8	560.4	562.0	563.6	565.1	566.7	568.3	569.9	571.5	573.1	576.3	579.4	582.6
23	584.2	585.8	587.4	589.0	590.5	592.1	593.7	595.3	596.9	598.5	601.7	604.8	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

$\frac{1}{64}$ . . . . .	.015625	$\frac{33}{64}$ . . . . .	.515625
$\frac{1}{32}$ . . . . .	.03125	$\frac{17}{32}$ . . . . .	.53125
$\frac{3}{64}$ . . . . .	.046875	$\frac{35}{64}$ . . . . .	.546875
1-16 . . . . .	.0625	9-16 . . . . .	.5625
$\frac{5}{64}$ . . . . .	.078125	$\frac{37}{64}$ . . . . .	.578125
$\frac{3}{32}$ . . . . .	.09375	$\frac{19}{32}$ . . . . .	.59375
$\frac{7}{64}$ . . . . .	.109375	$\frac{39}{64}$ . . . . .	.609375
1-8 . . . . .	.1250	5-8 . . . . .	.6250
$\frac{9}{64}$ . . . . .	.140625	$\frac{41}{64}$ . . . . .	.640625
$\frac{5}{32}$ . . . . .	.15625	$\frac{21}{32}$ . . . . .	.65625
$\frac{11}{64}$ . . . . .	.171875	$\frac{43}{64}$ . . . . .	.671875
3-16 . . . . .	.1875	11-16 . . . . .	.6875
$\frac{13}{64}$ . . . . .	.203125	$\frac{45}{64}$ . . . . .	.703125
$\frac{7}{32}$ . . . . .	.21875	$\frac{23}{32}$ . . . . .	.71875
$\frac{15}{64}$ . . . . .	.234375	$\frac{47}{64}$ . . . . .	.734375
1-4 . . . . .	.2500	3-4 . . . . .	.7500
$\frac{17}{64}$ . . . . .	.265625	$\frac{49}{64}$ . . . . .	.765625
$\frac{9}{32}$ . . . . .	.28125	$\frac{25}{32}$ . . . . .	.78125
$\frac{19}{64}$ . . . . .	.296875	$\frac{51}{64}$ . . . . .	.796875
5-16 . . . . .	.3125	13-16 . . . . .	.8125
$\frac{21}{64}$ . . . . .	.328125	$\frac{53}{64}$ . . . . .	.828125
$\frac{11}{32}$ . . . . .	.34375	$\frac{27}{32}$ . . . . .	.84375
$\frac{23}{64}$ . . . . .	.359375	$\frac{55}{64}$ . . . . .	.859375
3-8 . . . . .	.3750	7-8 . . . . .	.8750
$\frac{25}{64}$ . . . . .	.390625	$\frac{57}{64}$ . . . . .	.890625
$\frac{13}{32}$ . . . . .	.40625	$\frac{29}{32}$ . . . . .	.90625
$\frac{27}{64}$ . . . . .	.421875	$\frac{59}{64}$ . . . . .	.921875
7-16 . . . . .	.4375	15-16 . . . . .	.9375
$\frac{29}{64}$ . . . . .	.453125	$\frac{61}{64}$ . . . . .	.953125
$\frac{15}{32}$ . . . . .	.46875	$\frac{31}{32}$ . . . . .	.96875
$\frac{31}{64}$ . . . . .	.484375	$\frac{63}{64}$ . . . . .	.984375
1-2 . . . . .	.5000	1	1.0000

CABLE AND TELEGRAPH CODE

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

*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.	YIHWB	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	Gear Cutting Machine, 60-inch.	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.		
YIGBU	Internal Gear Cutting Attachment.		
YIGCY	Gear Cutting Machine, 90-inch.	YIKXA	*Grinder, 6-foot Vertical Surface.
YIGEX	For Spur Gears only.	YIKZE	With Plain Equipment.
YIGIZ	For Worm Gears only.	YILAB	With Plain Rotary Chuck.
YIGOB	For Spur and Worm Gears.	YILBE	With Rectangular Magnetic Chuck.
YIGUC	Internal Gear Cutting Attachment.	YILCI	With Plain Rotary and Rectangular Magnetic Chucks.
YIGVA	Gear Cutting Machine, 120-inch.	YILDO	With Plain Rotary, Rectangular Magnetic and Rotary Magnetic Chucks.
YIGWE	For Spur and Worm Gears.	YILEC	With Rectangular Magnetic and Rotary Magnetic Chucks.
YIGXI	Internal Gear Cutting Attachment.	YILFU	Plain Rotary Chuck.
YIGZO	*Grinder, 4 x 30-inch Cylindrical.	YILGY	Rectangular Magnetic Chuck.
YIHAX	Regular Equipment with Automatic Sizing Device.	YILID	Rotary Magnetic Chuck.
YIHBO	Regular Equipment without Automatic Sizing Device.	YILOF	Magnetic Chuck, arranged for 110 volts direct current.
YIHCU	Grinding Wheel.	YILUG	Magnetic Chuck, arranged for 220 volts direct current.
YIHDX	*Grinder, 6 x 48-inch Cylindrical.	YILZA	Grinding Wheel, suitable for—
YIHEZ	Regular Equipment with Automatic Sizing Device.	YIMAC	Grinder, Thread Milling Machine Cutter.
YIHIB	Regular Equipment without Automatic Sizing Device.	YIMBA	Regular Equipment.
YIHOC	Grinding Wheel.	YIMCE	Grinding Wheels.

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

CABLE AND TELEGRAPH CODE—Continued

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

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

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— $\frac{5}{8}$ " Drill Chuck with Taper Stem.
YOKOF	Lever Tailstock with Cross Slide.	YONLY	1— $\frac{5}{8}$ " 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 $\frac{3}{8}$ " 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.	YORGA	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	Lathe, 10-inch Toolmakers'.		
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. 0 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, <i>Regular Equipment English.</i>
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, <i>Regular Equipment, Metric.</i>
YOSKE	Tool Equipment Complete, Whitworth.	YOVME	6' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).
YOSLI	Lathe, 14-inch.	YOVROR	6' Bed, Regular Equipment, Metric, also Pan and Oil Pump.
YOSMO	6' Bed, <i>Regular Equipment, English.</i>	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, <i>Regular Equipment, English.</i>		
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.
- YOWAN 8' Bed, Regular Equipment, Metric.
- 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.
- YOWOS Above Equipment, ditto, also Pan (no Oil Pump).
- YOWPI Above Equipment, ditto, also Pan and Oil Pump.
- YOWRO 10' Bed, Regular Equipment, Metric.
- YOWTY 10' Bed, Regular Equipment, Metric, also Pan (no Oil Pump).
- YOXAP 10' Bed, Regular Equipment, Metric, also Pan and Oil Pump.
- 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 *Quick Withdrawing Mechanism.*
- YOXPE **Appliances (for 14-inch Lathe).**
- YOXRI 14' 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 sleeve, shaft and cutter, for milling spiral grooves in shaft as required; Draw-back Collet Mechanism complete with nine (9) collets from 3/8" to 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 3/4" to 1 7/8" diameter, advancing by sixteenths and from 1 1/2" to 2", advancing by eighths.
- YOXSU 14' x 6' 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.
- YOXTU 14' 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 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.
- YOXVY 14' x 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.
- YOZAR** *14' 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 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 $1\frac{1}{8}$ " diameter, advancing by sixteenths and from $1\frac{1}{2}$ " to 2", advancing by eighths.
- YOZES** *14' x 8' 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.
- YOZIT** *14' 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 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 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.
- YOZPA** *14' x 8' 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.
- YOZRE** *14' x 10' 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 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 $1\frac{1}{8}$ " diameter, advancing by sixteenths and from $1\frac{1}{2}$ " to 2", advancing by eighths.
- YOZSI** *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.
- YOZTO** *14' x 10' Lathe.*
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.
- YOZWY *14' x 10' Lathe.*
With the same equipment as above, and, in addition, with Oil Pump, Piping and Independent Countershaft for Oil Pump, Oil⁴ 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.
- 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 3½" dia. (Blank) ready to receive Chuck.
YUFZI *Translating Gears:*
YUGAZ 127 Teeth.
YUGBI 85 and 127 Teeth.
YUGCO *Micrometer Stop Clamp:*

CABLE AND TELEGRAPH CODE—Continued

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

*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 $1\frac{7}{8}$ " 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 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 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 $1\frac{7}{8}$ " diameter, advancing by sixteenths and from $1\frac{1}{2}$ " to 2", advancing by eighths.

CABLE AND TELEGRAPH CODE—Continued

- YUMGI** *16" x 8' Lathe.*
With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
- YUMHO** *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 (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.
- YUMIH** *16" x 8' Lathe.*
With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
- YUMKU** *16" x 10' 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 $1\frac{1}{8}$ " diameter, advancing by sixteenths, and from $1\frac{1}{2}$ " to 2", advancing by eighths.
- YUMLY** *16" x 10' Lathe.*
With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
- YUMOK** *16" x 10' 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 (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.
- YUNAG** *16" x 10' Lathe.*
With the above named equipment, and, in addition, Oil Pump and Piping, Oil Pan and Swinging Tank.
- YUNEH** *Geared Head:*
- YUNFA** *Geared Head in place of Cone Head.*
- YUNGE** *Tool Rests:*
- YUNHI** *Plain Compound Rest in place of Compound Elevating Rest.*

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	* <i>Lathe, $\frac{5}{8}$ x $4\frac{1}{2}$-inch Turret.</i>
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.
ZACBW	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, $\frac{3}{8}$ "', 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, 1 $\frac{1}{2}$ x 18-inch Turret.
ZADCU	Equipment "A" with Power Feed, Metric.	ZAGUG	Equipment "A", English.
ZADDDY	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	$\left. \begin{array}{l} 7\frac{1}{2}'' \\ 9'' \\ 12'' \end{array} \right\} \text{Three-jaw Geared Scroll Chuck with two sets of Jaws for inside and outside gripping.}$
		ZAHUH	
		ZAKAD	
		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" { Three-jaw Geared Scroll Chuck with two sets of Jaws for inside and outside gripping.
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	ZAZAT	Equipment "B", Metric.
ZATNE	12" { Chuck with two sets	ZAZOX	Equipment "C".
ZATOS	15" { of Jaws for inside and	ZAZSA	Equipment "D".
		ZAZTE	Equipment "E", English.
		ZAZUZ	Equipment "E", Metric.
		ZAZVI	Special Forming Slide with Power Transverse Feed.
ZATPI	Forging Chuck.	ZAZWO	Lead Screw and Change Gears for Thread Cutting.
ZATRO	8½" Lever Scroll Chuck with Holder.	ZAZZY	Tool Holder for inside and outside Thread Cutting.
YATSU	Two-jaw Chuck (specify jaws).	ZEBBU	15", Three-jaw Geared Scroll Chuck, with three sets of Jaws.
ZATTY	Drill Chuck, 2" capacity, with 2¼" Round Shank.	ZEBCY	Two-jaw Chuck, 6¼" diameter (specify jaws).
ZATUT	Five-taper Split Sleeves for 2" Drill Chuck (specify taper).	ZEBEX	Two-jaw Chuck, 8¼" diameter (specify jaws).
ZAVAP	Step-chuck and Closer Attachment.	ZEBIZ	Forging Chuck.
ZAVER	Extra Step-chucks (specify number).		
ZAVIS	Universal Turner with "V" Back-rests.		
ZAVNA	Universal Turner with Roller Back-rests.		
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	Measuring Machine.
ZECBU	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.	ZEHFE	Combination English and Metric Machine.
ZEDCO	Triple Tool Holder.	ZEHFI	Milling Machine, No. 00 Bench.
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.	ZEHKY	Swivel Vise.
ZEDIC	Bushings for 3" Round Tool Holder (specify size).	ZEHOH	Right Angle Piece.
ZEDOD	Round Tool Holder, 2¼", with- out Bushings.	ZEIIUK	*Milling Machine, No. 10 Hand.
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.
ZEFCE	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.	ZESEF	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.	ZEXOZ	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).
ZIFED	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. 0.	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.		
<hr/>			
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	25	VOXIL	VUBIP	VUCSU
110	40	VOXKI	VUBLA	VUCTY
110	60	VOXLO	VUBME	VUDAP
		VOXNY	VUBNI	VUDER
220		VOXOM	VUBOR	VUDIS
220	25	VOZAK	VUBPO	VUDNA
220	40	VOZEL	VUBRU	VUDOT
220	60	VOZHA	VUBSY	VUDPE
440		VOZIM	VUBUS	VUDRI
440	25	VOZKE	VUCAN	VUDSO
440	40	VOZLI	VUCEP	VUDTU
440	60	VOZMO	VUCIR	VUDVY
550		VOZON	VUCMA	VUFAR
550	25	VOZPY	VUCNE	VUFES
550	40	VOZUP	VUCOS	VUFIT
550	60	VUBAM	VUCPI	VUFPA

DIRECT CURRENT VOLTAGES

VUFRE 110	VUFWY 250	VUGRA 550
VUFSE 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	VUPEP 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	

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