PRECISION TOOLS

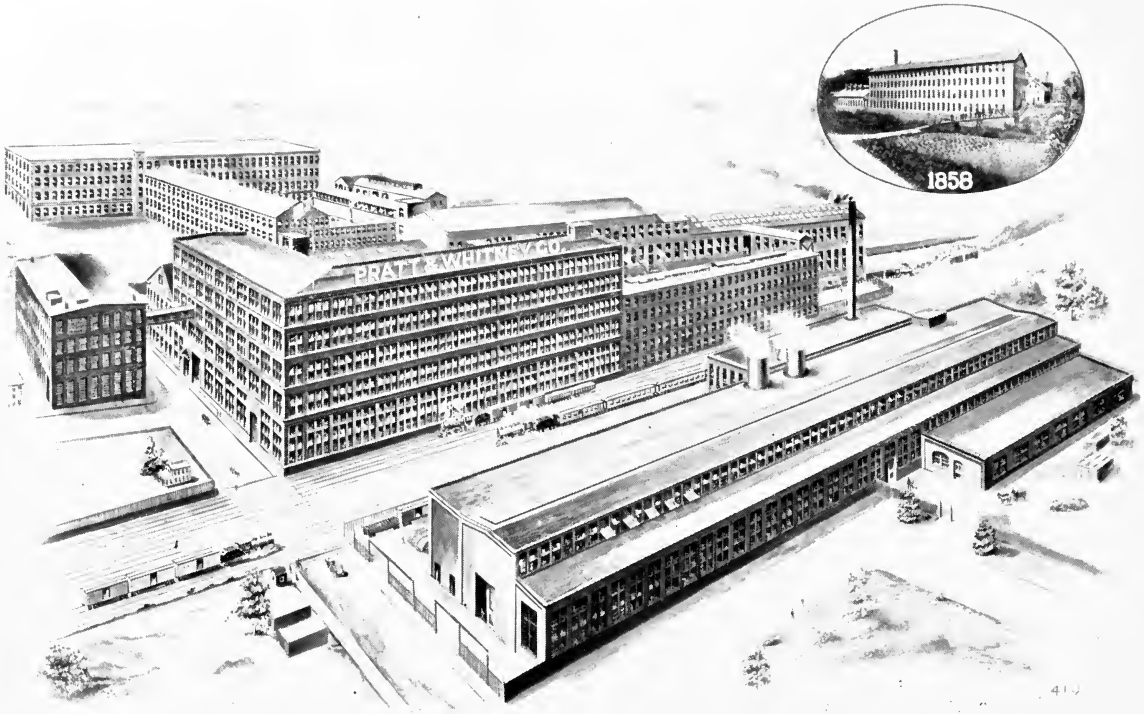
P&W CO.

PRATT & WHITNEY CO.
HARTFORD
CONN.

PRECISION TOOLS

PRATT & WHITNEY COMPANY

HARTFORD, CONNECTICUT



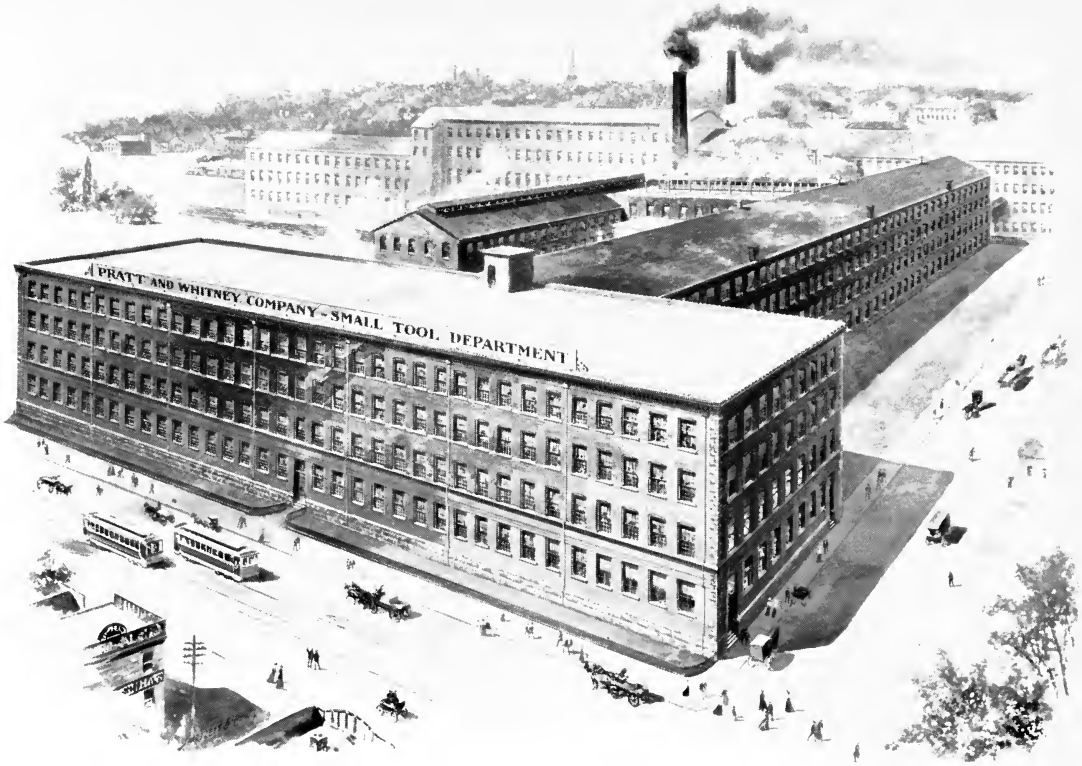
Machinery Department


1909
PRATT & WHITNEY COMPANY
To
THE PRATT & WHITNEY Co.
STANDARD GAUGES
CAPS & DIES
AWARDED BY THE CITY OF


COLUMBIAN EXPOSITION
COMMEMORATION OF THE
FOURTH ANNIVERSARY
DISCOVERY OF AMERICA
BY CHRISTOPHER COLUMBUS
MDCCCXCIII
WHITNEY CO.
AWARDED TO
Pratt & Whitney Co.
FOR
Best Display
of Iron
Working Tools
CINCINNATI INDUSTRIAL
EXPOSITION
Pratt & Whitney Co.
FOR
Display of
Standard Gauges etc.
1883
HENRY CARSON MEDAL
FOUNDED 1881


AWARDED TO
Pratt, Whitney & Co.
1867.
CINCINNATI INDUSTRIAL
EXPOSITION
Pratt & Whitney Co.
Bright
Drilling
Machine
1873
Pratt & Whitney Co.
Planer
Machine
1873
AWARDED TO
Pratt & Whitney Co.
For Tool & Cutting Machines
1875
DER FORTSCHRITTE
WELTAUSSTELLU
WIEN
AWARD
TO
The
Pratt & Whitney Co.
NATIONAL EXHIBITION
AWARDED BY
UNITED STATES
CENTENNIAL
COMMISSION
PARIS


GRAND PRIZE
LOUISIANA PURCHASE
EXPOSITION
GOLD MEDAL
LOUISIANA PURCHASE
EXPOSITION
GRAND PRIZE
LOUISIANA PURCHASE
EXPOSITION



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
Cleveland . . . . . Rockefeller Building

DOMESTIC AGENTS

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

FOREIGN AGENTS

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

INTRODUCTION

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

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

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

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

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

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

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

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

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

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

Code Attention is called to telegraphic code, page 265.

7 x 32-inch Bench Lathe

BENCH LATHE

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

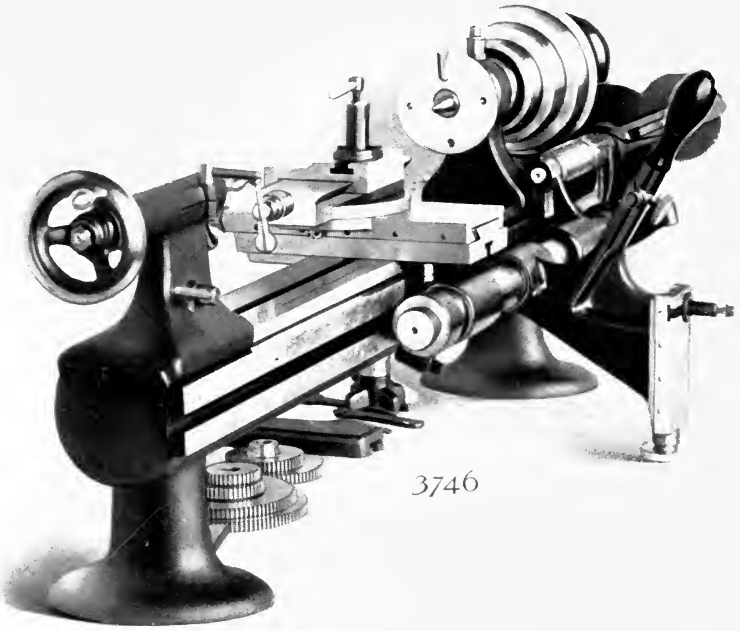
SPECIFICATIONS

RANGE	Length of Bed	32″
	Center Distance, maximum	16″
	Swing over Bed	7″
	Swing over Bed, with Raising Blocks	13″
	Back-rests, capacity	3″, 4″, 5″, and 6″
	Tool Post takes Tool	½″ x ¼″
	Collet Capacity	½″
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″, 3⅞″, 4¾″
	Cone (Counter.), diameter (3 steps)	5½″, 6⅜″, 7¼″
	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)	1¼″
	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

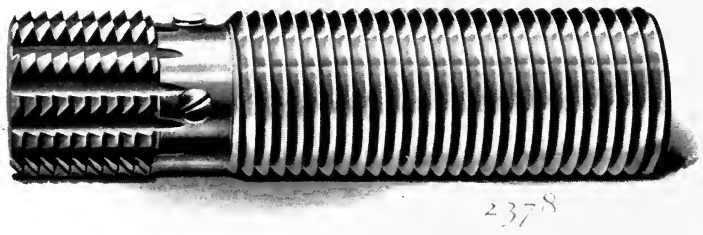
*For detailed information, see "Tapers", page 247.

† Index Holes in Cone Flange, 48 and 60.

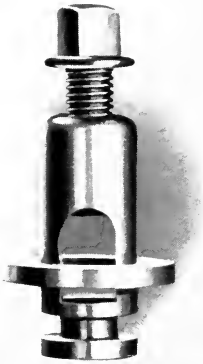
Code words, page 265.



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.

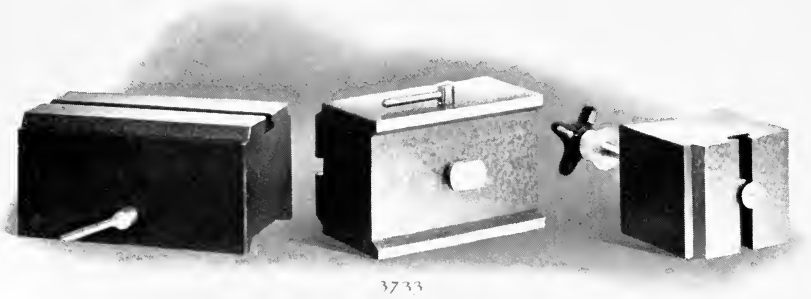
Regular Equipment Comprises: Bed with Rear Slide planed for Threading Attachment; Headstock with Face Plate, Center Collet and Center; Tailstock with Center; T-Rest with Binder.

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.

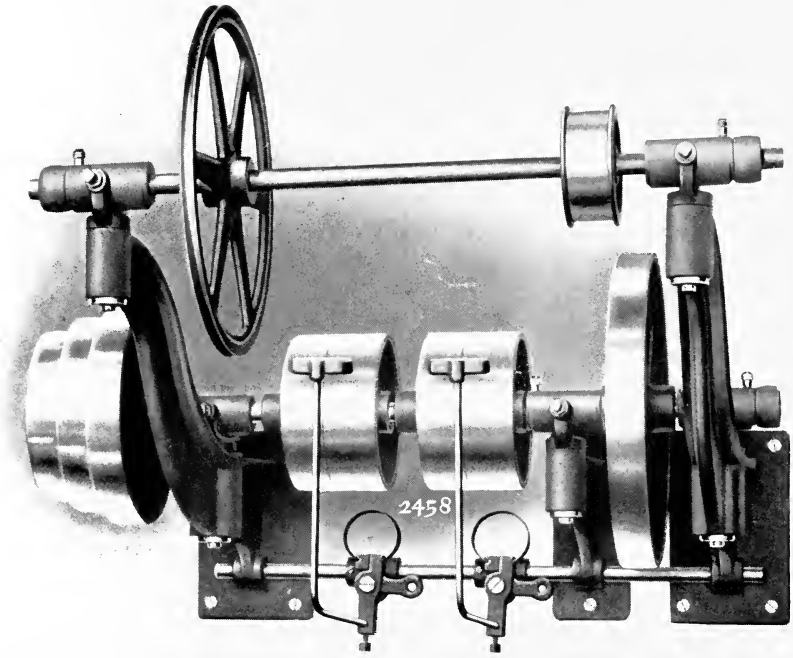
Special Threading Tool and Holder for Threading Attachment, furnished to order.

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

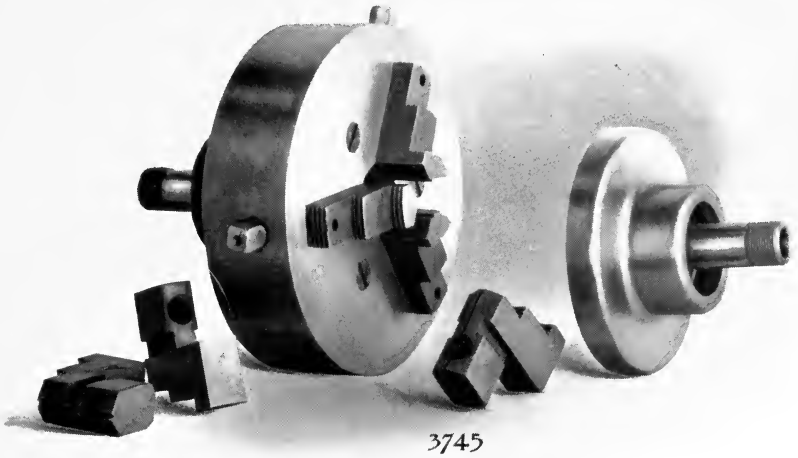
Raising Blocks 3 inches high, increasing swing of lathe to 13 inches; 3 in set: one each for Head, Tailstock and one for Compound Rest or other attachments.



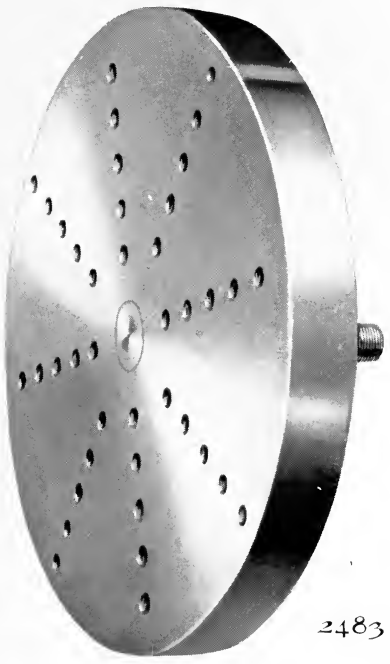
Two-speed Wall Countershaft with Grinding Attachment

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

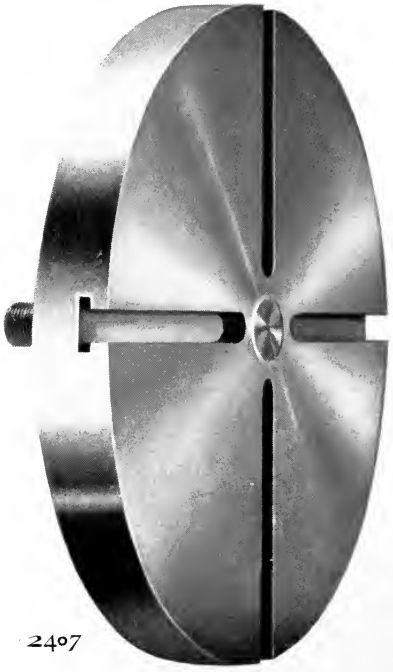
Wall Countershafts bolt directly to the wall; Wall-rod Countershafts are bolted to Wall-rods, which is preferable when a number of lathes are used together or are placed in front of windows. Wall-rod Brackets and Wall-rods 1 inch diameter, are carried in stock and furnished to order.



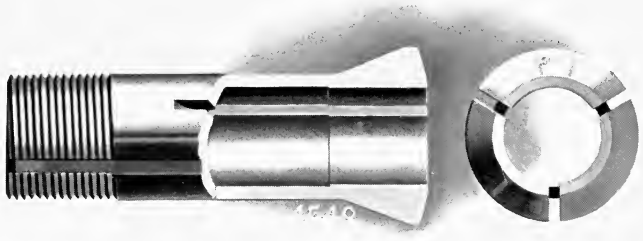
Combination Chucks: 4 and 6-inch with 2 sets of Jaws and Chuck-plate



7-inch Face-plate Chuck with Tapped Holes

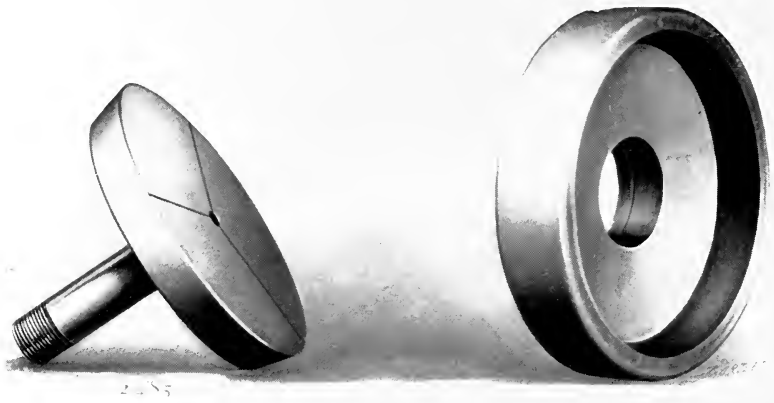


7-inch Face-plate Chuck with T-slots



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.



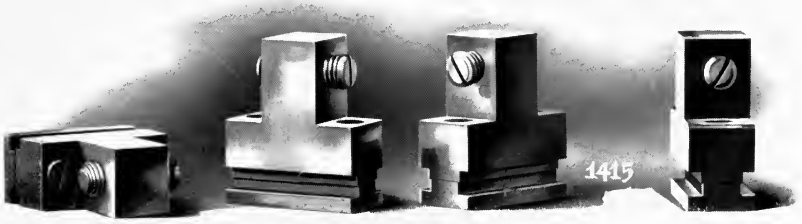
Blank Split Step-chuck and Closer

Step-chucks and Closers

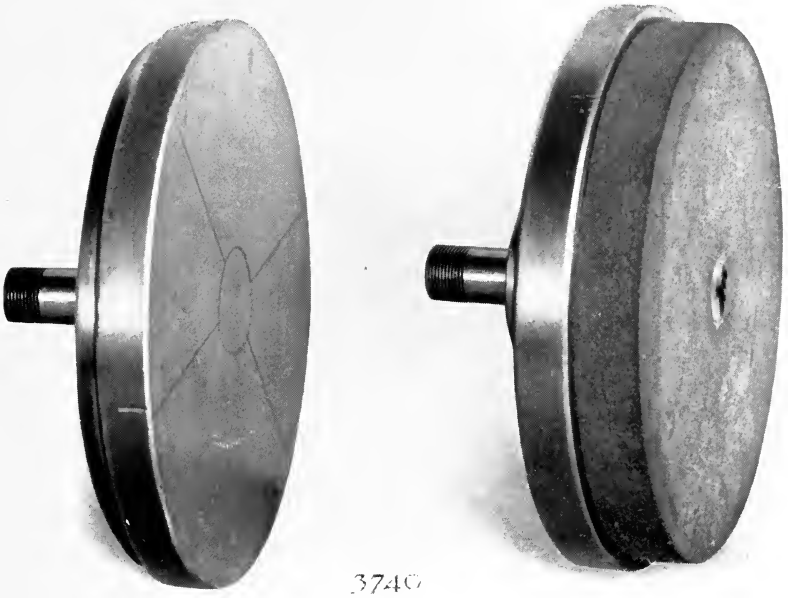
Made in five sizes.

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

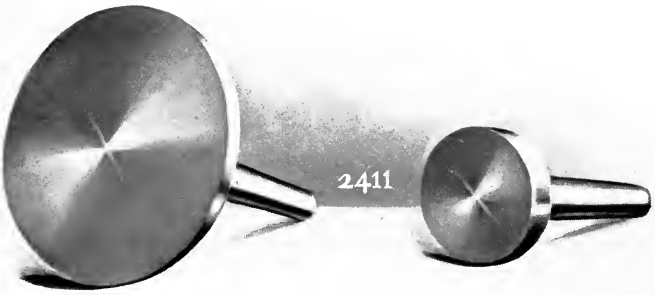
Closers A, B, C, D, E for above Chucks.



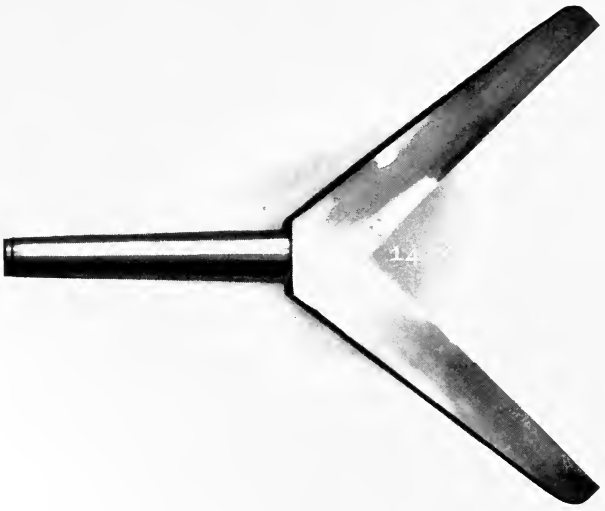
Chuck Jaws: For Face-plate Chucks with T-slots. Also used for Face-plate Quills with T-slots



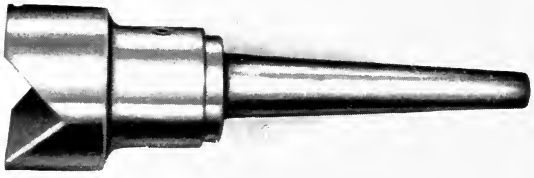
Face Emery Wheel and Face Lead Lap



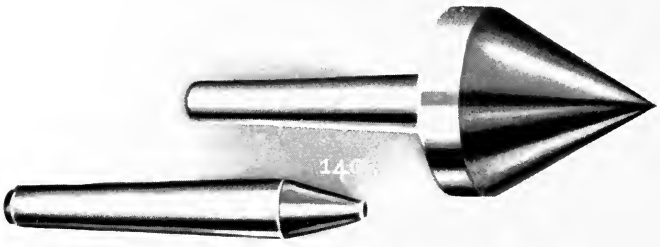
Drill Pads: 1, 2, 4 and 6-inch Diameter



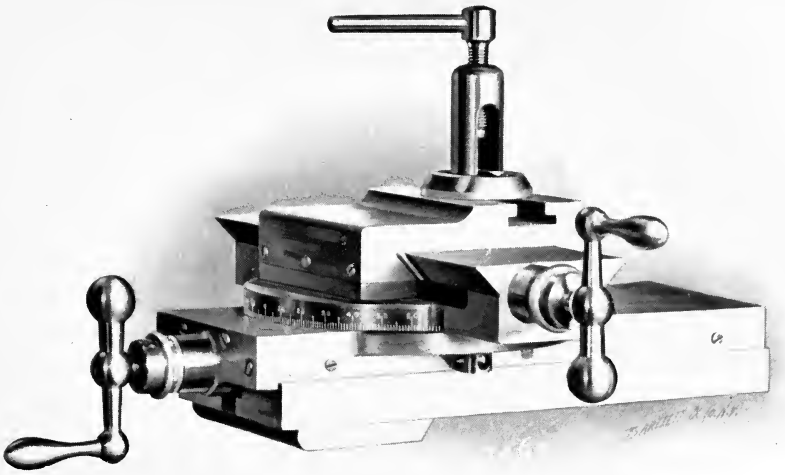
Plain V-center



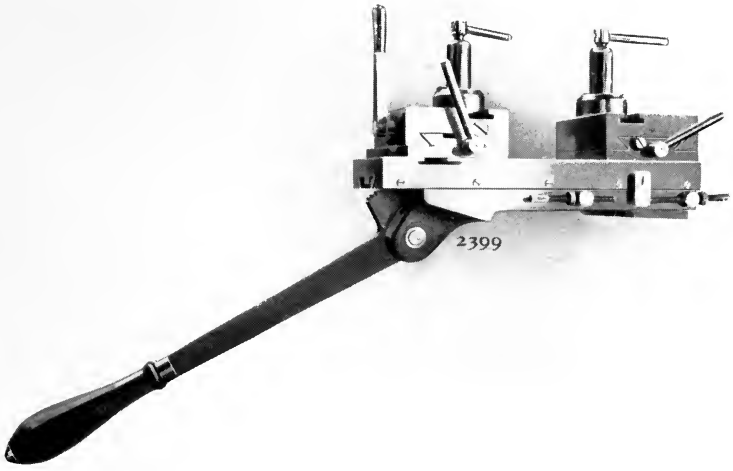
Swiveling V-center



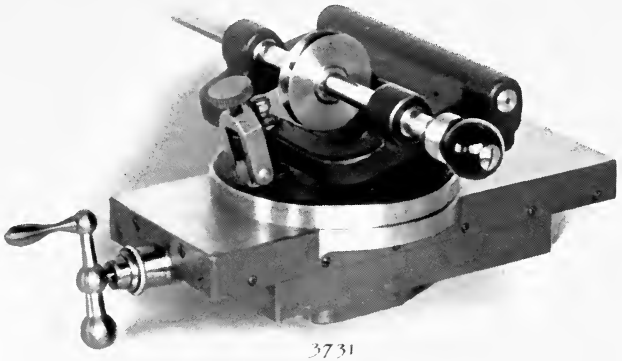
Large Plain Center and Female Center



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

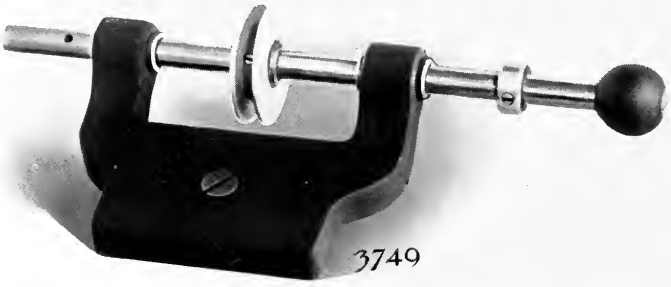


Double Slide-rest with Lever, Rack and Pinion Movement. Also made with Screw Movement



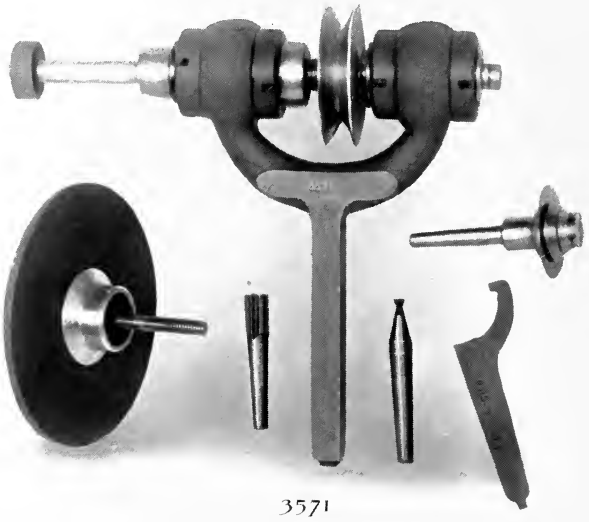
3731

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



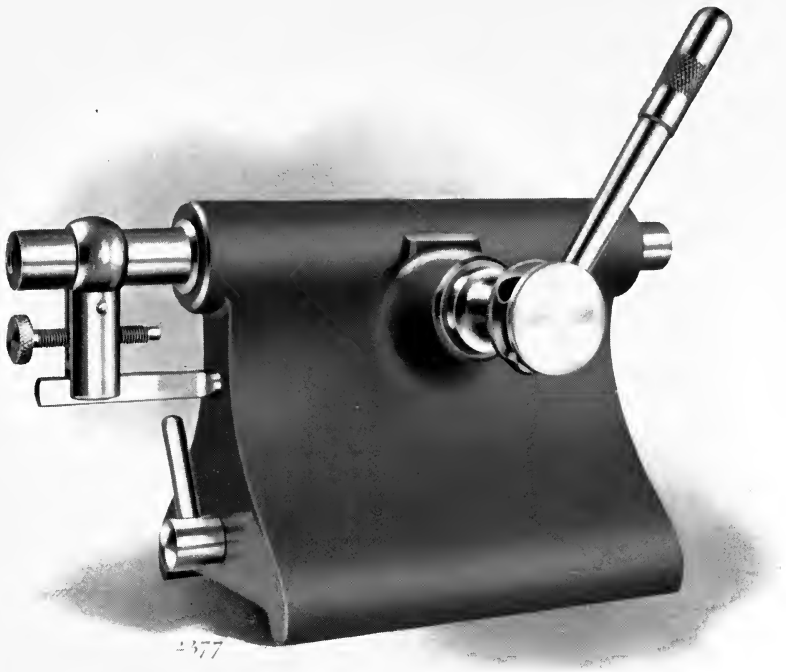
3749

Slide-rest Traverse-spindle Grinder

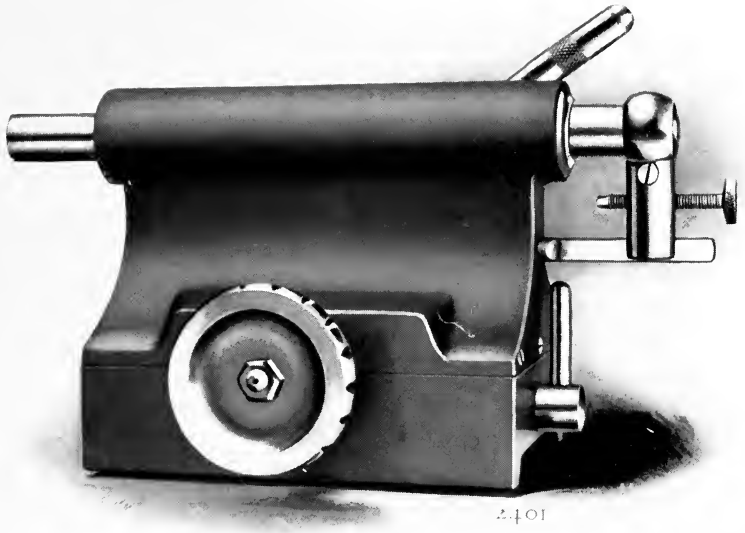


3571

Tool-post Grinder and Appliances



Plain Lever Tailstock



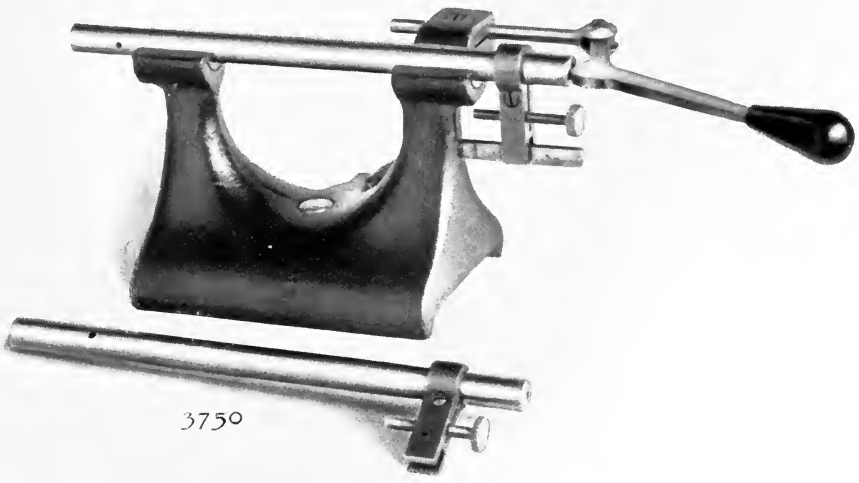
Lever Tailstock with Cross Slide

3827

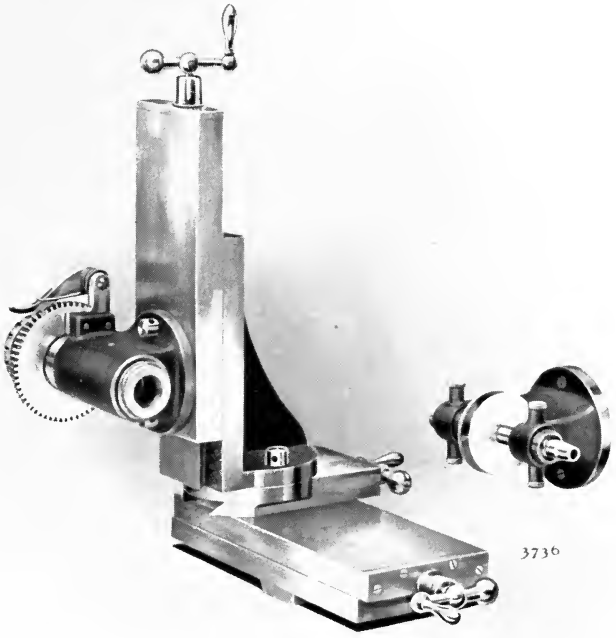
Arbors: ¼, ⅜ and ½ inch, for Milling Attachment

2392

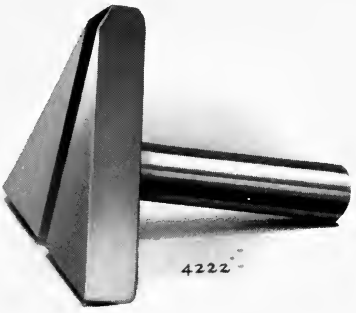
Back-rests: 3, 4, 5 and 6-inch Capacity



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



Milling Attachment with Extra Cutter Head

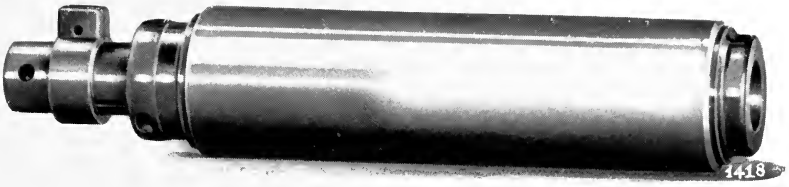


Triangular Table-rest, 2⅜-inch

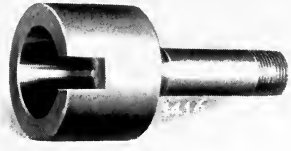
Rectangular Table-rest, 4 x 6-inch

Angle Plate, 2 x 3¼-inch

Quill-rest

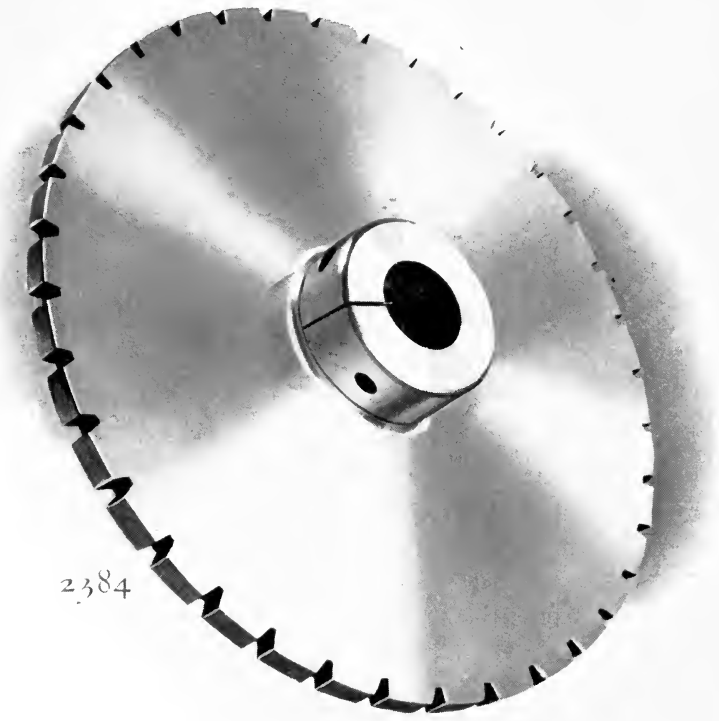


Chuck Quill

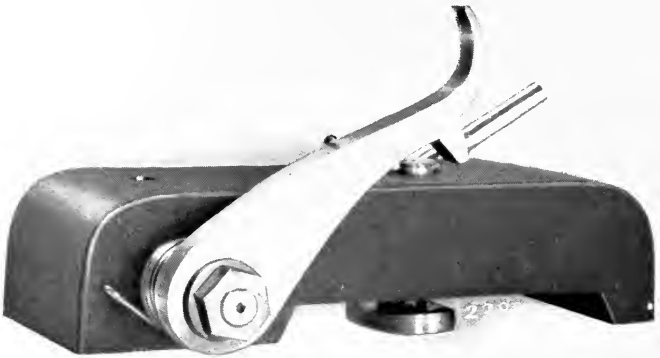


Quill Driver

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

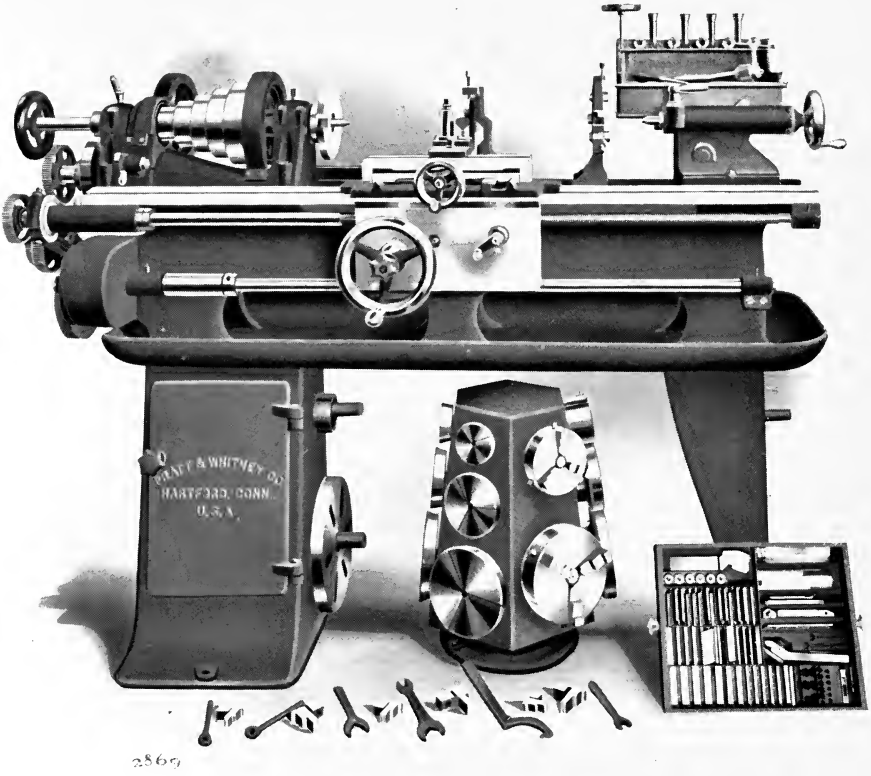


Index Plate: Number of Notches as Ordered



Index Pawl and Block

Filing Attachment and Driver
Files of various shapes furnished to order



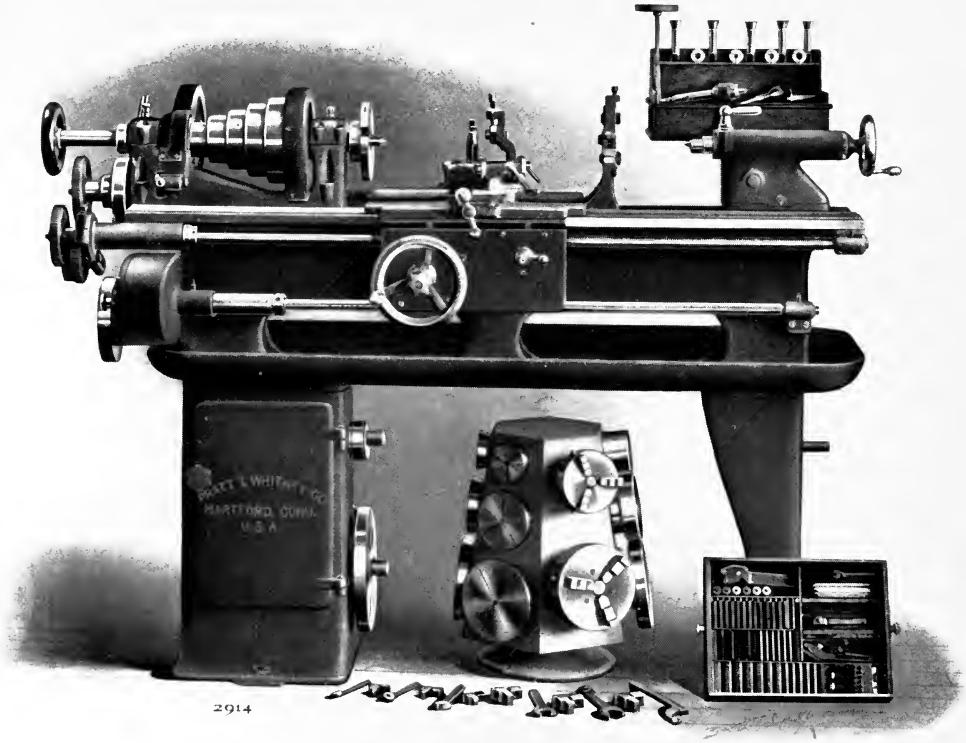
10-inch Toolmakers' Lathe with Plain Elevating Rest and Tool Equipment

10-INCH LATHE — SPECIFICATIONS

RANGE	Length of Bed	5′
	Center Distance, maximum	29″
	Swing over Bed, with Plain Elevating Rest	$10\frac{3}{4}$″
	Swing over Bed, with Compound Elevating Rest	$11\frac{3}{4}$″
	Swing over Carriage, with Plain Elevating Rest	$4\frac{13}{16}$″
	Swing over Carriage, with Compound Elevating Rest	7½″
	Steady Rest Capacity	2½″
	Follow Rest Capacity	2½″
	Tool Post takes Tool	½″ x 1″
	Collet Capacity	$\frac{1}{8}$″ to $\frac{5}{8}$″
	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	$1\frac{11}{16}$″ x 3″
	Rear Bearings	$1\frac{7}{16}$″ x 2½″
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through	$\frac{15}{16}$″
	*Taper Hole in Spindle Collet, No. 6 Jarno.	
	Front End, conical (H. & G.); Thread, 2¾″ diameter; 6 Pi., U. S. F.	
TAILSTOCK SPINDLE	Diameter	$1\frac{3}{8}$″
	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	$7\frac{81}{100}$ to 1
	Cone Diameters (5), large and small	7⅛″ and 2⅞″
	Pulley (Counter. Friction)	8″ x 3¼″
	Belt Width (Cone)	1½″
	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 1½ to 156 Pi., inc. 11½ 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, 1½ to 39 Pi., inc. 11½ Pi.	
FLOOR SPACE	Floor space	31″ x 6′ 2″
WEIGHTS	Machine, with Regular Equipment, net pounds	1300
	Tool Equipment, net pounds	180
	Crating Material (domestic), approximate pounds	200
	Boxing Material (foreign), approximate pounds	500
	Box, cubic feet	71

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

Code words, page 265.



(Patented)

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

10-INCH LATHE EQUIPMENT

REGULAR EQUIPMENT — The machine with English Lead, Cross Feed Screws and Dials; Rise and Fall Elevating Rest; Taper Attachment; Collet Attachment, with 9 Collets, 1/8 to 5/8 by 16ths; 2 Centers; Spindle Cap; Face Plates, 10½″ and 6½″ 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 3½″ diameter, ready to receive Chuck, are carried in stock.

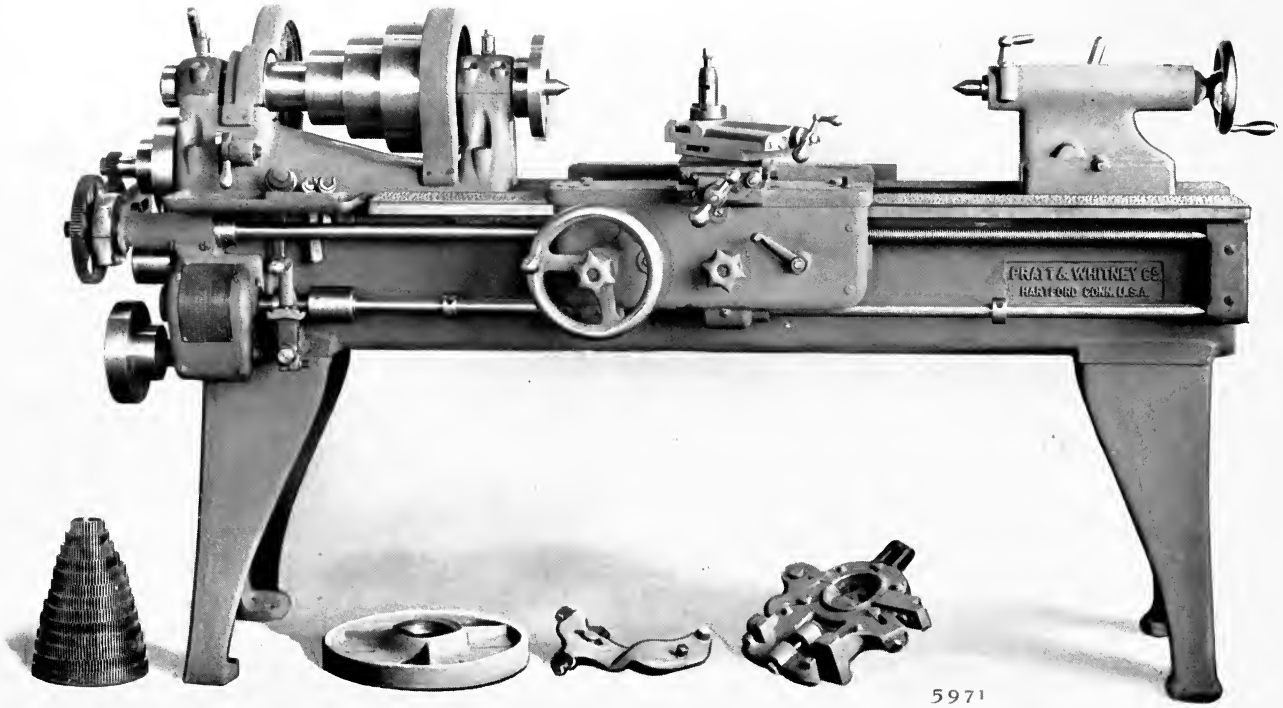
TOOL EQUIPMENT

CHUCKS . . .
- 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 $\frac{5}{16}$″ Drill Chuck, with stem.
- 1 $\frac{5}{16}$″ Drill Holder, size "A", No. 60 to $\frac{5}{16}$″ capacity.

STEP-CHUCK AND CLOSERS
- 2 Step-chucks, 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
- 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 1/4″, 3/8″, and 1/2″.
- 1 Screw Pitch Gauge.
- 1 Center Gauge.
- 1 Female Center.
- 1 Cabinet for Tools.
- 1 Pyramid for Chucks, etc.

Code words, page 265.



14-inch Engine Lathe

14-INCH LATHE — SPECIFICATIONS

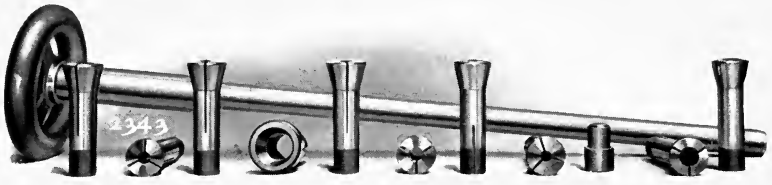
RANGE	Length of Bed	6′, 8′, 10′
	Center Distance, maximum	36″, 60″, 84″
	Swing over Bed	15 7/8″
	Swing over Carriage	9½″
	Steady Rest Capacity	4″
	Follow Rest Capacity	3″
	Tool Post takes Tool	5/8″ x 1¼″
	Attachments (see description)	
HEADSTOCK SPINDLE	Special Steel; Bearings, cylindrical; Front	2 7/16″ x 4″
	Rear Bearings	2″ x 3 5/16″
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through	1 3/16″
	*Taper Hole in Spindle, No. 13 Jarno.	
	*Taper Hole in Spindle Collet, No. 10 Jarno.	
	Front End, cylindrical, 2 5/8″ diameter; Thread 3¾″ 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 3/16 to 1
	Cone Diameters (4), large and small	9¾″ and 3¾″
	Countershaft Pulley, diameter	12″ x 4¼″
	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. 11½ 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. 11½ 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.

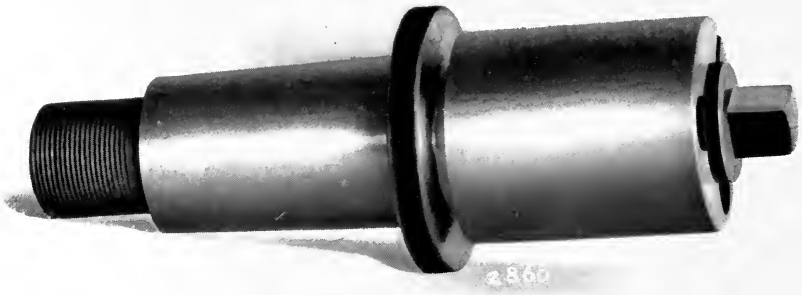
†For each additional 2′ of bed add 200 pounds.

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

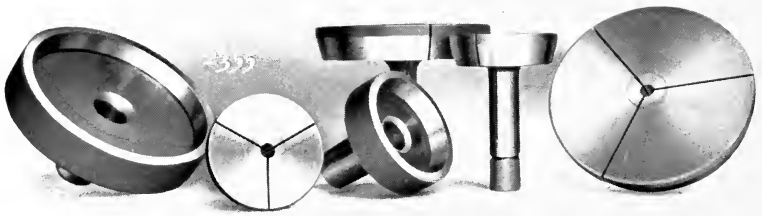
Code words, page 265.



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 WITHDRAWING 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, ⅜″ to ⅞″ 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), ¾″, $1\frac{3}{16}$″, ⅞″, $1\frac{5}{16}$″.
8 Bushings (for No. 2 Arbor), 1″ to $1\frac{7}{16}$″ by 16ths.
5 Bushings (for No. 3 Arbor), 1½″ to 2″ by 8ths.
1 Draw-in Spindle. (Same as Collet Attachment. Specify if not wanted).

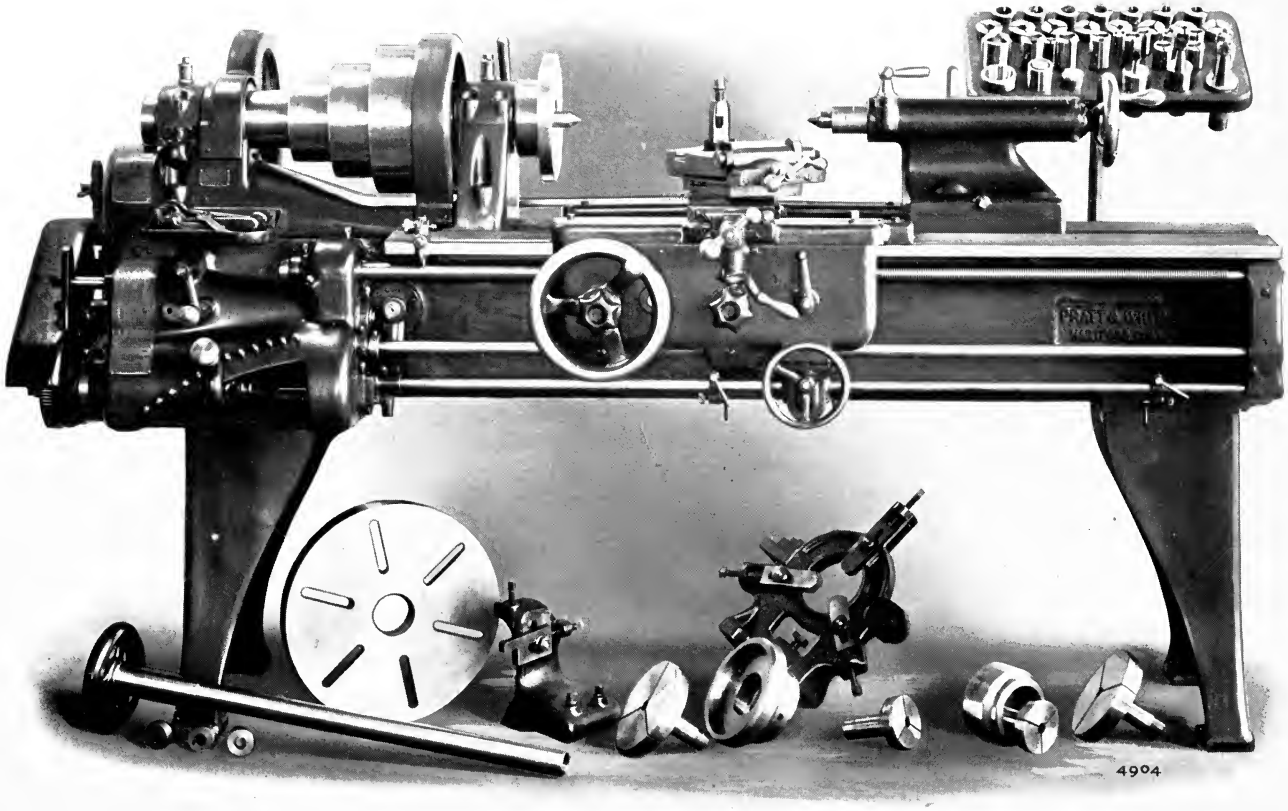
METRIC BUSHINGS —
5 Bushings (for No. 1 Arbor), 19, 20, 22, 24 and 26 m/m.
6 Bushings (for No. 2 Arbor), 28, 30, 32, 34, 36 and 38 m/m.
6 Bushings (for No. 3 Arbor), 40, 42, 44, 46, 48 and 50 m/m.
(Arbors and Bushings are hardened and ground, special treatment and care being used to insure accuracy).

STEP-CHUCK AND CLOSER ATTACHMENT — Consists of:
2 Step-chucks, ⅞″ 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 — 3½″ 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	6′, 8′, 10′
	Center Distance, maximum	36″, 60″, 84″
	Swing over Bed	16¾″
	Swing over Carriage	10″
	Steady Rest Capacity	5″
	Follow Rest Capacity	4″
	Tool Post takes Tool	⅝″ x 1¼″
	Attachments (see description).	
HEADSTOCK SPINDLE	Special Steel; Bearings, cylindrical; Front	2⅞″ x 4¼″
	Rear Bearings	2⅜″ x 3 7/16″
	Boxes (Cone Head), C. I., lined with Babbitt, adjustable for wear.	
	Boxes (Geared Head), Bronze, adjustable for wear.	
	Hole through	1 1/16″
	*Taper Hole in Spindle, No. 16 Jarno.	
	*Taper Hole in Spindle Collet, No. 10 Jarno.	
	Front End, conical (H. & G.); Thread 4¼″ diameter; ⅜ Pi., ⅜ Lead.	
TAILSTOCK SPINDLE	Diameter	2″
	Travel	6″
	*Taper Hole, No. 10 Jarno.	
SPEEDS CONE HEAD	Spindle Speeds, back gears in (8)	7 to 48½
	Spindle Speeds, back gears out (8)	63½ to 440
	Back Gear Ratio	9 1/10 to 1
	Cone Diameters (4), large and small	10¾″ to 4¼″
	Countershaft Pulley, diameter	14 x 4¼″
	Belt Width (Cone)	3″
	Belt Width (Countershaft Pulley)	4″
	Countershaft Speed, R. P. M.	114 and 150
	(For further information, see Lathe Catalogue).	
SPEEDS GEARED HEAD	Spindle Speeds (16)	8 to 450
	Ratio of Driving Pulley to slow Sp. Speed	45 to 1
	Diameter of Driving Pulley	10″ x 3¼″
	Belt Width (Driving Pulley)	3″
	Belt Width (Countershaft Pulley)	4″
	Countershaft Speed, R. P. M.	250 and 315
	(For further information, see Lathe Catalogue).	
FEEDS . . .	Carriage Longitudinal, P. R. Sp.	.0015″ to .092″
	Carriage Cross Feed, P. R. Sp.	.0014″ to .082″
	Micrometer Dials graduated in thousandths	
	(For further information, see Lathe Catalogue).	
THREADING .	English Gear Box and Lead Screw, 3 Pi., Acme, will cut English Threads 1½ 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	2700
	‡Pan and Oiling Attachment (6′ Bed), net pounds	700
	Crating Material (domestic), approximate pounds	300
	Boxing Material (foreign), approximate pounds	700
	Box, cubic feet	115

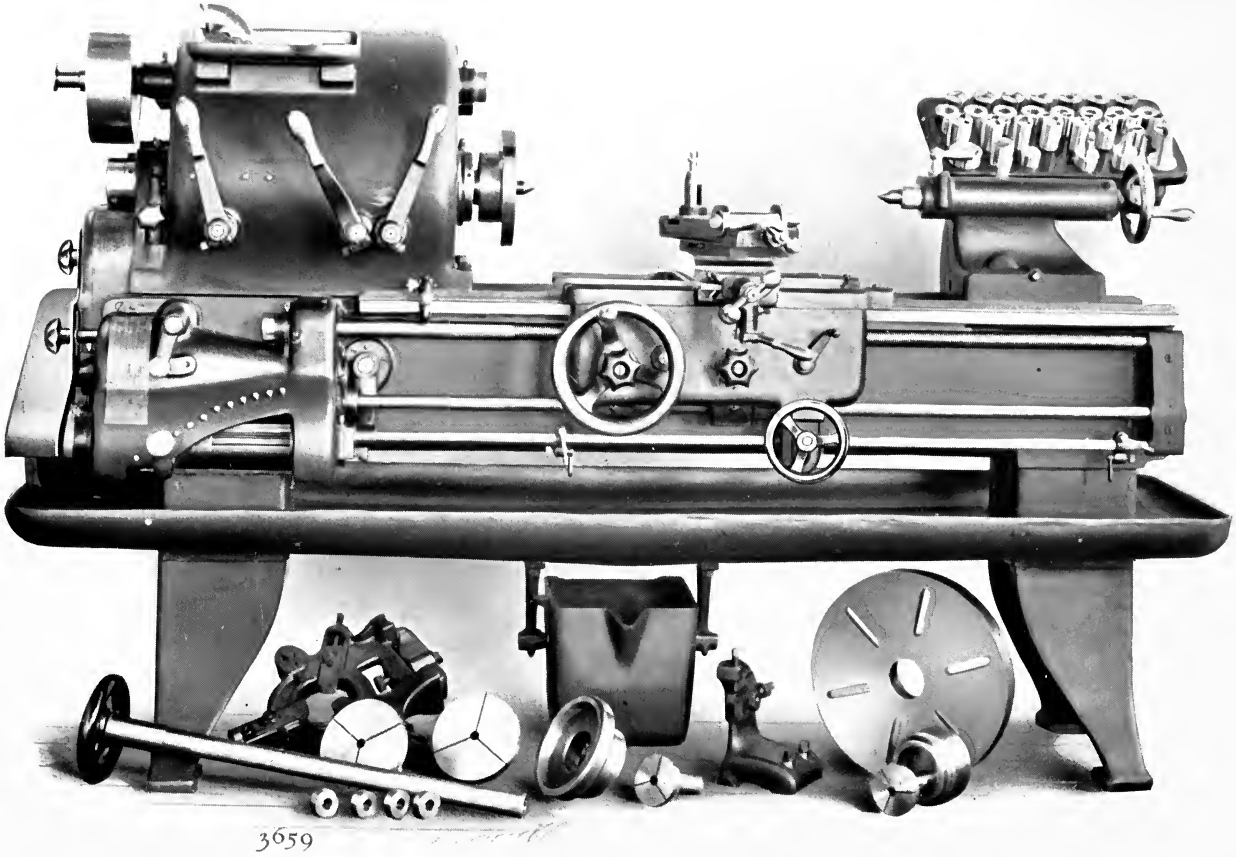
NOTE—Geared Head Machine with 6′ Bed weighs 3500 pounds net.

*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.



(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, ⅜″ to 1¼″ 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), ¾″, $\frac{13}{16}$″, ⅞″, $\frac{15}{16}$″.
8 Bushings (for No. 2 Arbor), 1″ to $1\frac{7}{16}$″ by 16ths.
5 Bushings (for No. 3 Arbor), 1½″ 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, ⅞″ to 3¾″ capacity.
1 Step-chuck, 3¾″ to 7″ capacity.
1 Step-chuck, with 4 Adjustable Jaws, 4½″ capacity.
1 Closer for 3¾″ Chucks
1 Closer for 7″ and 4½″ Chucks.
1 Spindle Bushing for Step-chucks.
1 Draw-in Spindle (same as Collet Attachment. Specify if not wanted).

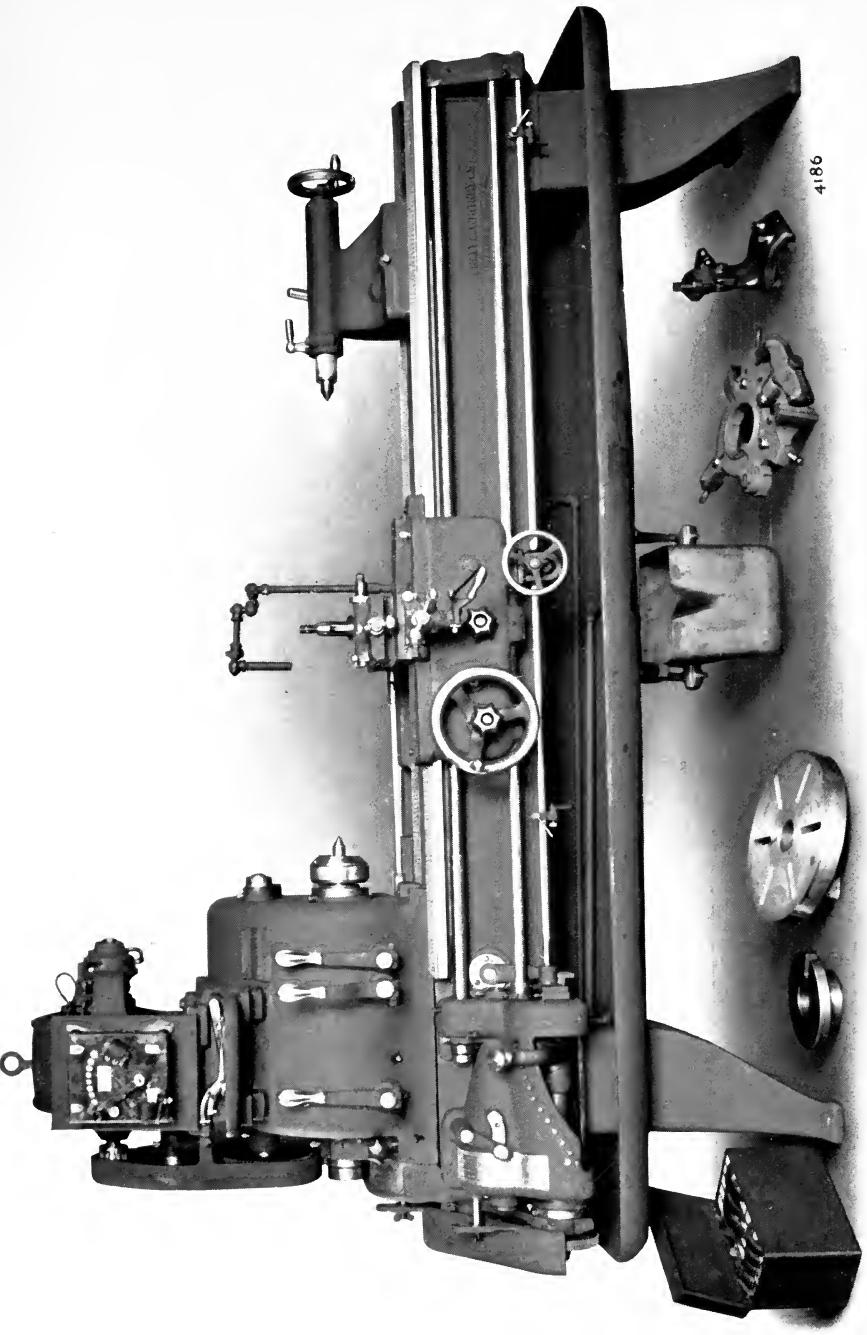
(Step-chucks are made of steel, and Closers of cast iron). Cut on page 45.

CHUCK PLATES — 3½″ 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.

Code words, page 265.

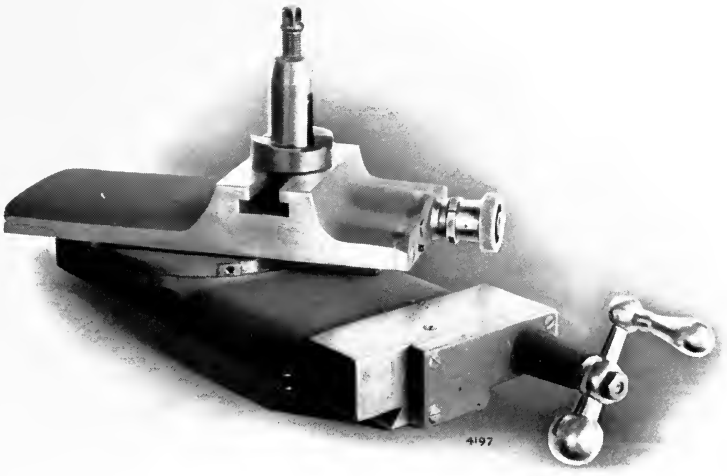


(Patented)
16-inch Lathe, All Geared Head, Motor Drive

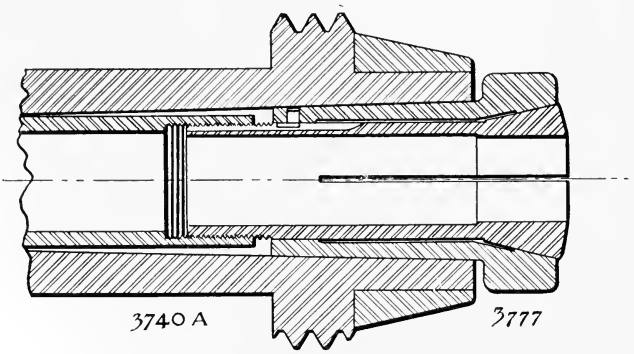
MOTOR DRIVE

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

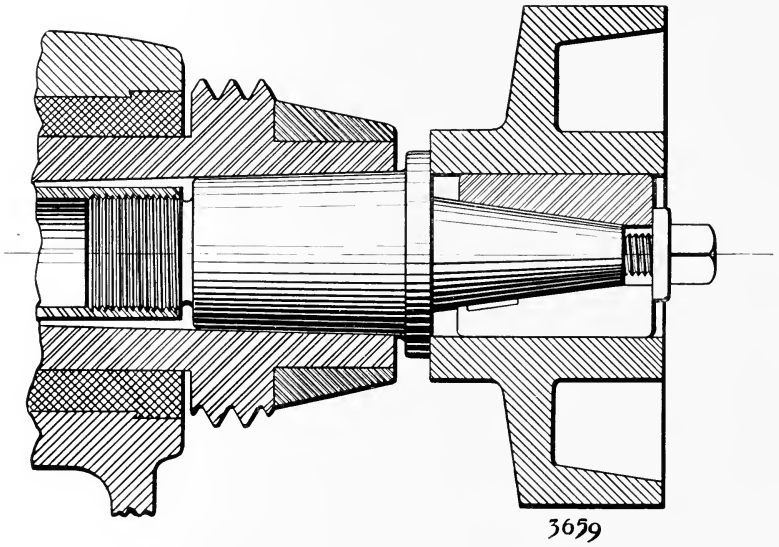
(Patented)
Plain Elevating Rest



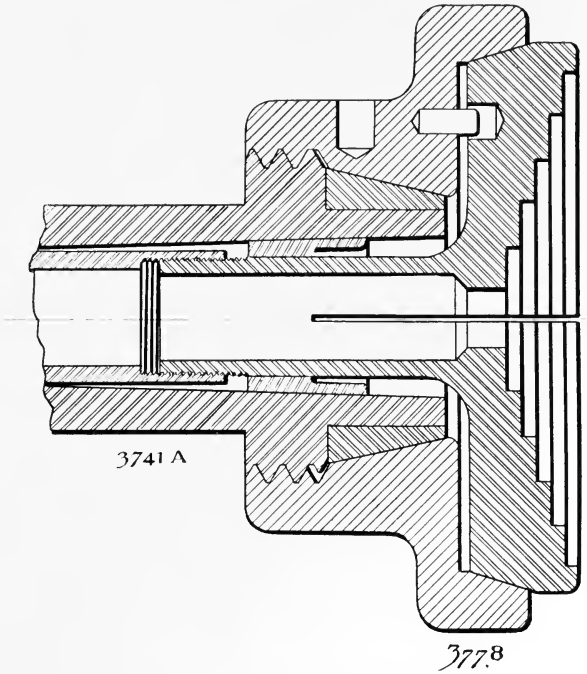
Ball-turning Rest for 16-inch Lathe



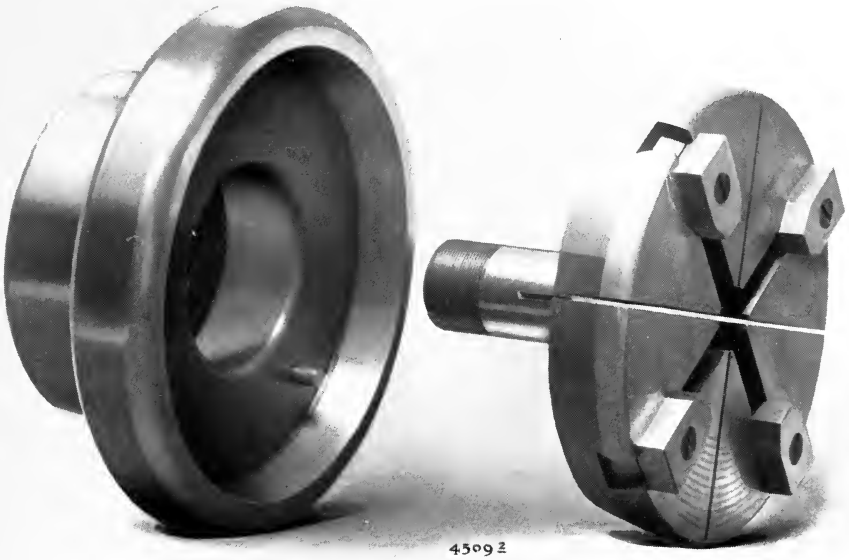
Section of Draw-back Collet Mechanism



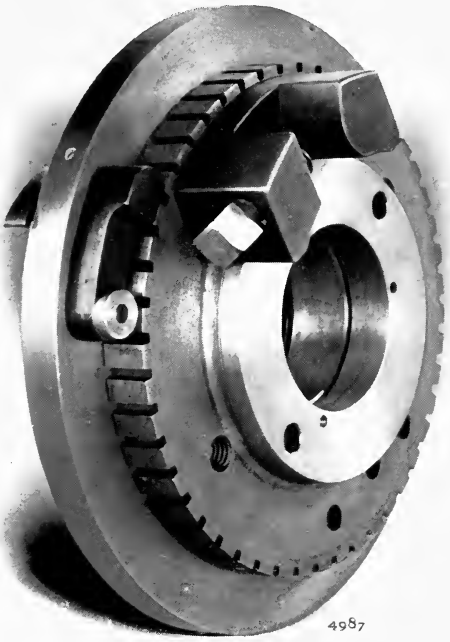
Expanding Arbor with Work in Position



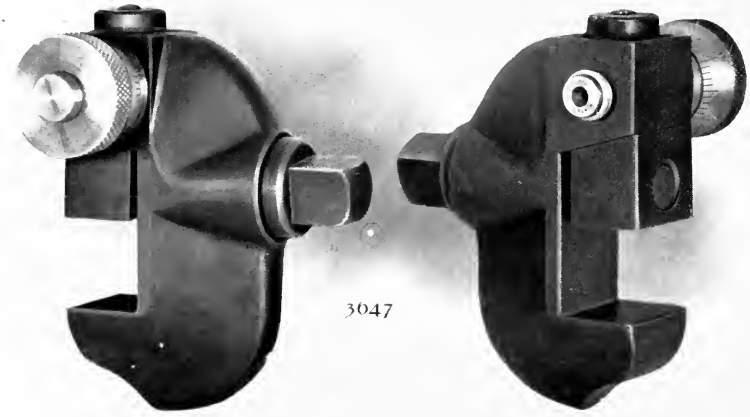
Section of Step-chuck and Closer



Step-chuck with Adjustable Jaws and Closer

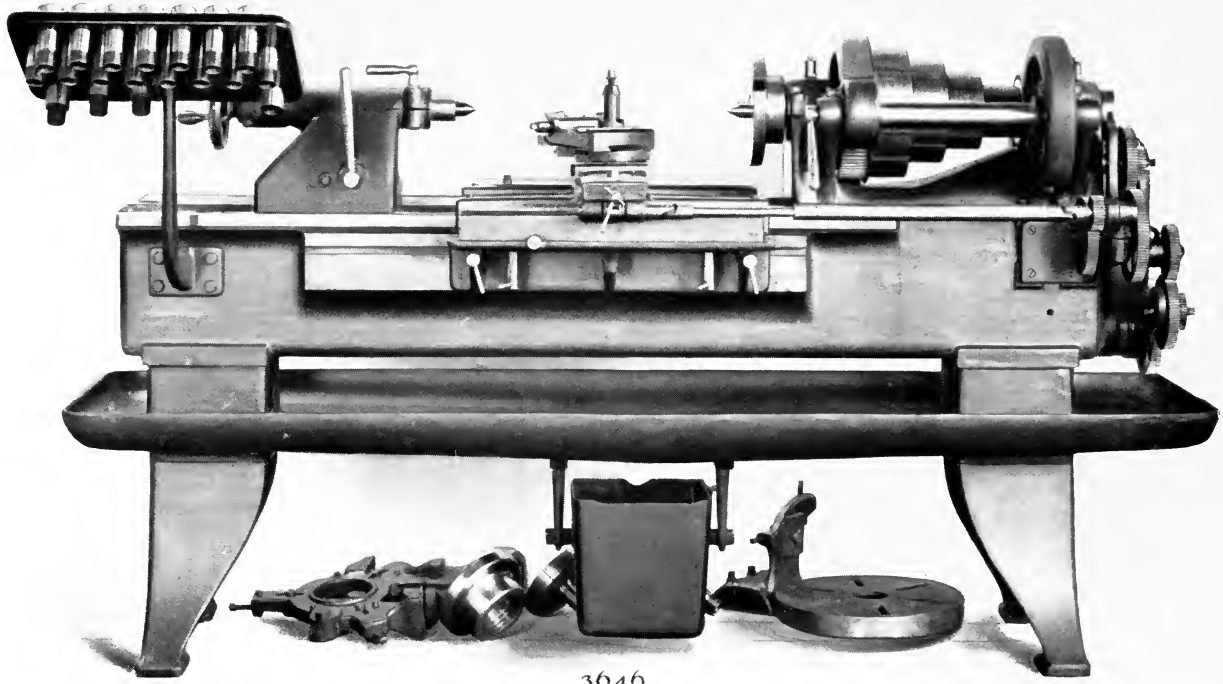


Indexing Face-plate for Cutting Multiple Threads



(Patented)

Micrometer Clamp



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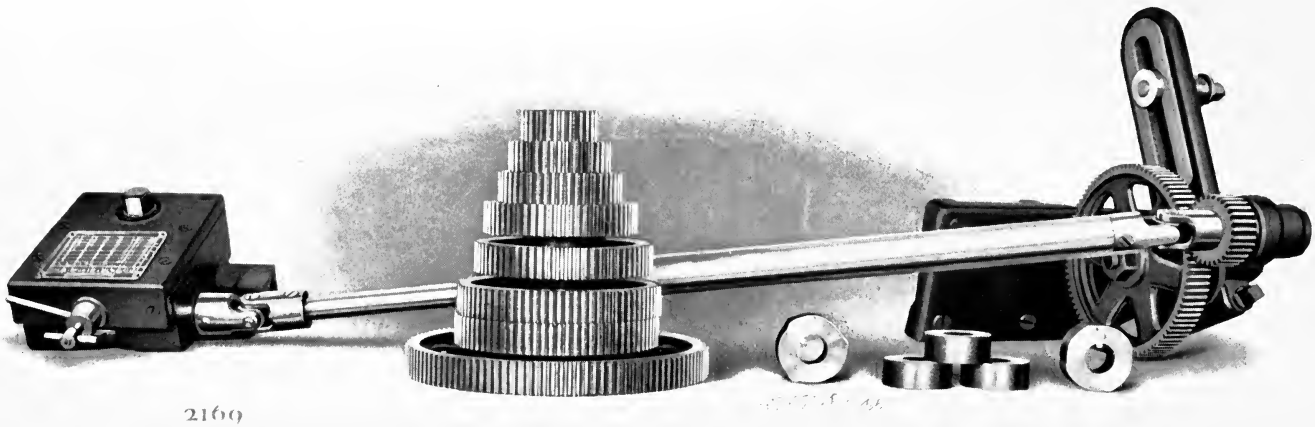
(Patented)

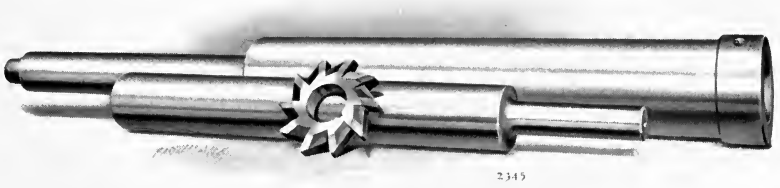
Relieving Attachment as applied to 14 and 16-inch Lathes



(Patented)

Regular Relieving Attachment

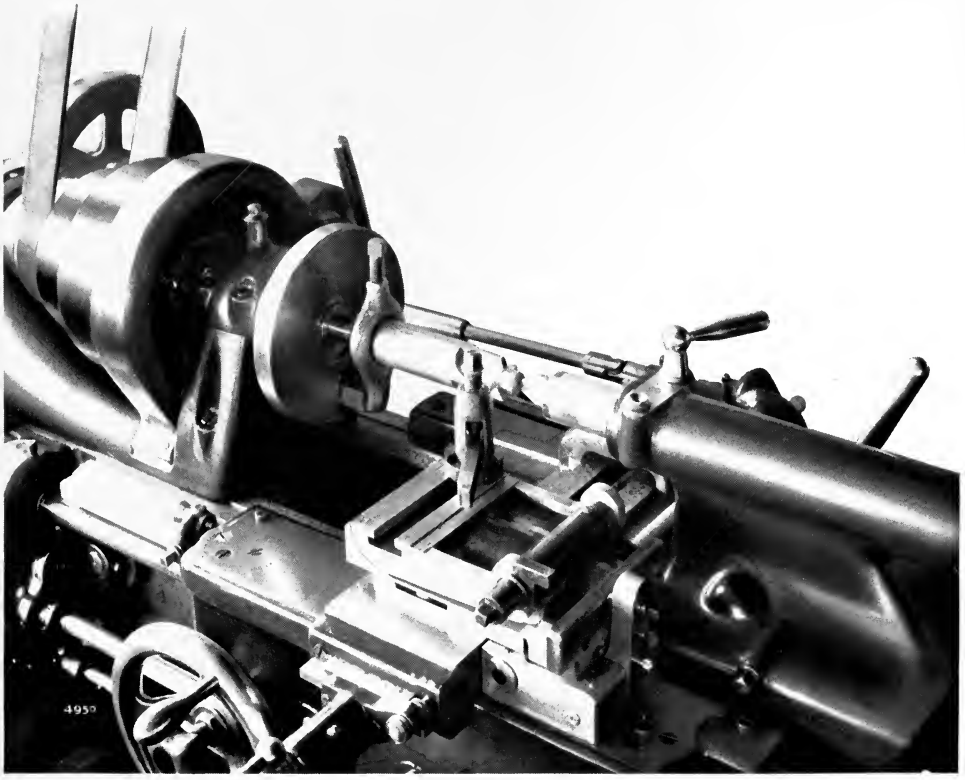
For radial relieving of any description, such as Hobs, Cutters, Taps, etc. It is furnished with 5 Cams; one each, single, double, triple, quadruple and one for Taps; also set of Change Gears, giving 19 changes, from 2 to 32 reliefs to revolution of the spindle



(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

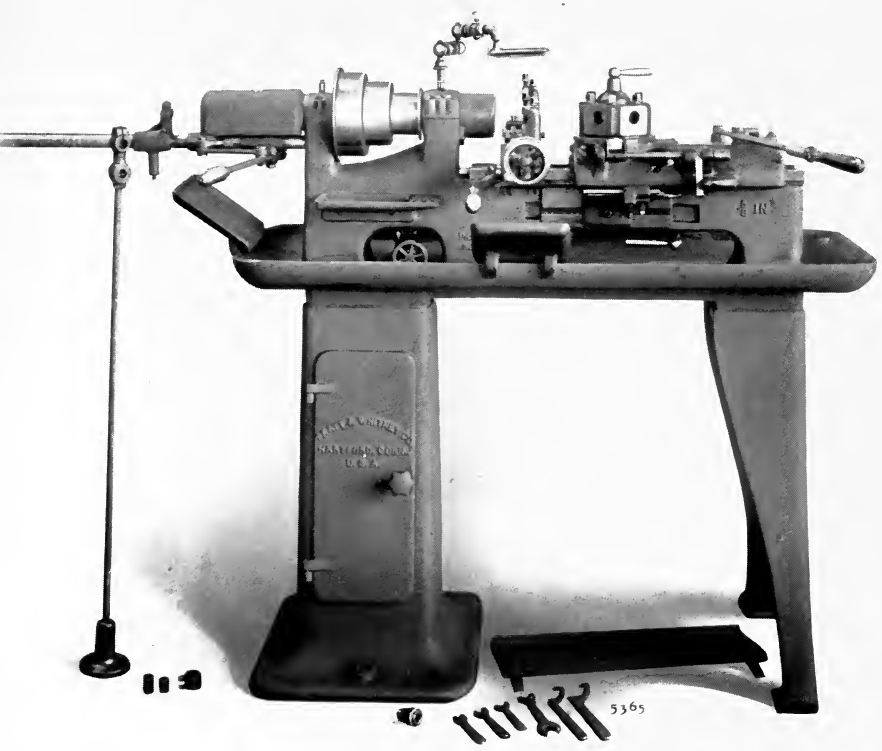


(Patented)

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)

⅝ x 4½-inch Turret Lathe: Equipment "A"

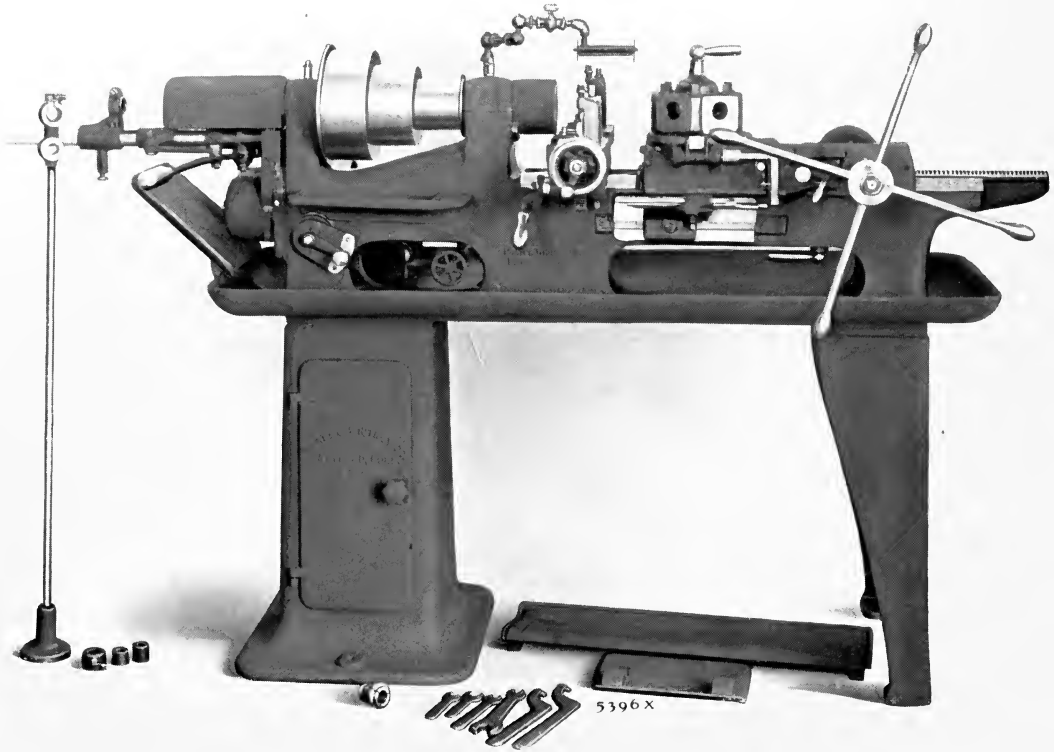
TURRET LATHE, 5/8 X 4½-INCH

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)	5/8″
	Chuck Capacity (square across flats)	7/16″
	Chuck Capacity (hexagonal across flats)	½″
	Length; maximum turning	4½″
	Swing over Bed	8¾″
	Swing over Cross Slide	4⅛″
	Threading Capacity	½″
TURRET	Hexagon, Flat Face; 6 holes, 1⅛″ diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide	2 1/16″
	Turret Hole Center to Top of Cross Slide	1¾″
	Turret Face to Spindle End, maximum	10⅝″
SPINDLE	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear.	1¾″ x 3⅛″
	Hole through Plunger	1 1/16″
	Hole through Spindle	1″
	Front End, 2½″ diameter; Thread, 2¾″ diameter; 10 Pi., U. S. F.	
SPEEDS	Spindle Speed Changes (9), R. P. M.	193 to 1235
	Cone on Machine (3 steps), diameter	3½″, 5¼″, 7″
	Pulleys (Countershaft)	8 x 3¼″
	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 26½″
	With Rod Feed	85½″ x 26½″
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

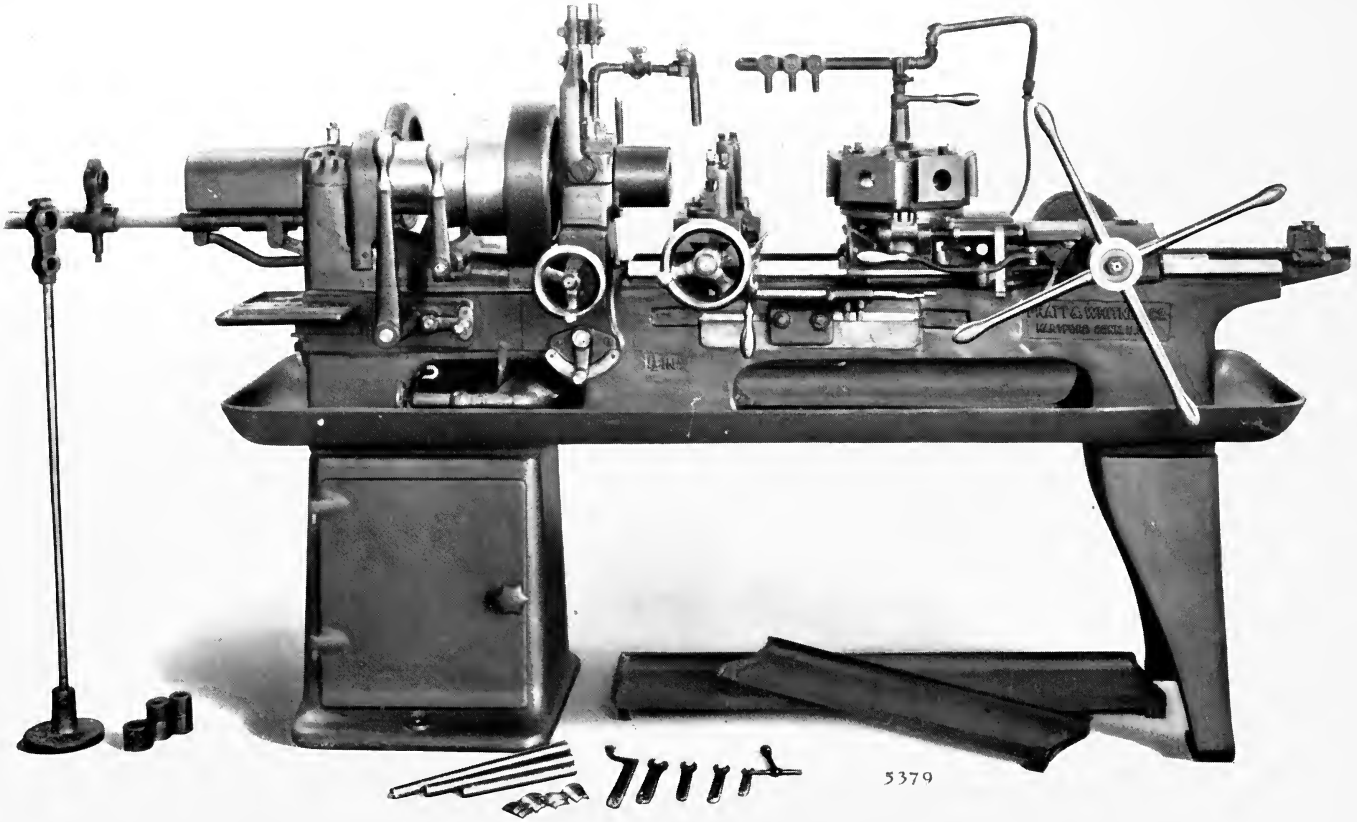
TURRET LATHE, 1 X 15-INCH

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	5⅛″
	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 Boxes, C. I., lined with Babbitt, adjustable for wear	2¼″ x 4″
	Hole through Plunger	1 1/16″
	Hole through Spindle	1⅜″
	Front End, 3⅛″ 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)

1½ x 18-inch Turret Lathe: Equipment "A"

TURRET LATHE, 1½ X 18-INCH—SPECIFICATIONS

RANGE	Chuck Capacity (round)	1½″
	Chuck Capacity (square across flats)	1″
	Chuck Capacity (hexagonal across flats)	1¼″
	Length; maximum turning	18″
	Swing over Bed	14″
	Swing over Cross Slide	7¼″
	Threading Capacity	1½″
TURRET	Hexagon, Faces Dovetailed; 6 holes, 1¾″ diameter. Stock can be fed through Turret.	
	Turret Hole Center to Top of Turret Slide	3¼″
	Turret Hole Center to Top of Cross Slide	2½″
	Turret Face to Spindle End, maximum	25⅛″
SPINDLE	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear	2 13/16″ x 4½″
	Hole through Plunger	1⅝″
	Hole through Spindle	1 15/16″
	Front End, 3 13/16″ diameter; Thread, 4″ diameter; 8 Pi., U. S. F.	
SPEEDS	Spindle Speed Changes (27), R. P. M.	20 to 800
	Back Gear Ratio	2.38 and 7 to 1
	Cone on Machine (3 steps), diameter	6⅛″, 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. Hand Feed through rack, pinion and turnstile.	.007″ to .016″
	Cross Slide, Transverse Power Feed Variations (3), P. R. Sp. Hand Feed through screw and hand-wheel.	.001″ to .0026″
	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

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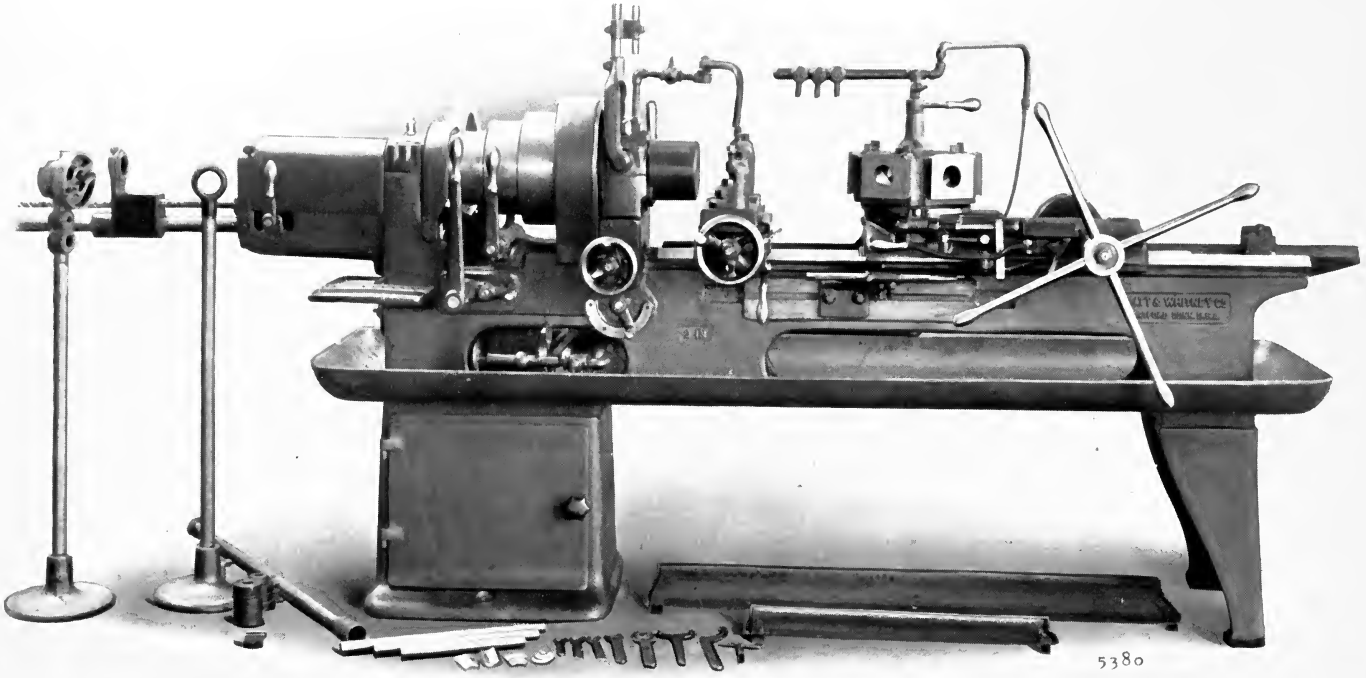


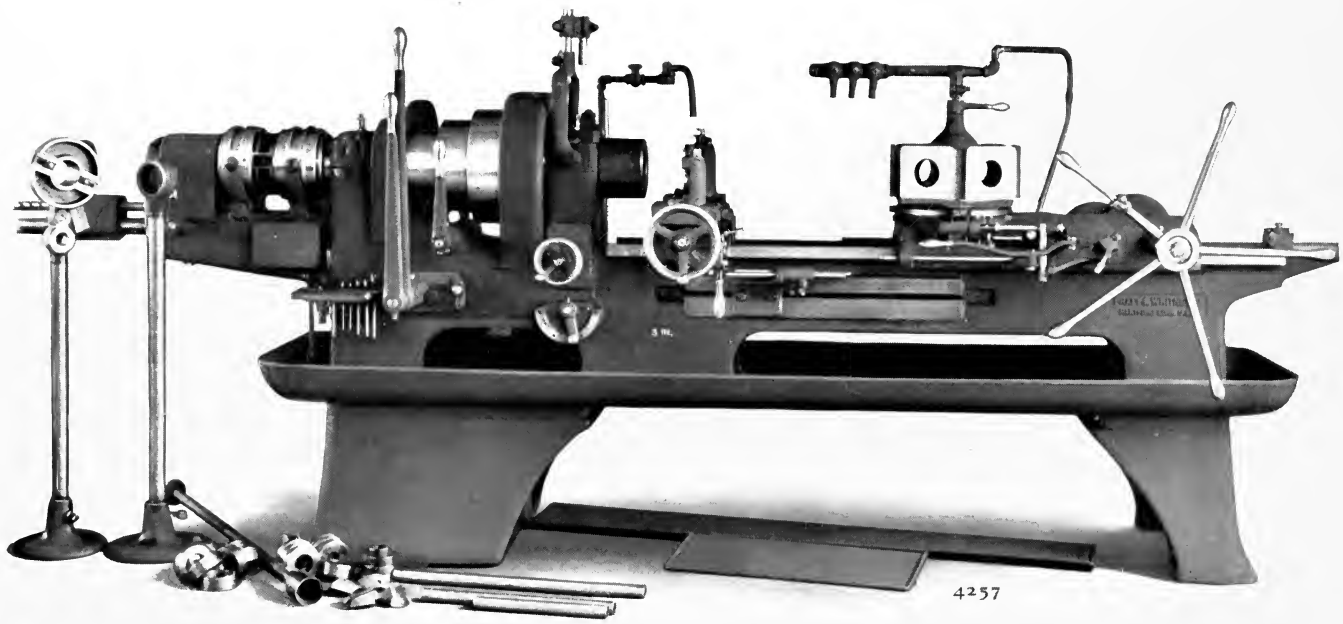
(Patented)

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 Boxes, C. I., lined with Babbitt, adjustable for wear.	3 3/8″ x 5″
	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. Hand Feed through rack, pinion and turnstile.	.007″ to .02″
	Cross Slide, Transverse Power Feed Variations (4), P. R. Sp. Hand Feed through screw and hand-wheel.	.0012″ to .0035″
	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 backward movement of Slide	
FLOOR SPACE	Without Rod Feed	9′ 4″ x 3′
	With Rod Feed	14′ x 3′
WEIGHTS	Machine Equipment "A", net pounds	3600
	Crating Material (domestic), approximate pounds	500
	Boxing Material (foreign), approximate pounds	1100
	Box, cubic feet	179

Code words, page 265.



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

TURRET LATHE, 3 X 36-INCH — SPECIFICATIONS

RANGE	Chuck Capacity (round)	3″
	Chuck Capacity (square across flats)	2 1/8″
	Chuck Capacity (hexagonal across flats)	2 9/16″
	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 3/16″
	Hole through Spindle	3 11/16″
	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. Hand Feed through rack, pinion and turnstile.	.007″ to .023″
	Cross Slide, Transverse Power Feed Variations (4), P. R. Sp. Hand Feed through screw and hand-wheel.	.0013″ to .0042″
	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: 5/8 x 4½-inch Turret Lathe

TURRET LATHE, 5/8 X 4½-INCH—EQUIPMENTS

"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS

1 5/8″ x 4½″ Turret Lathe, with
Oil Pump, Tank and Piping.
3 Oil Guards.
Countershaft (Three-speed friction).
Set of Wrenches.
Cross Slide, with Back and Front Tool Posts.
Automatic Rod Chuck, with
1 Collet, any size within capacity (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
7 Collets (round), 1/4″, 5/16″, 3/8″, 7/16″, 1/2″, 9/16″ and 5/8″.
3 Collets (hexagon), 3/8″, 7/16″ and 1/2″ across flats.
2 Collets (square), 3/8″ and 7/16″ 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 9/16″, Style "D", Self-opening Die-head, with
7 Sets of Chasers, 1/8″, 3/16″, 1/4″, 5/16″, 3/8″, 7/16″ and 1/2″, U. S. S.
1 Box for Collets and Chasers.

METRIC EQUIPMENT "B"

Includes Regular Equipment "B", with these modifications:
7 Collets (round), 6, 7, 8, 10, 12, 14 and 16 m/m diameter.
3 Collets (hexagon), 8, 12 and 16 m/m across corners.
2 Collets (square), 8 and 10 m/m across flats.
7 Sets of Chasers, 5, 6, 7, 8, 9, 10 and 12 m/m, International Standard.

WHITWORTH EQUIPMENT "B"

Includes Regular Equipment "B", with these modifications:
3 Collets (hexagon), .338″, .448″, .525″ diameter across flats.
Chasers for Self-opening Die-head, Whitworth Standard.

Code words, page 265.

(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), 3/8″ to 1″ inclusive by 16ths.
4 Collets (hexagon), 1/2″, 11/16″, 19/32″ and 25/32″ across flats.
3 Collets (square), 1/2″, 5/8″ and 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 3/4″, Self-opening Die-head, with roughing and finishing attachments and 8 Sets of Chasers, 1/4″, 5/16″, 3/8″, 7/16″, 1/2″, 9/16″, 5/8″ and 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.

Code words, page 265.

(Patented)

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

TURRET LATHE, 1½ X 18-INCH—EQUIPMENTS

"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS

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.

METRIC EQUIPMENT "A"

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

"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS

Includes Equipment "A" (minus set of Chuck Jaws), and
- 15 Sets of Chuck Jaws (round), ⅝″ to 1½″ inclusive by 16ths.
- 4 Sets of Chuck Jaws (hexagon), ⅞″, $\frac{31}{32}$″, $1\frac{1}{16}$″ 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″, $\frac{9}{16}$″, ⅝″, ¾″, ⅞″, 1″, 1⅛″ and 1¼″, U. S. S.
- 1 Box for Chuck Jaws and Chasers.

METRIC EQUIPMENT "B"

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.

WHITWORTH EQUIPMENT "B"

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.

Code words, page 265.

(Patented)

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

TURRET LATHE, 2 X 26-INCH — EQUIPMENTS

"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS

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.

METRIC EQUIPMENT "A"

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

"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS

Includes Equipment "A" (minus set of Chuck Jaws), and
- 17 Sets of Chuck Jaws (round), ¾″ to 1 7/16″ by 16ths, and 1½″ to 2″ by 8ths.
- 5 Sets of Chuck Jaws (hexagon), 3 1/32″, 1 1/16″, 1¼″, 1 7/16″ and 1 5/8″ across flats.
- 4 Sets of Chuck Jaws (square), ⅞″, 1″, 1⅛″ and 1¼″ 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 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.
- 1 Box for Chuck Jaws and Chasers.

METRIC EQUIPMENT "B"

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.

WHITWORTH EQUIPMENT "B"

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.

Code words, page 265.

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

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

"C" 2 X 26-INCH LOCOMOTIVE EQUIPMENT

Includes Equipment "A" (minus Chuck Jaws and Power Feed to Cross Slide), and

11 Sets of Chuck Jaws (round), ¾″ to 2″ inclusive, by 8ths.
3 Sets of Chuck Jaws (hexagon), 1 1/16″, 1¼″ and 1 7/16″ across flats.
3 Sets of Chuck Jaws (square), 1″, 1⅛″ and 1¼″ 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 1/16″ Taper to foot. Specify if otherwise).
1 Bell-mouth Pointing Tool.
1 1¼″ Self-opening Die, with roughing and finishing attachment, and
8 Sets of Chasers, ½″, 9/16″, ⅝″, ¾″, ⅞″ 1″, 1⅛″, 1¼″, 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

"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS

1 3″ x 36″ Turret Lathe, with
- Oil Pump, Tank and Piping.
- 2 Oil Guards.
- Countershaft (Three-speed friction).
- Set of Wrenches.

Cross Slide with Back and Front Tool Posts.

Automatic Rod Chuck, with
- 1 Set of Chuck Jaws, any size within capacity (3″ Round if not specified).

Rod Feed, Automatic Positive Power Screw Type, with
- Compensating Device.
- 1 Rod Support (plain).
- 1 Rod Support (revolving), with two sets of Jaws.
- 1 Rod Follower Bar.
- 4 Stock Collars.
- 7 Stock Bushings.

Rod Stop on Headstock, with 4 Rods.

METRIC EQUIPMENT "A"

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

"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS

Includes Equipment "A" (minus set of Chuck Jaws), and
- 9 Sets of Chuck Jaws (round), 2″ to 3″ inclusive, by 8ths.
- 5 Sets of Chuck Jaws (hexagon), $1\frac{13}{16}$″, 2″, $2\frac{3}{16}$″, $2\frac{3}{8}$″ and $2\frac{9}{16}$″ across flats.
- 6 Sets of Chuck Jaws (square), $1\frac{1}{2}$″, $1\frac{5}{8}$″, $1\frac{3}{4}$″, $1\frac{7}{8}$″, 2″ and $2\frac{1}{8}$″ across flats.
- 2 Universal Turners, with "V" Back-rests.
- 1 Universal Turner, with Roller Back-rests.
- 1 End Forming and Pointing Tool.
- 1 Bell-mouth Pointing Tool.
- 1 2″, Self-opening Die-head, with roughing and finishing attachment, and 1 set of Chasers, any standard size within capacity of Tool, U. S. S.
- 1 3″ Tool Holder for Round Shanks.
- 1 Box of Chuck Jaws and Chasers.

METRIC EQUIPMENT "B"

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

WHITWORTH EQUIPMENT "B"

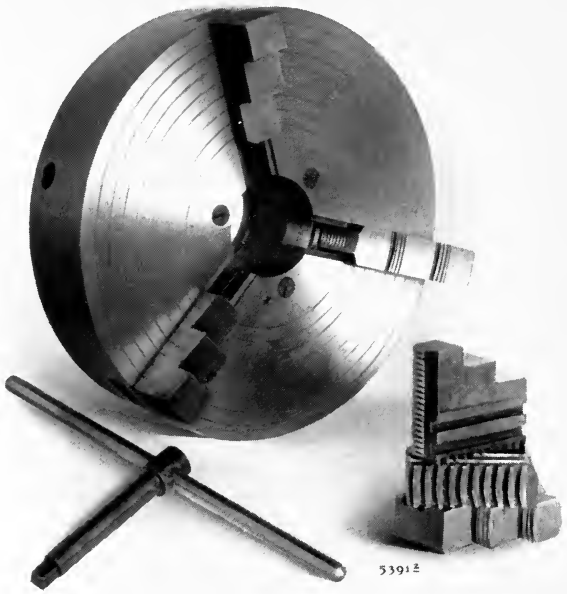
Includes Regular Equipment "B", with these modifications:
- 5 Sets of Chuck Jaws (hexagon), 1.860″, 2.048″, 2.215″, 2.413″, 2.576″ diameter across flats.

Chasers for Self-opening Die-head, Whitworth Standard.

Code words, page 265.

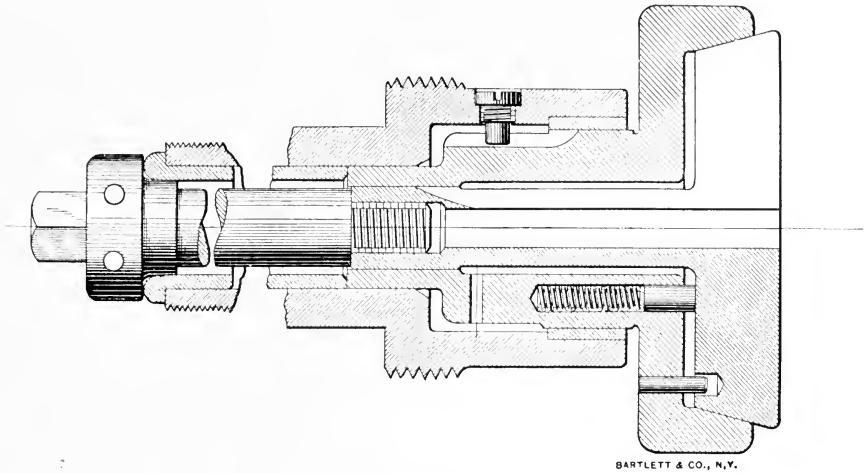
TURRET LATHE TOOLS AND APPLIANCES

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

⅝ x 4½-inch Machine; ⅝ to 3 inches
1 x 15 -inch Machine; 1 to 3¾ inches
1½ x 18 -inch Machine; 1½ to 5 inches
2 x 26-inch Machine; 2 to 6½ inches
3 x 36-inch Machine; 3 to 7 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 1½-inch machine has a capacity of 1 inch; for the 2-inch machine, 1½ 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

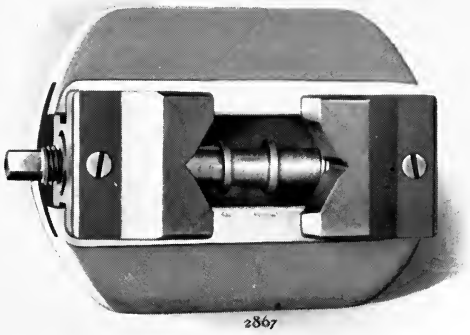
These chucks are made in the most substantial manner possible, steel forgings being used in their construction throughout, with the exception of the jaw screw, which is made of tool-steel They are furnished either with solid jaws flat or grooved, or with inserted jaws flat or grooved. Jaws are also fitted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

SIZES

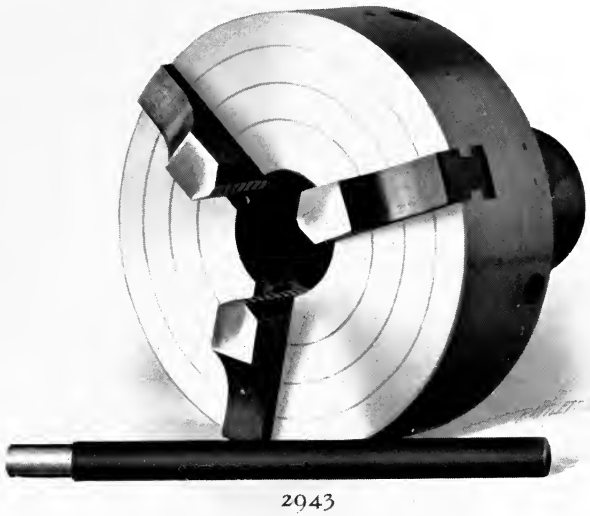
Machine used on	⅝ x 4½-inch Inches	1 x 15-inch Inches	1½ x 18-inch Inches	2 x 26-inch 2½ x 26-inch Inches	3 x 36-inch 2½ x 26-inch Inches
Diameter of Body or Hub	3½	4¼	5⅛	6¼	8¾
Length over all . . .	4	4¾	6⅛	7¼	10
Depth of Jaws . . .	1½	1¾	2⅛	2½	4⅛
Width of Jaws . . .	¾	1⅛	1⅝	2⅛	3½
Swing	4	5	6¾	8½	10⅛
Hole through	¾	1⅛	1⅝	2⅛	3⅛

TURRET LATHE TOOLS AND APPLIANCES—Continued

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



Forging Chuck



Lever Scroll Chuck

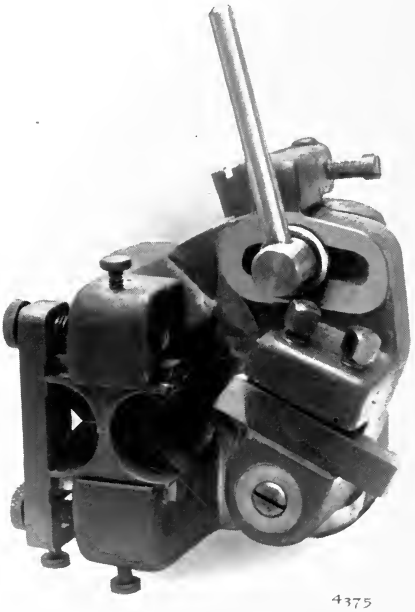
TURRET LATHE TOOLS AND APPLIANCES—Continued

(Patented)

Single Turner with Tangent Cutter, ⅝ x 4½ Turret Lathe

Single Turner with Tangent Cutter

Although very rigid this tool is still sensitive and very easily adjusted. Cutter of high-speed steel is located over-shot or tangent to the work. Back-rests are of high-speed steel, wedge shaped. Made for the ⅝-inch machine only.



4375

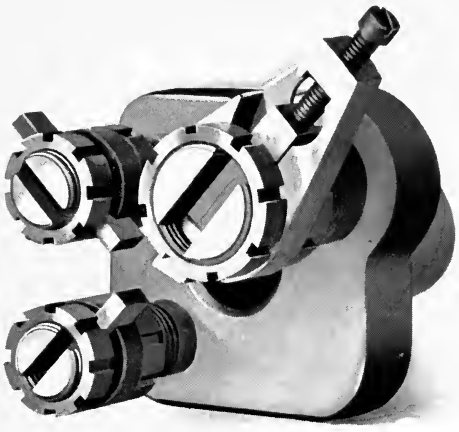
(Patented)

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.

TURRET LATHE TOOLS AND APPLIANCES—Continued

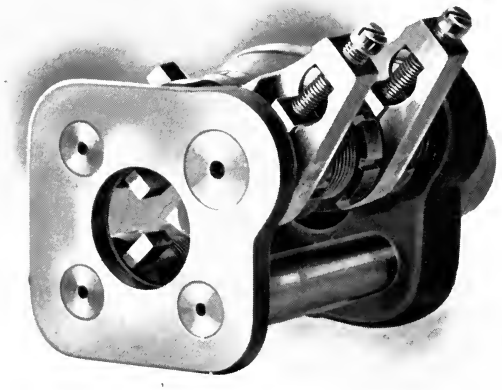
Single Turner with Radial Cutter A sizing or finishing tool in which the cutter is located radially, and both cutter and back-rests are capable of very fine adjustment. Made for the 5/8 and 1-inch machines only.



(Patented)

Single Turner with Radial Cutter, 5/8 x 4½ 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 5/8 and 1-inch machines only.



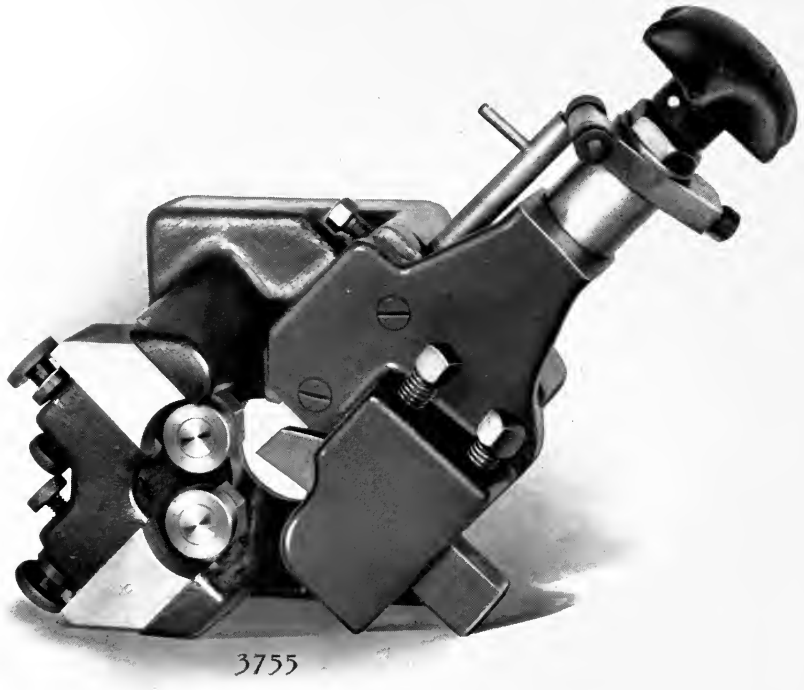
(Patented)

Multiple Turner with Radial Cutters, 5/8 x 4½ 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.



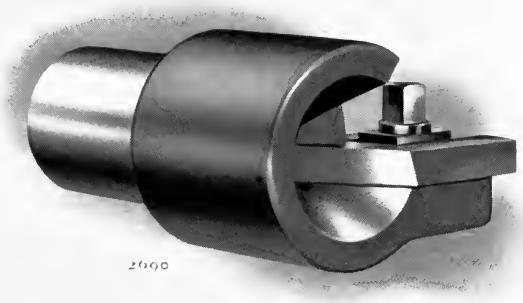
(Patented)

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

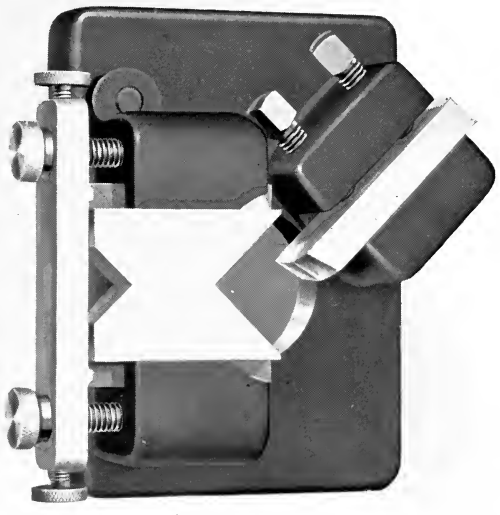
Open Side Turner Recommended for turning short work beyond the capacity of the universal turner. It is similar in construction to the universal turner previously described, with the exception that no provision is made for back-resting the work. Made for the 1½, 2 and 3-inch turret lathes.

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

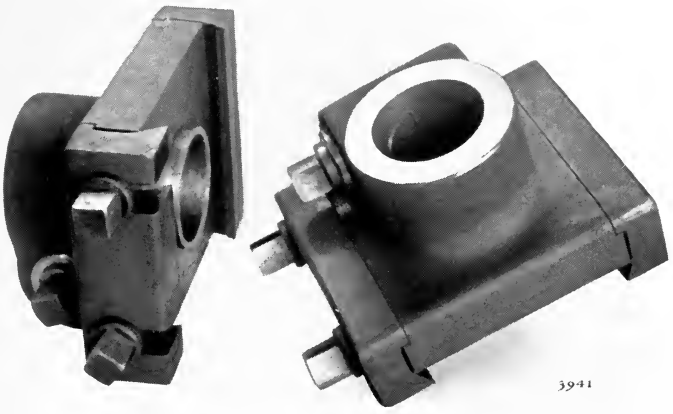
Suitable for turning tapers from either bar stock or forgings. Back-rest jaws may be set to follow or lead the tool as occasion may demand. The cutting tool is directly controlled by an accurate taper bar for angle, the work produced, therefore, is of a superior order and is fully equal to that obtained 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 ½ inch to the foot the bar should be planed to ¼ 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, 1½, 2 and 3-inch machines.

2310

SELF-OPENING DIE—SPECIFICATIONS

Size Inches	Used on Turret Lathe Inches	Capacity Inches	Shank, Diameter Inches
9/16	5/8	1/8 to 1/2	1 1/8
3/4	1	1/4 to 3/4	1 1/2
1	1 1/2	3/8 to 1	1 3/4
1 1/4	1 1/2 and 2	1/2 to 1 1/4	1 3/4
†1 1/2	*1 1/2, 2 and 3	5/8 to 1 1/2	2 1/4
†2	*2 and 3	3/4 to 2	3
3	3	1 1/2 to 3	4

*Special Holders required. † Also used on Turntable Lathe.



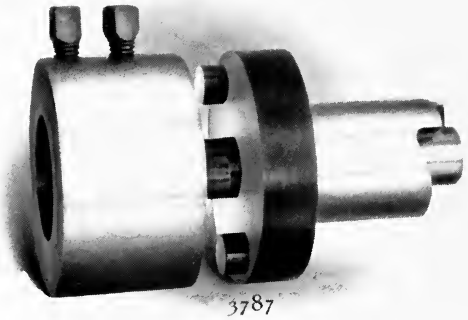
3941

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

TURRET LATHE TOOLS AND APPLIANCES—Continued

DRILL AND COUNTERBORE HOLDERS

Turret Lathe Inches	Bushing Hole Diameter Inches	Shank	
		Diameter Inches	Hole Inches
⅝ x 4½	1	1⅛	¾
1 x 15	1⅜	1½	1
1½ x 18	1½	1¾	1



RELEASING TAP AND DIE HOLDER—SPECIFICATIONS

Turret Lathe, Inches	Shank, Diameter, Inches	Hole, Diameter, Inches
⅝ x 4½	1⅛	1 3/16
1 x 15	1½	1⅜ or 1⅝
1½ x 18	1¾	2
*2 x 26	2¼	2¼
*3 x 36	3	†2

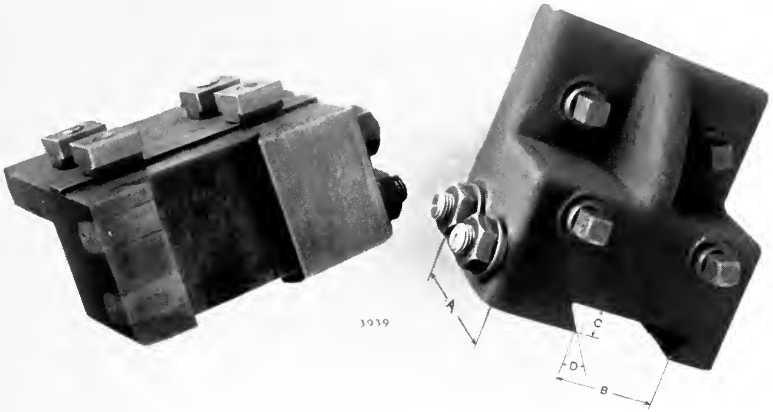
* Also used on Turntable Lathe

† May be enlarged to 3 inches

FLOATING REAMER HOLDER—SPECIFICATIONS

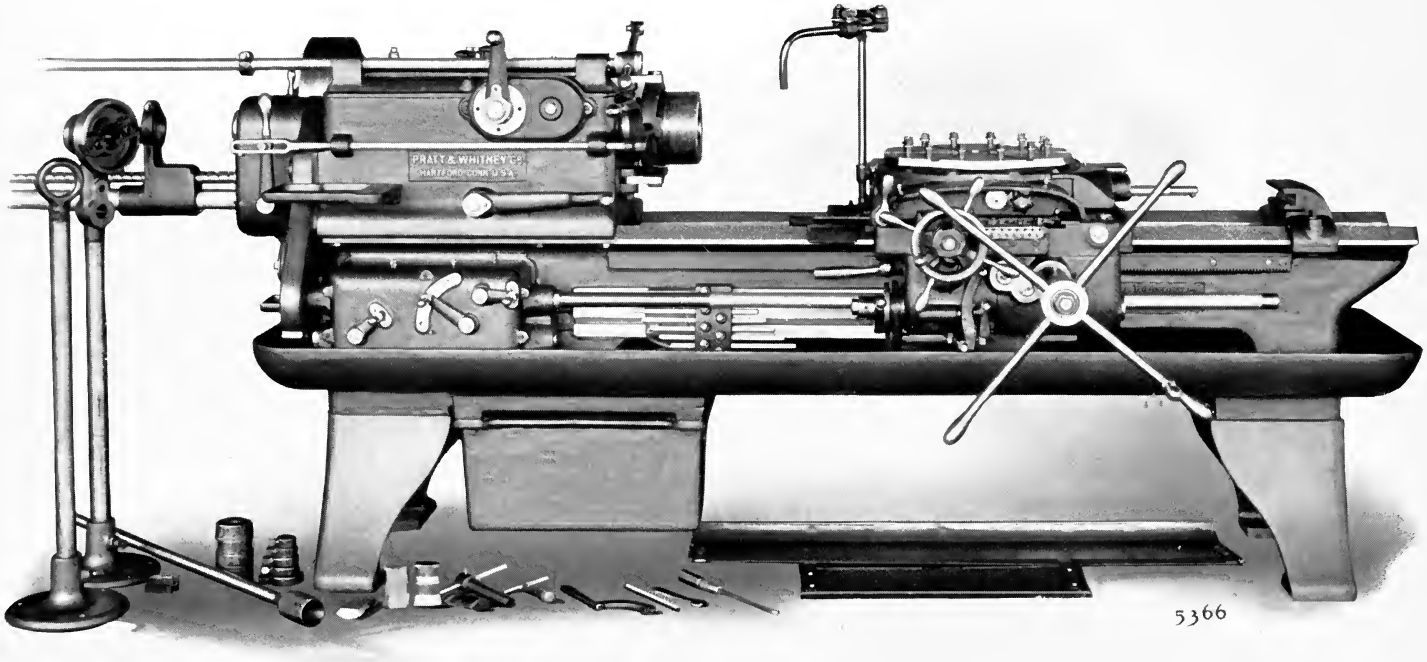
Turret Lathe, Inches	Shank, Diameter, Inches	Driving Ring Hole, Inches
5/8 x 4 1/2	1 1/8	1 3/16
1 x 15	1 1/2	1 1/16
1 1/2 x 18	1 3/4	1 3/8
*2 x 26	2 1/4	1 5/8
*3 x 36	3	2 1/16

* Also used on Turntable Lathe



DOVETAIL FORMING TOOL HOLDER—FOR ALL SIZE MACHINES

5/8 x 4 1/2 inches	A	1 3/4 inches	B	1 7/8 inches	C	5/8 inch	D	350
1 x 15 inches	A	2 1/4 inches	B	1 7/8 inches	C	5/8 inch	D	350
1 1/2 x 18 inches	A	2 1/2 inches	B	3 inches	C	3/4 inch	D	350
2 x 26 inches	A	3 inches	B	3 inches	C	3/4 inch	D	350
3 x 36 inches	A	3 1/2 inches	B	3 inches	C	3/4 inch	D	350



(Patented)

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

TURNTABLE LATHE, 2½ X 26-INCH

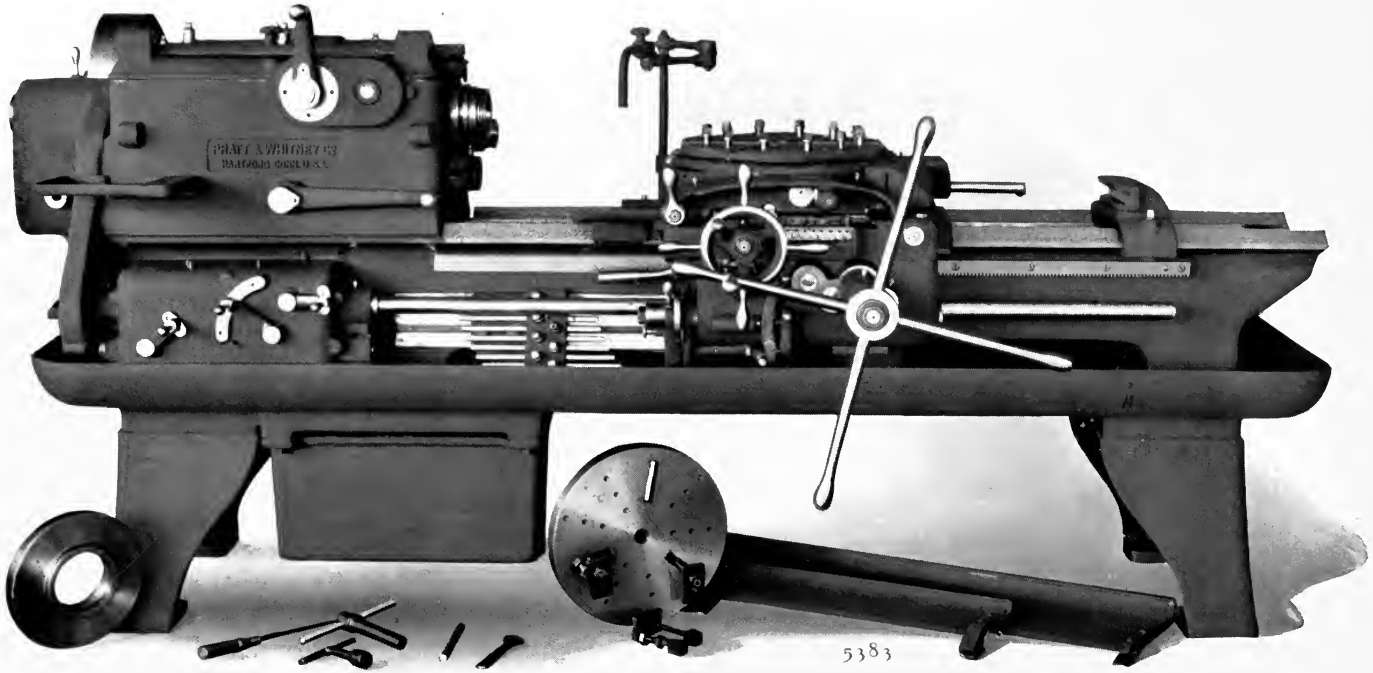
A new machine in which is embodied every required refinement known for easy, convenient, rapid and accurate operation. It is provided with a Constant-Speed, All-Geared Head and a Cross-Feeding Turntable. It is practically universal in adaptability and is suitable for an endless variety of work on castings,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

SPECIFICATIONS

RANGE	*Rod Chuck Capacity (round)	¾″ to 2½″
	*Rod Chuck Capacity (square across flats)	¾″ to 1¾″
	*Rod Chuck Capacity (hexagonal across flats)	¾″ to $2\frac{3}{16}$″
	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, $4\frac{29}{32}$″ 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.



(Patented)

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

TURNTABLE LATHE, 2½ X 26-INCH—EQUIPMENTS

"A" MACHINE ARRANGED FOR ROD WORK WITHOUT TOOLS

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

"B" MACHINE ARRANGED FOR ROD WORK WITH TOOLS

Includes Equipment "A" (minus Chuck Jaws), and
  *15 Sets of Jaws, suitable for
    Round Rod, ¾″ to 2½″ (19 to 64 m/m) across flats.
    Square Rod, ¾″ to 1¾″ (19 to 44 m/m) across flats.
    Hexagon Rod, ¾″ to $2\frac{3}{16}$″ (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)

"D" MACHINE ARRANGED FOR CASTING AND FORGING WORK WITH TOOLS

Includes Equipment "C" (minus Blank Chuck Plate), and
1 15″, 3-Jaw, Geared Scroll Chuck (extra heavy), with
  2 Sets of Jaws for outside and inside gripping.
  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.

"E" MACHINE ARRANGED FOR ROD WORK, CASTINGS AND FORGINGS WITH TOOLS

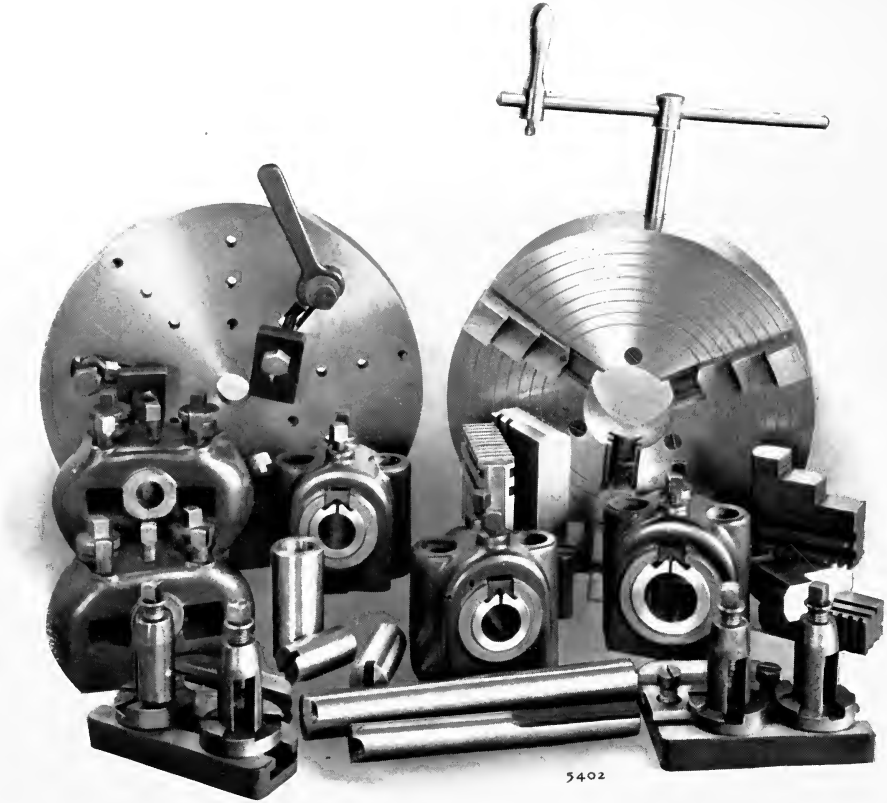
Includes Equipment "A" (minus Chuck Jaws), and
*15 Sets of Jaws, suitable for
Round Rod, ¾″ to 2½″ (19 to 64 m/m).
Square Rod, ¾″ to 1¾″ (19 to 44 m/m) across flats.
Hexagon Rod, ¾″ to 2 3/16″ (19 to 55 m/m) across flats.
1 15″, 3-Jaw, Geared Scroll Chuck (extra heavy), with
  2 Sets of Jaws, for outside and inside gripping.
  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
  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 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
  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.

METRIC EQUIPMENT "E"

Differs from the above only in Chasers furnished for the 1½″ Die-head. (See Equipment "B").

*For detailed information, see table, page 103.

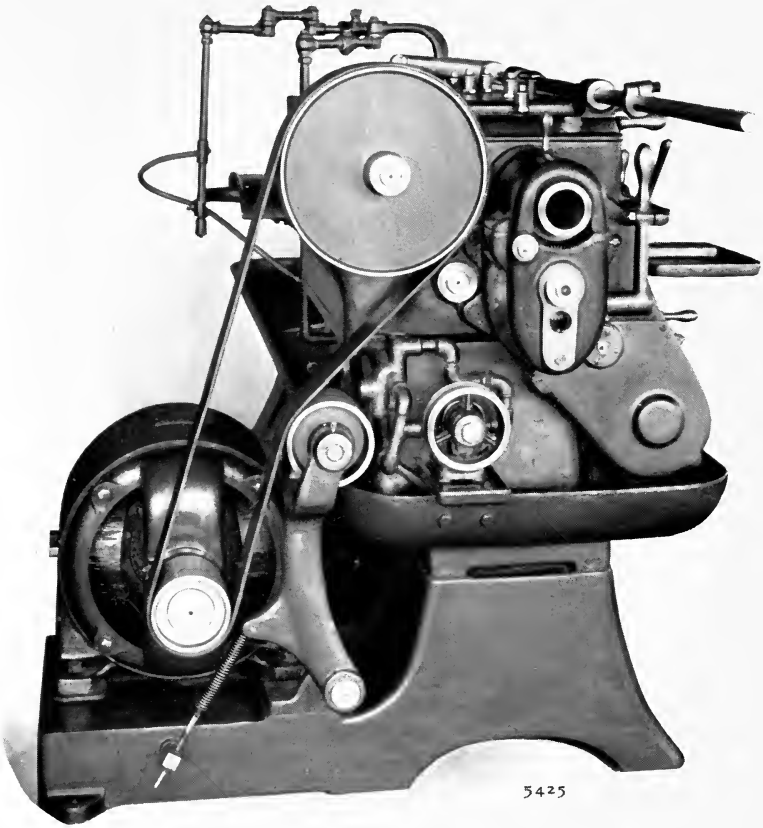
Code words, page 265.



(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

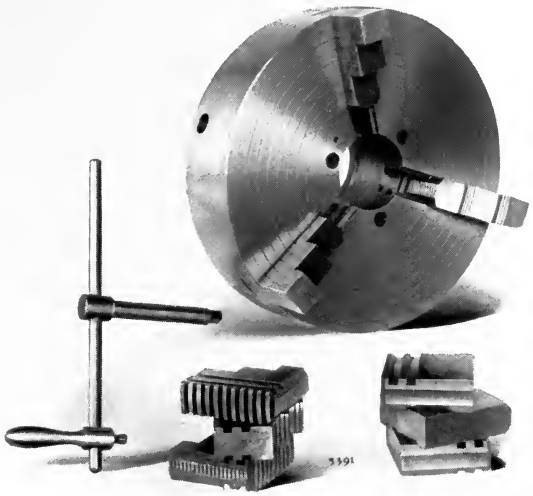
Motor Drive Motor base is cast integral with front pedestal. It is provided with an automatic belt tightener and will accommodate any standard motor. Motor should be 7½ horse-power, constant speed not over 1200 revolutions per minute. If motor is furnished by customer full specifications are required. (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).

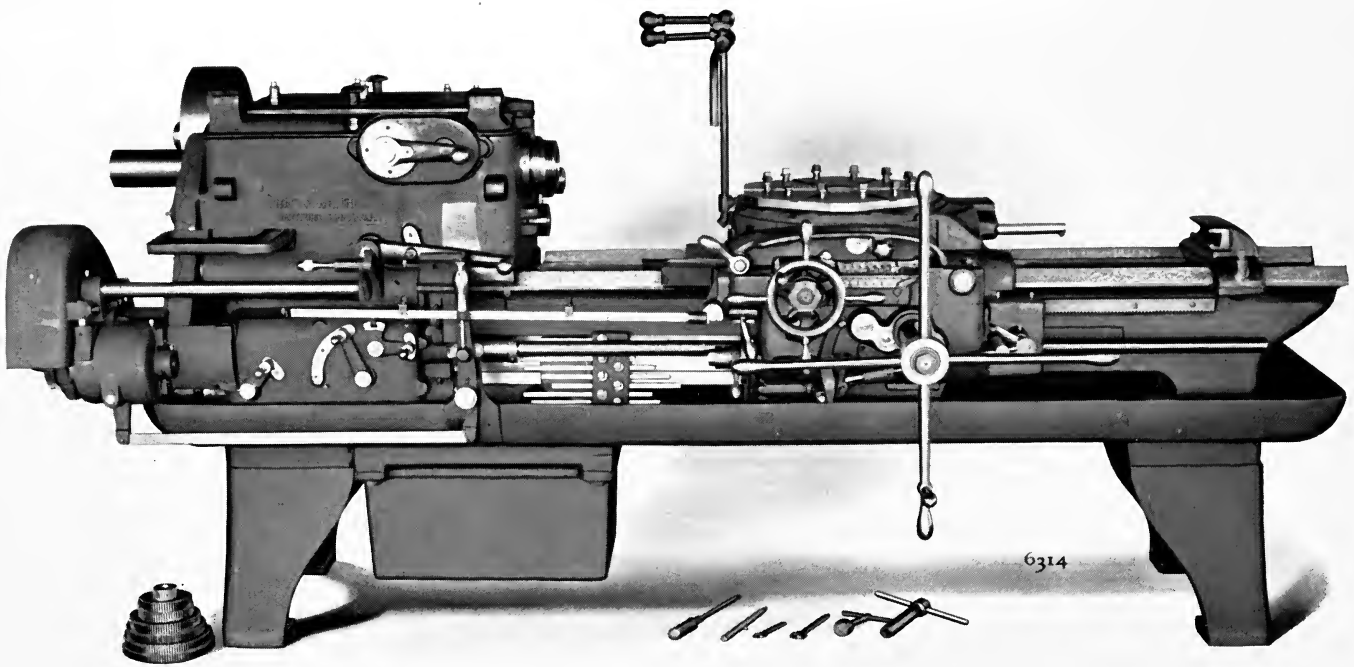
Threading Attachment An attachment extremely simple in design, attached to the machine proper in a most convenient manner. It is equally well suited and efficient on either long or short, external or internal work. Longitudinal travel of carriage is automatically controlled in either direction by means of conveniently located adjustable stops. Carriage return is accomplished through threading attachment, entirely independent of countershaft. As regularly furnished, it will cut threads from 1½ to 20 pi., including 4½, 5½ and 11½ pi. Special gears may be furnished to order to practically meet any requirement.

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

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



15-inch Three-jaw Geared Scroll Chuck



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

TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

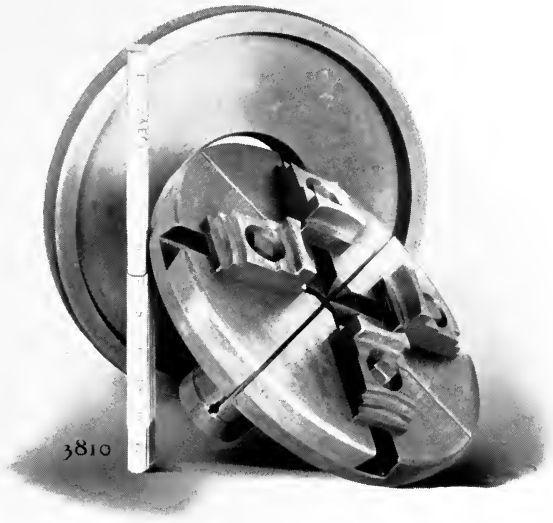
Two-jaw Chuck (See Two-jaw Chucks, page 74).

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

See page 75 for illustration.

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

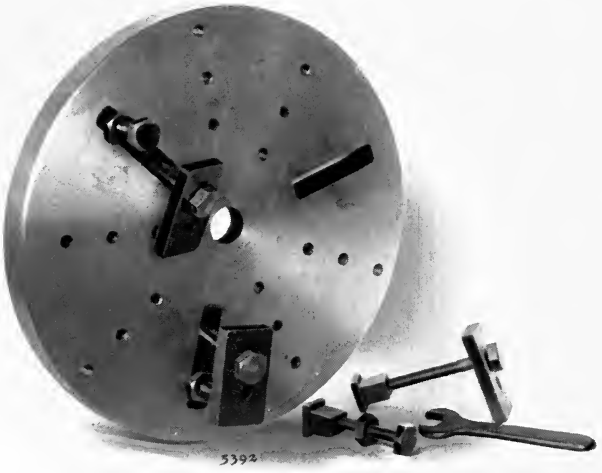
Step-chuck with Adjustable Jaws and Closer Closer is made of gun iron; step-chuck is made of steel and provided with four adjustable jaws with a maximum capacity of 12 inches. The closing mechanism is controlled by means of an eccentric, which is operated by a crank wrench. For second operation work,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



Step-chuck, with Adjustable Jaws and Closer

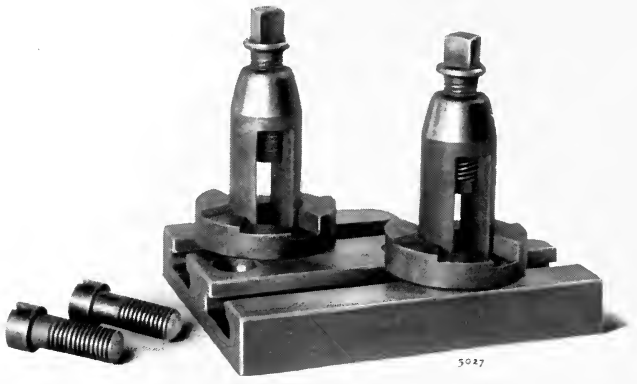
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

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



Face-plate with Equipment

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



Tool Post Holder

TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

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

Off-set Tool Post Holder

Triple Tool Holder For holding two rectangular and one round shank tool simultaneously. Round hole is 1⅛-inch diameter to accommodate the regular boring bar.

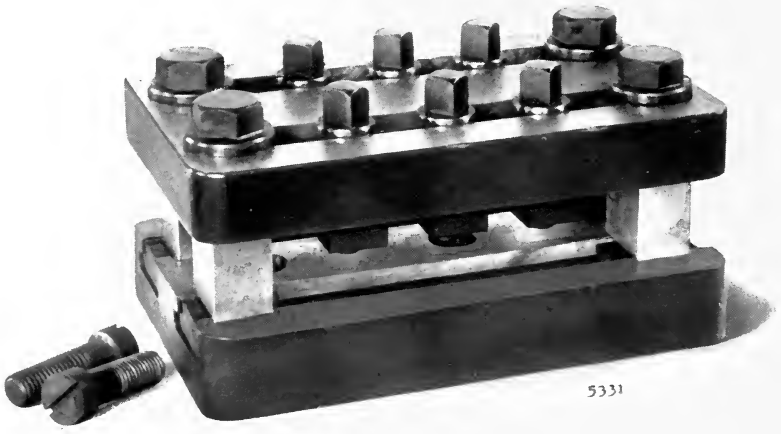
Triple Tool Holder

TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

Round Tool Holders Made in two sizes, 2¼ 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 1½-inch bushing is carried in stock for the 2¼-inch holder, and the 2 and 2½-inch for the 3-inch holder.

Round Tool Holder

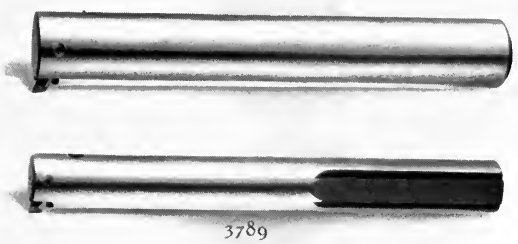
Multiple Tool Holder For the accommodation of several tools at once which may be freely adjusted latterly in any desired relation to one another and still be rigidly held in their adjusted positions. Tool accommodating space is 6½ x 1¼-inch. (Furnished to order).



(Patented)
Multiple Tool Holder

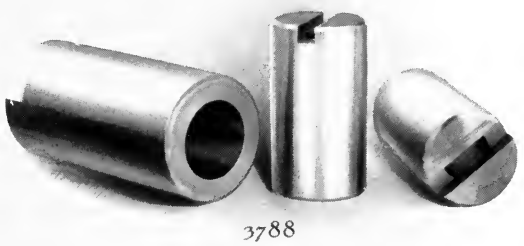
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

Boring Bars with Adjustable Cutter Made of steel, hardened and ground in two sizes, 1⅛ x 10 and 1½ 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 1½-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 2½-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.

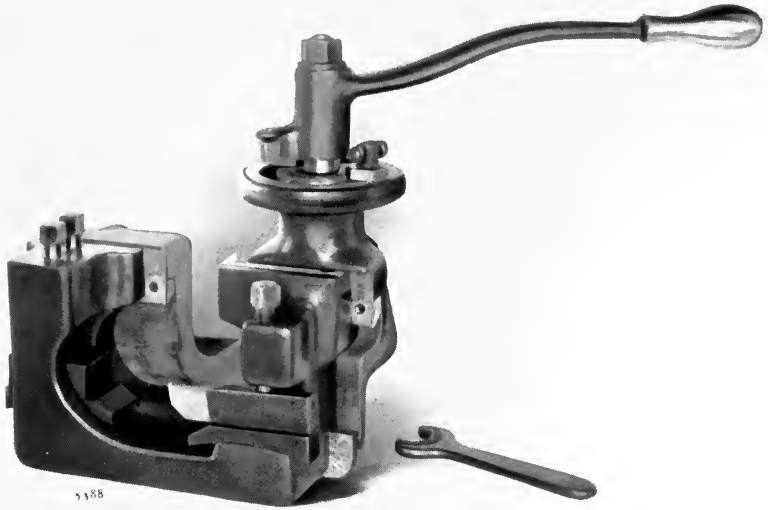
(Patented)

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.

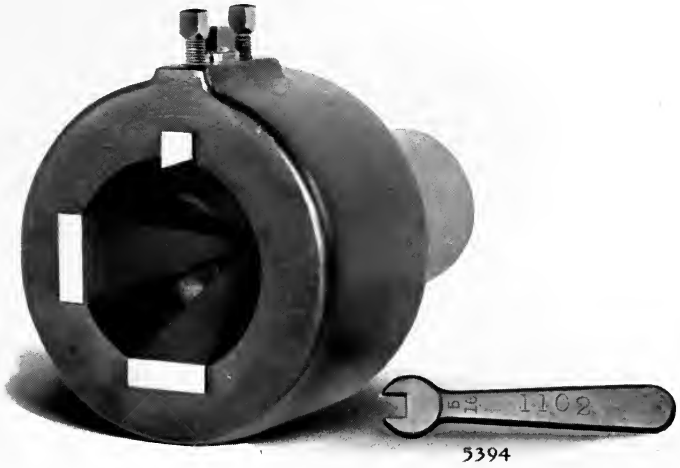
TURNTABLE LATHE APPLIANCES AND TOOLS—Continued

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 2½ 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 1½-inch capacity is recommended with this machine, but die-heads with 2-inch capacity may be furnished if desired.

See page 79 for illustration.

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

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

Open Side Turner Is recommended for turning short work above 2½ 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

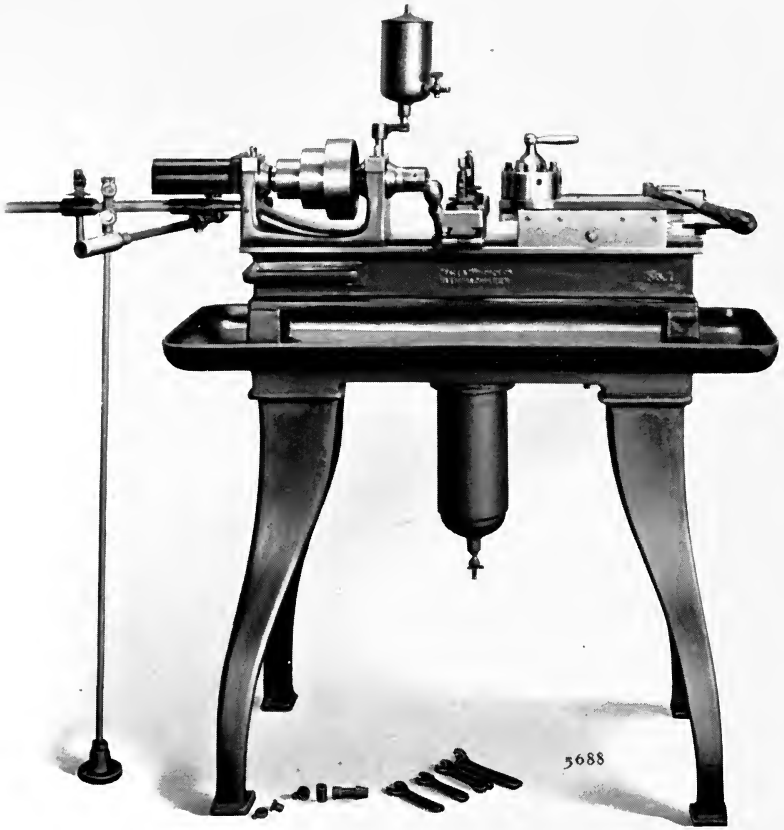
English Sizes

Nominal Sizes	Will Take Stock		
	Round	Hexagon	Square
¾	11/16 to 13/16	11/16 to 13/16	11/16 to 13/16
⅞	53/64 to 15/16	53/64 to 15/16	53/64 to 15/16
1	61/64 to 1 1/16	61/64 to 1 1/16	61/64 to 1 1/16
1⅛	1 5/64 to 1 3/16	1 5/64 to 1 3/16	1 5/64 to 1 3/16
1¼	1 13/64 to 1 5/16	1 13/64 to 1 5/16	1 13/64 to 1 5/16
1⅜	1 21/64 to 1 7/16	1 21/64 to 1 7/16	1 21/64 to 1 7/16
1½	1 29/64 to 1 9/16	1 29/64 to 1 9/16	1 29/64 to 1 9/16
1⅝	1 37/64 to 1 11/16	1 37/64 to 1 11/16	1 37/64 to 1 11/16
1¾	1 45/64 to 1 13/16	1 45/64 to 1 13/16	1 45/64 to 1 13/16
1⅞	1 53/64 to 1 15/16	1 53/64 to 1 15/16	. . . .
2	1 61/64 to 2 1/16	1 61/64 to 2 1/16	. . . .
2⅛	2 5/64 to 2 3/16	2 5/64 to 2 3/16	. . . .
2¼	2 13/64 to 2 5/16	. . . .	. . . .
2⅜	2 21/64 to 2 7/16	. . . .	. . . .
2½	2 29/64 to 2 9/16	. . . .	. . . .

Metric Sizes

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

NOTE — When holding Hexagon Stock use but Three Jaws.



No. 1 Hand Screw Machine

NO. 1 HAND SCREW MACHINE—SPECIFICATIONS

RANGE	Collet Capacity (round)	$\frac{7}{16}''$
	Collet Capacity (square across flats)	$\frac{9}{32}''$
	Collet Capacity (hexagonal across flats)	$\frac{3}{8}''$
	Length, maximum turning	$2\frac{1}{2}''$
	Swing over Bed	$8\frac{3}{8}''$
	Swing over Cut-off Slide	$3\frac{1}{2}''$
	Threading Capacity	$\frac{3}{8}''$
TURRET	Diameter (round)	$4\frac{3}{8}''$
	Holes (6), $\frac{9}{16}''$ diameter (4 or 8 holes to order).	
	Turret Hole Center to Top of Turret Slide	$1\frac{5}{16}''$
SPINDLE	Special Steel; Cylindrical Bearings; Front Boxes, C. I., lined with Babbitt, adjustable for wear.	$1\frac{3}{8}''$ x $2\frac{3}{4}''$
	Hole through Plunger	$\frac{15}{32}''$
	Hole through Spindle	$\frac{3}{4}''$
	Front End, $1\frac{7}{64}''$ diameter; Thread, $1\frac{1}{4}''$; 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 $2\frac{3}{4}''$
	Belt Width (Cone)	$1\frac{3}{4}''$
	Belt Width (Counter. Pulleys)	$2\frac{1}{2}''$
	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.

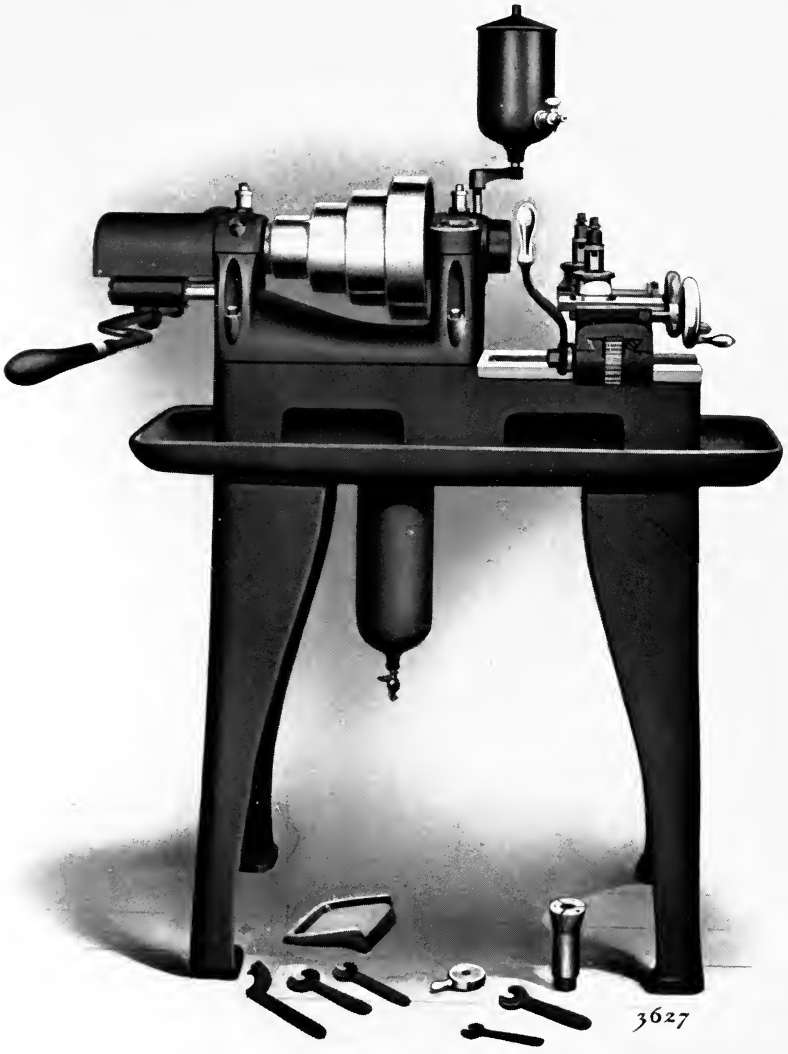
Code words, page 265.

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)	7/16″	45/64″
	Collet Capacity (hexagon across flats)	17/32″	55/64″
	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)	11/16″	11/16″
	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	21/32″	1 1/32″
	Hole through Spindle	15/16″	1 5/16″
	Front End, diameter	1 7/16″	2 5/16″
	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	1½″
	Longitudinal Movement of Base	10″
	Transverse Movement of Tool Slide	5½″
	Collet Capacity (Drawback Type)	1⅜″
	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 13/32″
	Hole through Spindle	1¾″
SPEEDS	Spindle Speeds (8), R. P. M.	97 to 569
	Cone Diameters (4), large diameter	9⅝″
	Pulleys (Counter. Friction)	10″ x 3⅜″
	Belt Width (Cone)	2½″
	Belt Width (Counter. Friction Pulleys)	3¼″
	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″, 1½″ and 2″, and parts for holding the regular 14″ Lathe Expansion Bushing. (Furnished to order).

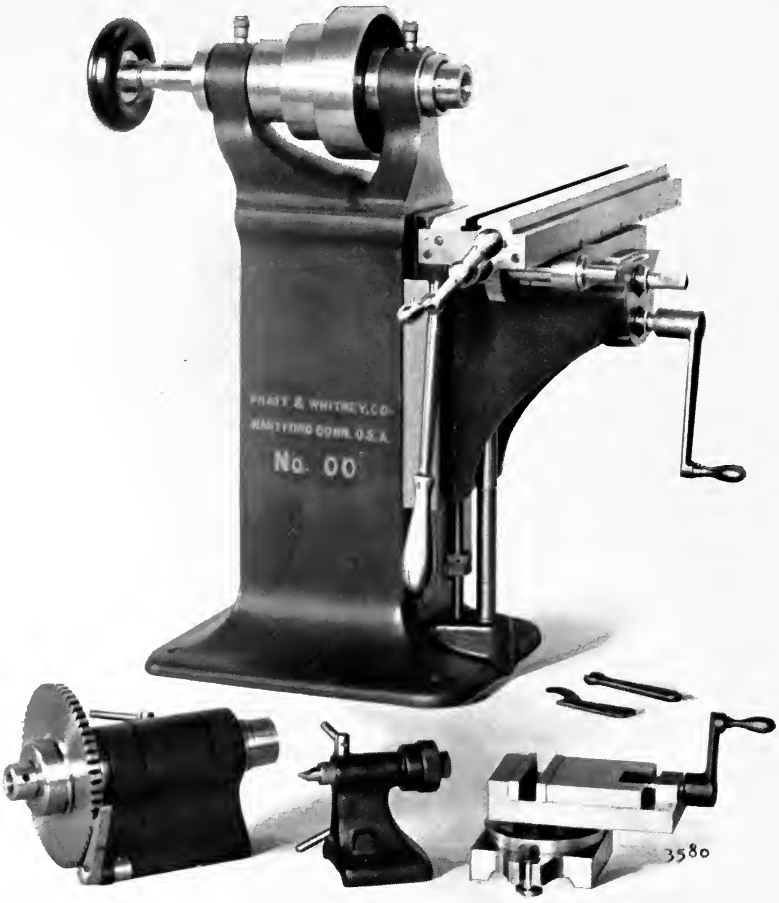
TOOL SLIDE WITH SCREW TRANSVERSE FEED

Furnished in place of Lever Feed to order.

REGULAR COLLETS

Regular Collets, 7/16″ to ⅝″ by 16ths, ⅝″ to 1⅜″ 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.

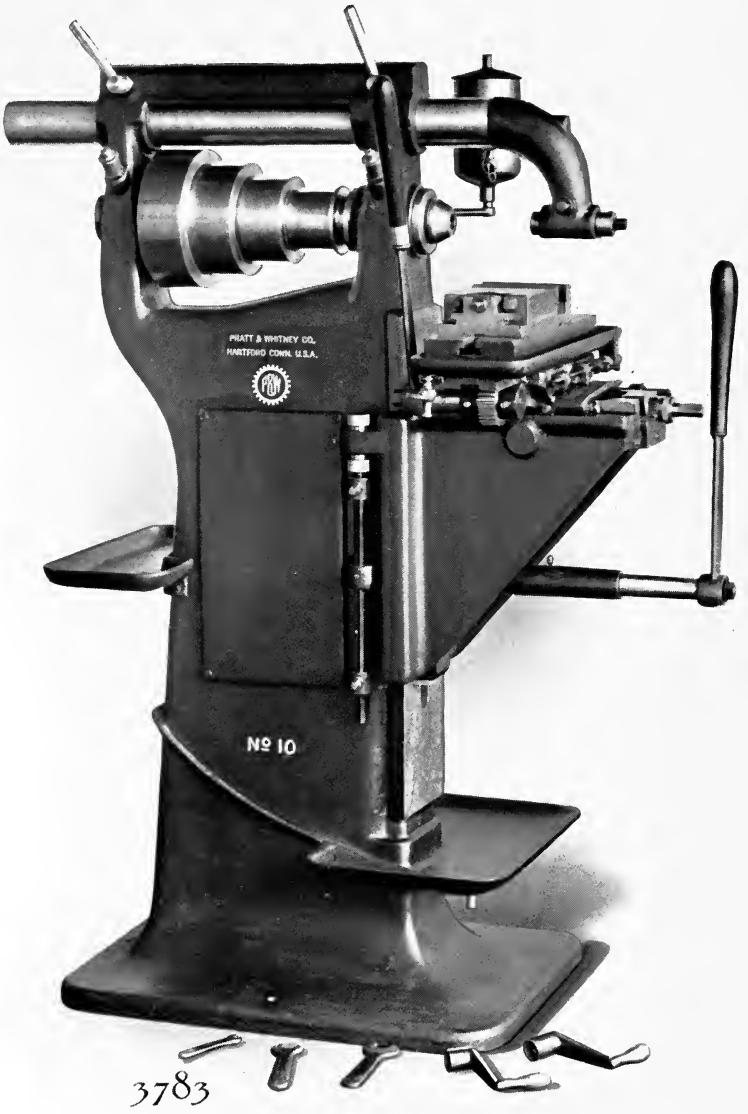
SPECIFICATIONS

RANGE . . .	Table — Working Surface (Sides, 30 degrees angle) . . .	14½″ x 2″
	,, Longitudinal Travel (combination lever and screw) .	7″
	,, Center to End of Spindle, maximum	3 5/8″
	,, 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	2 5/16″
	Width, depth and opening of Jaws	2½″, ½″, 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 Seat	.650″
	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)	1⅛″
	Belt Width (Counter. Pulley)	1¼″
	Countershaft Speed, R. P. M.	128 and 512
BENCH SPACE	Bench Space	17 5/8″ x 24 5/8″
WEIGHTS . .	Machine, with Regular Equipment, net pounds	175
	Boxing Material, approximate pounds	50
REGULAR EQUIPMENT	Includes the Machine, with Set of Wrenches and Countershaft (2-speed Wall).	
INDEX QUILL CENTERS	Consists of Quill-rest with Quill (Spindle Nose same as Head Spindle) and 60-notch Index Plate; Tailstock with Center. (Furnished to order).	
SWIVEL VISE .	Graduated with H. & G. Jaws. (Furnished to order).	

Right angle piece. (Furnished to order).,

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

Code words, page 265.



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

NO. 10 HAND MILLING MACHINE

MADE WITH OR WITHOUT OVERHANGING ARM

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

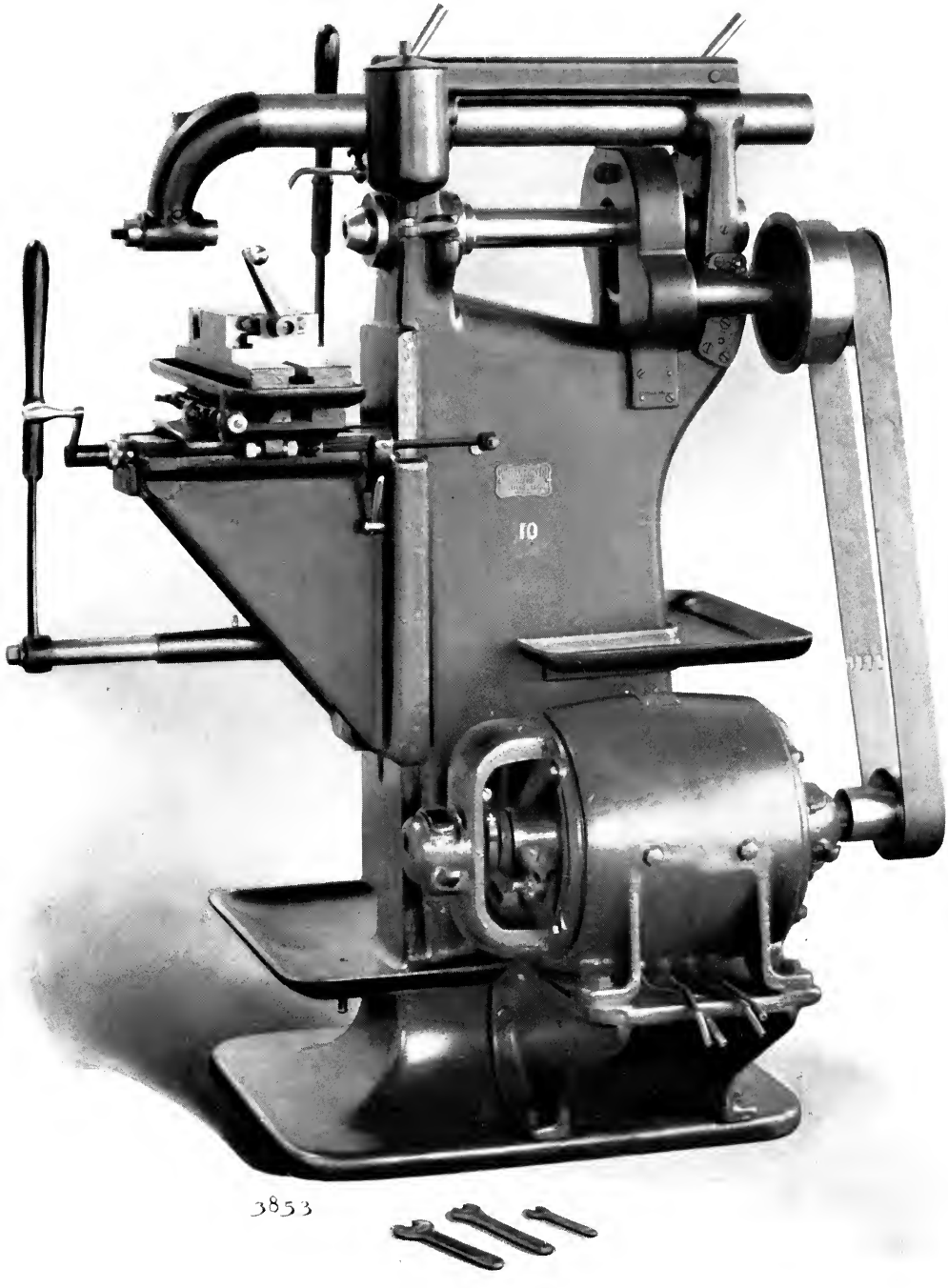
SPECIFICATIONS

RANGE	Table — Working Surface	4¾″ x 16″
	" Longitudinal Travel (by lever)	4″
	" Center to End of Spindle, maximum	6⅜″
	" Transverse Adjustment (by screw)	5″
	" Top to Centre of Spindle, maximum	9″
	" Vertical Adjustment (by lever)	8″
	" Top to Underside of Arm, minimum	5⅛″
	" T-slot (1), width	⅝″
VISE	Size, No. 2½.	
	Width, depth and opening of Jaws	4⅝″, ⅞,″ 2⅝″
MICROMETER DIALS	Graduated in thousandths.	
SPINDLE	Special Steel; Bearings, cylindrical; Front Boxes, Bronze; O. D., conical, adjustable for wear.	1⅝″ x 4⅞″
	Hole through	⅜″
	*Taper Hole, No. 0 Power m/m.	
SPEEDS	Spindle Speeds (4), R. P. M.	76 to 400
	Cone Diameters (4), large	8″
	Pulley (Counter.)	10″ x 3″
	Belt Width (Cone)	2½″
	Belt Width (Countershaft Pulley)	2⅞″
	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



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

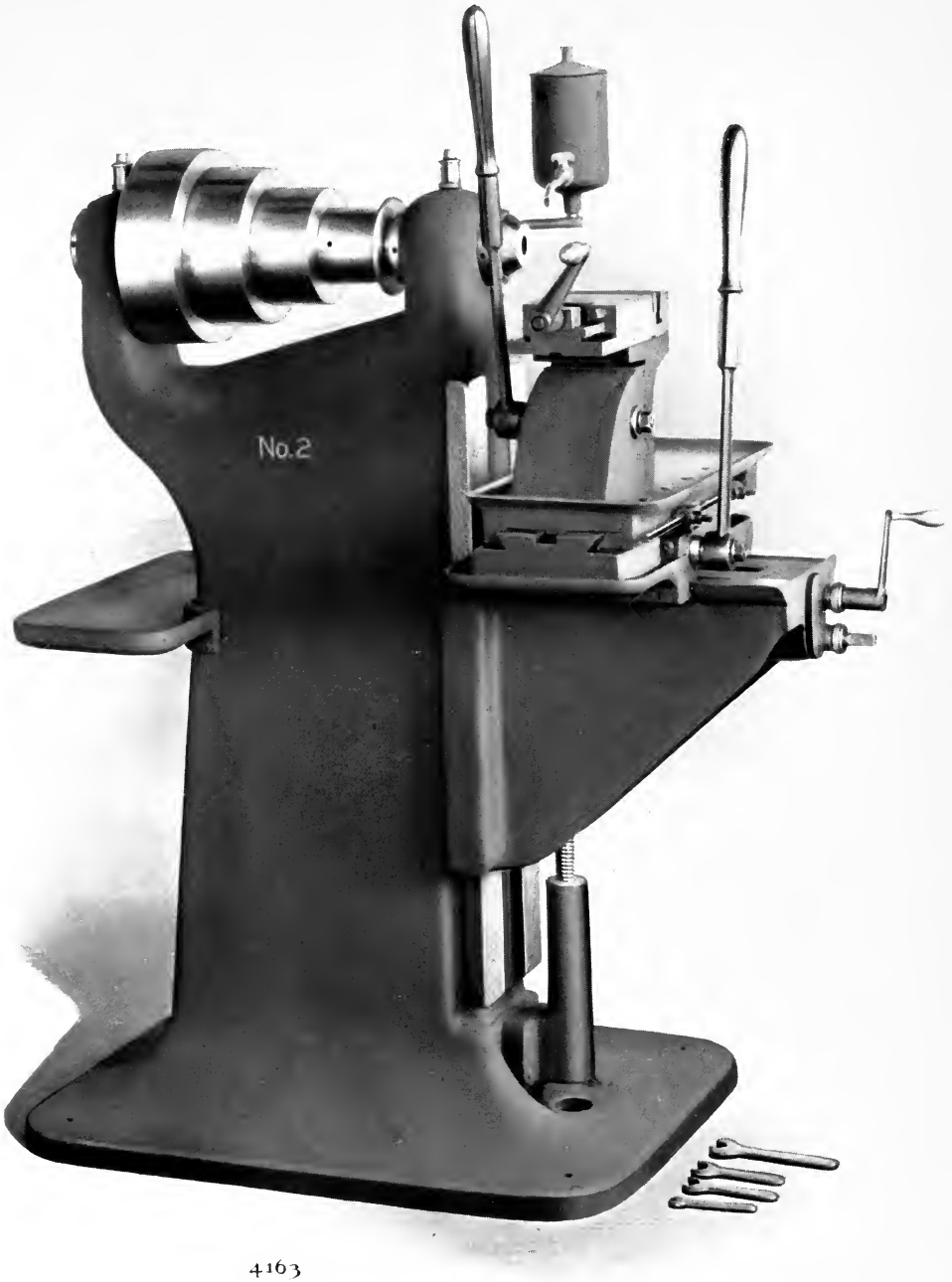
This machine is similar in design to the No. 10, its wider range, however, making it suitable for a class of work beyond the capacity of the smaller machine.

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 5/16″
	" 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	2″ x 5 3/8″
	Boxes, Bronze; O. D., conical, adjustable for wear.	
	Hole through	5/8″
	*Taper Hole, No. 1 Power m/m.	
SPEEDS	Spindle Speeds (4), R. P. M.	75 to 375
	Cone Diameters (4), large	10″
	Pulley (Countershaft)	12″ x 3 1/4″
	Belt Width (Cone)	3″
	Belt Width (Countershaft Pulley)	3 1/8″
	Countershaft Speed, R. P. M.	125
FLOOR SPACE	Floor Space	36″ x 40″
WEIGHTS	Machine, with Regular Equipment, net pounds	1150
	Crating Material (domestic), approximate pounds	150
	Boxing Material (foreign), approximate pounds	300
	Box, cubic feet	40
REGULAR EQUIPMENT	The Machine, with Oil Pot; Set of Wrenches and Countershaft (tight and loose Pulley).	
VERTICAL MILLING ATTACHMENT	(See page 135).	
VISE AND ARBORS	(See pages 132-133).	

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

Code words, page 265.



No. 2 Hand Milling Machine with Vertical Vise Slide

NO. 2 HAND MILLING MACHINE WITH VERTICAL VISE SLIDE SPECIFICATIONS

RANGE	Table — Working Surface	4¾″ x 6″
	" Longitudinal Travel (by lever)	6″
	" Center to End of Spindle, maximum	8¼″
	" 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	⅝″
VISE	Size, No. 2½.	
	Width, depth and opening of Jaws	4⅝″, ⅞″, 2⅝″
MICROMETER DIALS	Graduated in thousandths.	
SPINDLE	Special Steel; Bearings, cylindrical; Front	2″ x 5⅜″
	Boxes, Bronze; O. D., conical, adjustable for wear.	
	Hole through	⅝″
	†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″ x 3¼″
	Belt Width (Cone)	3″
	Belt Width (Countershaft Pulley)	3⅛″
	Countershaft Speed, R. P. M.	125
FLOOR SPACE	Floor Space	36″ x 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

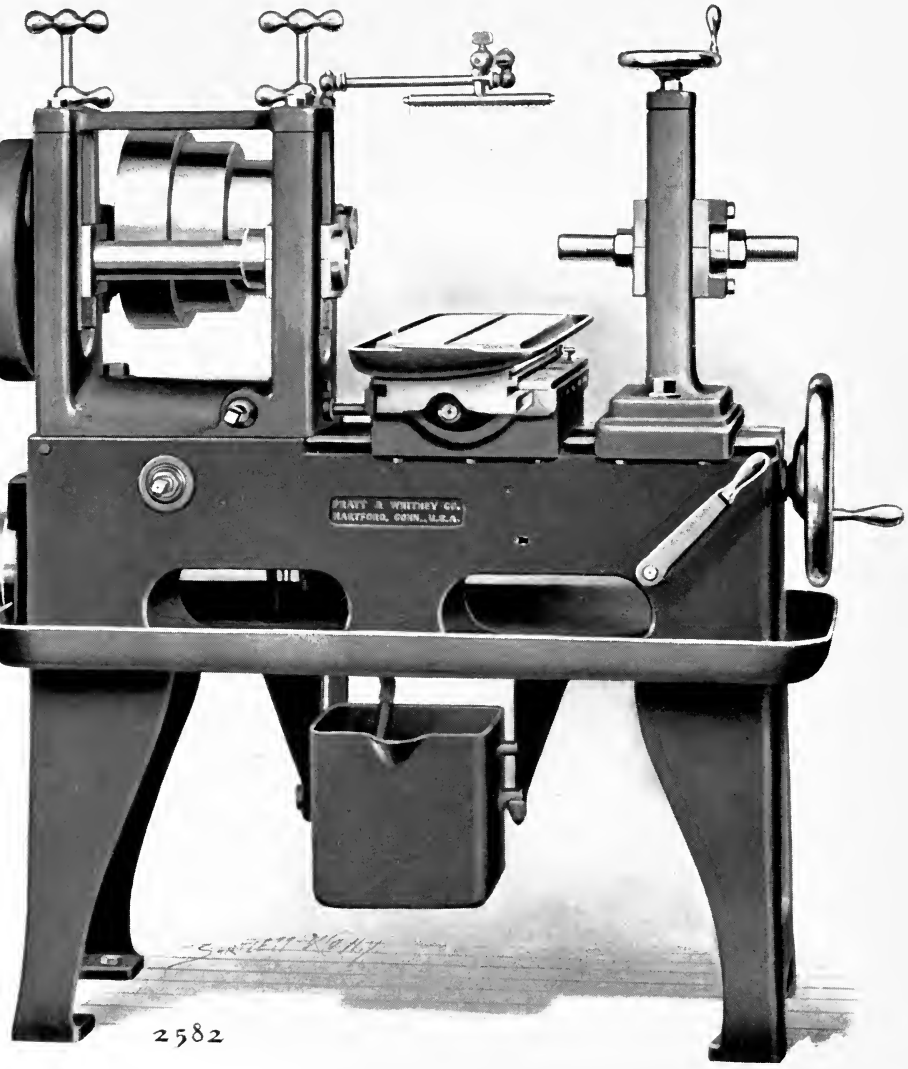
This machine is particularly adapted for various milling operations on guns, typewriters, sewing machines, automobiles, etc. The quick return of table by hand, coupled with the simple construction and convenient arrangement of the other operating requirements, enables one operator to take care of several 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	5 5/16″
	" 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

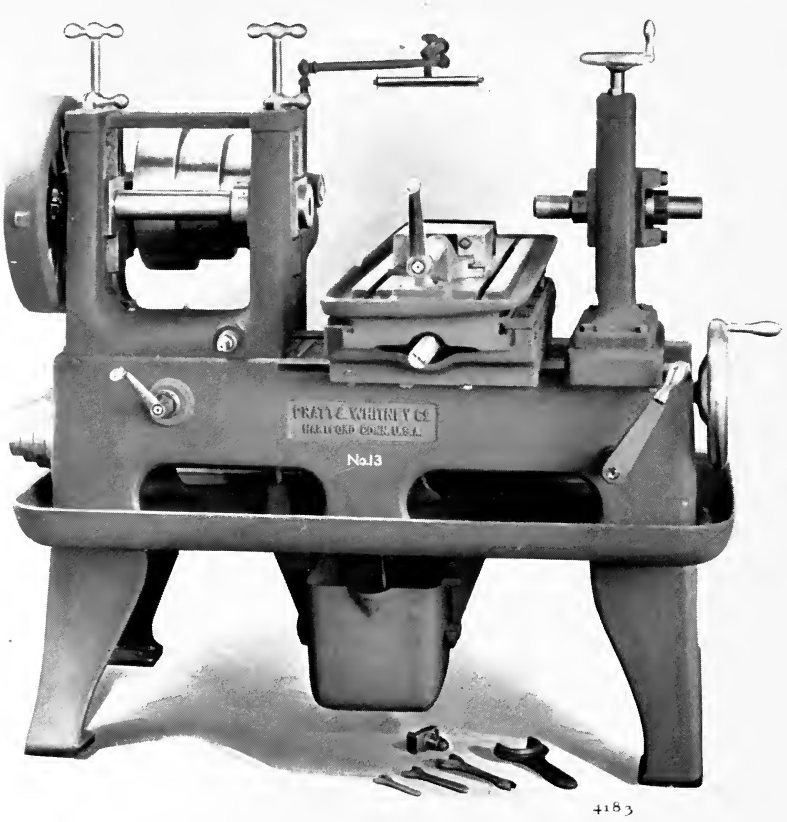
These machines have recently been re-designed and, while retaining the general characteristics of the Lincoln Type, differ from the original in the following manner: Machines are far more rigid and powerful; Oil Pans surround and are cast integral with the bed and table; Tables are provided with T-slots; 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″, ⅝″, 2½″
VISE	Size, No. 12	
	Width, depth and opening of Jaws	7″, 1¼″, 3⅜″
SPINDLE	Special Steel; Bearings, cylindrical; Front Boxes, C. I., lined with Babbitt, adjustable for wear.	2⅜″ x 3¾″
	Hole through	$\frac{9}{16}$″
	*Taper Hole, No. 11 Jarno.	
SPEEDS	Spindle Speeds (3), R. P. M.	22 to 50
	Gearing Ratio	$4\frac{15}{22}$ 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

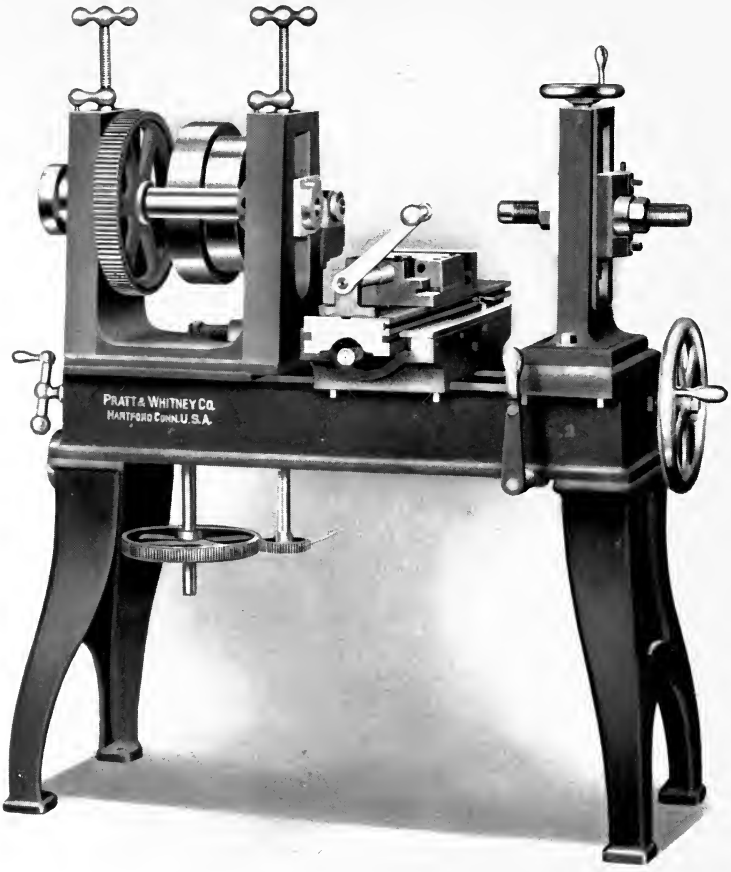
NO. 13 LINCOLN MILLING MACHINE

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	7¼″
	" Transverse Adjustment	6¼″
	" 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	20½″
	T-slots; number, size, distance apart	3, ⅝″, 4″
VISE	Size, No. 12.	
	Width, depth and opening of Jaws	7″, 1¼″, 3⅜″
SPINDLE	Special Steel; Bearings, cylindrical; Front	2⅝″ x 4⅛″
	Boxes, C. I., lined with Babbitt, adjustable for wear.	
	Hole through.	1 1/16″
	*Taper Hole, No. 12 Jarno.	
SPEEDS	Spindle Speeds (3), R. P. M.	23 to 43
	Gearing Ratio	5 1/18 to 1
	Cone Diameters (3), large	14″
	Pulleys (Countershaft)	14″ x 4¼″
	Belt Width (Cone)	3¼″
	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

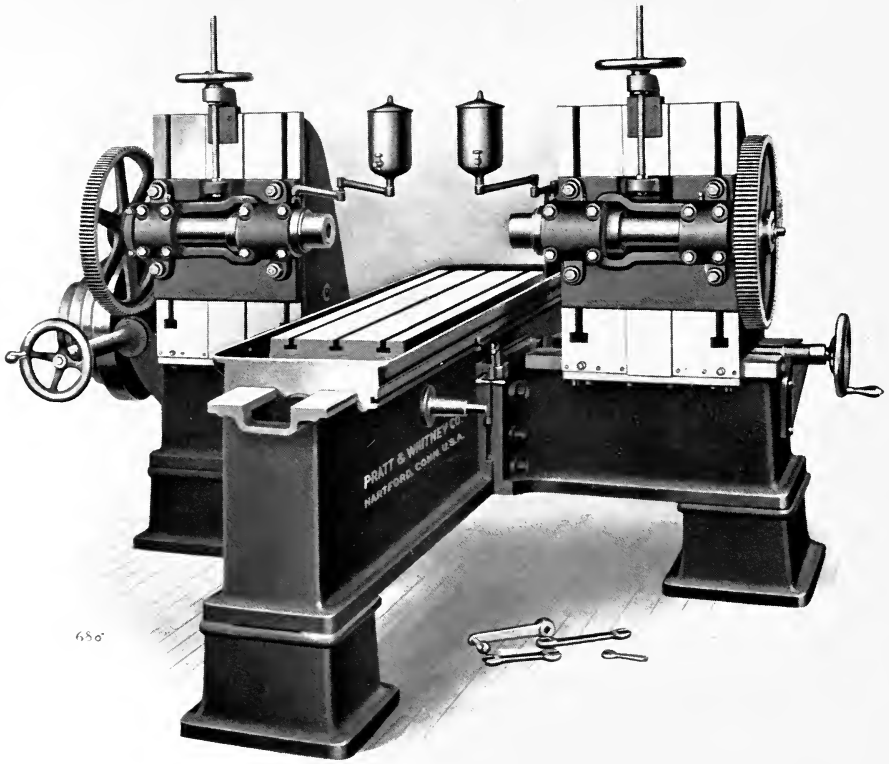
NO. 2 LINCOLN MILLING MACHINE

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 1/16″
	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.	2 1/4″ x 3 3/4″
	*Taper Hole, No. 2 Power m/m.	
SPEEDS	Spindle Speeds (3), R. P. M.	18 to 40
	Gearing Ratio	4 15/22 to 1
	Cone Diameters (3), large	12″
	Pulleys (Countershaft)	11″ x 3 1/2″
	Belt Width (Cone)	2 1/2″
	Belt Width (Countershaft Pulley)	3 1/4″
	Countershaft Speeds, R. P. M.	125
FEEDS	Table Longitudinal (4), by Feed Cones, P. R. Sp.	.0119″ to .0446″
FLOOR SPACE	Floor Space	48″ x 58″
WEIGHTS	Machine, with Regular Equipment, net pounds	1425
	Crating Material (domestic), approximate pounds	100
	Boxing Material (foreign), approximate pounds	400
	Box, cubic feet	52
REGULAR EQUIPMENT	The Machine, with Set of Wrenches and Countershaft (tight and loose Pulley).	
	(Vise and Arbors furnished to order. See pages 132-133.	

* For detailed information, see " Tapers ", page 247. Code words, page 265.



No. 3½ Double Horizontal Milling Machine

NO. 3½ POWER MILLING MACHINE

MADE TO ORDER ONLY

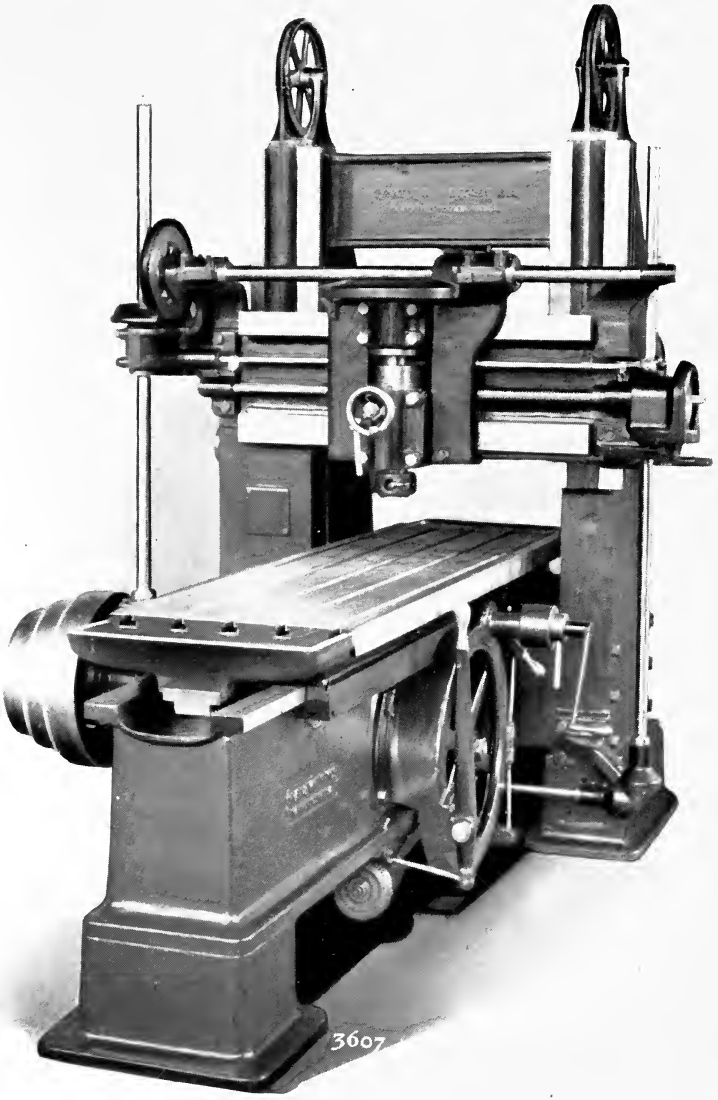
Bed is made in lengths to accommodate tables from 4 to 14 feet. Machine has two heads, which have both vertical and longitudinal adjustment. Table is driven by large worm and worm rack and is provided with quick power return.

SPECIFICATIONS

RANGE	Table — Length	4′ to 14′
	„ Width	14½″
	„ Travel	4′ to 14′
	„ Top to Center of Spindle, minimum	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	15/16″
	*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

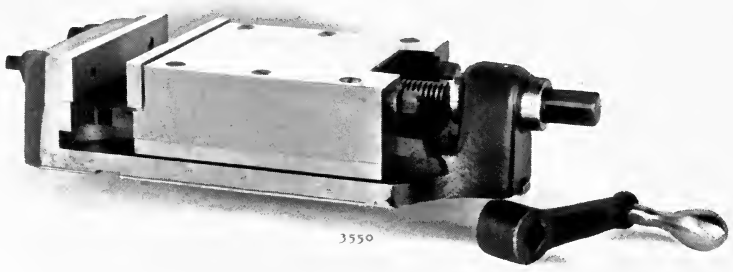
Made in one size, with either one or two spindles. Table is made in various lengths; both table and spindles are provided with power feed in either direction.

SPECIFICATIONS

		One Sp.	Two Sps.
RANGE	Table — Length	6′	6′
	" Width	22″	22″
	" Travel	6′	6′
	" Top to End of Spindle, minimum	¾″	¾″
	" Top to End of Spindle, maximum	25″	25″
	Distance between Uprights	24½″	24½″
	T-slots (5); size, ¾″; distance apart, 4⅝″.		
SPINDLE	Special Steel; Bearings, cylindrical; Front	2¾″ x 8″	2¾″ x 8″
	Hole through	⅝″	⅝″
	*Taper Hole (Power Milling Machine)	No. 3	No. 3
	Front End	2¾″, 5 Pi., R. H.	2¾″, 5 Pi., R. H.
SPEEDS	Spindle Speeds (6), R. P. M.	11½ to 61	11½ 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 4¼″ and 14″ x 7″
	Belt Width (Cone)	3¼″	4″
	Belt Width (Counter. Pulleys)	3¾″ and 4¾″	4″ and 6¾″
	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	6¼′ x 13½′	8¼′ x 13½′
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.

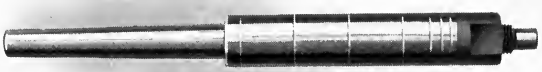


VISES FOR MILLING MACHINES

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

Used on Machine		Size Number	Jaws			Weight Net Pounds
			Width Inches	Depth Inches	Opening Inches	
HAND MILLING MACHINE	No. 10 No. 2. Vertical Vise Slide	2½	4⅝	⅞	2⅝	21
	No. 2. Regular No. 2. Column Power	11	5	1	3	29
LINCOLN MILLING MACHINE	No. 2	4	7	1¼	3¼	52
	No. 12	12	7	1¼	3⅜	62
	No. 13					

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



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

Arbor for No. 2 Lincoln Milling Machine

Arbor for No. 12 and No. 13 Lincoln Milling Machines 5675

ARBORS FOR MILLING MACHINES

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

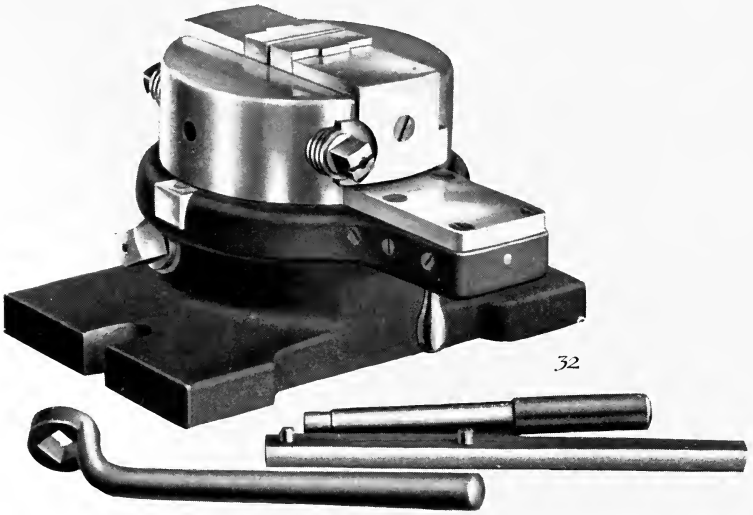
Lincoln Milling Machine Arbors are made in one style only, with Arm Support; the No. 2 is provided with tang, and the Nos. 12 and 13 drilled and tapped for Pull-back; Arbors are splined for cutters.

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

	Number	Diameter	Cutter Length No Arm	Cutter Length With Arm	*Taper
HAND MILLING MACHINE	10	¾	2 and 3½	2 and 4	No. 0. Power M. M.
		⅞	3 and 5	4 and 6	No. 0. Power M. M.
		1	3 and 5	4 and 6	No. 0. Power M. M.
	2	¾	2 and 3½	†2 and 4	No. 1. Power M. M.
		⅞	3 and 5	†4 and 6	No. 1. Power M. M.
		1	3 and 5	†4 and 6	No. 1. Power M. M.
	2	1		6 and 9	No. 2. Power M. M.
		1¼		6 and 9	No. 2. Power M. M.
LINCOLN MILLING MACHINE	12	1		6 and 9	No. 11. Jarno
		1¼		6 and 9	No. 11. Jarno
	13	1		10 and 14	No. 12. Jarno
		1¼		10 and 14	No. 12. Jarno
		1½		10 and 14	No. 12. Jarno

* For detailed information, see Tapers, page 247.

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



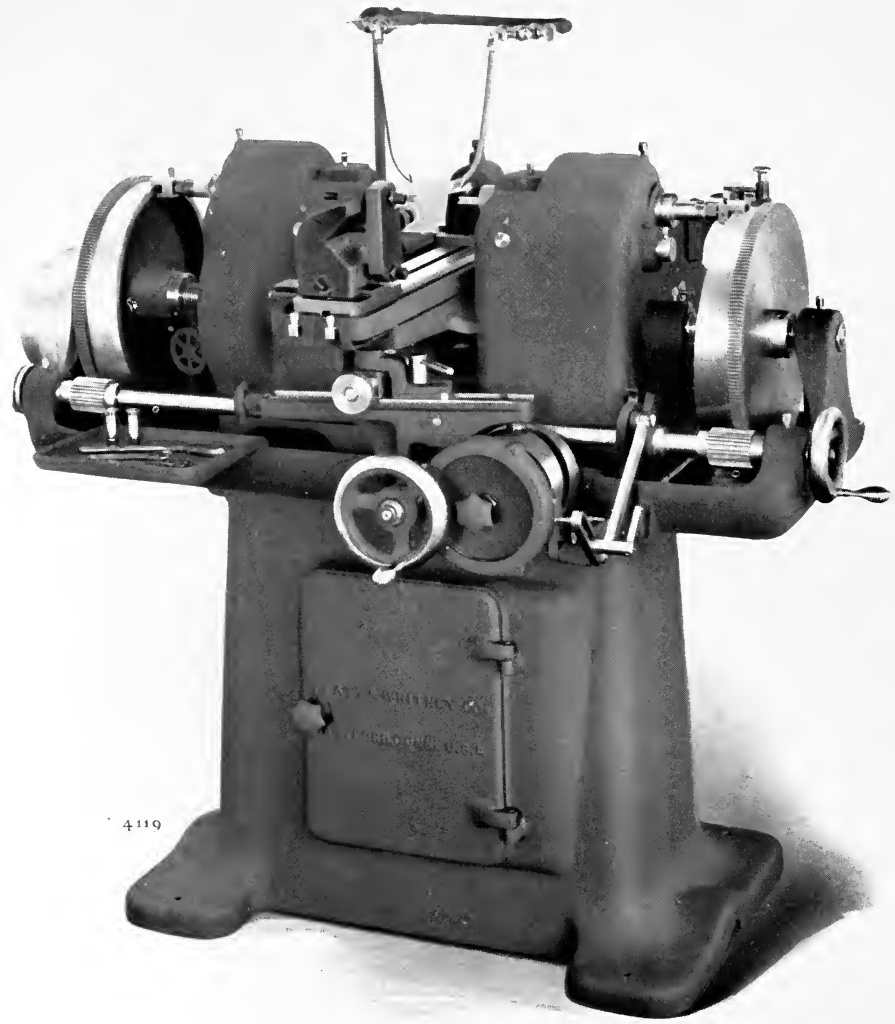
INDEX MILLING FIXTURE

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	1½″
Jaws, width	1 3/16″
Total height of fixture	5½″
Base, dimensions	9¼″ x 5⅝″
Weight, pounds	35

VERTICAL MILLING ATTACHMENT

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



Spline Milling Machine

SPLINE MILLING MACHINE

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

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

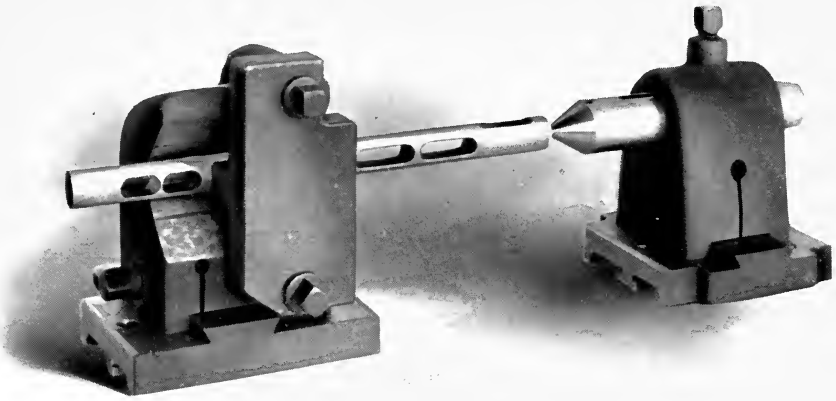
SPECIFICATIONS

RANGE	Table Travel	0″ to 4″
	Table Top to Center of Cutter Spindles	3½″
	Cutting Diameter, maximum	1″
	Cutting Depth (using both Spindles), maximum	4″
	Cutting Depth (using one Spindle), maximum	2″
SPEEDS	Spindle Speeds (6), R. P. M.	401 to 1532
	Cone Diameters (3), large diameter	12″
	Pulleys (Counter. Friction)	12″ x 4¼″
	Belt Width (Cone)	2″
	Belt Width (Counter. Pulley)	4⅛″
	Countershaft Speeds, R. P. M.	250 and 325
FEEDS	Table Feeds (5), P. R. Sp. ¼″ stroke	.0007″ to .0057″
	Table Feeds (5), P. R. Sp. 4″ stroke	.0112″ to .092″
	Spindle Feed, per notch of Feed Ratchet	.0028″
FLOOR SPACE	Floor Space	56½″ x 43½″
WEIGHTS	Regular Equipment, net pounds	1800
	Crating Material (domestic), approximate pounds	100
	Boxing Material (foreign), approximate pounds	450
	Box, cubic feet	62

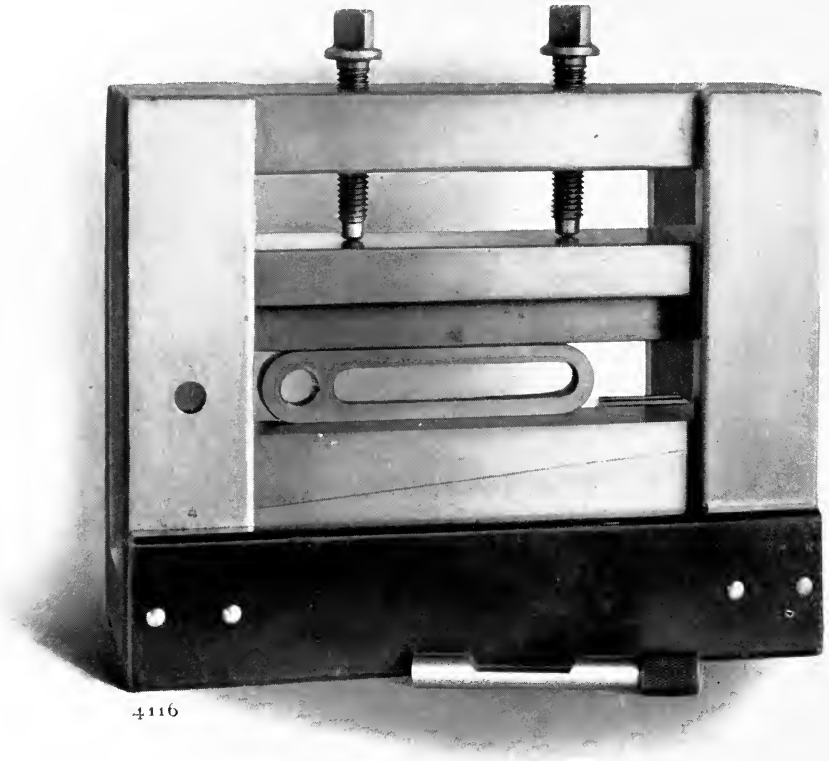
REGULAR EQUIPMENT

The Machine, with
Oil Pump, Tank and Piping.
Universal Vise and Foot Stock for Round Stock.
4 Draw-in Collets (2 each, ¼″ and $\frac{7}{16}$″).
2 Cutters, any size, with 2 or 4 lips.
Countershaft (2-speed Friction).
Set of Wrenches.
(See attachments on following pages).

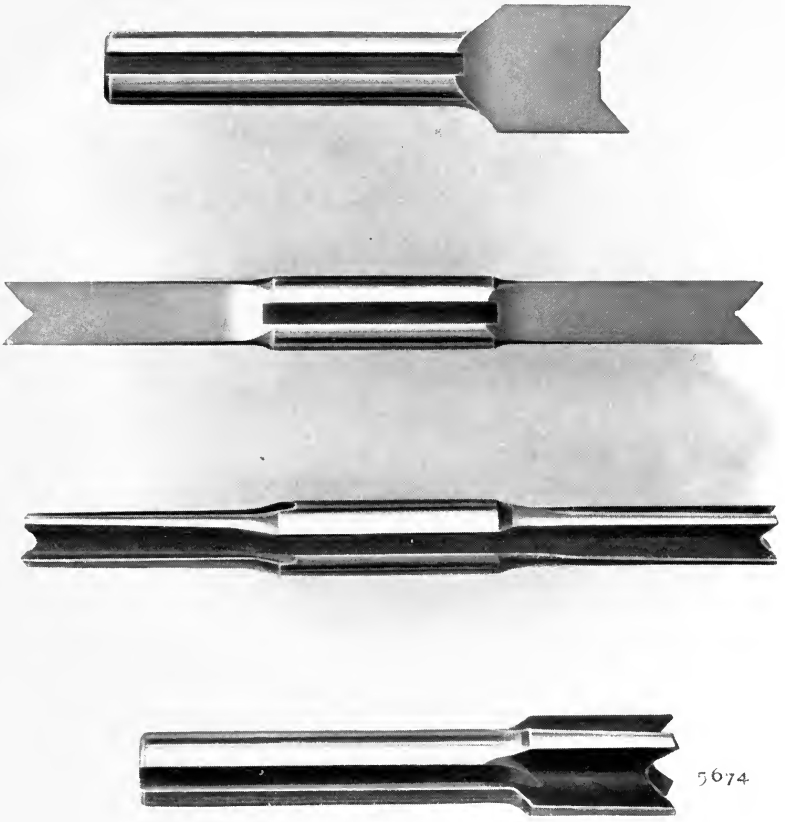
Code words, page 265.



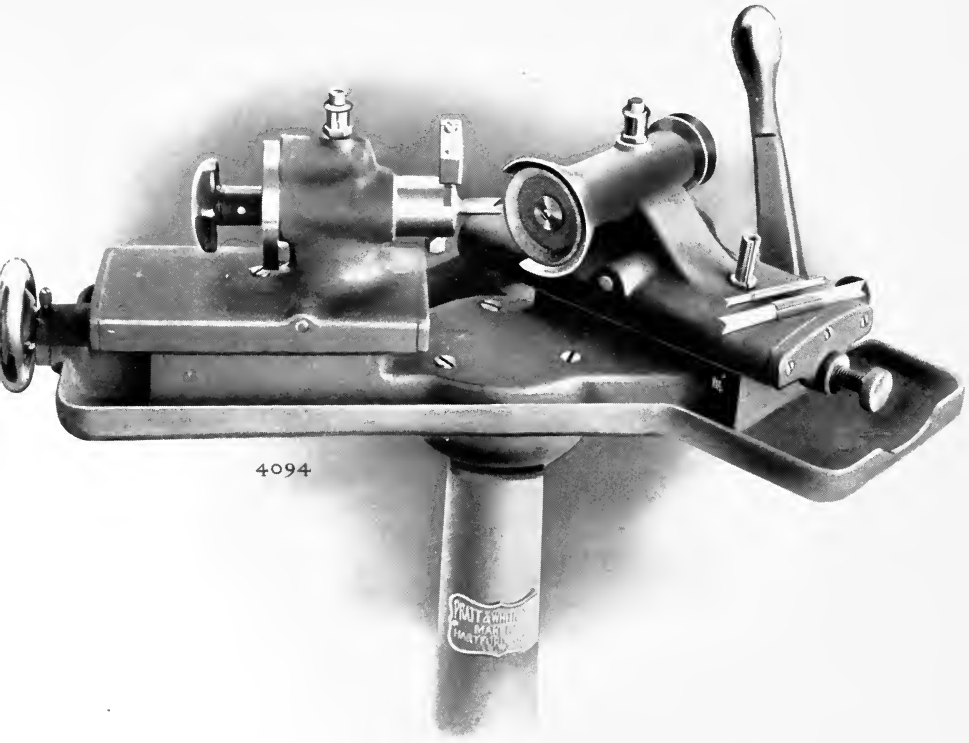
Universal Vise and Foot Stock for Round Work—Sample of Work Shown in Place



Universal Vise for Square and Flat Stock with Work in Place



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.

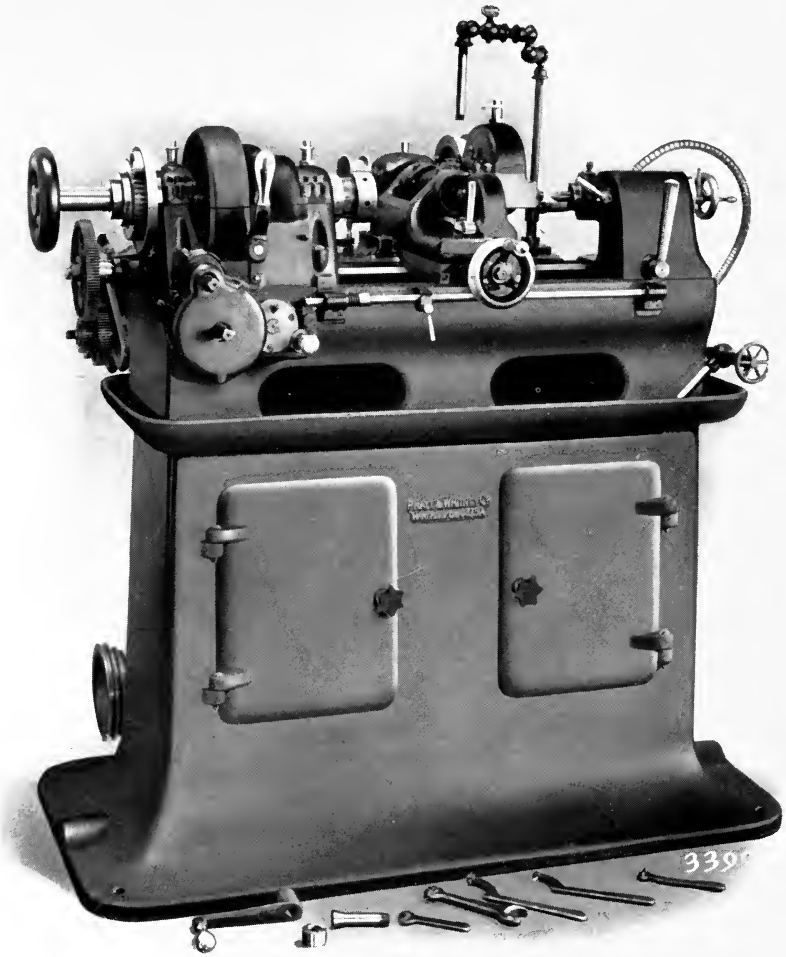
SPECIFICATIONS

RANGE	Cutter Slide Adjustment (by lever)	2″
	Wheel Slide Adjustment (by screw)	3″
GRINDING WHEELS	(Cupped), 2½″ diameter; ⅝″ wide; ⅜″ hole.	
SPEEDS	Spindle Speed, R. P. M.	5143
	Pulley (Spindle), Grooved, diameter	1¾″
	Pulley (Counter., tight and loose)	6″ x 1⅝″
	Belt Width (Spindle Pulley), ¼″ 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 (¼″ and $\frac{7}{16}$″) and Countershaft.

Code words, page 265.



(Patented)

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

4½ X 12-INCH THREAD MILLING MACHINE

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

SPECIFICATIONS

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	3/16″
	Collet Capacity (Spindle)	1″
	Collet Capacity (Draw-back Attachment)	5/8″
	Hole through Spindle	1 1/16″
	Follow Rest Capacity	1¾″
	Index Ring (Regular), 48 notches	
	Lead Screw (Regular), 2 Pi.; (Metric), 12 m/m P.	
CUTTERS . .	Diameters	1 1/4″ and 1 5/8″
	Hole	7/16″
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 1¾″ 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.

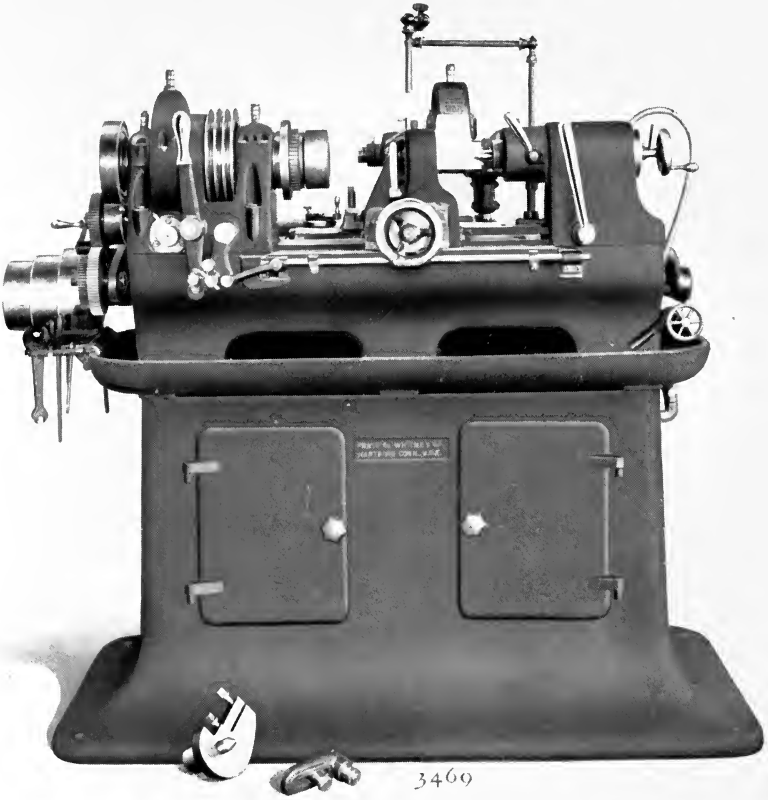
CUTTERS . .

Cutters either U. S., V., International or Whitworth Standards, 1¼″ and 1⅝″ diameters, are carried in stock.

DRAW-BACK COLLET MECHANISM

With Collets, any size from ⅛″ to ⅝″ 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.

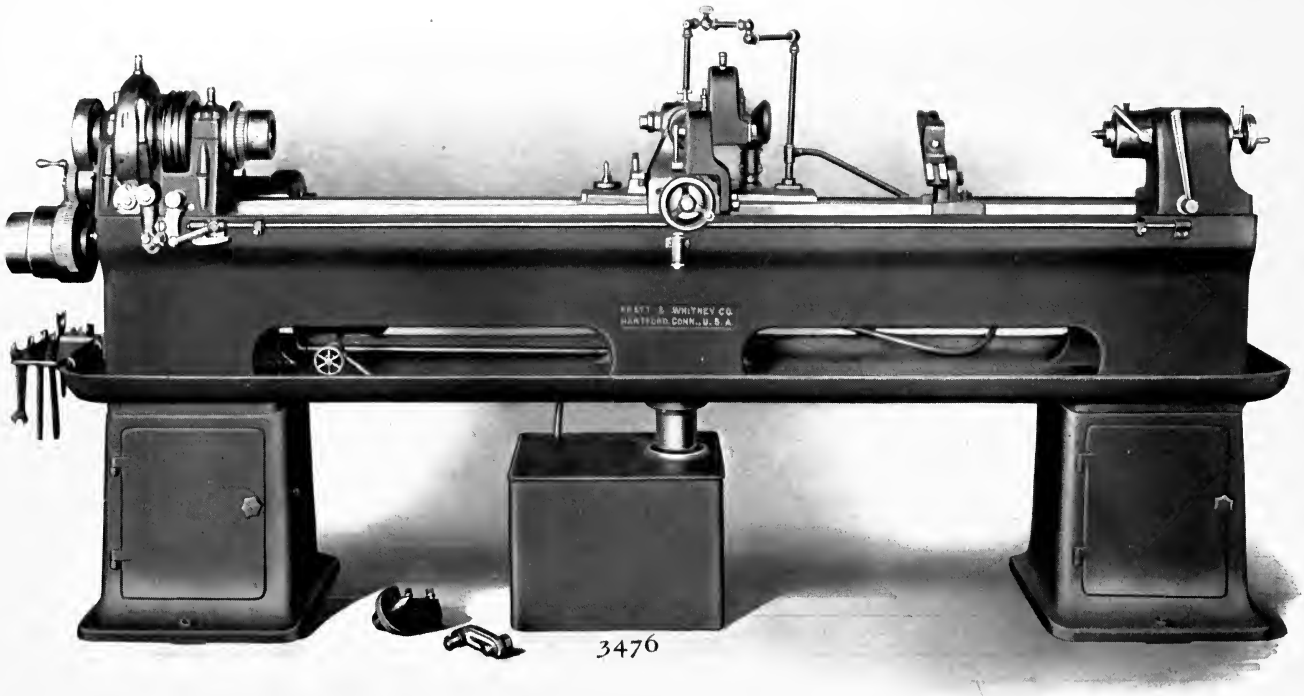
SPECIFICATIONS

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)	$\frac{7}{16}$″
	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)	$2\frac{1}{32}$″
	Hole through Spindle (Oversize Head)	$3\frac{1}{32}$″
	Follow Rest Capacity (Regular)	2″
	Follow Rest Capacity (Oversize)	3″
	Index Ring (Regular), 48 notches.	
	Lead Screw (Regular), 2 Pi.; (Metric), 12 m/m P.	
CUTTERS	Diameter for Regular Cutter Head	2″, $2\frac{1}{4}$″, $2\frac{5}{8}$″
	Diameter for Oversize Cutter Head	$2\frac{5}{8}$″ and $3\frac{1}{4}$″
	Hole for Regular Cutter Head	$\frac{3}{4}$″
	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)	$51\frac{3}{10}$ R. P. M.
	Work Spindle Speed, minimum (Lead Screw Drive)	1 rev. in 25 min.
	Cutter Spindle Speeds (3), R. P. M.	118, 144, 177
	Countershaft Speed, R. P. M.	215
	Pulleys (Countershaft, tight and loose)	12″ x $4\frac{1}{4}$″

FLOOR SPACE	Machine	6″ x 14″	6″ x 48″	6″ x 80″	6″ x 132″
	Floor Space	41″ x 61″,	41″ x 7′ 11″,	41″ x 10′ 7″,	41″ x 14′ 11″

WEIGHTS		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

REGULAR EQUIPMENT

The Machine, with
Oil Pump, Tank and Piping.
1 Spindle Collet, 2″ hole.
1 Spindle Collet Bushing (round), any size up to 1¾″.
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.

OVERSIZE HEAD TAILSTOCK AND FOLLOW REST

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.

SPECIAL HEAVY CUTTER HEAD

Designed for Cutters up to 3¼″ diameter, 1″ hole, and is capable of milling a thread ⅝″ deep at one cut. Furnished to order in place of regular cutter head and especially recommended in connection with oversize head parts.

INTERNAL MILLING

The machine can be furnished to order, with an Internal Milling Attachment, suitable for milling threads of moderate pitch in holes from 1¼″ in diameter to about 6″. When machine is thus arranged it is adapted for internal milling only.
Cut on page 148.

BACKING-OUT ATTACHMENT

To enable depth of cut to be tapered out to zero in three turns of spindle. (Furnished to order).

COMPOUND TAPER ATTACHMENT

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.

POWER QUICK RETURN DEVICE

Furnished to order on 6″ x 80″ and 6″ x 132″ machines.

DRAW-BACK COLLET ATTACHMENT

With Collets from ⅜″ to ⅞″ inclusive by 16th. (Furnished to order).
Cut on page 149.

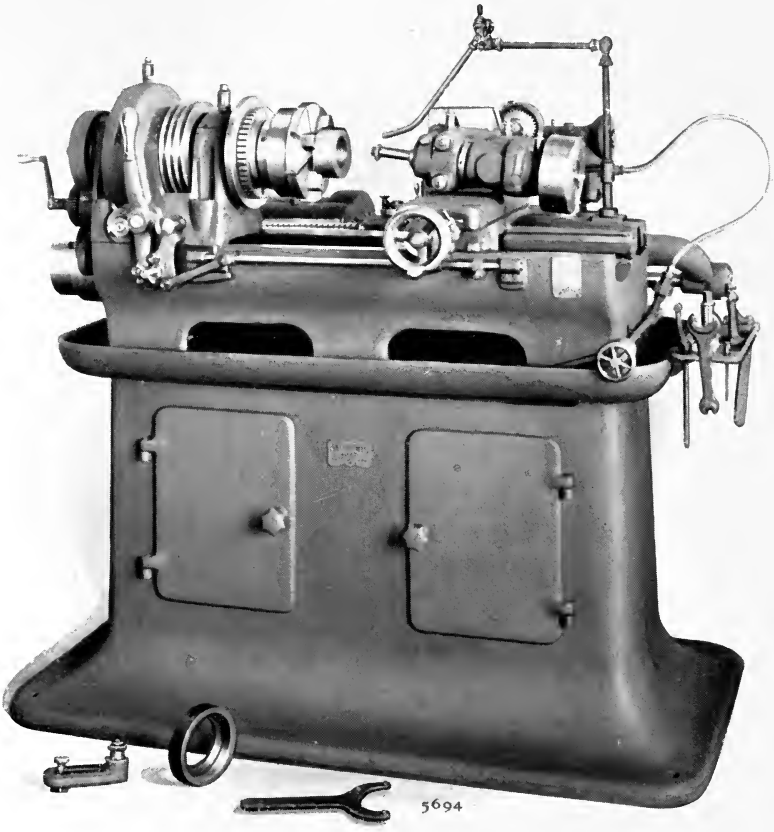
CUTTERS . . .

U. S., V., International, Worm and Acme Standards are carried in stock.

SPECIAL EQUIPMENTS

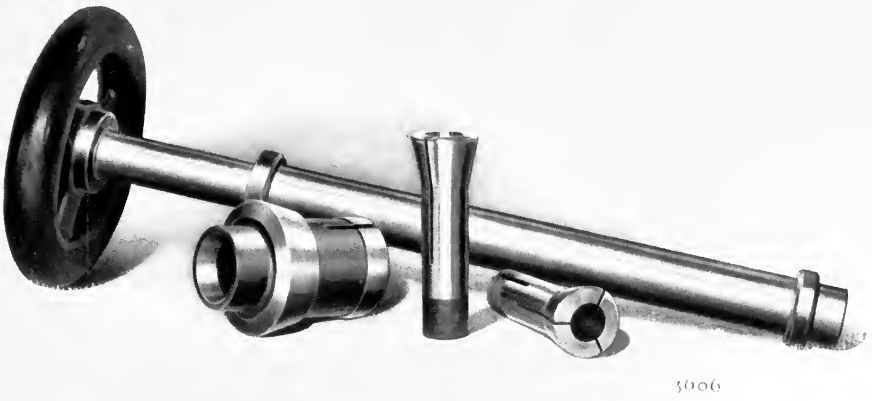
These machines may be furnished with special equipments to meet demands out of the ordinary. Full information furnished upon receipt of drawings or samples.

Code words, page 265.



(Patented)

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



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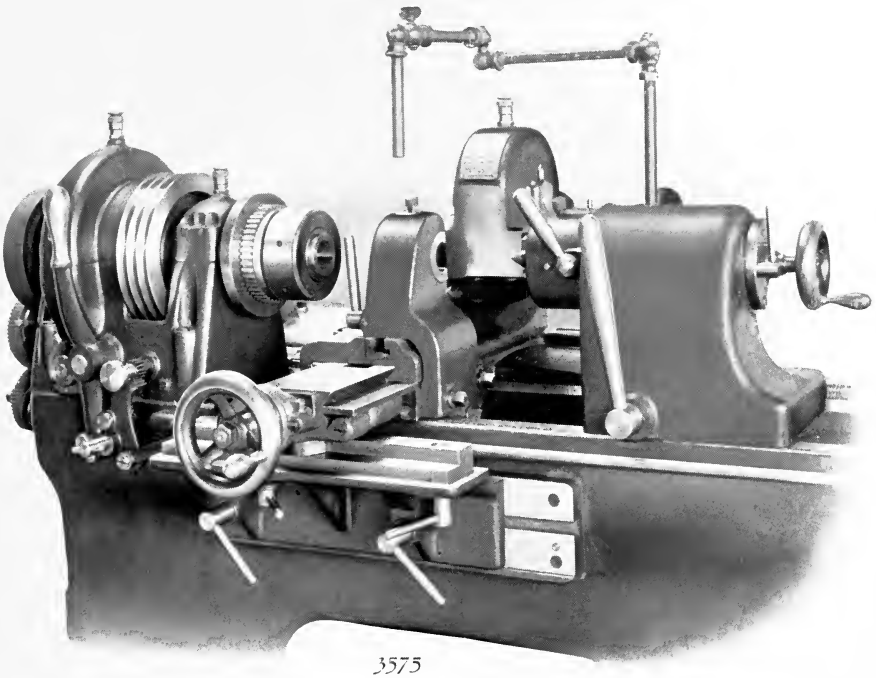
Draw-back Collet Attachment



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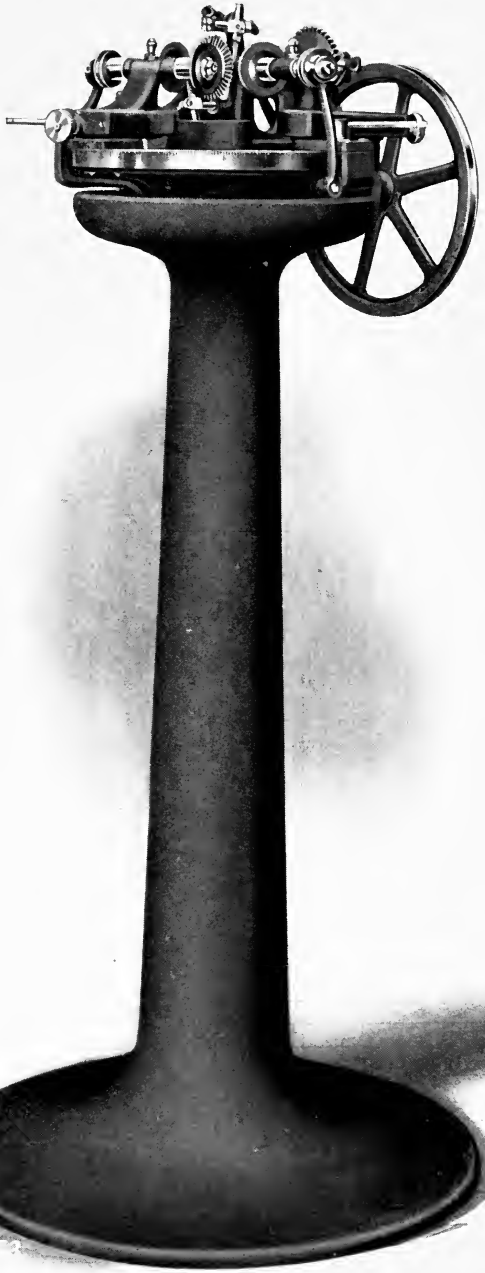
(Patented)

Taper Milling Attachment



(Patented)

Automatic Cutter Grinder

AUTOMATIC GRINDER FOR THREAD MILLING CUTTERS

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

SPECIFICATIONS

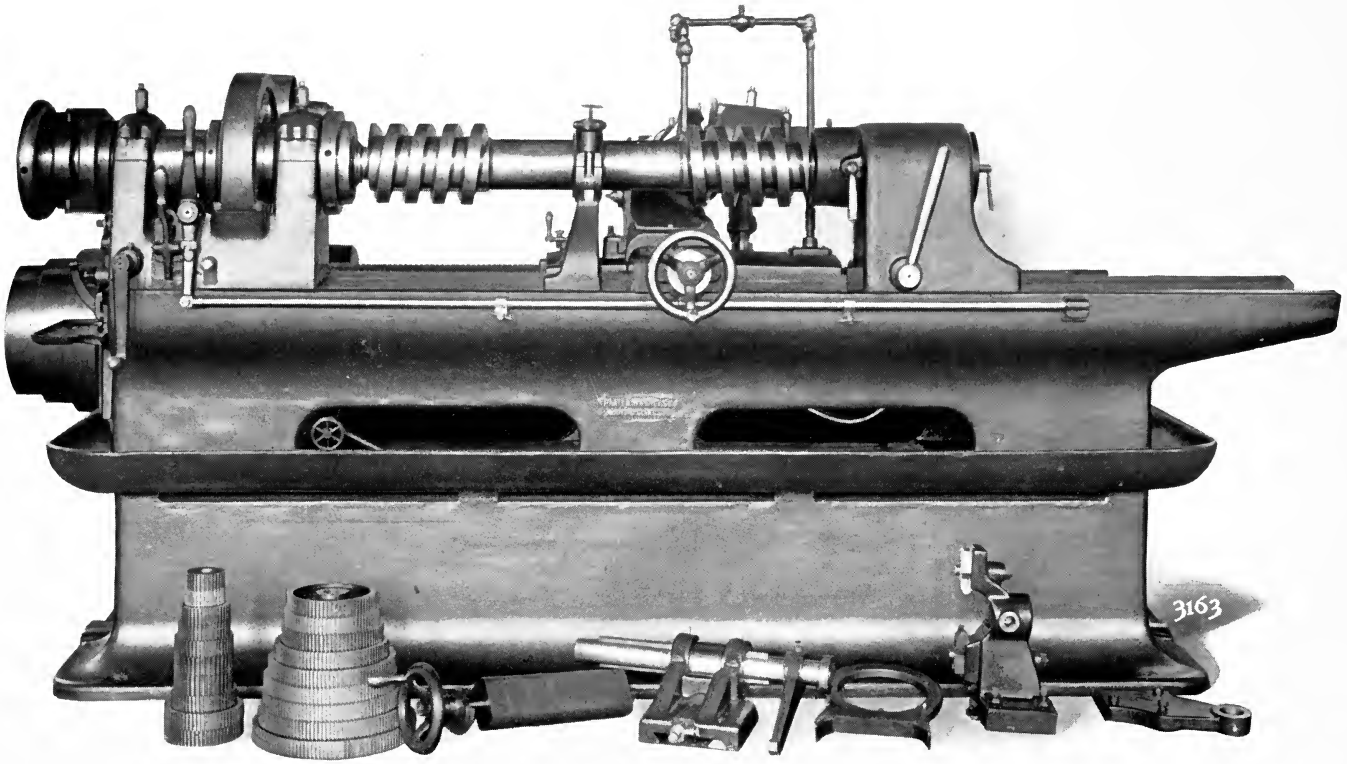
RANGE	Travel of Grinding Wheel Spindles	$1\frac{5}{16}$″
	Capacity Cutter, diameter, maximum	$3\frac{1}{2}$″
	Graduation in degrees, any desired angle obtainable.	
GRINDING WHEELS	Grinding Wheels, $2\frac{1}{2}$″ x $\frac{1}{8}$″ and $\frac{3}{8}$″ Hole.	
SPEEDS	Spindle Speed, R. P. M.	7000
	Pulley (Counter., tight and loose)	6″ x $1\frac{5}{8}$″
	Belt Width (Spindle Pulley), $\frac{1}{8}$″ Twisted Rawhide.	
	Belt Width (Machine Driving), $\frac{1}{4}$″ round.	
	Belt Width (Counter., tight and loose)	$1\frac{1}{2}$″
	Countershaft Speed, R. P. M.	400
FLOOR SPACE	Floor Space	22″ Circle
WEIGHTS	Machine, Regular Equipment, net pounds	265
	Crating Material (domestic), approximate pounds	50
	Boxing Material (foreign), approximate pounds	200
	Box, cubic feet	24

REGULAR EQUIPMENT

The Machine, with
- 3 Index Plates (24, 30 and 34 teeth).
- 3 Grinding Wheels.
- 2 Countershafts.
- 1 Cutter Adapter, either $\frac{7}{16}$″, $\frac{3}{4}$″ or 1″ diameter. (Spindle end is $\frac{5}{16}$″ 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.

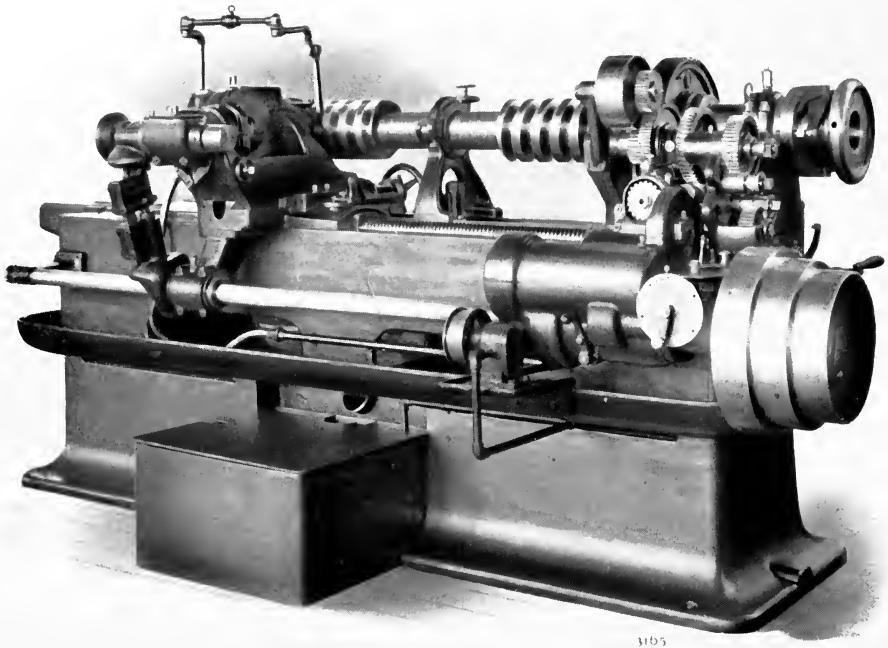
SPECIFICATIONS

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 9/16″
	Follow Rest Capacity	4″
	Index Ring (Regular), 24 notches.	
	Lead Screw (Regular), 1″ Lead; (Metric), 24 m/m Lead.	
CUTTERS	Diameters, Regular Cutter Head	4″, 4 1/2″, 5″, 5 1/2″, 6″
	Diameters, Oversize Cutter Head, maximum	6 1/2″
	Hole, Regular Cutter Head	1 5/8″
	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

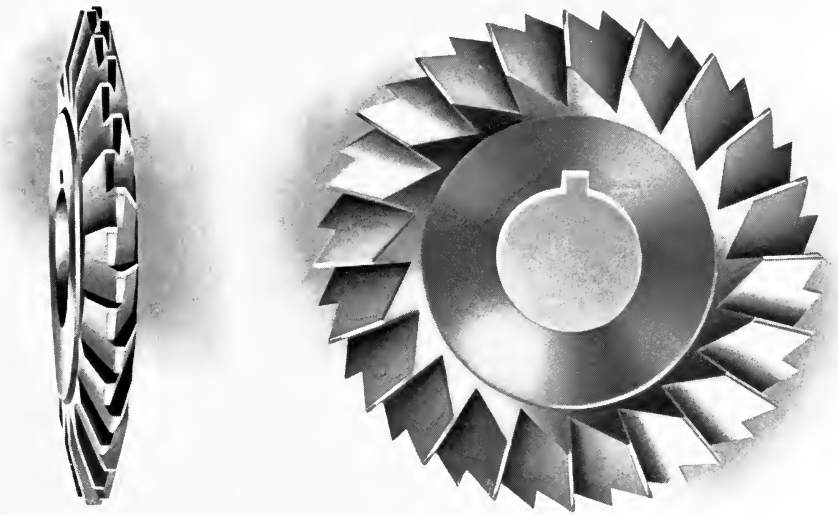
REGULAR EQUIPMENT

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.

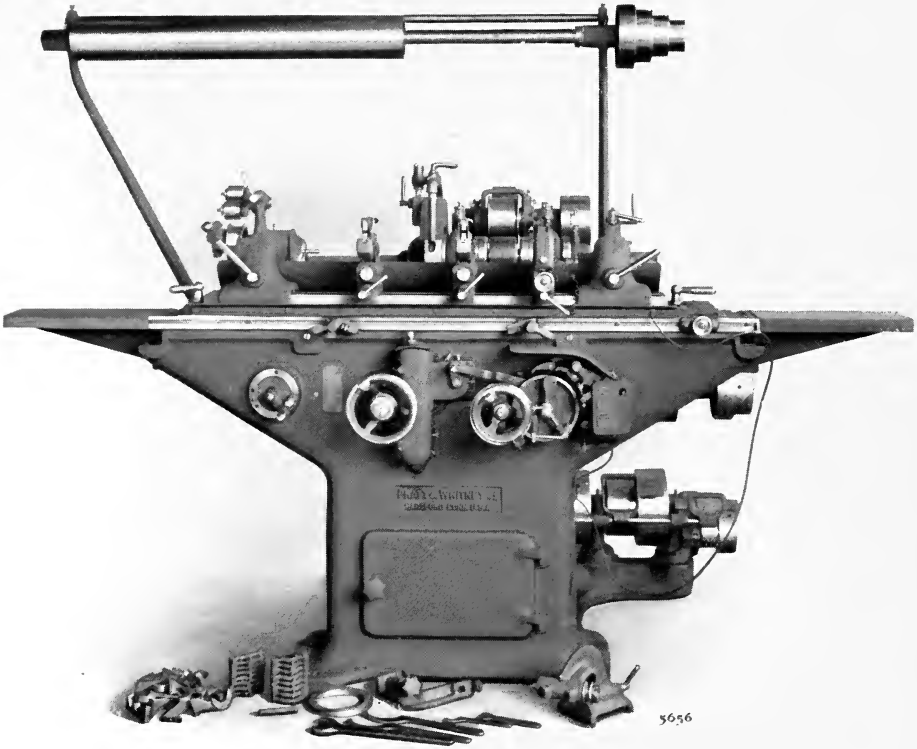


Rear View: 12 x 48-inch Thread Milling Machine



(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

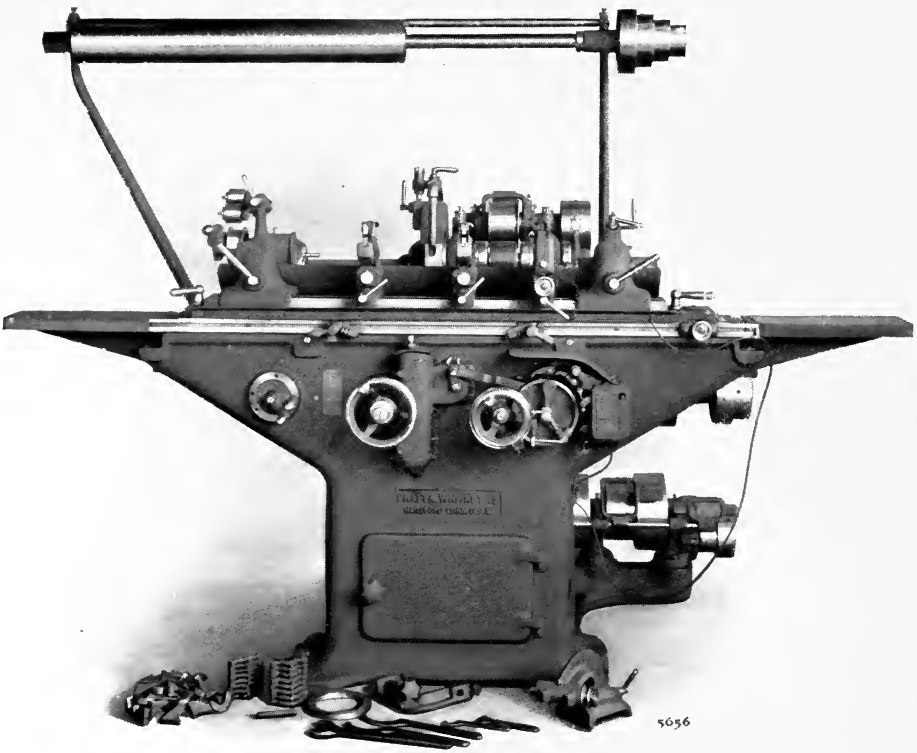
RANGE	Center Distance, maximum	30″
	Swing over Table	4″
	Taper, per foot, maximum	2″
GRINDING WHEELS	Diameter	12″
	Width	½″ to 1¾″
	Hole	5″
WHEEL SPINDLE	Tool Steel (H. & G.); Cylindrical Bearings, diameter	1¾″ and 1 13/16″ x 5″
	Boxes, Bronze; conical, on O. D., adjustable for wear.	
	*Taper Hole in Head and Tailstock Spindles, Jarno Taper, No. 5.	
SPEEDS	Wheel Speeds (2), R. P. M.	1890 and 2980
	Work Speeds (4), R. P. M.	100 to 384
	Pulley (Counter., tight and loose)	12″ x 5¼″
	Belt Width (Wheel Spindle Driving Pulley)	3″
	Countershaft Speed, R. P. M.	410
FEEDS	Table Feeds (6), inches per minute	21 to 101
	Wheel Feeds, ½ to 12 teeth feed, reducing diameter of work	.000125″ to 003″
FLOOR SPACE	Floor Space	10′ 8″ x 46¼″
WEIGHTS	Machine, with Regular Equipment, net pounds	4000
	Crating Material (domestic), approximate pounds	350
	Boxing Material (foreign), approximate pounds	1100
	Box, cubic feet	180

REGULAR EQUIPMENT

The Machine, with Automatic Sizing Device.
1 Grinding Wheel.
1 Wheel Truing Device.
1 Center Grinding Attachment.
2 Universal Back-rests.
36 Back-rest Shoes (2 each, ¼″ to 2″).
16 Work Dogs (¼″ to 2¼″).
Set of Wrenches and Countershaft.

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

Code words, page 265.



(Patented)

6 x 48-inch Cylindrical Automatic Sizing Grinder

6 X 48-INCH CYLINDRICAL AUTOMATIC SIZING GRINDER

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

SPECIFICATIONS

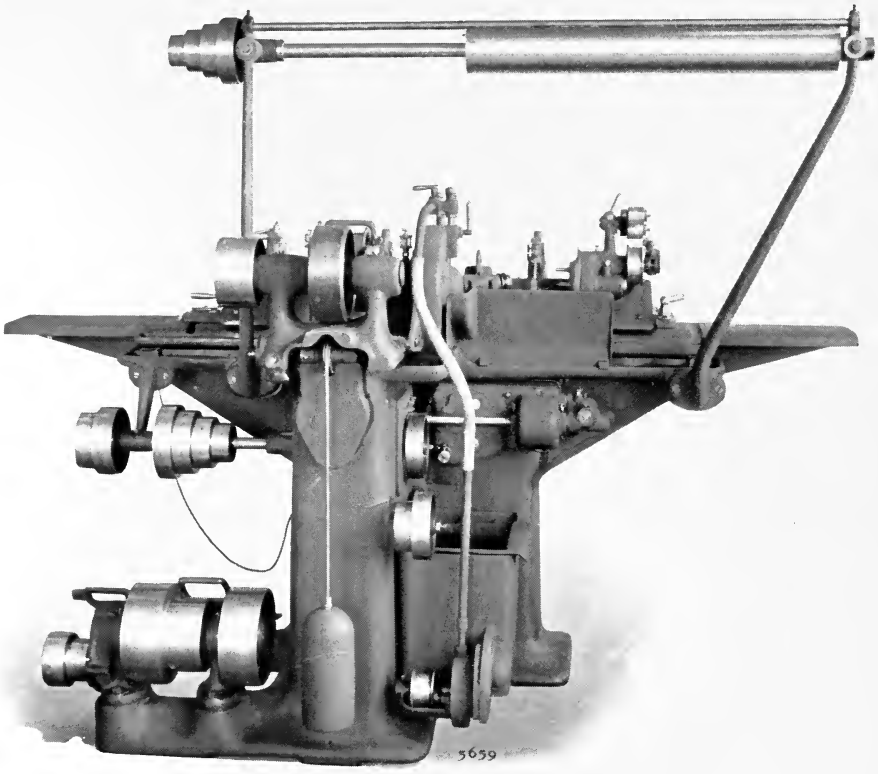
RANGE	Center Distance, maximum	48″
	Swing over Bed	6″
	Taper, per foot, maximum	2″
GRINDING WHEELS	Diameter	12″
	Width	1″ to 2½″
	Hole	5″
WHEEL SPINDLE	Tool Steel (H. & G.); Cylindrical Bearings, diameter	1¾″ and 1 13/16″ x 5″
	Boxes, Bronze; conical on O. D., adjustable for wear.	
	*Taper Hole in Head 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 5¼″
	Belt Width (Wheel Spindle Driving Pulley)	3″
	Countershaft Speed, R. P. M.	410
FEEDS	Table Feeds (6), inches per minute	21 to 101
	Wheel Feeds, ½ to 12 teeth feed, reducing diameter of work	.000125″ to .003″
FLOOR SPACE	Floor Space	13′ 3″ x 50 3/8″
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 2¾″).
Set of Wrenches and Countershaft.

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

Code words, page 265.

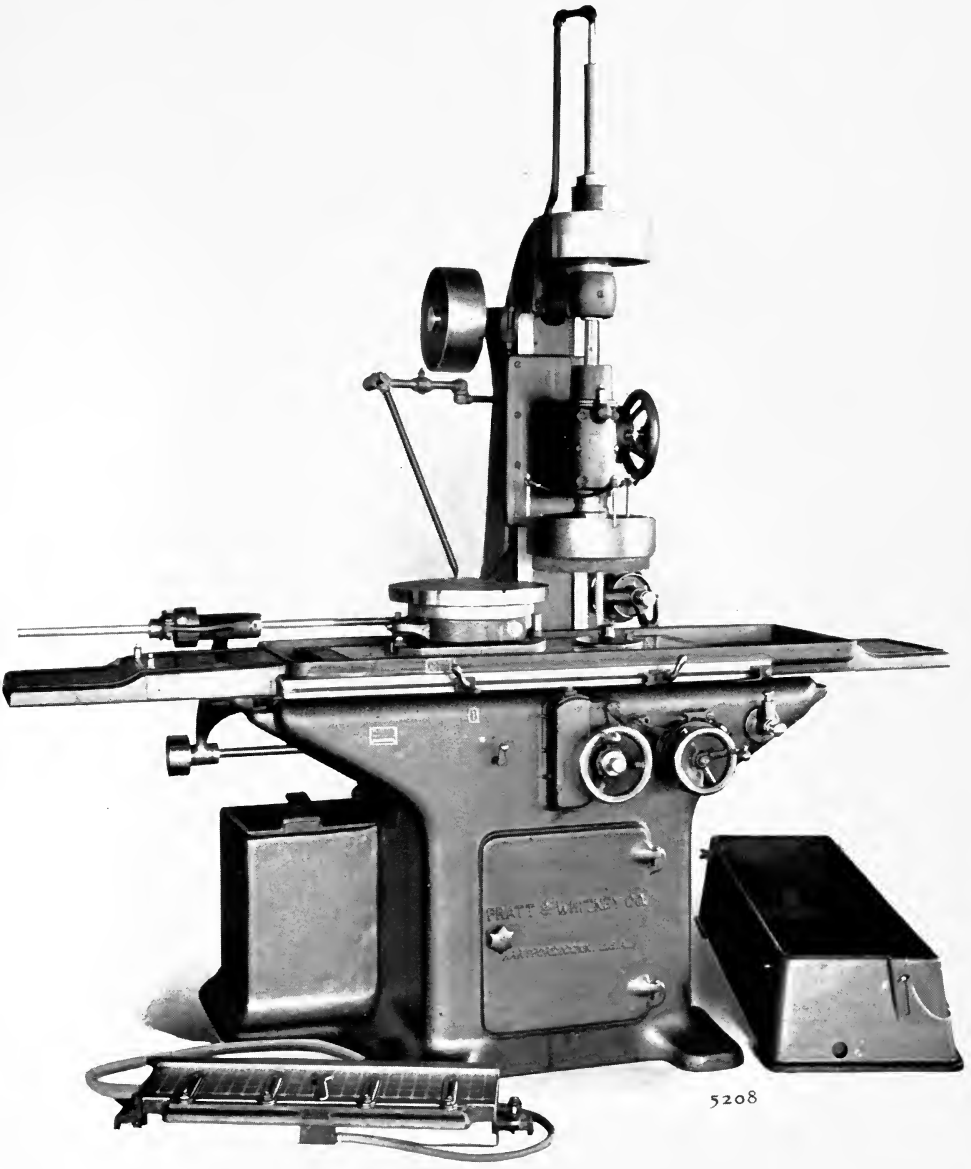


Cylindrical Grinder: Rear View

(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.

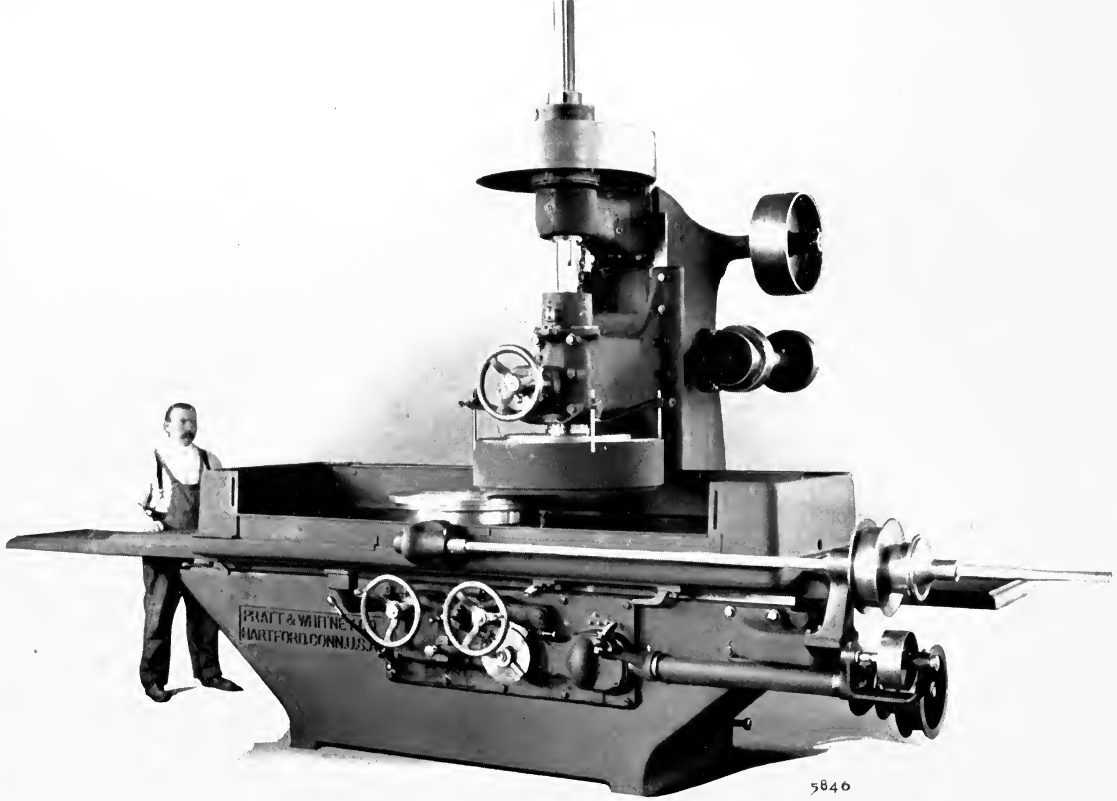
SPECIFICATIONS

RANGE	Table Working Surface	10¾″ x 36″
	Table Top to (new) Grinding Wheel, maximum	13″
	Table Travel, maximum	36″
ROTARY CHUCK	(Plain), diameter, 16″; height, 4½″.	
	*(Magnetic), diameter, 16″; height, 8¼″.	
*RECTANGULAR MAGNETIC CHUCK	Working Surface, 7¼″ x 31″; height, 4″.	
WHEELS	Diameter, 12″; height, 4″; thickness, 1¼″.	
	(Wheels and Mounts, 14″ diameter, furnished to order).	
SPEEDS	Spindle Speed, R. P. M.	1133
	Pulley (Spindle)	12″ x 4¼″
	Pulley (Driving on Counter.)	20″ x 6¼″
	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	61½″ 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	202

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.

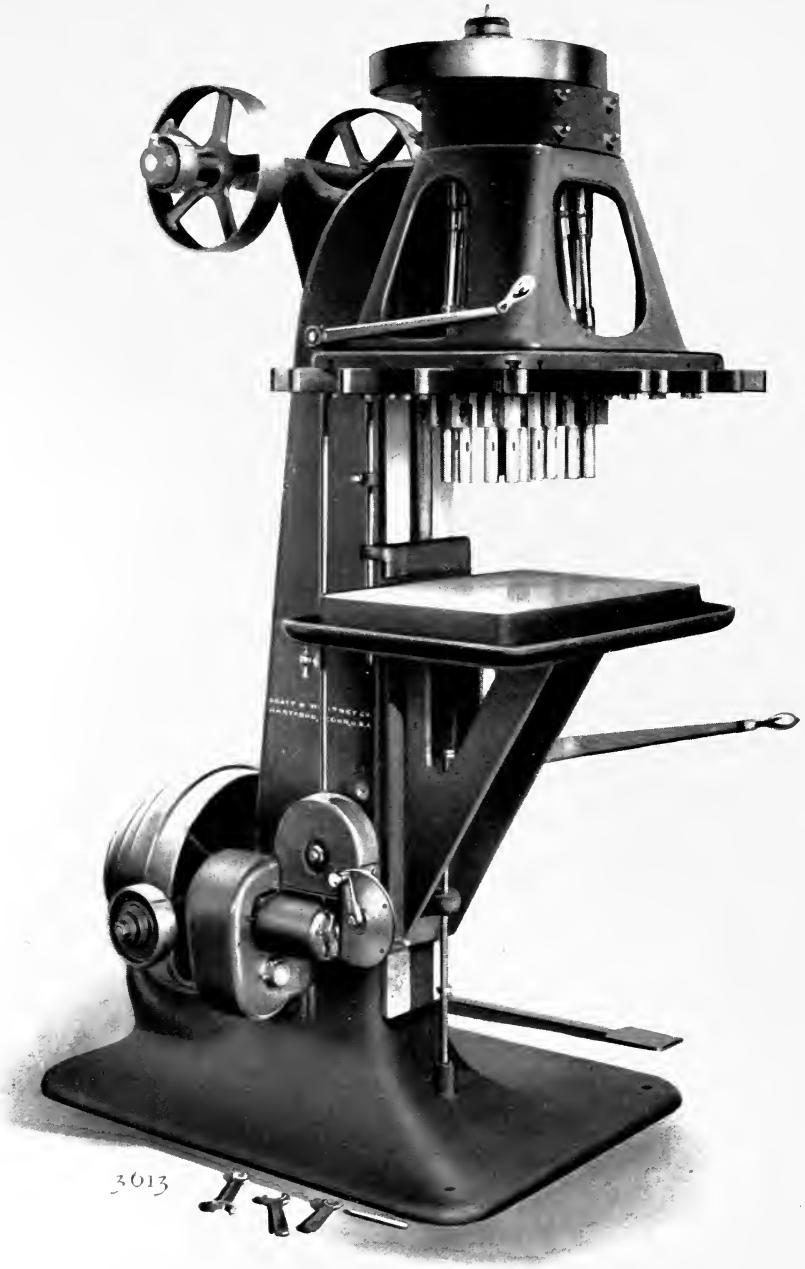
SPECIFICATIONS

RANGE	Table Working Surface (Square Head)	12″ x 12″
	Table Working Surface (Rectangular Head)	12″ x 18″
	*Table Top to (¾″) Spindle Ends, minimum	6″
	*Table Top to (¾″) Spindle Ends, maximum	15″
	Vertical Travel of Knee on Column	12″
	Column Face to Head Center (Square Head)	7¾″
	Column Face to Head Center (Rectangular Head)	7¾″
	Drilling Capacity (diameter, Drills)	1/32″ to ¼″
SPINDLES	Spindle Center Distance, minimum diameter of Spindle plus	1/32″
	Spindle Center Distance, maximum (Square Head)	7″ x 7″
	Spindle Center Distance, maximum (Rectangular Head)	7″ x 13″
	Spindles, maximum number in Square Head	12
	Spindles, maximum number in Rectangular Head	16
	Spindles, Vertical Adjustment (see page 173).	
	Spindle Diameters, largest regularly used	¾″
	Spindles, Taper Hole (see page 173).	
SPEEDS	Spindle Speeds, Square Head (2), R. P. M.	1110 and 1470
	Spindle Speeds, Rectangular Head (2), R. P. M.	1100 and 1460
	Pulley (Driving on Head)	12″ x 2″
	Pulley (Countershaft)	10″ x 3½″
	Belt Width (Driving Pulley)	1¾″
	Belt Width (Counter. Pulleys)	3¼″
	Countershaft Speed, R. P. M.	500
†FEEDS	Power to Knee, Square Head (4), R. P. Sp.	.00096 to .0042
	Power to Knee, Rectangular Head (4), R. P. Sp.	.00097 to .0043
FLOOR SPACE	Floor Space	25″ x 33″
WEIGHTS	Machine, Square Head and Counter., net pounds	930
	Crating Material (domestic), approximate pounds	150
	Boxing Material (foreign), approximate pounds	400
	Box, cubic feet	53

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

*Spindles in central positions. Code words, page 265.

†Special Feeds to order.



(Patented)

No. 12 Adjustable Multiple Spindle Drill

NO. 12 MULTIPLE SPINDLE DRILL

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

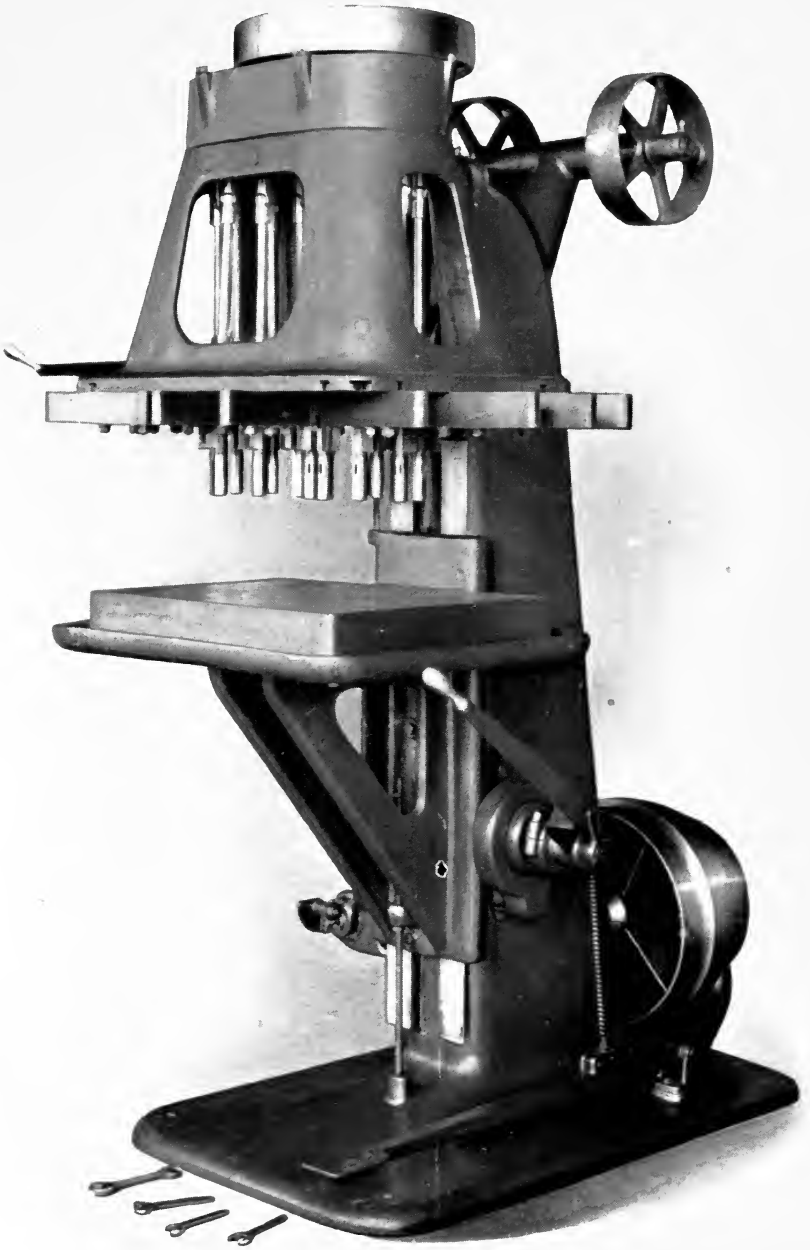
SPECIFICATIONS

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)	1/16″ to ⅜″
SPINDLES	Spindle Center Distance, minimum diameter of Spindle plus.	1/32″
	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.

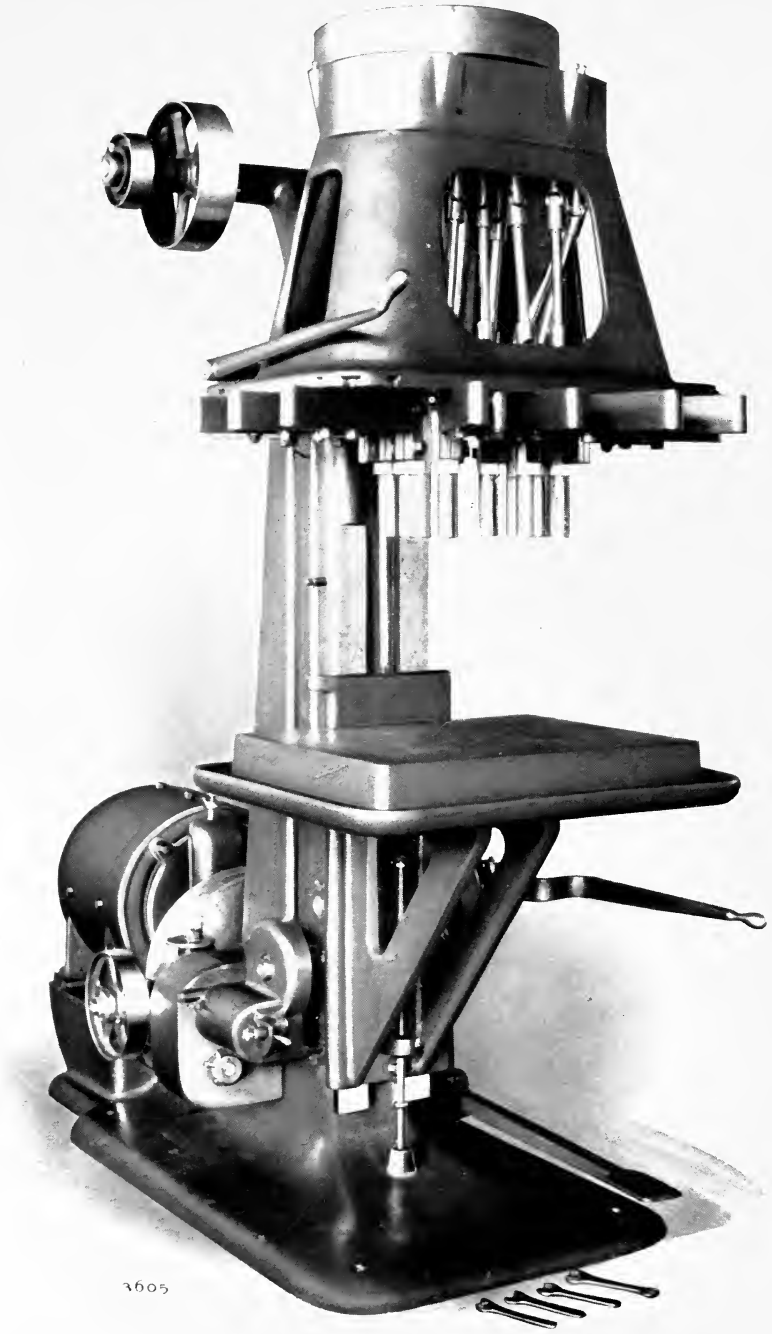
SPECIFICATIONS

RANGE	Table Working Surface (Square Head)	29¼″ x 26¼″
	Table Working Surface (Rectangular Head)	34¾″ x 26¼″
	*Table Top to (1¼″) Spindle Ends, minimum	7″
	*Table Top to (1¼″) Spindle Ends, maximum	36½″
	Vertical Travel of Knee on Column	17¼″
	Vertical Adjustment of Table in Knee	12¼″
	Column Face to Head Center (Square Head)	15¼″
	Column Face to Head Center (Rectangular Head)	14¼″
	Drilling Capacity (diameter, Drills)	3/16″ to ½″
SPINDLES	Spindle Center Distance, minimum diameter of Spindle plus	1/16″
	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	1½″
	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 3½″
	Pulley (Countershaft)	12″ x 4¾″
	Belt Width (Driving Pulley)	3¼″
	Belt Width (Counter. Pulleys)	4½″
	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.



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
3/8	11, 12	3 Drill	2 1/4	1/8	1/8	3/16
1/2	11, 12	4 Drill	2 1/4	5/32	3/16	1/4
5/8	11, 12, 13	5 Collet	2 1/4	7/32	1/4	5/16
3/4	11, 12, 13	5 Collet	2 1/4	9/32	5/16	3/8
7/8	12, 13	1 Morse	2 7/16	11/32	3/8	7/16
1	12, 13	1 Morse	2 7/16	13/32	7/16	1/2
1 1/8	12, 13	1 Morse	2 5/8	7/16	1/2	5/8
1 1/4	12, 13	2 Morse	3 1/16	1/2	9/16	3/4
1 1/2	13	2 Morse	3 1/2	5/8	11/16	1

NOTE—All spindles 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

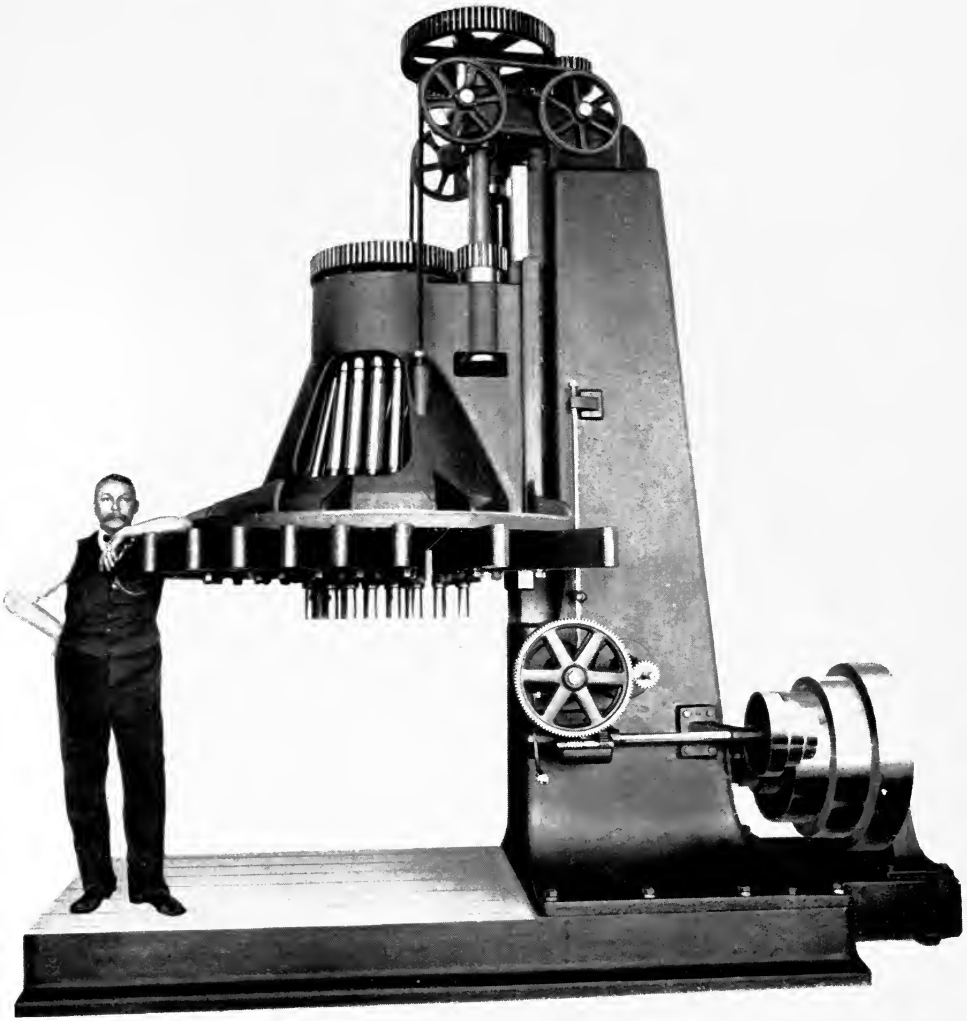
MADE TO ORDER

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	45″ x 52″
	Base Top to (largest) Spindle Ends, maximum	40″
	Vertical Travel of Head on Column	32″
	Column Face to Head Center (Square Head)	18″
	Column Face to Head Center (Rectangular Head)	18″
	Drilling Capacity (diameter, Drills)	½″ to 1″
	T-slots in Base (5); ⅞″ wide; 7½″ apart.	
BOX TABLE	(To order only), dimensions	15″ x 21″ x 27″
	T-slots, $\frac{11}{16}$″ wide.	
SPINDLES	Spindle Center Distance, minimum diameter of Sps. plus	$\frac{1}{16}$″
	Spindle Center Distance, maximum (Square Heads)	20″ x 20″ and 26″ x 26″
	Spindle Center Distance, maximum (Rectangular Heads)	20″ x 32″
	Spindles in Square Head, maximum number	12
	Spindles in Rectangular Head, maximum number	16
	Spindle, Vertical Adjustment (2¼″ Spindle)	3″
	Spindle Diameters, largest regularly used	2¼″
	Spindle Taper Hole, No. 3 Morse.	
SPEEDS	Spindle Speeds (6), R. P. M.	239 to 464
	Cone Diameters (3), largest diameter	23¾″
	Pulley (Counter., tight and loose)	18″ x 8″
	Belt Width (Cone)	6″
	Belt Width (Counter. Pulleys)	7¾″
	Countershaft Speed, R. P. M.	280, 320
FEEDS	Power to Head (4), R. P. Sp.	.004″ to .0123″
	(Quick return by power or hand in either direction).	
FLOOR SPACE	Floor Space	7′ 2½″ x 9′ 11⅞″
WEIGHTS	Machine, with Square Head, net pounds	14000
	Crating Material (domestic), approximate pounds	1000
	Boxing Material (foreign), approximate pounds	3000
	Box, cubic feet	511

Code words, page 265.



2029

(Patented)

No. 7, Type G, Adjustable Multiple Spindle Drill

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

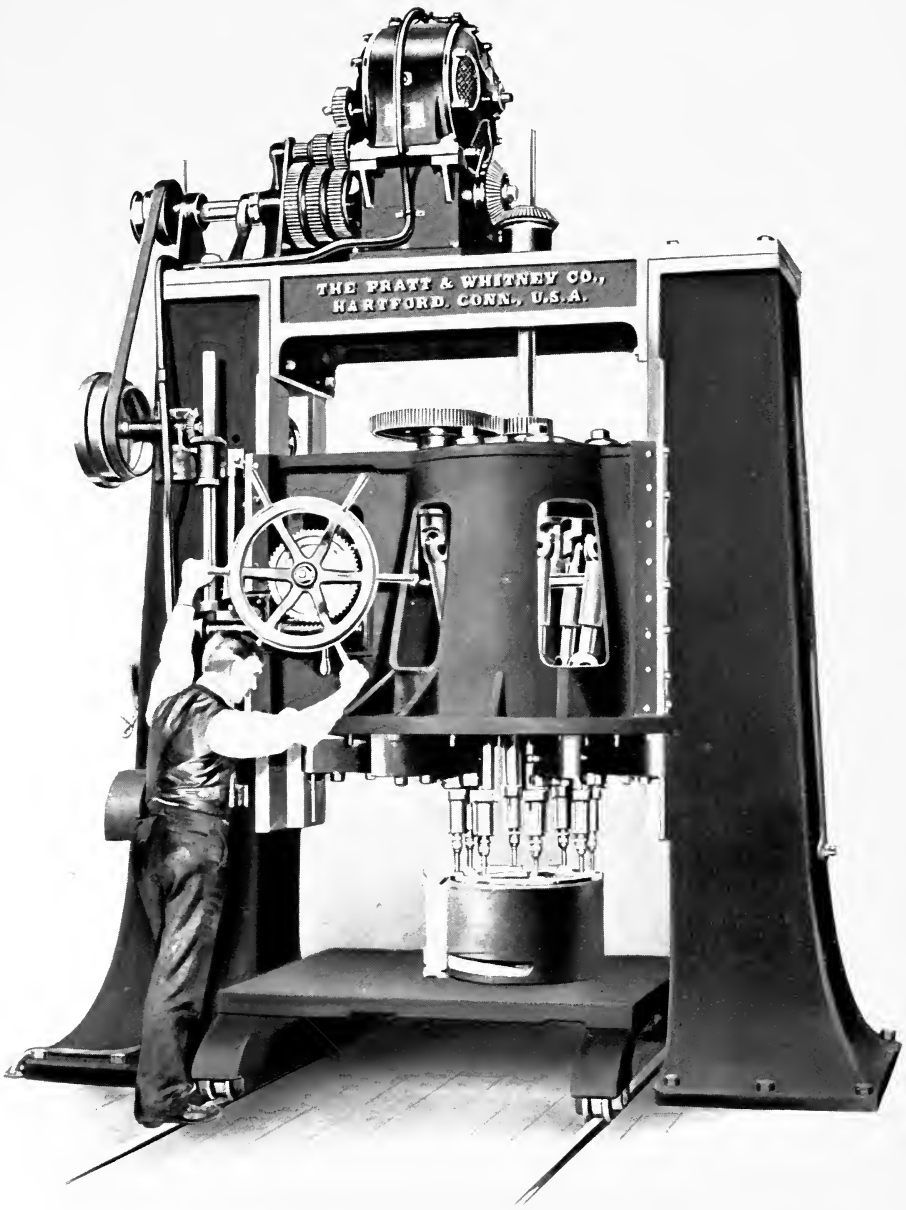
MADE TO ORDER

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

SPECIFICATIONS

RANGE	Base Working Surface	50″ x 48″
	Base Top to Spindle Ends, maximum	61½″
	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)	⅝″ to 1¼″
SPINDLES	Spindle Center Distance, minimum	3½″
	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	2½″
	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)	7¾″
	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 5/16″
SPINDLES	Spindle Center Distance, minimum	4½″
	Spindle Center Distance (Rectangular Head), minimum	24⅝″ x 13½″
	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	.002″ to .007″
	(Quick return by power or hand in either direction).	
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	15″ x 20″
	Table Top to Spindle Ends, maximum	19″
	Vertical Movement of Table	7″
	Vertical Adjustment of Knee on Column	12″
	Column Face to Spindle Center	8″
	Drilling Capacity (diameter, Drills)	¾″
SPINDLES	Number (4); Tool Steel; Bearings, cylindrical; Lower Spindles Gear Driven.	1⅛″ x 2¼″
	Boxes, Bronze.	
	Taper Hole, No. 2 Morse.	
	Center Distance between Spindles	4″
SPEEDS	Spindle Speeds, 2 Central Spindles (4), R. P. M.	289 to 477
	Spindle Speeds, L. H. Outer Spindle (4), R. P. M.	463 to 764
	Spindle Speeds, R. H. Outer Spindle (4), R. P. M.	723 to 1193
	Pulley (Head)	12″
	Cone Diameters (2)	8¼″, 9⅛″
	Pulleys (Counter. Friction)	8″ x 3¼″
	Belt Width (Head Pulley)	2″
	Belt Width (Cone)	2⅛″
	Belt Width (Counter. Pulleys)	3″
	Countershaft Speeds, R. P. M.	250, 300
FEEDS	To Table; Hand by Lever and Treadle. (Power to order).	
FLOOR SPACE	Floor Space	28″ x 40″
WEIGHTS	Machine, with Regular Equipment, net pounds	1175
	Crating Material (domestic), approximate pounds	150
	Boxing Material (foreign), approximate pounds	450
	Box, cubic feet	53
REGULAR EQUIPMENT	Machine, with Set of Wrenches. Countershaft (two-speed double friction). (Power Feed to Table to order).	

Code words, page 265.

Four-spindle Sensitive Drill

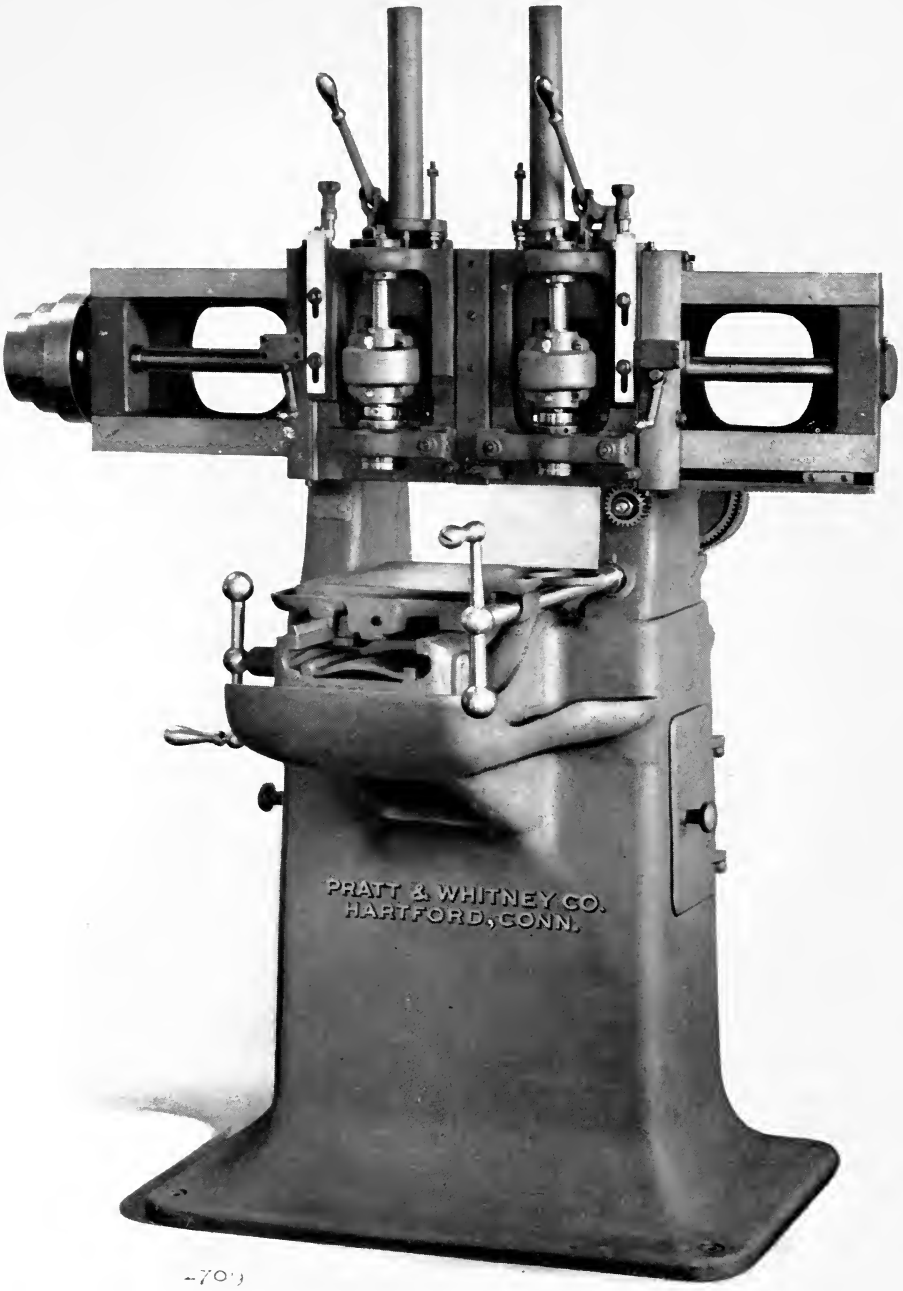
SENSITIVE DRILLS — SPECIFICATIONS

	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	30″	30″	26″	26″	
Heads, Vertical Adjustment	6″	6″	6″	6″	6″
Drilling Capacity (*diameter Drills)	0″ to 5/16″	0″ to 5/16″	0″ to 5/16″	0″ to 5/16″	0″ to 5/16″
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.
* ½-inch Drills are often used, in which case drill chuck is removed and taper hole in spindle utilized.
Code words, page 265.



(Patented)

No. 11 Profiling Machine, Gear Driven

NO. 11 PROFILING MACHINE

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

SPECIFICATIONS

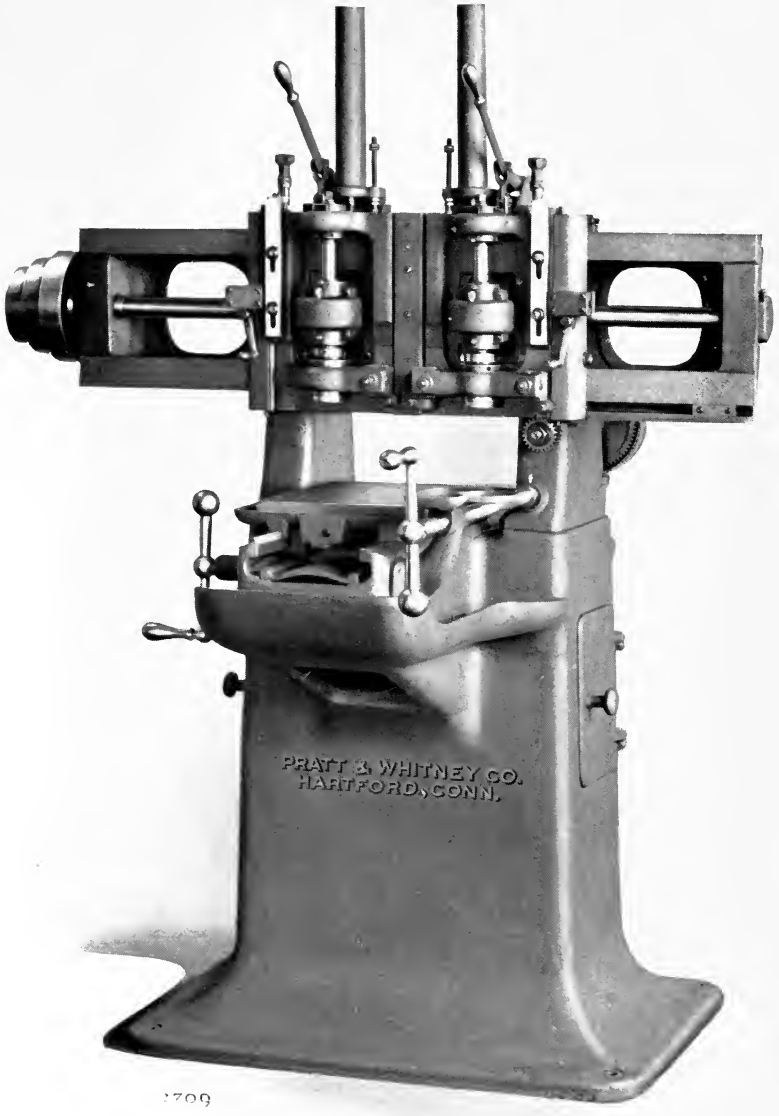
RANGE	Table Working Surface	8″ x 10½″
	*Table Top to Bottom of Cross Slide	4″
	Table Longitudinal Movement	17¾″
	Cross Slide, Transverse Movement	19½″
	Head, Vertical Movement	3″
	Uprights, distance between	14″
SPINDLES	Two Spindles, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear.	$1\frac{5}{16}$″ x $2\frac{9}{16}$″
	Center Distance between Spindles	9″
	†Center Distance between Spindle and Guide-pin	3″
	Center Distance, maximum adjustment of Guide-pin	$\frac{1}{16}$″
	‡Taper Hole, Jarno Taper, No. 5. Pull-back Rods provided.	
SPEEDS	Spindle Speed, Gear Driven (3), R. P. M.	435 to 860
	Spindle Speed, Belt Driven (3), R. P. M.	1165 to 2300
	Counter Speed, Gear Driven, R. P. M.	450
	Counter Speed, Belt Driven, R. P. M.	480
	Cone Diameters (3), large diameter and width	$8\frac{7}{16}$″ x 2⅛″
	Pulley (Countershaft), Gear Driven	9″ x 2¼″
	Pulleys (Countershaft), Belt Driven	7″ x 2¾″
FLOOR SPACE	Gear Driven Machine	55″ x 49″
	Belt Driven Machine	58″ x 65″
WEIGHTS	Machine, Regular Equipment, net pounds	2100
	Crating Material (domestic), approximate pounds	300
	Boxing Material (foreign), approximate pounds	650
	Box, cubic feet	105
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and suitable Piping; Set of Wrenches; Countershaft (tight and loose Pulley). (Friction Countershaft can be furnished to order).	

*Raising Blocks to increase this distance furnished to order.

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

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

Code words, page 265.



(Patented)

No. 12 Profiling Machine, Gear Driven

NO. 12 PROFILING MACHINE

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

SPECIFICATIONS

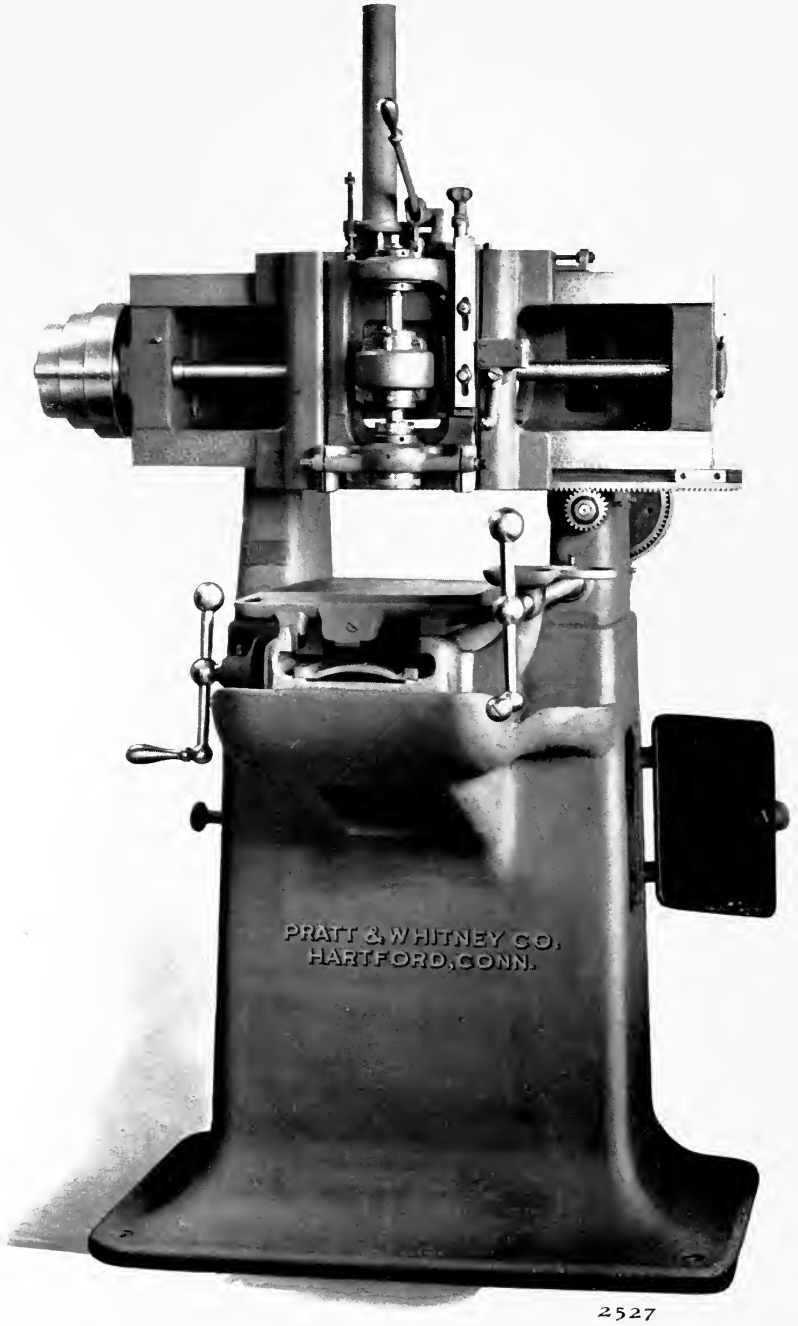
RANGE . . .	Table Working Surface	12″ x 15″
	*Table Top to Bottom of Cross Slide	5 1/4″
	Table Longitudinal Movement	23 1/2″
	Cross Slide, Transverse Movement	26 3/4″
	Head, Vertical Movement	3 3/4″
	Uprights, distance between	19″
SPINDLES . .	Two Spindles, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear.	1 9/16″ x 2 15/16″
	Center Distance between Spindles	12″
	†Center Distance between Spindle and Guide-pin	4 1/8″
	Center Distance, maximum adjustment of Guide-pin . . .	1/16″
	‡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

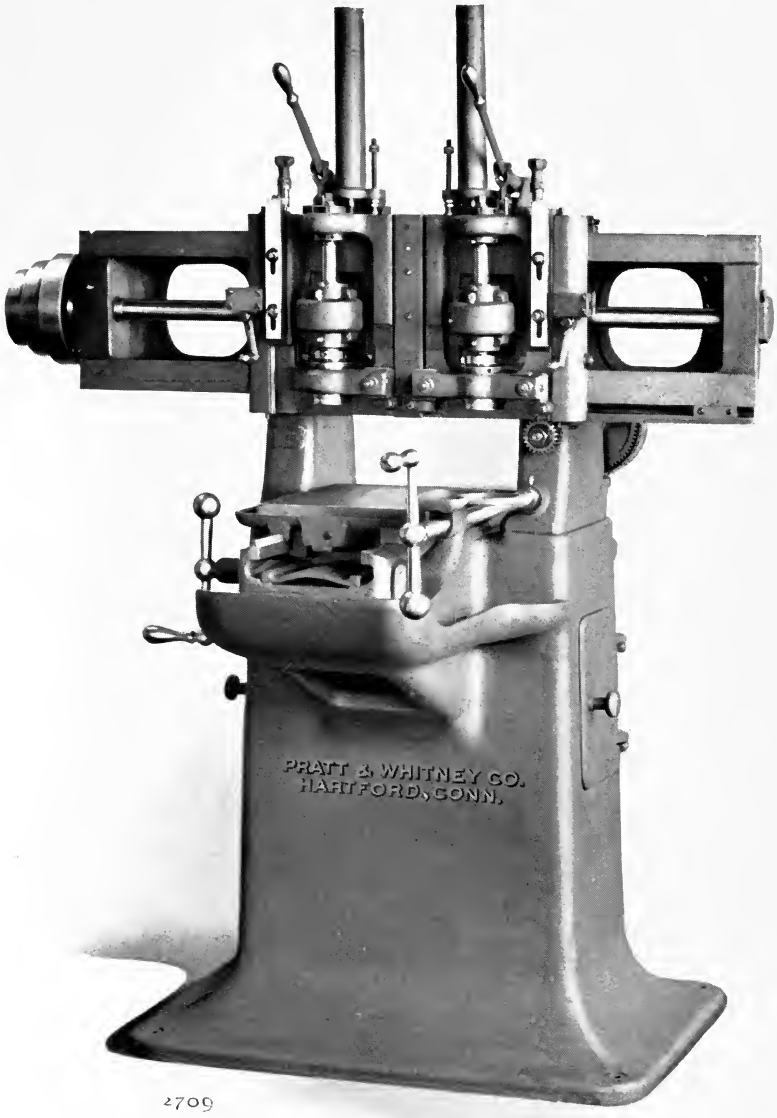
RANGE	Table Working Surface	12″ x 15″
	*Table Top to Bottom of Cross Slide	5¼″
	Table Longitudinal Movement	19″
	Cross Slide, Transverse Movement	18″
	Head, Vertical Movement	3″
	Uprights, distance between	15½″
SPINDLES	One Spindle, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear	$1\frac{5}{16}$″ x $2\frac{9}{16}$″
	†Center Distance between Spindle and Guide-pin	4⅛″
	Center Distance, maximum adjustment of Guide-pin	$\frac{1}{16}$″
	‡Taper Hole, Jarno Taper, No. 5. Pull-back Rod provided.	
SPEEDS	Spindle Speed, Gear Driven (3), R. P. M.	435 to 860
	Spindle Speed, Belt Driven (3), R. P. M.	1165 to 2300
	Counter Speed, Gear Driven, R. P. M.	450
	Counter Speed, Belt Driven, R. P. M.	480
	Cone Diameters (3), large diameter and width	$8\frac{7}{16}$″ x 2⅛″
	Pulleys (Countershaft), Gear Driven	9″ x 2¼″
	Pulleys (Countershaft), Belt Driven	7″ x 2¾″
FLOOR SPACE	Gear Driven Machine	55″ x 49″
	Belt Driven Machine	58″ x 65″
WEIGHTS	Machine, Regular Equipment, net pounds	1800
	Crating Material (domestic), approximate pounds	250
	Boxing Material (foreign), approximate pounds	500
	Box, cubic feet.	90
REGULAR EQUIPMENT	The Machine, with Oil Pump, Tank and suitable Piping; Set of Wrenches; Countershaft (tight and loose Pulley). (Friction Countershaft can be furnished to order).	

*Raising Blocks to increase this distance furnished to order.

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

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

Code words, page 265.



(Patented)

No. 14 Profiling Machine, Gear Driven

NO. 14 PROFILING MACHINE

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

SPECIFICATIONS

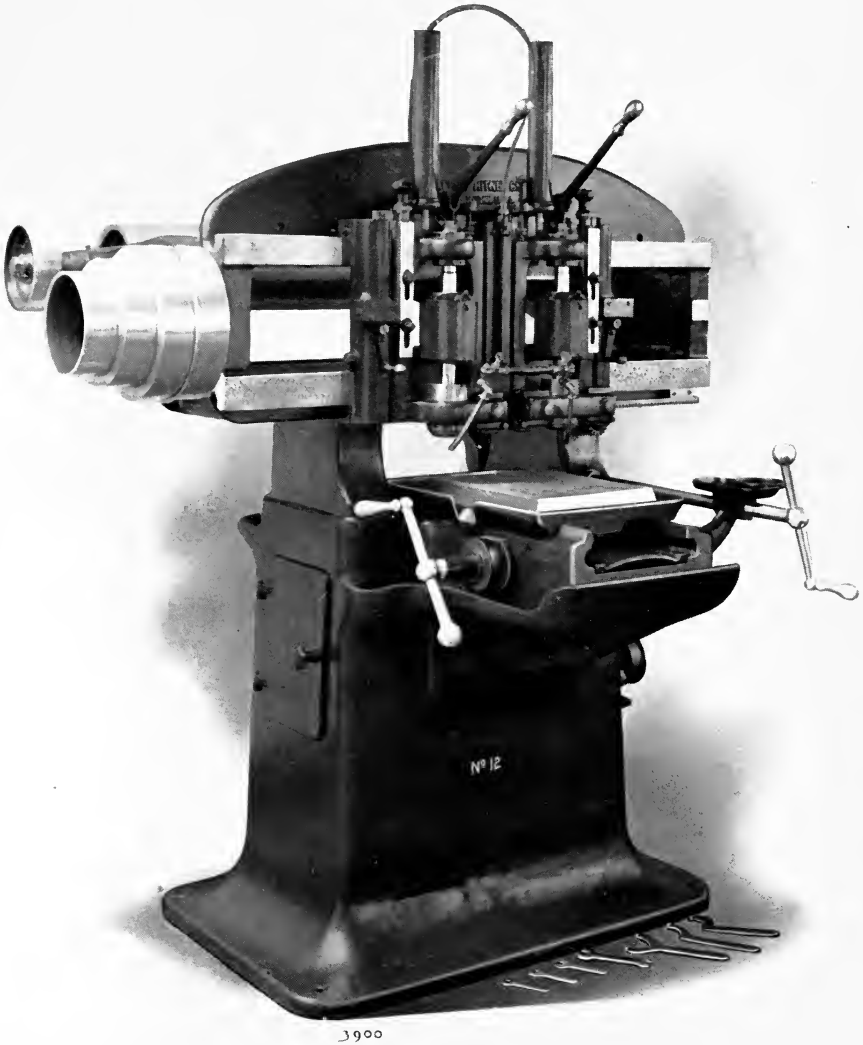
RANGE	Table Working Surface	12″ x 15″
	*Table Top to bottom of Cross Slide	5¼″
	Table Longitudinal Movement	19″
	Cross Slide, Transverse Movement	26″
	Head, Vertical Movement	3″
	Uprights, distance between	15½″
SPINDLES	Two Spindles, Special Steel; Bearings, cylindrical; Front Boxes, Bronze; conical on O. D., adjustable for wear.	$1\frac{5}{16}$″ x $2\frac{9}{16}$″
	Center Distance between Spindles	11¼″
	†Center Distance between Spindle and Guide-pin	4⅛″
	Center Distance, maximum adjustment of Guide-pin	$\frac{1}{16}$″
	‡Taper Hole, Jarno Taper, No. 5.	
	Pull-back Rods provided.	
SPEEDS	Spindle Speed, Gear Driven (3), R. P. M.	435 to 860
	Spindle Speed, Belt Driven (3), R. P. M.	1165 to 2300
	Counter Speed, Gear Driven, R. P. M.	450
	Counter Speed, Belt Driven, R. P. M.	480
	Cone Diameters (3), large diameter and width	$8\frac{7}{16}$″ x 2⅛″
	Pulley (Countershaft), Gear Driven	9″ x 2¼″
	Pulleys (Countershaft), Belt Driven.	7″ x 2¾″
FLOOR SPACE	Gear Driven Machine	72″ x 49″
	Belt Driven Machine	72″ x 65″
WEIGHTS	Machine, Regular Equipment, net pounds	2100
	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 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.



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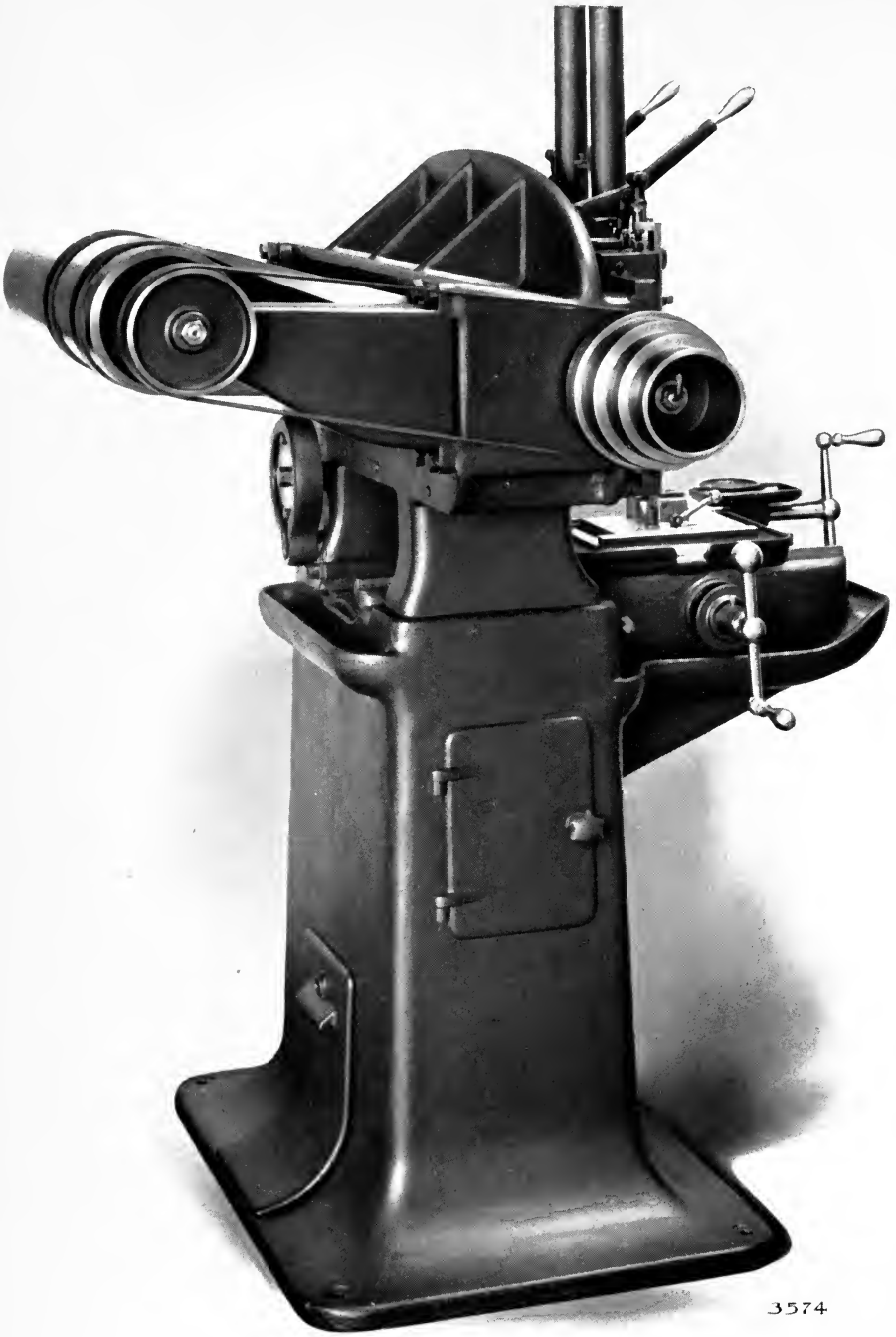
(Patented)

Profiling Machine, Belt Drive



(Patented)

Side View: Profiling Machine, Belt Drive

Cutters for Profiling Machines

Five-degree Taper Cutter

Straight Cutter

Facing Cutter

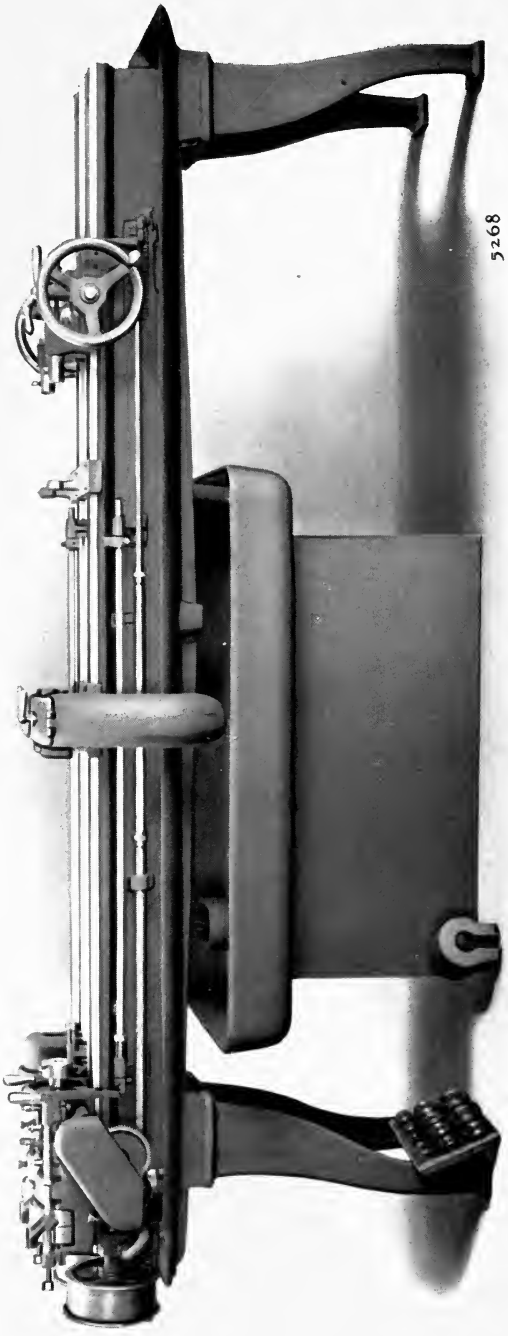
5672

CUTTERS FOR PROFILING MACHINE

Machine Numbers	Style	Size — Inches
11, 12, 13, 14	Straight	1/2
11, 12, 13, 14	Straight	5/8
11, 12, 13, 14	Straight	3/4
12	Straight	7/8
12	Straight	1
12	Straight	1 1/8
11, 13, 14	Facing	3/4
11, 12, 13, 14	Facing	1
11, 12, 13, 14	Facing	1 1/4
12	Facing	1 1/2
11, 12, 13, 14	50 Taper	1/2
11, 12, 13, 14	50 Taper	5/8
11, 12, 13, 14	50 Taper	3/4
12	50 Taper	7/8
12	50 Taper	1
12	50 Taper	1 1/8

COLLETS

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



No. 1 Gun Barrel and Tube Drilling Machine

NO. 1 GUN BARREL AND TUBE DRILLING MACHINE

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

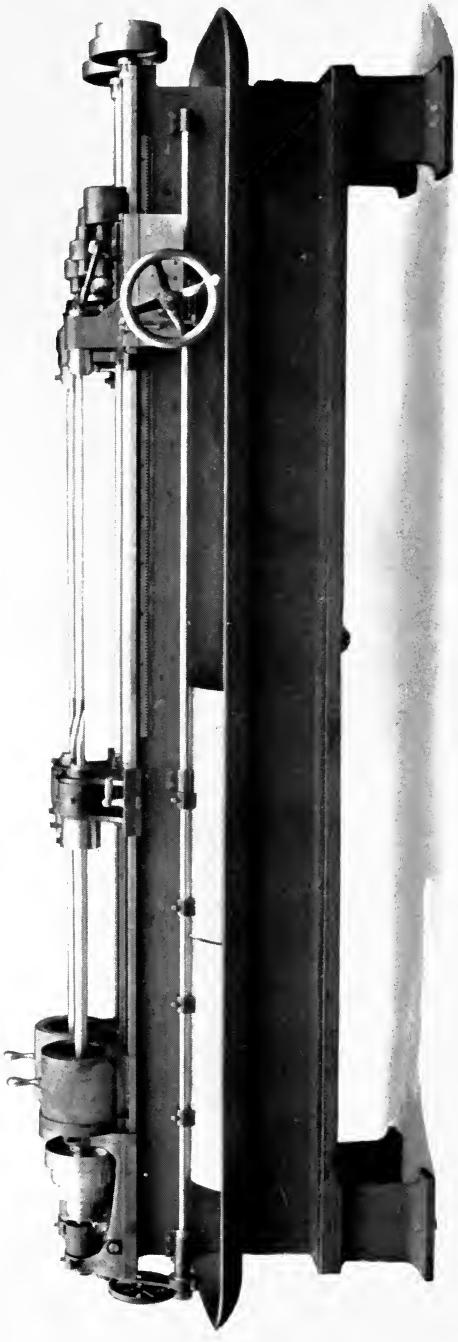
SPECIFICATIONS

RANGE	Length of Bed (A)	(A) 6′ — (B) 14½″
	Drilling Capacity, length (B)	(A) 9½′ — (B) 32½″ (A) 13′ — (B) 53¾″
	Drilling Capacity, diameter	$\frac{13}{16}$″
	Swing over Bed	6½″
SPEEDS	Spindle Speed Changes (3), R. P. M.	1250 to 2500
	Number of Spindles	2
	Driving Pulley	6″ x 1⅝″
	Pulleys (Counter., tight and loose)	7″ x 3¼″
	Countershaft Speed, R. P. M.	750
FLOOR SPACE	Floor Space (9½′ Bed)	11′ 3″ x 28″
WEIGHTS	Machine, Regular Equipment (9½′ Bed), net pounds	3000
	Crating Material (domestic), approximate pounds	400
	Boxing Material (foreign), approximate pounds	1000
	Box, cubic feet	128

REGULAR EQUIPMENT

The Machine, with
Oil Pumps, Tank and Piping.
1 each, Drill and Support Bushing for Spindle.
Set of Change Gears.
Set of Wrenches.
Countershaft (tight and loose Pulley).
(3-change Pulleys are furnished with Counter).

Code words, page 265.



362

No. 1½ Gun Barrel Drilling Machine, Belt Driven

NO. 1½ GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

SPECIFICATIONS

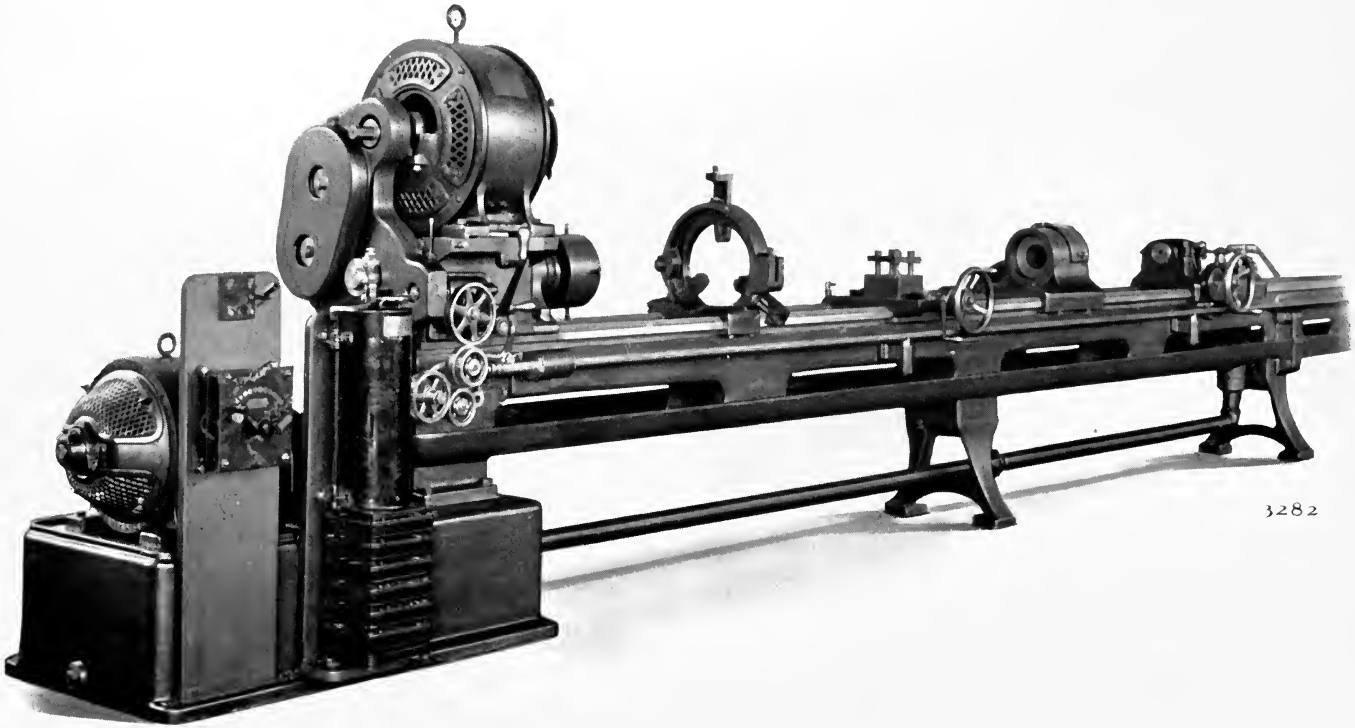
RANGE	Length of Bed (A) / Drilling Capacity, length (B)	(A) 8′ — (B) $9\frac{7}{16}$″
		(A) 12′ — (B) $33\frac{7}{16}$″
		(A) 16′ — (B) $57\frac{7}{16}$″
		(A) 20′ — (B) $81\frac{7}{16}$″
		(A) 22′ — (B) $93\frac{7}{16}$″
		(A) 24′ — (B) $105\frac{7}{16}$″
	Drilling Capacity, diameter	1½″
	Swing over Bed	11″
SPEEDS	Spindle Speed Changes (4), R. P. M.	63 to 922
	Number of Spindles	2
	Gearing Ratio	$3\frac{3}{10}$ to 1
	Cone Diameters (4), largest	9″
	Pulleys (Counter., tight and loose)	10″ x 2⅛″
	Countershaft Speed, R. P. M.	Plain, 300; B. G., 375
FLOOR SPACE	Floor Space (12′ Bed)	13′ 4″ x 44″
WEIGHTS	Machine, Regular Equipment (12′ Bed), net pounds	5600
	Crating Material (domestic), approximate pounds	500
	Boxing Material (foreign), approximate pounds	1200
	Box, cubic feet	165

REGULAR EQUIPMENT

The Machine, with
Oil Pumps, Tank and Piping.
1 each, Drill and Support Bushing for Spindle.
Set of Change Gears.
Set of Wrenches.
Countershaft (tight and loose Pulley).

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

Code words, page 265.



No. 2 Gun Barrel and Tube Drilling Machine, Motor Driven

NO. 2 GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

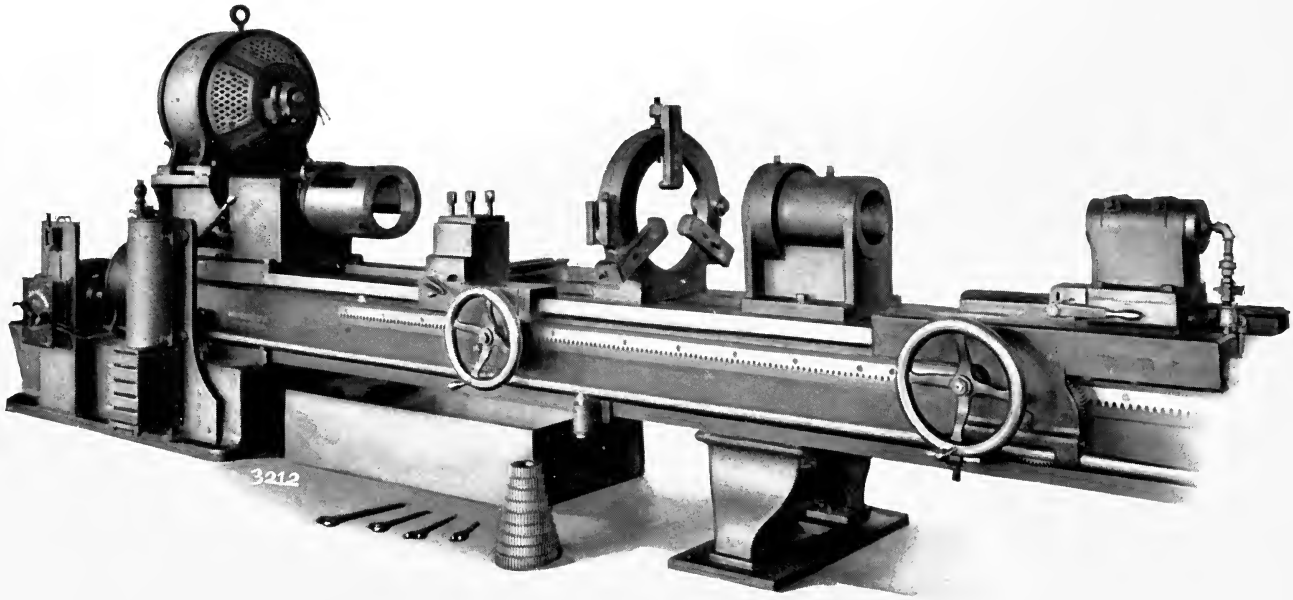
SPECIFICATIONS

RANGE	Length of Bed (A)	(A) 20′ — (B) 72″
	Drilling Capacity, length (B)	(A) 40′ — (B) 186″
	Drilling Capacity, diameter	3″
	Swing over Bed	14½″
SPEEDS	Spindle Speed Changes (4), R. P. M.	36 to 125
	Number of Spindles	1
	Gearing Ratio	$6\frac{5}{10}$ to 1
	Cone Diameters (4), largest	12″
	Pulleys (Counter., tight and loose)	14″ x 3½″
	Countershaft Speed, R. P. M.	350
FLOOR SPACE	Floor Space (20′ Bed)	20′ x 32″
WEIGHTS	Machine, Regular Equipment (20′ Bed), net pounds	6600
	Crating Material (domestic), approximate pounds	600
	Boxing Material (foreign), approximate pounds	1650
	Box, cubic feet	180

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.



No. 3 Gun Barrel and Tube Drilling Machine, Motor Driven

NO. 3 GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

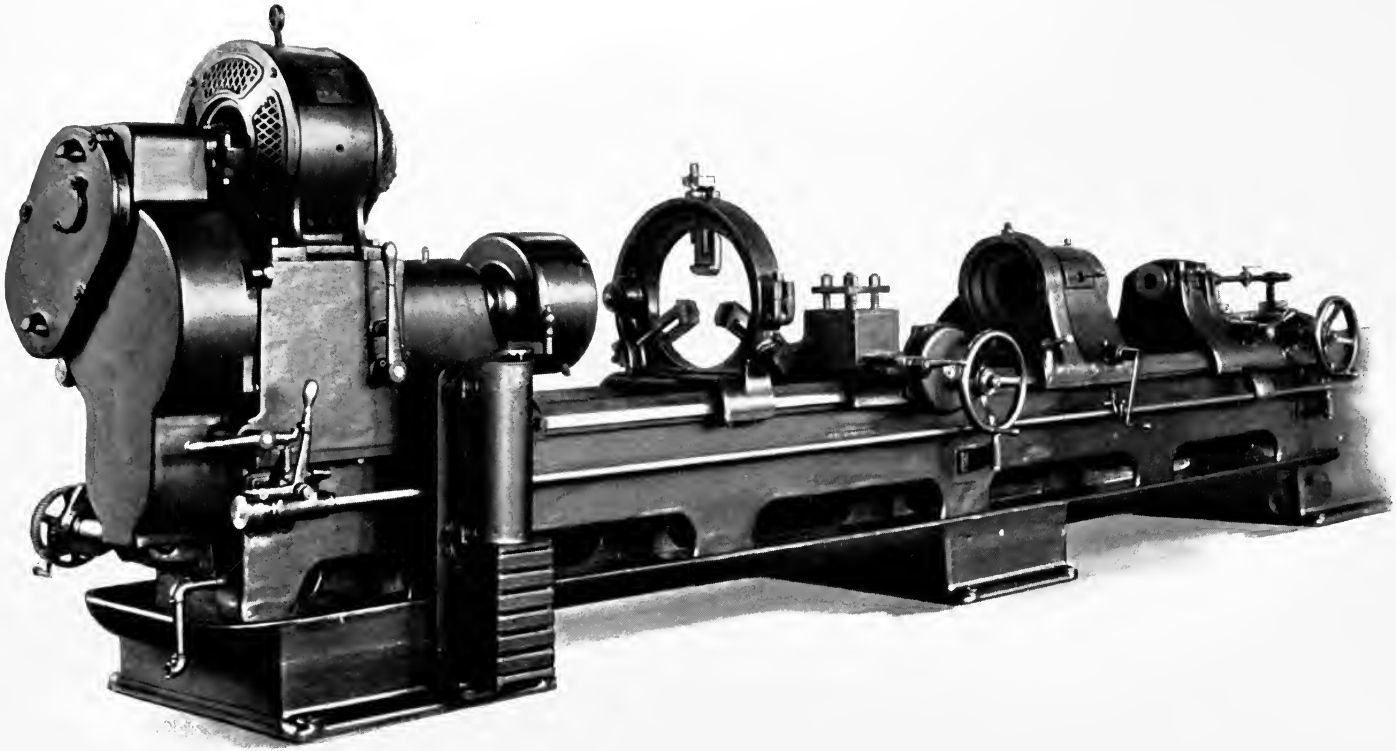
SPECIFICATIONS

RANGE	Length of Bed (A) / Drilling Capacity, length (B)	(A) 20′ — (B) 63⅜″ (A) 25′ — (B) 93⅜″ (A) 40′ — (B) 183⅜″ (A) 46′ — (B) 219⅜″
	Drilling Capacity, diameter	6″
	Swing over Bed	25″
SPEEDS	Spindle Speed Changes (4), R. P. M.	7 to 111
	Number of Spindles	1
	Gearing Ratio	6.54 to 1
	Cone Diameters (4), largest	18″
	Pulleys (Counter., tight and loose)	8″, 12″, 18″ x 4¼″
	Countershaft Speed, R. P. M.	672, 251, 94
FLOOR SPACE	Floor Space (25′ Bed)	30′ x 40″
WEIGHTS	Machine, Regular Equipment (25′ Bed), net pounds	16000
	Crating Material (domestic), approximate pounds	750
	Boxing Material (foreign), approximate pounds	3500
	Box, cubic feet	375

REGULAR EQUIPMENT

The Machine, with
- Oil Pump, Tank and Piping.
- 1 each, Drill and Support Bushing for Spindle.
- Set of Change Gears.
- Set of Wrenches.
- Countershaft (tight and loose Pulley).

Code words, page 265.



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

NO. 4 GUN BARREL AND TUBE DRILLING MACHINE

MADE TO ORDER ONLY

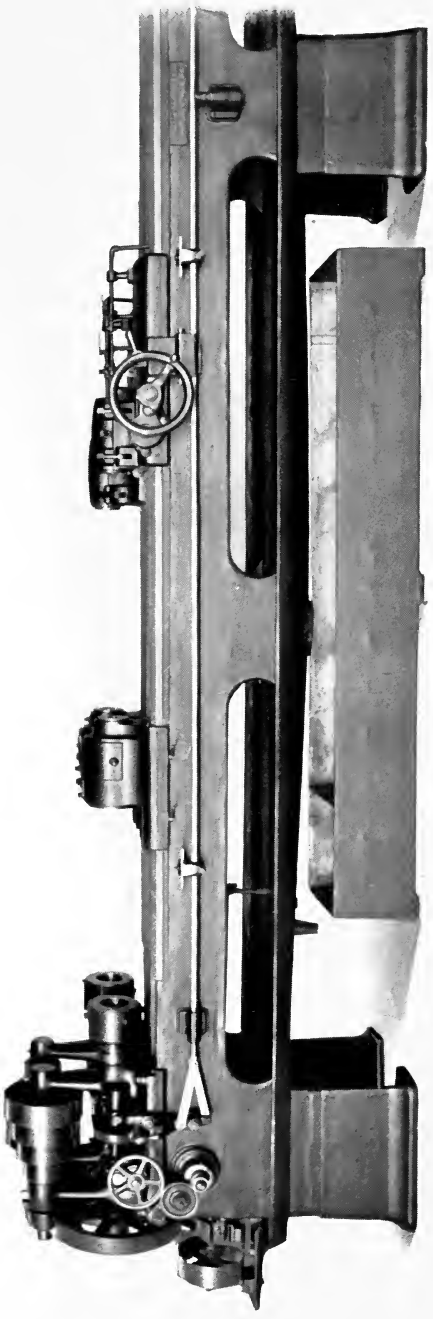
SPECIFICATIONS

RANGE . . .	Length of Bed	40′
	Drilling Capacity, length	171½″
	Drilling Capacity, diameter	9″
	Swing over Bed	30″
SPEEDS . . .	Spindle Speed Changes (4), R. P. M.	5 to 80
	Number of Spindles	1
	Gearing Ratio	8.24 to 1
	Cone Diameters (4), largest	18″
	Pulleys (Counter., tight and loose)	18″ x 5¼″
	Countershaft Speed, R. P. M.	200
FLOOR SPACE	Floor Space	42′ x 52″
WEIGHTS . .	Machine, Regular Equipment, net pounds	28000
	Crating Material (domestic), approximate pounds	800
	Boxing Material (foreign), approximate pounds	5600
	Box, cubic feet	500

REGULAR EQUIPMENT

The Machine, with
- Oil Pump, Tank and Piping.
- 1 each, Drill and Support Bushing for Spindle.
- Set of Change Gears.
- Set of Wrenches.
- Countershaft (tight and loose Pulley).

Code words, page 265.



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 5/16″
	Drilling Capacity, length (B)	(A) 27′—(B) 117 5/16″
		(A) 33′—(B) 153 5/16″
	Drilling Capacity, diameter	3″
	Swing over Bed	12″
SPEEDS	Spindle Speed Changes (4), R. P. M.	33 to 117
	Number of Spindles	2
	Gearing Ratio	6 to 1
	Cone Diameters (4), largest	12″
	Pulleys (Counter., tight and loose)	6″, 8″, 10″, 12″ x 3 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.

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	2¾″
	Transverse Adjustment of Drill Slide	2″
GRINDING WHEELS	Wheel (Front)	8″ x 1″—⅝″ hole
	Wheel (Back)	4½″ x 1 7/16″—1 7/16″ hole
SPEEDS	Spindle Speed, R. P. M.	1326
	Pulley (Spindle)	2⅜″ x 1¼″
	Pulley (Counter., tight and loose)	7″ x 2¼″
	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	$8\frac{1}{2}'$
	Capacity, length of Hole, maximum	$36''$
	Capacity, diameter of Hole, maximum	$\frac{13}{16}''$
	Cone Diameters (3), largest	$10\frac{1}{2}''$
	Pulley (Counter., tight and loose)	$12'' \times 2\frac{1}{2}''$
	Belt Width (Cone)	$2\frac{1}{4}''$
	Belt Width (Counter. Pulleys)	$2\frac{1}{4}''$
	Countershaft Speed, R. P. M.	120
FLOOR SPACE	Floor Space	$9'4'' \times 26\frac{3}{4}''$
WEIGHTS	Regular Equipment, net pounds	2000
	Crating Material, approximate pounds	250
	Boxing Material, approximate pounds	500
	Box, cubic feet	75

REGULAR EQUIPMENT — The Machine, with Oil Pump and suitable Piping;
Set of Wrenches and Countershaft (tight and loose Pulley).

Code words, page 265.

No. 2 Tube and Gun Barrel Lapping Machine

GUN BARREL LAPPING MACHINE

MADE TO ORDER

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

SPECIFICATIONS

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

Code words, page 265.

No. 3 Rifling Machine

NO. 3 RIFLING MACHINE

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

SPECIFICATIONS

RANGE	Swing over Bed	8″
	Length of Bed	12′ 4″
	Rifling Length, maximum	36″
	Rifling Pitch, straight to one turn in	5″
	Rifling Grooves (usual number)	4, 5, 6
	Carriage Travel, maximum	46″
	Carriage Cutting Speed, per minute	30′
	Carriage Returning Speed, per minute	30′
	Hole through Spindle	1½″
	Feed Screw, diameter and pitch	2″, 1″ Double
	Pulley (Driving on Machine)	9″ x 1½″
	Pulley (Counter., tight and loose)	10″ x 2¾″
	Belt Width (Driving Pulley)	1½″
	Belt Width (Counter. Pulley)	2½″
	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. 3½ Rifling Machine

NO. 3½ RIFLING MACHINE

MADE TO ORDER ONLY

SPECIFICATIONS

RANGE	Swing over Bed	12½″ or 20½″
	Length of Bed	17′
	Rifling Length, maximum	61″
	Rifling Pitch, straight to one turn in	50″
	Rifling Grooves (usual number)	12
	Carriage Travel, maximum	70″
	Carriage Cutting Speed, per minute	6′
	Carriage Returning Speed, per minute	18′
	Hole through Spindle	2¾″
	Feed Screw, diameter and pitch	2¼″, ¾″ Single
	Pulley (Driving on Machine)	10″ x 2⅛″
	Pulley (Counter., tight and loose)	12″ x 3¼″
	Belt Width (Driving Pulley)	2″
	Belt Width (Counter. Pulley)	3″
	Countershaft Speed, R. P. M.	200
FLOOR SPACE	Floor Space	32″ x 18′ 4″
WEIGHTS	Machine, Regular Equipment, net pounds	5250
	Crating Material (domestic), approximate pounds	500
	Boxing Material (foreign), approximate pounds	1300
	Box, cubic feet	200

REGULAR EQUIPMENT

Machine arranged for Uniform Twist.
2 Countershafts (tight and loose Pulley).
1 Rifling Rod.
Set of Wrenches.
(Machine arranged with Increased Twist, to order).

Code words, page 265.

No. 4 Rifling Machine

NO. 4 RIFLING MACHINE

MADE TO ORDER ONLY

SPECIFICATIONS

RANGE	Swing over Bed	20½″
	Length of Bed	25′
	Rifling Length, maximum	9′
	Rifling Pitch, straight to one turn in	91″
	Rifling Grooves (usual number)	12
	Carriage Travel, maximum	10′
	Carriage Cutting Speed, per minute	6′
	Carriage Returning Speed, per minute	18′
	Hole through Spindle	4″
	Feed Screw, diameter and pitch	2½″, 1″ Single
	Pulley (Driving on Machine)	12″ x 2¼″
	Pulley (Counter., tight and loose)	12″ x 3¼″
	Belt Width (Driving Pulley)	2⅛″
	Belt Width (Counter. Pulley)	3″
	Countershaft Speed, R. P. M.	185
FLOOR SPACE	Floor Space	4′ 9″ x 26′ 3″
WEIGHTS	Machine, Regular Equipment, net pounds	11000
	Crating Material (domestic), approximate pounds	600
	Boxing Material (foreign), approximate pounds	1800
	Box, cubic feet	330

REGULAR EQUIPMENT

Machine arranged for Uniform Twist.
2 Countershafts (tight and loose Pulley).
1 Rifling Rod.
Set of Wrenches.
(Machine arranged with Increased Twist, to order).

Code words, page 265.

No. 5 Rifling Machine, Motor Driven

NO. 5 RIFLING MACHINE

MADE TO ORDER ONLY

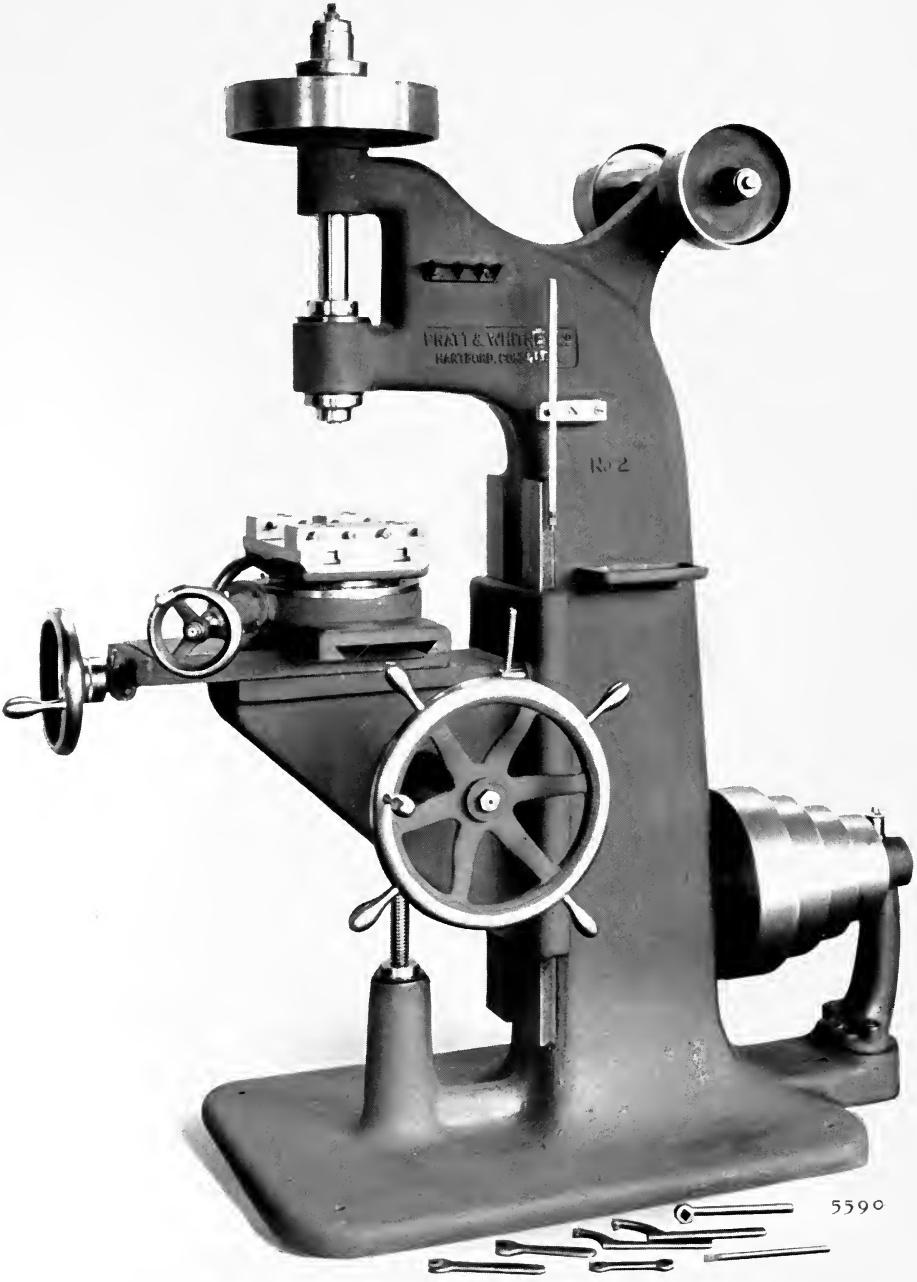
SPECIFICATIONS

RANGE	Swing over Bed	22½″
	Length of Bed	40′
	Rifling Length, maximum	13′ 8″
	Rifling Pitch, straight to one turn in	140″
	Rifling Grooves (usual number)	24 and 30
	Carriage Travel, maximum	15′
	Carriage Cutting Speed, per minute	6′
	Carriage Returning Speed, per minute	18′
	Hole through Spindle	7″
	Feed Screw, diameter and pitch	3½″, 1″ Single
	Pulley (Driving on Machine)	16″ x 2¾″
	Pulley (Counter., tight and loose)	16″ x 3½″
	Belt Width (Driving Pulley)	2½″
	Belt Width (Counter. Pulley)	3¼″
	Countershaft Speed, R. P. M.	225
FLOOR SPACE	Floor Space	6′ 8″ x 41′ 8″
WEIGHTS	Machine, Regular Equipment, net pounds	21250
	Crating Material (domestic), approximate pounds	600
	Boxing Material (foreign), approximate pounds	5300
	Box, cubic feet	950

REGULAR EQUIPMENT

Machine arranged for Uniform Twist.
2 Countershafts (tight and loose Pulley).
1 Rifling Rod.
Set of Wrenches.
(Machine arranged with Increased Twist, 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

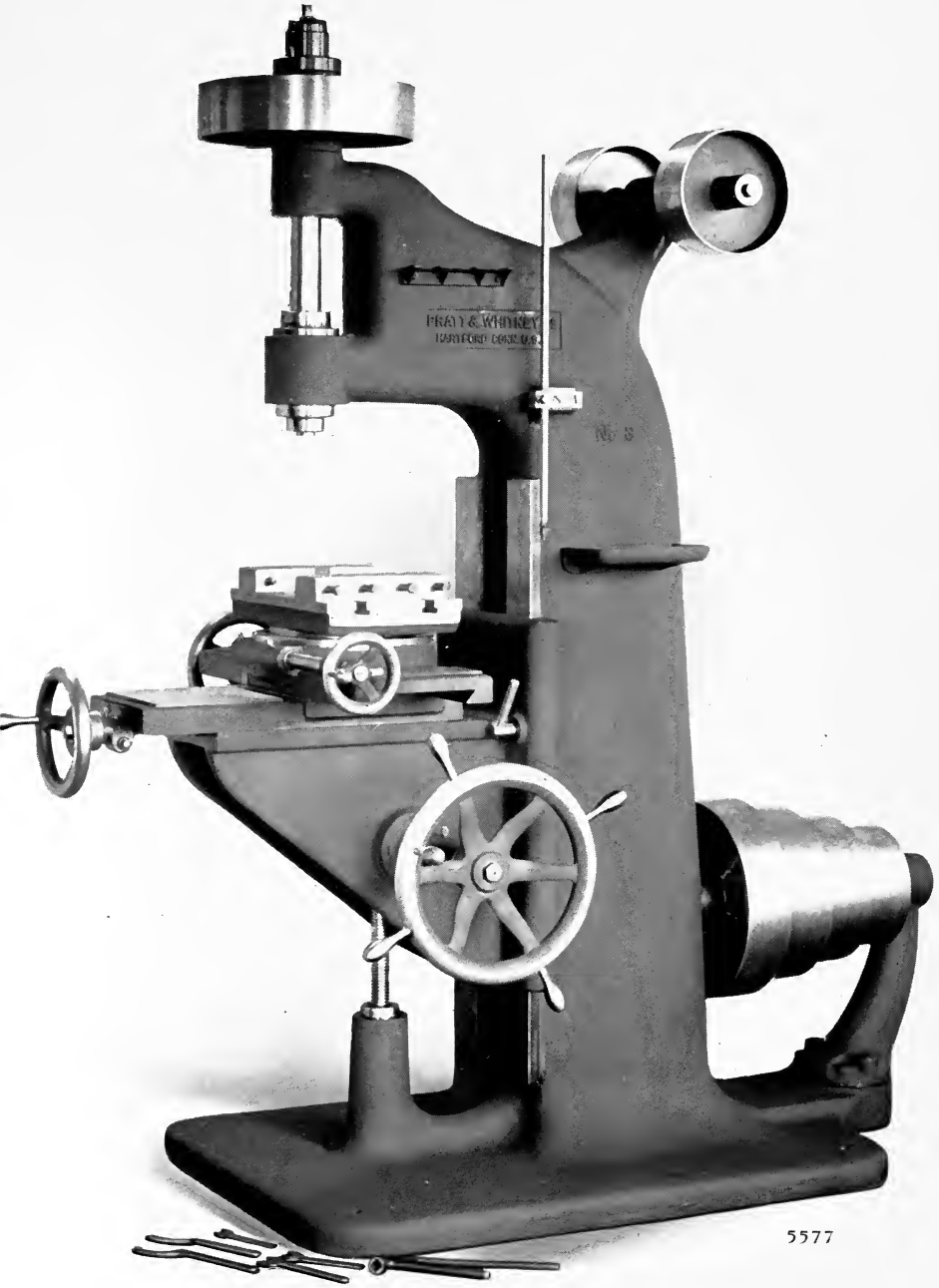
The Machine, with
Circular Vise.
Spindle Collet.
Set of Wrenches.
Countershaft (2-speed tight and loose Pulley).

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.

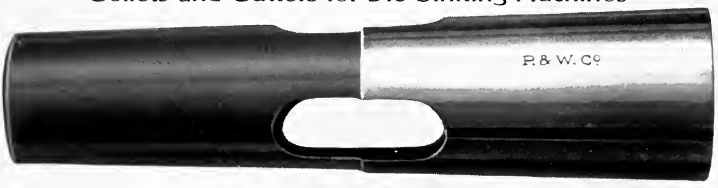
SPECIFICATIONS

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

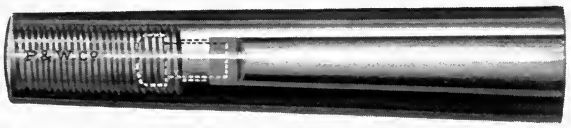
* For detailed information, see "Tapers", page 247.

Code words, page 265.

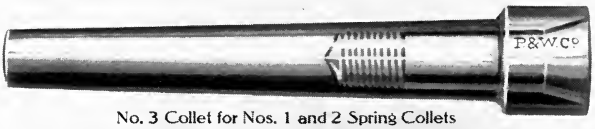
Collets and Cutters for Die Sinking Machines



No. 9 Spring Collet: 1-inch Straight Hole



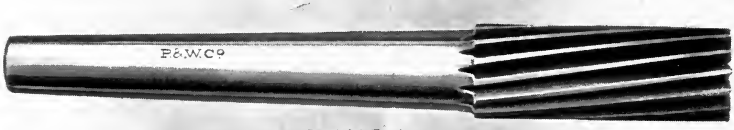
Nos. 5 to 8 Taper Collets



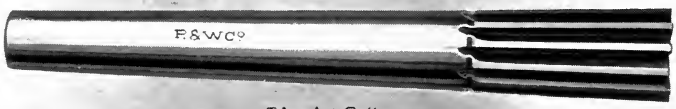
No. 3 Collet for Nos. 1 and 2 Spring Collets

5673

Nos. 1 and 2 Spring Collets with Cutter



Straight Cutter



Trimming Cutter

Five-degree Taper Cutter

Roughing Cutter

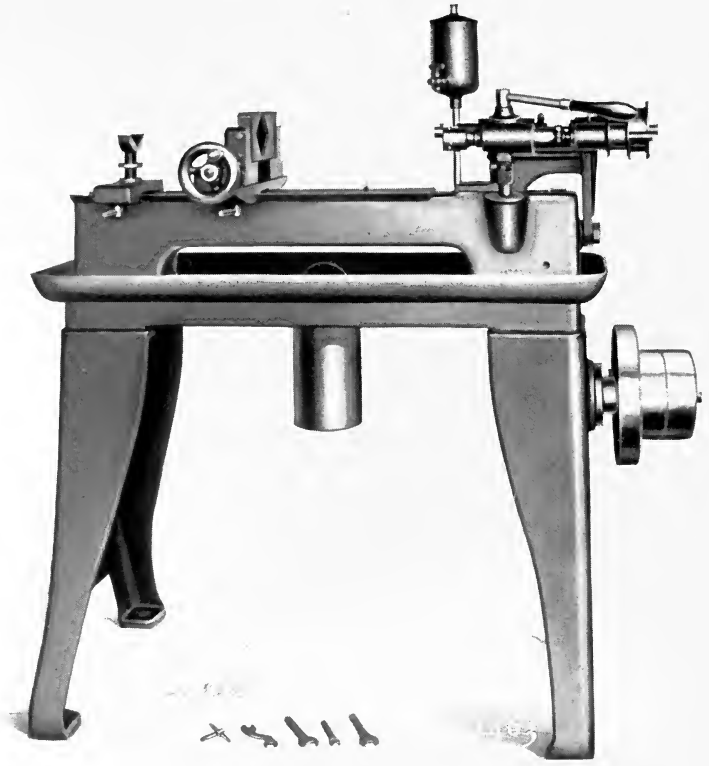
TOOL EQUIPMENT — DIE SINKING MACHINE

		Machine No. 2	Machine No. 3	Fit Collet
Collets — Number		1	–	3
		2	–	3
		3	–	6 and 8
		5	–	Spindle
		*6	–	Spindle
		–	7	Spindle
		–	*8	Spindle
		–	9	Spindle
Cutters		3/16″	–	1
		1/4″	–	1
		3/8″	–	2
		1/2″	1/2″	5 and 7
	Roughing, Straight †5° Taper, Trimming — 1 each	5/8″	5/8″	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	1½″
SPEEDS	Drill Spindle, R. P. M.	1782
	Reamer Spindle, R. P. M.	770
	Counter. Pulleys	7″ x 2⅜″
	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

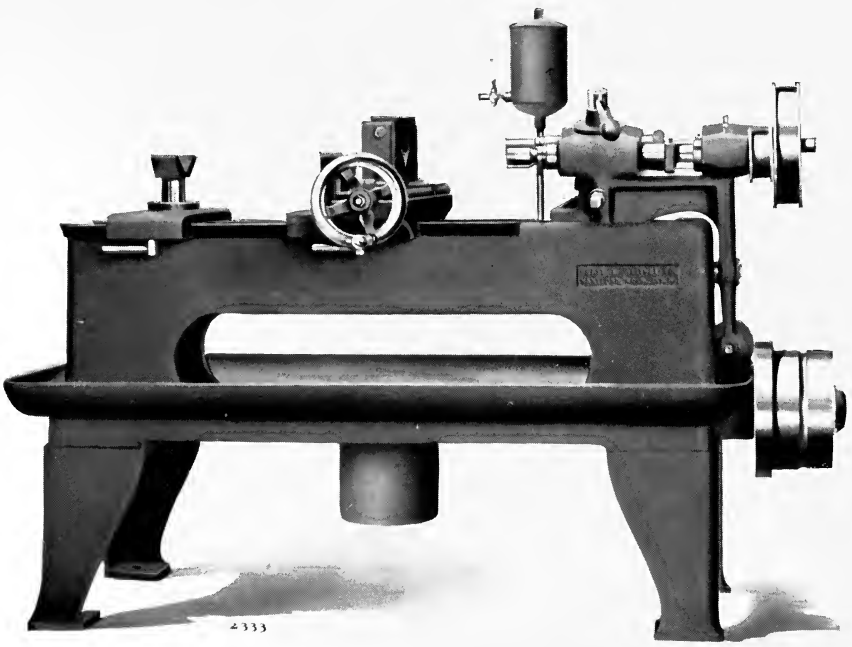
REGULAR EQUIPMENT

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).

REVOLVING CHUCK

2″ capacity, for accurately centering finished work on the 4″ machine, can be furnished to order, in which case a drum countershaft replaces the regular.

Code words, page 265.



6-inch Two-spindle Centering Machine

6-INCH CENTERING MACHINE

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

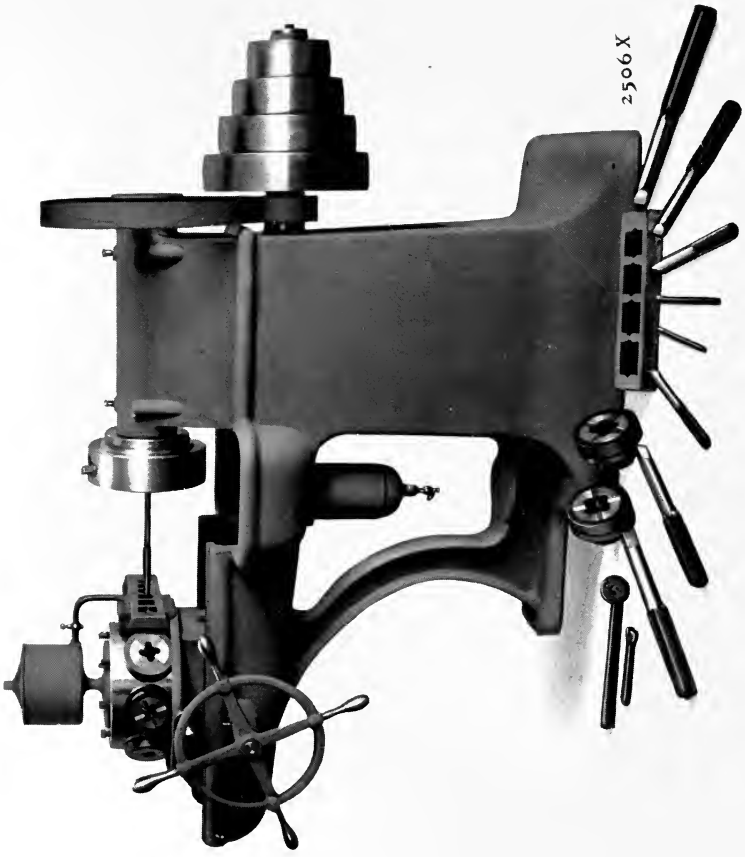
SPECIFICATIONS

CAPACITY	Capacity	6″
	Spindle Longitudinal Movement	3″
SPEEDS	Drill Spindle, R. P. M.	781
	Reamer Spindle, R. P. M.	267
	Counter. Pulleys	12″ x 2¼″
	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

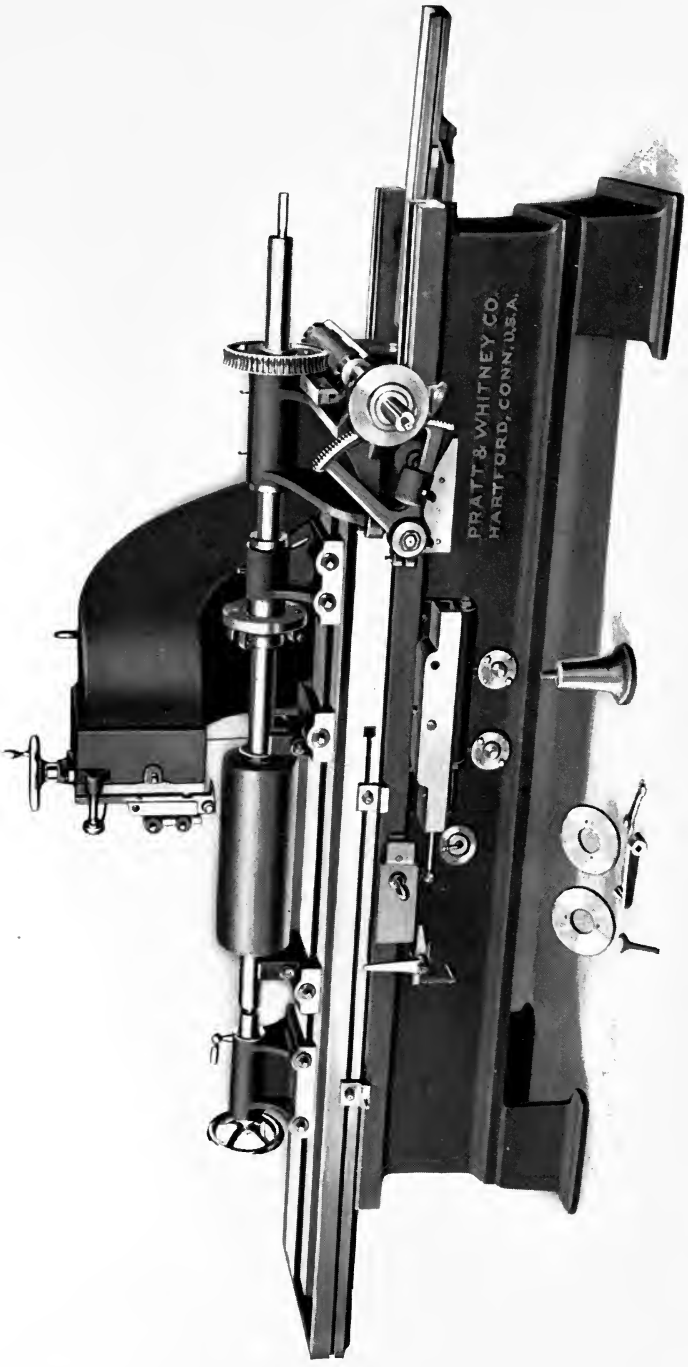
RANGE	Threading or Tapping Capacity	1½″
	Travel of Turret Slide	20″
TURRET	Round; 8 holes, 3″ diameter.	
SPINDLE	C. I.; Bearing Portion, cylindrical; 4⅜″ diameter.	
	Boxes, C. I., adjustable for wear.	
	Hole through Spindle	3¼″
SPEEDS	Spindle Speeds (4), R. P. M.	30 to 120
	Gearing Ratio	5 to 1
	Cone Diameters (4), large diameter	15″
	Pulleys (Counter. Friction)	14″ x 4½″
	Belt Width (Cone)	3¼″
	Belt Width (Counter. Pulleys)	4¼″
	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, ½″, ⅝″, ¾″, ⅞″, 1″, 1⅛″, 1¼″, 1⅜″ and 1½″, 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	5¾″
	Offset of Spiral, per foot 9″ roll	0″ to 2½″
	Cutting Speed, per minute	24″
	Returning Speed, per minute	40′
	Countershaft Pulleys	28″ x 4¼″
	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).

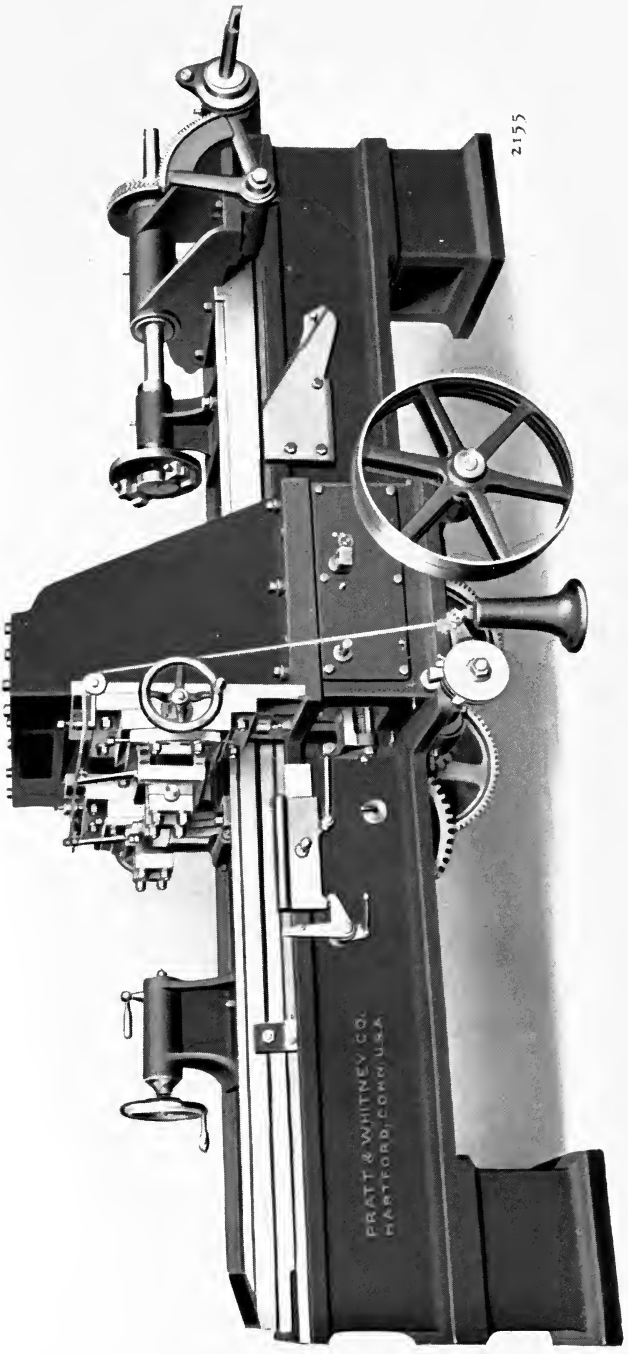
SPECIAL EQUIPMENT

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

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 $3\frac{2}{10}$″
	Cutting Speed, per minute	24″
	Returning Speed, per minute	24′
	Countershaft Pulleys	18″ x $4\frac{1}{4}$″
	Countershaft Speed, R. P. M.	95″
FLOOR SPACE	Floor Space	$6\frac{1}{2}$′ x 17′
WEIGHTS	Machine, Regular Equipment, net pounds	12700
	Crating Material (domestic), approximate pounds	1300
	Boxing Material (foreign), approximate pounds	3000
	Box, cubic feet	360

REGULAR EQUIPMENT

The Machine, with
3 Index Plates.
Suitable Jacks.
Set of Wrenches.
Countershaft (tight and loose Pulley).

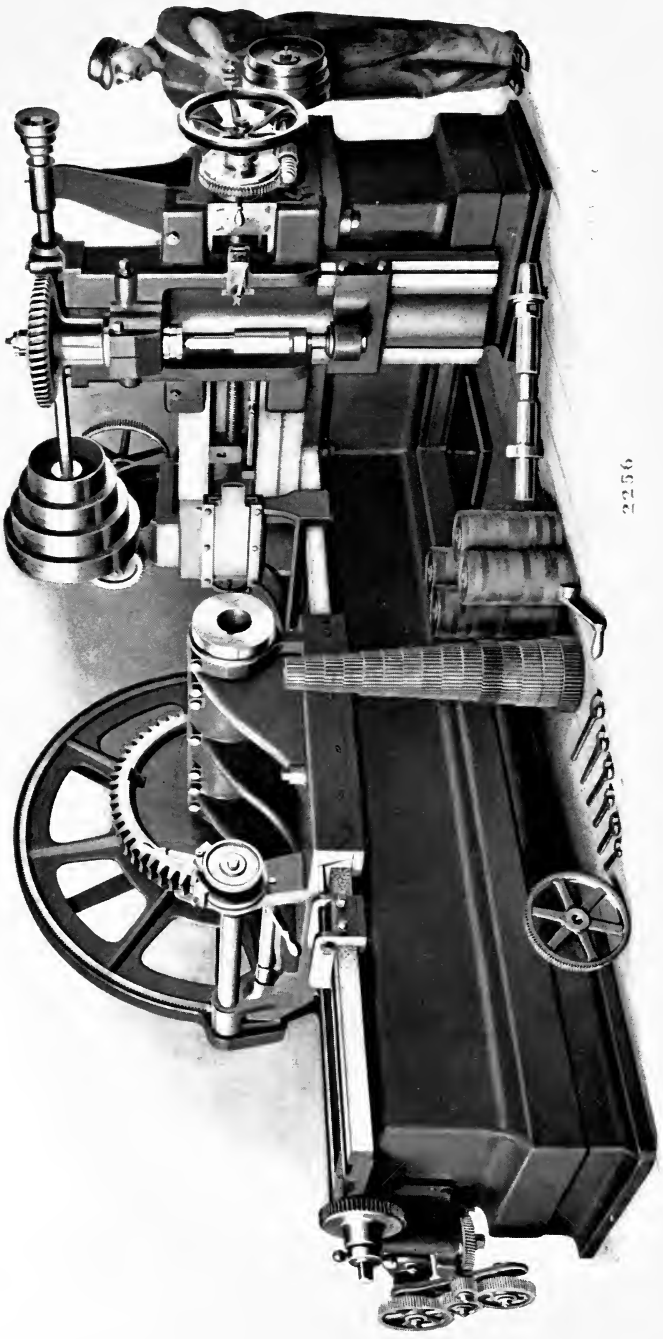
SPECIAL EQUIPMENT

The machine may readily be altered to accommodate rolls beyond the given capacity. All inquiries should be accompanied by detailed information regarding rolls to be grooved.

CUTTERS

Furnished to order upon receipt of drawings and specifications stating form and grooves per inch required.

Code words, page 265.



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

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 Adjustment	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 5¾″
	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 (domestic), approximate pounds	1300	500	1000
	Boxing Material (foreign), approximate pounds . .	1800	3000	5000
	Box, cubic feet	260	300	550

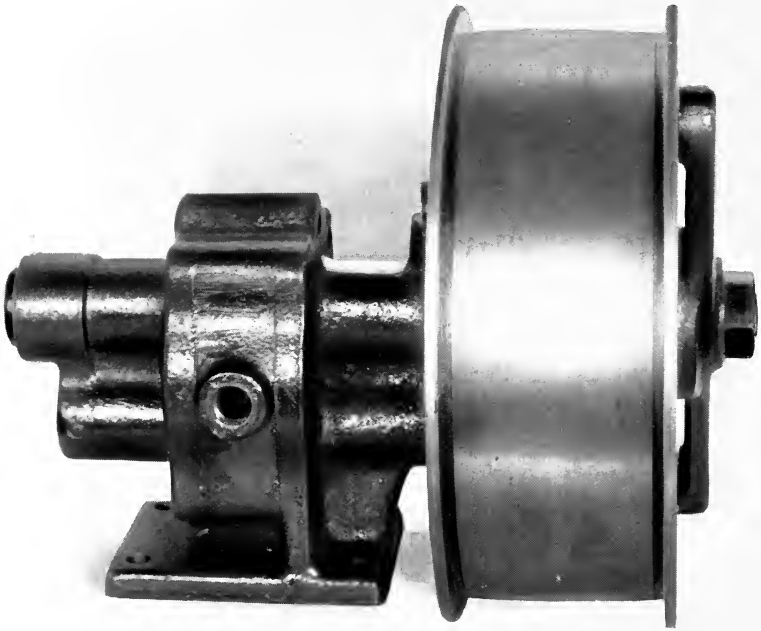
REGULAR EQUIPMENT

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.

Code words, page 265.

2878

Oil Pump for Low Pressures



5810

No. 2 High Pressure Oil Pump

ROTARY OIL PUMPS

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

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

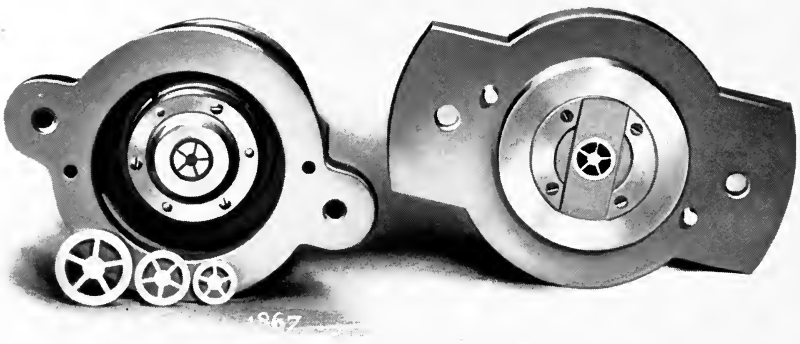
SPECIFICATIONS

	No. 0	No. 2	No. 3	No. 12
*Capacity, quarts per minute	1⅞	6	9	6
Pressure per square inch, pounds	100	500 to 1000	100	100
Pipes, inlet and delivery	⅜″	⅜″	½″	½″
Speed, R. P. M.	150	300	150	150
Driving Pulley, diameter	3″	9″	7″	5″
Belt Width	1″	3″	2″	1½″
Base Dimensions	3″ x 3¼″	3¼″ x 4½″	6″ x 6½″	3⅛″ x 3¼″
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



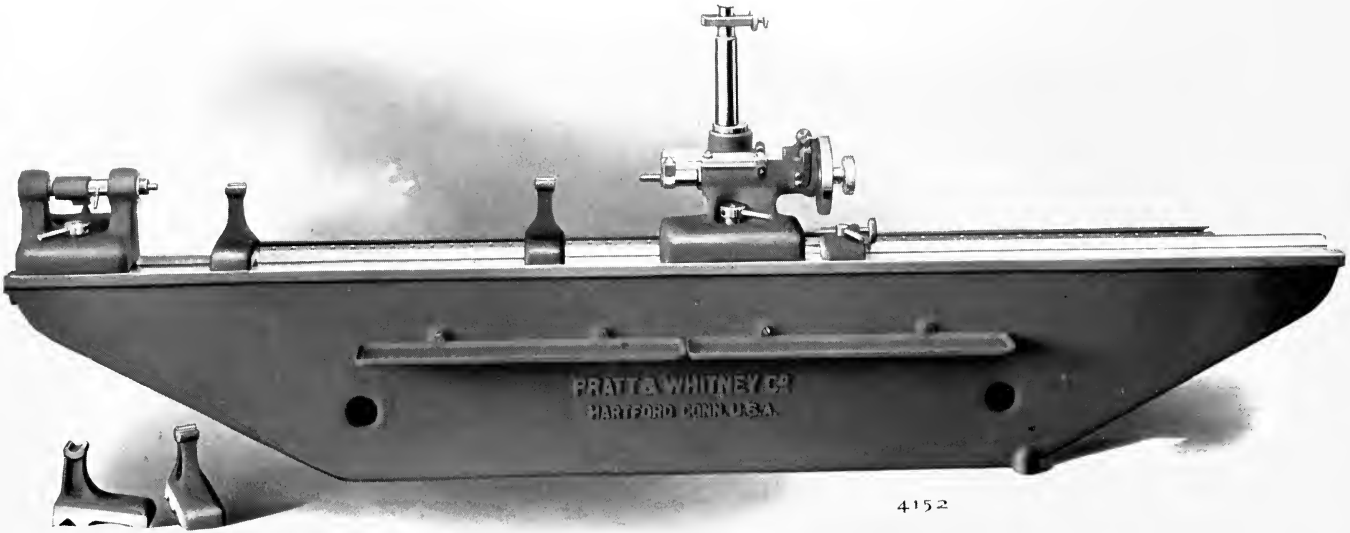
Sub-press Base Showing Dies and Blanks

SUB-PRESS BASES AND STANDS

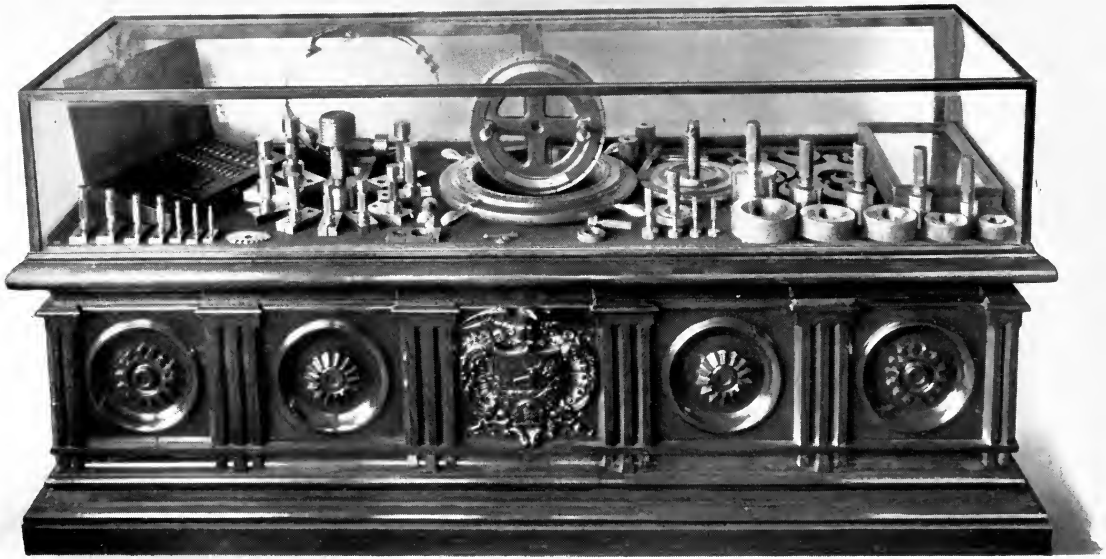
Ready for the insertion of punches and dies. All sizes are of a uniform height of $8\frac{1}{2}''$ from base to top of button when punches and dies are together. Piston bearing is of Babbitt metal with means provided for taking up the wear. Sub-press Dies are made to order to drawings or models, and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

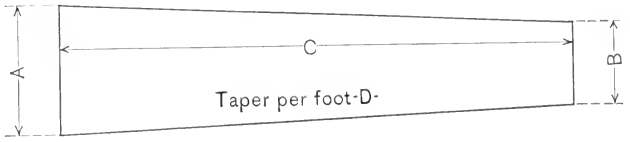


3375 2

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

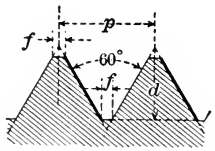


DETAIL OF TAPERS USED, SEE MACHINE SPECIFICATIONS FOR NUMBERS

Taper	No.	A	B	C	D
Jarno	2	.250	.20	1	.600
Jarno	3	.375	.30	1½	.600
Jarno	4	.500	.40	2	.600
Jarno	5	.625	.50	2½	.600
Jarno	6	.750	.60	3	.600
Jarno	7	.875	.70	3½	.600
Jarno	8	1.000	.80	4	.600
Jarno	9	1.125	.90	4½	.600
Jarno	10	1.250	1.00	5	.600
Jarno	11	1.375	1.10	5½	.600
Jarno	12	1.500	1.20	6	.600
Jarno	13	1.625	1.30	6½	.600
Jarno	14	1.750	1.40	7	.600
Jarno	15	1.875	1.50	7½	.600
Jarno	16	2.000	1.60	8	.600
Jarno	17	2.125	1.70	8½	.600
Jarno	18	2.250	1.80	9	.600
Jarno	19	2.375	1.90	9½	.600
Jarno	20	2.500	2.00	10	.600
Morse	1	.475	.369	2⅛	.600
Morse	2	.700	.572	2 9/16	.602
Morse	3	.938	.778	3 3/16	.602
Morse	4	1.231	1.020	4 1/16	.623
Power M. M.	0	.873	.685	4½	.503
Power M. M.	1	1.014	.797	6	.435
Power M. M.	2	1.285	1.047	5 17/32	.516
Power M. M.	3	1¾	1.477	6 9/16	½
Drill Socket	2	.540	.409	2½	.629
Drill Collet	3	¼	.211	1 3/16	9/16
Drill Collet	4	.281	.230	1 1/16	9/16
Drill Collet	5	.378	.300	1⅝	9/16
Gang Drill	2	.749	.555	4	.581
Lathe	25″	1.528	1.246	6	.564
Lathe	18″	1.083	.854	4⅞	.5643

All dimensions are in inches.

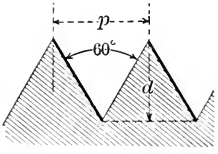
UNITED STATES STANDARD THREAD



Formula
p = pitch = $\frac{1}{\text{No. threads per inch}}$
d = depth = $p \times .64952$
f = flat = $\frac{p}{8}$

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 1/4
3/8	16	1 1/4	7	2 3/8	4	3 1/2	3 1/4
7/16	14	1 3/8	6	2 1/2	4	3 5/8	3 1/4
1/2	13	1 1/2	6	2 5/8	4	3 3/4	3
9/16	12	1 5/8	5 1/2	2 3/4	4	3 7/8	3
5/8	11	1 3/4	5	2 7/8	3 1/2	4	3
3/4	10	1 7/8	5	3	3 1/2		
7/8	9	2	4 1/2	3 1/8	3 1/2		

SHARP "V" THREAD (THEORETICAL)

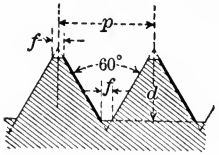


Formula
p = pitch = $\frac{1}{\text{No. threads per inch}}$
d = depth = $p \times .86603$

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	15/16	9	2 1/8	4 1/2	3 3/8	3 1/4
3/8	16	1	8	2 1/4	4 1/2	3 1/2	3 1/4
7/16	14	1 1/8	7	2 3/8	4 1/2	3 5/8	3 1/4
1/2	12	1 1/4	7	2 1/2	4	3 3/4	3
9/16	12	1 3/8	6	2 5/8	4	3 7/8	3
5/8	11	1 1/2	6	2 3/4	4	4	3
11/16	11	1 5/8	5	2 7/8	4		
3/4	10	1 3/4	5	3	3 1/2		
13/16	10	1 7/8	4 1/2	3 1/8	3 1/2		

INTERNATIONAL AND FRENCH STANDARD THREAD

(METRIC SYSTEM)



Formula
- p = pitch
- d = depth = $p \times .64952$
- f = flat = $\frac{p}{8}$

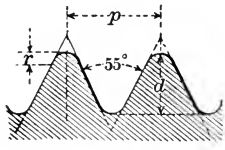
INTERNATIONAL STANDARD

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

FRENCH STANDARD

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

WHITWORTH STANDARD THREAD



Formula:

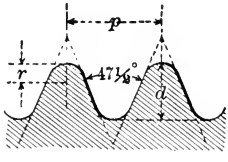
$$p = \text{pitch} = \frac{1}{\text{No. threads per inch}}$$

$$d = \text{depth} = p \times .64033$$

$$r = \text{radius} = p \times .1373$$

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
5/16	18	15/16	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
7/16	14	1 1/8	7	2 3/8	4	3 5/8	3 1/4
1/2	12	1 1/4	7	2 1/2	4	3 3/4	3
9/16	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
11/16	11	1 5/8	5	2 7/8	3 1/2		
3/4	10	1 3/4	5	3	3 1/2		
13/16	10	1 7/8	4 1/2	3 1/8	3 1/2		

BRITISH ASSOCIATION STANDARD THREAD



Formula:

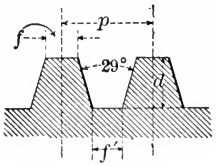
$$p = \text{pitch}$$

$$d = \text{depth} = p \times .6$$

$$r = \text{radius} = \frac{2 \times p}{11}$$

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

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

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

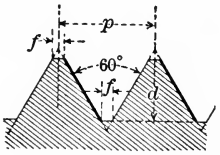
f' = flat on bottom of thread = $p \times .3707 - 0052$

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	½	1.010	.7414	.7362	1.2586	1.2637
1 7/8	1 1/5	.9475	.6950	.6897	1.1799	1.1850
1 3/4	1 1/7	.8850	.6487	.6435	1.1012	1.1064
1 5/8	1 1/8	.8225	.6025	.5973	1.0226	1.0277
1 ½	⅔	.7600	.5560	.5508	.9439	.9491
1 7/16	2 2/3	.7287	.5329	.5277	.9046	.9097
1 3/8	2 1/11	.6975	.5097	.5045	.8652	.8704
1 5/16	2 1/16	.6662	.4865	.4813	.8259	.8311
1 ¼	2 1/5	.635	.4633	.4581	.7866	.7918
1 3/16	2 1/9	.6037	.4402	.4350	.7472	.7525
1 1/8	2 2/9	.5725	.4170	.4118	.7079	.7131
1 1/16	2 1/17	.5412	.3938	.3886	.6686	.6739
1	1	.510	.3707	.3655	.6293	.6345
15/16	1 1/15	.4787	.3476	.3424	.5898	.5950
⅞	1 1/7	.4475	.3243	.3191	.5506	.5558
13/16	1 1/8	.4162	.3012	.2960	.5112	.5164
¾	1 1/3	.385	.2780	.2728	.4720	.4772
11/16	1 5/11	.3537	.2548	.2496	.4327	.4379
⅝	1 ½	.3433	.2471	.2419	.4194	.4246
5/8	1 3/5	.3225	.2316	.2264	.3934	.3986
9/16	1 7/9	.2912	.2085	.2033	.3539	.3591
½	2	.260	.1853	.1801	.3147	.3199
7/16	2 2/7	.2287	.1622	.1570	.2752	.2804
⅜	2 ½	.210	.1482	.1430	.2518	.2570
3/8	2 2/3	.1975	.1390	.1338	.2359	.2411
⅓	3	.1766	.1235	.1183	.2098	.2150
5/16	3 1/5	.1662	.1158	.1106	.1966	.2018
9/32	3 ½	.1528	.1059	.1007	.1797	.1849
¼	4	.1350	.0927	.0875	.1573	.1625
2/9	4 ½	.1211	.0824	.0772	.1398	.1450
1/5	5	.110	.0741	.0689	.1259	.1311
3/16	5 1/3	.1037	.0695	.0643	.1179	.1232
1/6	6	.0933	.0617	.0565	.1049	.1101
1/7	7	.0814	.0530	.0478	.0899	.0951
⅛	8	.0725	.0463	.0411	.0787	.0839
1/9	9	.0655	.0413	.0361	.0699	.0751
1/10	10	.060	.0371	.0319	.0629	.0681
1/16	16	.0412	.0232	.0180	.0392	.0444

A. S. M. E. STANDARD

FOR MACHINE SCREWS

United States Standard Form of Thread



Formula

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

d = depth = $p \times .64952$

f = flat = $\frac{p}{8}$

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, 2 inches; 4½ threads per inch; find diameter at bottom of thread. D = 2 inches; for 4½ threads U. S. S., constant, C = .2886; then diameter at bottom of thread, D1 = 2—.2886 = 1.7114 inches.

TAP DRILLS

FOR U. S. STANDARD THREAD

Size Inches	Size of Drill	Size Inches	Size of Drill	Size Inches	Size of Drill
1/4	12	5/8	33/64	1 3/8	1 11/64
5/16	D	3/4	5/8	1 1/2	1 19/64
3/8	N	7/8	47/64	1 5/8	1 13/32
7/16	S	1	27/32	1 3/4	1 1/2
1/2	13/32	1 1/8	61/64	1 7/8	1 5/8
9/16	15/32	1 1/4	1 5/64	2	1 23/32

FOR U. S. FORM OF THREAD 1/16 TO 17/64-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
1/16	60	.041	57	5/64	56	.055	53
1/16	64	.042	56	5/64	60	.056	53
3/32	48	.067	50	7/64	40	.077	46
3/32	50	.068	50	7/64	44	.080	45
3/32	56	.071	49	7/64	48	.082	44
3/32	60	.072	48	9/64	32	.100	37
1/8	40	.093	41	9/64	36	.105	35
1/8	44	.096	40	9/64	40	.108	34
1/8	48	.098	39	11/64	32	.131	29
5/32	32	.116	31	11/64	36	.136	28
5/32	36	.120	1/8	11/64	40	.139	27
5/32	40	.124	30	13/64	24	.149	24
3/16	24	.133	29	13/64	28	.157	20
3/16	28	.141	27	13/64	32	.162	19
3/16	30	.144	26	13/64	36	.167	18
3/16	32	.147	25	15/64	24	.180	13
3/16	36	.152	23	15/64	28	.188	10
7/32	24	.164	19	15/64	32	.194	8
7/32	28	.172	16	15/64	36	.198	7
7/32	32	.178	14	17/64	18	.193	9
7/32	36	.183	12	17/64	20	.201	5
1/4	18	.178	14	17/64	24	.211	3
1/4	20	.185	12	17/64	26	.216	2
1/4	22	.190	10	17/64	32	.225	1
1/4	24	.196	8				
1/4	26	.200	6				

TAP DRILLS

FOR MACHINE SCREW TAPS

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

Size of Taps	No. of Threads	Size of Drills	Size of Taps	No. of Threads	Size of Drills
2	48	51	12	24	19
2	56	50	13	20	19
2	64	49	13	24	15
3	40	49	14	20	16
3	48	48	14	22	13
3	56	44	14	24	9
4	32	48	15	18	13
4	36	45	15	20	10
4	40	44	15	24	6
5	30	44	16	16	13
5	32	43	16	18	10
5	36	41	16	20	6
5	40	40	16	24	2
6	30	41	17	16	7
6	32	37	17	18	4
6	36	36	17	20	2
6	40	33	18	16	3
7	28	35	18	18	2
7	30	34	18	20	A
7	32	31	19	16	1
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			Thickness of Metal Inches	Screwed Ends	
Nominal Inside Inches	Actual Inside Inches	Actual Outside Inches		No. of Threads per Inch	Length of Perfect Thread Inches
⅛	0.270	0.405	0.068	27	0.19
¼	0.364	0.540	0.088	18	0.29
⅜	0.494	0.675	0.091	18	0.30
½	0.623	0.840	0.109	14	0.39
¾	0.824	1.050	0.113	14	0.40
1	1.048	1.315	0.134	11½	0.51
1¼	1.380	1.660	0.140	11½	0.54
1½	1.610	1.900	0.145	11½	0.55
2	2.067	2.375	0.154	11½	0.58
2½	2.468	2.875	0.204	8	0.89
3	3.067	3.500	0.217	8	0.95
3½	3.548	4.000	0.226	8	1.00
4	4.026	4.500	0.237	8	1.05
4½	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 (¾ 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
⅛ inch	$\frac{11}{32}$ inch	1¼ inches	$1\frac{7}{16}$ inches
¼ inch	$\frac{7}{16}$ inch	1½ inches	$1\frac{23}{32}$ inches
⅜ inch	$\frac{9}{16}$ inch	2 inches	$2\frac{3}{16}$ inches
½ inch	$\frac{45}{64}$ inch	2½ inches	$2\frac{27}{64}$ inches
¾ inch	$\frac{51}{64}$ inch	3 inches	$3\frac{19}{64}$ inches
1 inch	1⅛ inches		

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

DIFFERENT STANDARDS FOR WIRE GAUGE IN USE IN THE UNITED STATES

DIMENSIONS OF SIZES IN DECIMAL PARTS OF AN INCH

No. of Wire Gauge	American or Brown & Sharpe	Birmingham or Stubs' Wire	Washburn & Moen Mfg. Co. Worcester Mass.	Trenton Iron Co. Trenton N. J.	Stubs' Steel Wire	U. S. Standard for Plate	No. of Wire Gauge
000000	. . .	. .	. .	. .	. .	.46875	000000
00000	. . .	. .	. .	.45	. .	.4375	00000
0000	.46	.454	.3938	.4	. .	.40625	0000
000	.40964	.425	.3625	.36	. .	.375	000
00	.3648	.38	.3310	.33	. .	.34375	00
0	.32486	.34	.3065	.305	. .	.3125	0
1	.2893	.3	.2830	.285	.227	.28125	1
2	.25763	.284	.2625	.265	.219	.265625	2
3	.22942	.259	.2437	.245	.212	.25	3
4	.20431	.238	.2253	.225	.207	.234375	4
5	.18194	.22	.2070	.205	.204	.21875	5
6	.16202	.203	.1920	.19	.201	.203125	6
7	.14428	.18	.1770	.175	.199	.1875	7
8	.12849	.165	.1620	.16	.197	.171875	8
9	.11443	.148	.1483	.145	.194	.15625	9
10	.10189	.134	.1350	.13	.191	.140625	10
11	.090742	.12	.1205	.1175	.188	.125	11
12	.080808	.109	.1055	.105	.185	.109375	12
13	.071961	.095	.0915	.0925	.182	.09375	13
14	.064084	.083	.0800	.08	.180	.078125	14
15	.057068	.072	.0720	.07	.178	.0703125	15
16	.05082	.065	.0625	.061	.175	.0625	16
17	.045257	.058	.0540	.0525	.172	.05625	17
18	.040303	.049	.0475	.045	.168	.05	18
19	.03589	.042	.0410	.04	.164	.04375	19
20	.031961	.035	.0348	.035	.161	.0375	20
21	.028462	.032	.03175	.031	.157	.034375	21
22	.025347	.028	.0286	.028	.155	.03125	22
23	.022571	.025	.0258	.025	.153	.028125	23
24	.0201	.022	.0230	.0225	.151	.025	24
25	.0179	.02	.0204	.02	.148	.021875	25
26	.01594	.018	.0181	.018	.146	.01875	26
27	.014195	.016	.0173	.017	.143	.0171875	27
28	.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 11/16	24.08	18.91	5 3/8	96.30	75.64
1/16	.013	.010	3/4	25.21	19.80	7/16	98.55	77.40
1/8	.052	.041	13/16	26.37	20.71	1/2	100.8	79.19
3/16	.117	.092	7/8	27.55	21.64	9/16	103.1	81.00
1/4	.208	.164	15/16	28.76	22.59	5/8	105.5	82.83
5/16	.326	.256	3	30.00	23.56	11/16	107.8	84.69
3/8	.469	.368	1/16	31.26	24.55	3/4	110.2	86.56
7/16	.638	.501	1/8	32.55	25.57	13/16	112.6	88.45
1/2	.833	.654	3/16	33.87	26.60	7/8	115.1	90.36
9/16	1.055	.828	1/4	35.21	27.65	15/16	117.5	92.29
5/8	1.302	1.023	5/16	36.58	28.73	6	120.0	94.25
11/16	1.576	1.237	3/8	37.97	29.82	1/8	125.1	98.22
3/4	1.875	1.473	7/16	39.39	30.94	1/4	130.2	102.3
13/16	2.201	1.728	1/2	40.83	32.07	3/8	135.5	106.4
7/8	2.552	2.004	9/16	42.30	33.23	1/2	140.8	110.6
15/16	2.930	2.301	5/8	43.80	34.40	5/8	146.3	114.9
1	3.333	2.618	11/16	45.33	35.60	3/4	151.9	119.3
1/16	3.763	2.955	3/4	46.88	36.82	7/8	157.6	123.7
1/8	4.219	3.313	13/16	48.45	38.05	7	163.3	128.3
3/16	4.701	3.692	7/8	50.05	39.31	1/8	169.2	132.9
1/4	5.208	4.091	15/16	51.68	40.59	1/4	175.2	137.6
5/16	5.742	4.510	4	53.33	41.89	3/8	181.3	142.4
3/8	6.302	4.950	1/16	55.01	43.21	1/2	187.5	147.3
7/16	6.888	5.410	1/8	56.72	44.55	5/8	193.8	152.2
1/2	7.500	5.890	3/16	58.45	45.91	3/4	200.2	157.2
9/16	8.138	6.392	1/4	60.21	47.29	7/8	206.7	162.4
5/8	8.802	6.913	5/16	61.99	48.69	8	213.3	167.6
11/16	9.942	7.455	3/8	63.80	50.11	1/4	226.9	178.2
3/4	10.21	8.018	7/16	65.64	51.55	1/2	240.8	189.2
13/16	10.95	8.601	1/2	67.50	53.01	3/4	255.2	200.4
7/8	11.72	9.204	9/16	69.39	54.50	9	270.0	212.1
15/16	12.51	9.828	5/8	71.30	56.00	1/4	285.2	224.0
2	13.33	10.47	11/16	73.24	57.52	1/2	300.8	236.3
1/16	14.18	11.14	3/4	75.21	59.07	3/4	316.9	248.9
1/8	15.05	11.82	13/16	77.20	60.63	10	333.3	261.8
3/16	15.95	12.53	7/8	79.22	62.22	1/4	350.2	275.1
1/4	16.88	13.25	15/16	81.26	63.82	1/2	367.5	288.6
5/16	17.83	14.00	5	83.33	65.45	3/4	385.2	302.5
3/8	18.80	14.77	1/16	85.43	67.10	11	403.3	316.8
7/16	19.80	15.55	1/8	87.55	68.76	1/4	421.9	331.3
1/2	20.83	16.36	3/16	89.70	70.45	1/2	440.8	346.2
9/16	21.89	17.19	1/4	91.88	72.16	3/4	460.2	361.4
5/8	22.97	18.04	5/16	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										
	1/16	3/32	1/8	1/4	3/8	1/2	*600	5/8	3/4	1	1 1/4
1/32	.0002	.0002	.0003	.0007	.0010	.0013	.0016	.0016	.0020	.0026	.0033
1/16	.0003	.0005	.0007	.0013	.0020	.0026	.0031	.0033	.0039	.0052	.0065
1/8	.0007	.0010	.0013	.0026	.0039	.0052	.0062	.0065	.0078	.0104	.0130
3/16	.0010	.0015	.0020	.0039	.0059	.0078	.0094	.0098	.0117	.0156	.0195
1/4	.0013	.0020	.0026	.0052	.0078	.0104	.0125	.0130	.0156	.0208	.0260
5/16	.0016	.0024	.0033	.0065	.0098	.0130	.0156	.0163	.0195	.0260	.0326
3/8	.0020	.0029	.0039	.0078	.0117	.0156	.0187	.0195	.0234	.0312	.0391
7/16	.0023	.0034	.0046	.0091	.0137	.0182	.0219	.0228	.0273	.0365	.0456
1/2	.0026	.0039	.0052	.0104	.0156	.0208	.0250	.0260	.0312	.0417	.0521
9/16	.0029	.0044	.0059	.0117	.0176	.0234	.0281	.0293	.0352	.0469	.0586
5/8	.0033	.0049	.0065	.0130	.0195	.0260	.0312	.0326	.0391	.0521	.0651
11/16	.0036	.0054	.0072	.0143	.0215	.0286	.0344	.0358	.0430	.0573	.0716
3/4	.0039	.0059	.0078	.0156	.0234	.0312	.0375	.0391	.0469	.0625	.0781
13/16	.0042	.0063	.0085	.0169	.0254	.0339	.0406	.0423	.0508	.0677	.0846
7/8	.0046	.0068	.0091	.0182	.0273	.0365	.0437	.0456	.0547	.0729	.0911
15/16	.0049	.0073	.0098	.0195	.0293	.0391	.0469	.0488	.0586	.0781	.0977
1	.0052	.0078	.0104	.0208	.0312	.0417	.050	.0521	.0625	.0833	.1042
2	.0104	.0156	.0208	.0417	.0625	.0833	.100	.1042	.125	.1667	.2083
3	.0156	.0234	.0312	.0625	.0937	.1250	.150	.1562	.1875	.250	.3125
4	.0208	.0312	.0417	.0833	.125	.1667	.200	.2083	.250	.3333	.4167
5	.0260	.0391	.0521	.1042	.1562	.2083	.250	.2604	.3125	.4167	.5208
6	.0312	.0469	.0625	.125	.1875	.250	.300	.3125	.375	.500	.625
7	.0365	.0547	.0729	.1458	.2187	.2917	.350	.3646	.4375	.5833	.7292
8	.0417	.0625	.0833	.1667	.250	.3333	.400	.4167	.500	.6667	.8333
9	.0469	.0703	.0937	.1875	.2812	.375	.450	.4687	.5625	.750	.9375
10	.0521	.0781	.1042	.2083	.3125	.4167	.500	.5208	.625	.8333	1.0417
11	.0573	.0859	.1146	.2292	.3437	.4583	.550	.5729	.6875	.9167	1.1458
12	.0625	.0937	.125	.250	.375	.500	.600	.625	.750	1.000	1.250
13	.0677	.1016	.1354	.2708	.4062	.5417	.650	.6771	.8125	1.0833	1.3542
14	.0729	.1094	.1458	.2917	.4375	.5833	.700	.7292	.875	1.1667	1.4583
15	.0781	.1172	.1562	.3125	.4687	.625	.750	.7812	.9375	1.250	1.5625
16	.0833	.125	.1667	.3333	.500	.6667	.800	.8333	1.000	1.3333	1.6667
17	.0885	.1328	.1771	.3542	.5312	.7083	.850	.8854	1.0625	1.4167	1.7708
18	.0937	.1406	.1875	.3750	.5625	.750	.900	.9375	1.125	1.500	1.875
19	.0990	.1484	.1979	.3958	.5937	.7917	.950	.9896	1.1875	1.5833	1.9792
20	.1042	.1562	.2083	.4167	.625	.8333	1.000	1.0417	1.250	1.6667	2.0833
21	.1094	.1641	.2187	.4375	.6562	.875	1.050	1.0937	1.3125	1.750	2.1875
22	.1146	.1719	.2292	.4583	.6875	.9167	1.100	1.1458	1.375	1.8333	2.2917
23	.1198	.1797	.2396	.4792	.7187	.9583	1.150	1.1979	1.4375	1.9167	2.3958
24	.125	.1875	.250	.500	.750	1.000	1.200	1.250	1.500	2.000	2.500

*Pratt & Whitney Standard Taper.

TABLE OF DECIMAL EQUIVALENTS OF MILLIMETERS AND FRACTIONS OF MILLIMETERS

Millimeters	Inches	Millimeters	Inches	Millimeters	Inches	Millimeters	Inches
$\frac{1}{100}$	= .00039	$\frac{33}{100}$	= .01299	$\frac{64}{100}$	= .02520	$\frac{95}{100}$	= .03740
$\frac{2}{100}$	= .00079	$\frac{34}{100}$	= .01339	$\frac{65}{100}$	= .02559	$\frac{96}{100}$	= .03780
$\frac{3}{100}$	= .00118	$\frac{35}{100}$	= .01378	$\frac{66}{100}$	= .02598	$\frac{97}{100}$	= .03819
$\frac{4}{100}$	= .00157	$\frac{36}{100}$	= .01417	$\frac{67}{100}$	= .02638	$\frac{98}{100}$	= .03858
$\frac{5}{100}$	= .00197	$\frac{37}{100}$	= .01457	$\frac{68}{100}$	= .02677	$\frac{99}{100}$	= .03898
$\frac{6}{100}$	= .00236	$\frac{38}{100}$	= .01496	$\frac{69}{100}$	= .02717	1	= .03937
$\frac{7}{100}$	= .00276	$\frac{39}{100}$	= .01535	$\frac{70}{100}$	= .02756	2	= .07874
$\frac{8}{100}$	= .00315	$\frac{40}{100}$	= .01575	$\frac{71}{100}$	= .02795	3	= .11811
$\frac{9}{100}$	= .00354	$\frac{41}{100}$	= .01614	$\frac{72}{100}$	= .02835	4	= .15748
$\frac{10}{100}$	= .00394	$\frac{42}{100}$	= .01654	$\frac{73}{100}$	= .02874	5	= .19685
$\frac{11}{100}$	= .00433	$\frac{43}{100}$	= .01693	$\frac{74}{100}$	= .02913	6	= .23622
$\frac{12}{100}$	= .00472	$\frac{44}{100}$	= .01732	$\frac{75}{100}$	= .02953	7	= .27559
$\frac{13}{100}$	= .00512	$\frac{45}{100}$	= .01772	$\frac{76}{100}$	= .02992	8	= .31496
$\frac{14}{100}$	= .00551	$\frac{46}{100}$	= .01811	$\frac{77}{100}$	= .03032	9	= .35433
$\frac{15}{100}$	= .00591	$\frac{47}{100}$	= .01850	$\frac{78}{100}$	= .03071	10	= .39370
$\frac{16}{100}$	= .00630	$\frac{48}{100}$	= .01890	$\frac{79}{100}$	= .03110	11	= .43307
$\frac{17}{100}$	= .00669	$\frac{49}{100}$	= .01929	$\frac{80}{100}$	= .03150	12	= .47244
$\frac{18}{100}$	= .00709	$\frac{50}{100}$	= .01969	$\frac{81}{100}$	= .03189	13	= .51181
$\frac{19}{100}$	= .00748	$\frac{51}{100}$	= .02008	$\frac{82}{100}$	= .03228	14	= .55118
$\frac{20}{100}$	= .00787	$\frac{52}{100}$	= .02047	$\frac{83}{100}$	= .03268	15	= .59055
$\frac{21}{100}$	= .00827	$\frac{53}{100}$	= .02087	$\frac{84}{100}$	= .03307	16	= .62992
$\frac{22}{100}$	= .00866	$\frac{54}{100}$	= .02126	$\frac{85}{100}$	= .03346	17	= .66929
$\frac{23}{100}$	= .00906	$\frac{55}{100}$	= .02165	$\frac{86}{100}$	= .03386	18	= .70866
$\frac{24}{100}$	= .00945	$\frac{56}{100}$	= .02205	$\frac{87}{100}$	= .03425	19	= .74803
$\frac{25}{100}$	= .00984	$\frac{57}{100}$	= .02244	$\frac{88}{100}$	= .03465	20	= .78740
$\frac{26}{100}$	= .01024	$\frac{58}{100}$	= .02283	$\frac{89}{100}$	= .03504	21	= .82677
$\frac{27}{100}$	= .01063	$\frac{59}{100}$	= .02323	$\frac{90}{100}$	= .03543	22	= .86614
$\frac{28}{100}$	= .01102	$\frac{60}{100}$	= .02362	$\frac{91}{100}$	= .03583	23	= .90551
$\frac{29}{100}$	= .01142	$\frac{61}{100}$	= .02402	$\frac{92}{100}$	= .03622	24	= .94488
$\frac{30}{100}$	= .01181	$\frac{62}{100}$	= .02441	$\frac{93}{100}$	= .03661	25	= .98425
$\frac{31}{100}$	= .01220	$\frac{63}{100}$	= .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	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16
0	0.0	1.6	3.2	4.8	6.4	7.9	9.5	11.1	12.7	14.3	15.9	17.5	19.1	20.6	22.2	23.8
1	25.4	27.0	28.6	30.2	31.7	33.3	34.9	36.5	38.1	39.7	41.3	42.9	44.4	46.0	47.6	49.2
2	50.8	52.4	54.0	55.6	57.1	58.7	60.3	61.9	63.5	65.1	66.7	68.3	69.8	71.4	73.0	74.6
3	76.2	77.8	79.4	81.0	82.5	84.1	85.7	87.3	88.9	90.5	92.1	93.7	95.2	96.8	98.4	100.0
4	101.6	103.2	104.8	106.4	108.0	109.5	111.1	112.7	114.3	115.9	117.5	119.1	120.7	122.2	123.8	125.4
5	127.0	128.6	130.2	131.8	133.4	134.9	136.5	138.1	139.7	141.3	142.9	144.5	146.1	147.6	149.2	150.8
6	152.4	154.0	155.6	157.2	158.8	160.3	161.9	163.5	165.1	166.7	168.3	169.9	171.5	173.0	174.6	176.2
7	177.8	179.4	181.0	182.6	184.2	185.7	187.3	188.9	190.5	192.1	193.7	195.3	196.9	198.4	200.0	201.6
8	203.2	204.8	206.4	208.0	209.6	211.1	212.7	214.3	215.9	217.5	219.1	220.7	222.3	223.8	225.4	227.0
9	228.6	230.2	231.8	233.4	235.0	236.5	238.1	239.7	241.3	242.9	244.5	246.1	247.7	249.2	250.8	252.4
10	254.0	255.6	257.2	258.8	260.4	261.9	263.5	265.1	266.7	268.3	269.9	271.5	273.1	274.6	276.2	277.8
11	279.4	281.0	282.6	284.2	285.7	287.3	288.9	290.5	292.1	293.7	295.3	296.9	298.4	300.0	301.6	303.2
12	304.8	306.4	308.0	309.6	311.1	312.7	314.3	315.9	317.5	319.1	320.7	322.3	323.8	325.4	327.0	328.6
13	330.2	331.8	333.4	335.0	336.5	338.1	339.7	341.3	342.9	344.5	346.1	347.7	349.2	350.8	352.4	354.0
14	355.6	357.2	358.8	360.4	361.9	363.5	365.1	366.7	368.3	369.9	371.5	373.1	374.6	376.2	377.8	379.4
15	381.0	382.6	384.2	385.8	387.3	388.9	390.5	392.1	393.7	395.3	396.9	398.5	400.0	401.6	403.2	404.8
16	406.4	408.0	409.6	411.2	412.7	414.3	415.9	417.5	419.1	420.7	422.3	423.9	425.4	427.0	428.6	430.2
17	431.8	433.5	435.0	436.6	438.1	439.7	441.3	442.9	444.5	446.1	447.7	449.3	450.8	452.4	454.0	455.6
18	457.2	458.8	460.4	462.0	463.5	465.1	466.7	468.3	469.9	471.5	473.1	474.7	476.2	477.8	479.4	481.0
19	482.6	484.2	485.8	587.4	488.9	490.5	492.1	493.7	495.3	496.9	498.5	500.1	501.6	503.2	504.8	506.4
20	508.0	509.6	511.2	512.8	514.3	515.9	517.5	519.1	520.7	522.3	523.9	525.5	527.0	528.6	530.2	531.8
21	533.4	535.0	536.6	538.2	539.7	541.3	542.9	544.5	546.1	547.7	549.3	550.9	552.4	554.0	555.6	557.2
22	558.8	560.4	562.0	563.6	565.1	566.7	568.3	569.9	571.5	573.1	574.7	576.3	577.8	579.4	581.0	582.6
23	584.2	585.8	587.4	589.0	590.5	592.1	593.7	595.3	596.9	598.5	600.1	601.7	603.2	604.8	606.4	608.0

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

TABLE OF DECIMAL EQUIVALENTS

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

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

CABLE AND TELEGRAPH CODE

YERAF *Bolt Cutter, No. 4.
YERDA Regular Equipment with Taps and Dies.
YEREG Regular Equipment without Taps and Dies.
YERFE Taps and Dies only, complete set.

YERGI *Centering Machine, 4-inch.
YERHO Regular Equipment with Drills and Reamers.
YERIH Regular Equipment without Drills or Reamers.

YERKU *Centering Machine, 6-inch.
YERLY Regular Equipment with Drills and Reamers.
YEROK Regular Equipment without Drills or Reamers.

YERUL *Cutting-off Machine, 2½-inch
YESAG Regular Equipment.

YESEH *Cutting-off Machine, 3¼-inch
YESFA Regular Equipment.

YESGE *Die Sinking Machine, No. 2.
YESHI Regular Equipment without Tools.
YESIK Regular and Tool Equipment.
YESKO Tools only, complete set.

YESLU *Die Sinking Machine, No. 3.
YESOL Regular Equipment without Tools.
YETAH Regular and Tool Equipment.
YETEK Tools only, complete set.

YETGA *Drill, No. 11 Gang.
YETHE Regular Equipment.
YETIL Regular Equipment and Power Feed to Table.

YETKI *Drill, No. 11 Multiple Spindle.
YETLO With Square Head, no Power Feed, no Spindles.
YETNY With Square Head and Power Feed, no Spindles.
YETOM With Rectangular Head, no Power Feed, no Spindles.
YEVAK With Rectangular Head and Power Feed, no Spindles.
YEVEL Spindles (specify number and size).

YEVHA *Drill, No. 12 Multiple Spindle.
YEVKE With Square Head, no Power Feed, no Spindles.
YEVLI With Square Head and Power Feed, no Spindles.
YEVON With Rectangular Head, no Power Feed, no Spindles.
YEVPY With Rectangular Head and Power Feed, no Spindles.
YEVUP Spindles (specify number and size).

YEWAL *Drill, No. 13 Multiple Spindle.
YEWEM With Square Head, no Power Feed, no Spindles.
YEWKA With Square Head and Power Feed, no Spindles.
YEWLE With Rectangular Head, no Power Feed, no Spindles.
YEWOP With Rectangular Head and Power Feed, no Spindles.
YEWPU Spindles (specify number and size).

YEWRY Drill, No. 14 Multiple Spindle.
YEXAM With Square Head.
YEXEN With Rectangular Head.
YEXIP Spindles (specify number and size).

YEXLA Drill, No. 7 Type "G" Multiple.
YEXME With 24″ Head.
YEXNI With 36″ Head.
YEXOR Spindles (specify number and size).

YEXPO Drill, No. 10 Type "H" Multiple.
YEXRU With Rectangular Head.
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.**
YEZEP One-spindle, Regular Equipment.
YEZIR Two-spindle, Regular Equipment.
YEZMA Three-spindle, Regular Equipment.
YEZNE Four-spindle, Regular Equipment.
YEZOS Bench, Regular Equipment.
YEZPI Drill Chuck (s).
YEZRO Bell Center.
YEZSU Dead Center.
YEZTY "V" Block with Extension.

YIFUB **Gear Cutting Machine, 60-inch.**
YIFWI For Spur Gears only.
YIFXO For Worm Gears only.
YIFZU For Spur and Worm Gears.
YIGBU Internal Gear Cutting Attachment.

YIGCY **Gear Cutting Machine, 90-inch.**
YIGEX For Spur Gears only.
YIGIZ For Worm Gears only.
YIGOB For Spur and Worm Gears.
YIGUC Internal Gear Cutting Attachment.

YIGVA **Gear Cutting Machine, 120-inch.**
YIGWE For Spur and Worm Gears.
YIGXI Internal Gear Cutting Attachment.

YIGZO ***Grinder, 4 x 30-inch Cylindrical.**
YIHAX Regular Equipment with Automatic Sizing Device.
YIHBO Regular Equipment without Automatic Sizing Device.
YIHCU Grinding Wheel.

YIHDY ***Grinder, 6 x 48-inch Cylindrical.**
YIHEZ Regular Equipment with Automatic Sizing Device.
YIHIB Regular Equipment without Automatic Sizing Device.
YIHOC Grinding Wheel.

YIHUD ***Grinder, 3-foot Vertical Surface.**
YIHWA With Plain Equipment.
YIHXE With Plain Rotary Chuck.
YIHZI With Rectangular Magnetic Chuck.
YIKAZ With Plain Rotary and Rectangular Magnetic Chucks.
YIKBI With Plain Rotary, Rectangular Magnetic and Rotary Magnetic Chucks.
YIKCO With Rectangular Magnetic and Rotary Magnetic Chucks.
YIKDU Plain Rotary Chuck.
YIKEB Rectangular Magnetic Chuck.
YIKFY Rotary Magnetic Chuck.
YIKIC Magnetic Chuck, arranged for 110 volts direct current.
YIKOD Magnetic Chuck, arranged for 220 volts direct current.
YIKUF Grinding Wheel, suitable for——

YIKXA ***Grinder, 6-foot Vertical Surface.**
YIKZE With Plain Equipment.
YILAB With Plain Rotary Chuck.
YILBE With Rectangular Magnetic Chuck.
YILCI With Plain Rotary and Rectangular Magnetic Chucks.
YILDO With Plain Rotary, Rectangular Magnetic and Rotary Magnetic Chucks.
YILEC With Rectangular Magnetic and Rotary Magnetic Chucks.
YILFU Plain Rotary Chuck.
YILGY Rectangular Magnetic Chuck.
YILID Rotary Magnetic Chuck.
YILOF Magnetic Chuck, arranged for 110 volts direct current.
YILUG Magnetic Chuck, arranged for 220 volts direct current.
YILZA Grinding Wheel, suitable for——

YIMAC **Grinder, Thread Milling Machine Cutter.**
YIMBA Regular Equipment.
YIMCE Grinding Wheels.

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

CABLE AND TELEGRAPH CODE—Continued

YIMDI **Grinder, Fish-tail Cutter.**
YIMED Regular Equipment.
YIMFO Grinding Wheels.

YIMGU **Grinder, Gun Barrel Drill.**
YIMHY Regular Equipment.
YIMOG Grinding Wheels (front).
YINAD Grinding Wheels (back).

YINCA **Gun Barrel and Tube Drilling Machine, No. 1.**
YINDE Regular Equipment, 6′ Bed.
YINEF Regular Equipment, 9½′ Bed.
YINFI Regular Equipment, 13′ Bed.
YINGO Regular Equipment, 17′ Bed.
YINHU Machine to drill holes ——— dia. ——— deep.

YINKY *Gun Barrel and Tube Drilling Machine, No. 1½.
YINOH Regular Equipment, 8′ Bed.
YIPAF Regular Equipment, 12′ Bed.
YIPDA Regular Equipment, 16′ Bed.
YIPEG Regular Equipment, 20′ Bed.
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.
YIPLY Regular Equipment, 19′ Bed.
YIPOK Regular Equipment, 40′ Bed.
YIPUL Machine to drill holes ——— dia. ——— deep.

YIRAG *Gun Barrel and Tube Drilling Machine, No. 3.
YIREH Regular Equipment, 20′ Bed.
YIRFA Regular Equipment, 25′ Bed.
YIRGE Regular Equipment, 40′ Bed.
YIRHI Regular Equipment, 46′ Bed.
YIRIK Machine to drill holes ——— dia. ——— deep.

YIRKO *Gun Barrel and Tube Drilling Machine, No. 4.
YIRLU Regular Equipment, 40′ Bed.
YIRMY Machine to drill holes ——— dia. ——— deep.

YIROL *Gun Barrel and Tube Drilling Machine, No. 12.
YISAH Regular Equipment, 16′ Bed.
YISEK Regular Equipment, 27′ Bed.
YISGA Regular Equipment, 33′ Bed.
YISHE Machine to drill holes ——— dia ——— deep.

YISIL **Gun Barrel Turning Machine.**
YISKI Regular Equipment.

YISLO **Gun Barrel Reaming Machine.**
YISNY Regular Equipment.

YISOM **Gun Barrel and Tube Lapping Machine.**
YITAK Regular Equipment.

YITEL **Gun Barrel Rifling Machine, No. 3.**
YITHA Regular Equipment, Uniform Twist and Scrape Cutter.
YITIM Regular Equipment, Uniform Twist and Hook Cutter.
YITKE Regular Equipment, Increased Twist and Hook Cutter.

YITLI **Gun Barrel Rifling Machine, No. 3½.**
YITMO Regular Equipment, Uniform Twist (specify rifling length).
YITON Regular Equipment, Increased Twist (specify rifling length).

YITPY **Gun Barrel Rifling Machine, No. 4.**
YITUP Regular Equipment, Uniform Twist (specify rifling length).
YIXAN Regular Equipment, Increased Twist (specify rifling length).

YIXEP **Gun Barrel Rifling Machine, No. 5.**
YIXIR Regular Equipment, Uniform Twist (specify rifling length).
YIXMA Regular Equipment, Increased Twist (specify rifling length).

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

CABLE AND TELEGRAPH CODE — Continued

YIXNE **Pistol Rifling Machine.**
YIXOS Regular Equipment.

YIXPI **Gun Barrel Chambering Machine.**
YIXRO Regular Equipment.

YIXSU **Gun Receiver, Splining Machine.**
YIXTY Regular Equipment.

YIXUT **Lathe, No. 3 Bench.**
YIZAP Regular Equipment.

YIZER *Countershafts:*
YIZIS Two-speed Wall.
YIZNA Two-speed Wall Rod.
YIZOT Two-speed Wall with Grinding Attachment.
YIZPE Two-speed Wall Rod with Grinding Attachment.
YIZRI Wall Rod Brackets.
YIZSO Wall Rods.

YIZTU *Collets:*
YIZVY Draw-back Collets, English or Metric (specify sizes).
YOBAS Center Collets.

YOBET *Chucks, Combination and Drill Type:*
YOBRA 4″ Three-jaw Comb., 2 Sets of Jaws and Chuck-plate.
YOBSE 6″ Three-jaw Comb., 2 Sets of Jaws and Chuck-plate.
YOBTI Chuck-plate, Blank.
YOBUX Drill Chuck, $\frac{2}{6}\frac{1}{4}$ with Taper Stem.

YOBVO *Chucks, Face-plate Type:*
YOBXY With Tapped Holes.
YOCAT With T-slots.
YOCOX Set of 4 Jaws for Chuck with T-slots.

YOCSA *Step-chucks and Closers:*
YOCTE Chuck "A".
YOCUZ Chuck "B".
YOCVI Chuck "C".
YOCWO Chuck "D".
YOCZY Chuck "E".
YODBY Closer "A".
YODIX Closer "B".
YODOZ Closer "C".
YODTA Closer "D".
YODUB Closer "E".
YODWI Complete Set of Step-chucks and Closers.

YODXO *Centers:*
YODZU Large, Plain.
YOFBU Female.
YOFCY Plain "V".
YOFEX Swivel "V".

YOFIZ *Drill Pads:*
YOFOB 1″ Diameter.
YOFVA 2″ Diameter.
YOFWE 4″ Diameter.
YOFXI 6″ Diameter.
YOFZO *Indexing Parts:*
YOGAX Index Pawl and Block.
YOGBO Index Plate for Head (specify notches).

YOGCU *Angle Plate.*

YOGDY *Raising Blocks, Set of Three.*

YOGEZ *Slide-rests.*
YOGIB Compound Slide-rest, English Screws and Dials.
YOGOC Compound Slide-rest, Metric Screws and Dials.
YOGUD Double Slide-rest with Lever Movement.
YOGWA Double Slide-rest with Screw Movement.

YOGXE *Grinding Rests:*
YOGZI With Traversing Spindles, English Screws and Dials.
YOHAZ With Traversing Spindles, Metric Screws and Dials.
YOHBI Slide-rest, Traverse Spindle Grinder.
YOHCO Slide-rest, Tool Post Grinder.

YOHDU *Quill Parts:*
YOHEB Quill Rest.
YOHFY Chuck Quill.
YOHIC Face-plate Quill with Tapped Holes in Face-plate.
YOHOD Face-plate Quill with T-slots in Face-plate.
YOHUF Quill Driver.

CABLE AND TELEGRAPH CODE—Continued

YOHXA *Table Rests:*
YOHZE Triangular.
YOKAB Rectangular.

YOKBE *Back-rests:*
YOKCI 3″ Capacity.
YOKDO 4″ Capacity.
YOKEC 5″ Capacity.
YOKFU 6″ Capacity.

YOKGY *Tailstocks:*
YOKID Lever Tailstock, Plain.
YOKOF Lever Tailstock with Cross Slide.
YOKUG Open-Tailstock with one Spindle and Pulley.
YOKZA Half Open-Tailstock with one Spindle and Dog.
YOLAC Extra Spindle and Dog for Half Open-Tailstock.

YOLBA *Milling Attachment:*
YOLCE With 48-Notch Index Plate, English Screws and Dials.
YOLDI With 48-Notch Index Plate, Metric Screws and Dials.
YOLFO Cutter Head for Milling Attachment.
YOLGU Arbors for Milling Attachment (specify sizes).

YOLHY *Filing Attachment:*
YOLIF Complete with Driver.

YOLOG *Threading Attachment:*
YOLUH With English Micrometer Adjustment.
YOMAD With Metric Micrometer Adjustment.
YOMCA Hob Screws with Hob for Chasing Nut (specify pitches).
YOMDE Threading Tool and Holder.
YOMEF Brackets and Gear for accommodating Old Model Threading Attachment to New Model Lathe.

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.

YOMOH Compound Elevating Rest in place of Rise and Fall Rest.
YOMUK Quick Withdrawing Mechanism for Compound Elevating Rest.
YONAF Collets, English or Metric (specify sizes).
YONDA Chuck-plate, 3″ dia. (Blank), ready to receive Chuck.
YONEG Chuck-plate, 3½″ dia. (Blank), ready to receive Chuck.

YONFE *Tool Equipment—10-inch Lathe.*
YONGI *Chucks:*
YONHO 1—4″ Three-jaw Comb. with 2 Sets of Jaws and Plate.
YONIH 1—6″ Three-jaw Comb. with 2 Sets of Jaws and Plate.
YONKU 1—$\frac{5}{16}$″ Drill Chuck with Taper Stem.
YONLY 1—$\frac{5}{16}$″ Drill Holder, Size "A", No. 60 to $\frac{5}{16}$″ Capacity.

YONOK *Step-chucks and Closers:*
YONUL 2—Step-chucks $\frac{5}{8}$″ to 2″ Capacity.
YOPAG 2—Step-chucks 2″ to 4″ Capacity.
YOPEH 2—Step-chucks 4″ to 6″ Capacity.
YOPFA 1—Closer for 2″ Step-chucks.
YOPGE 1—Closer for 4″ Step-chucks.
YOPHI 1—Closer for 6″ Step-chucks.

YOPIK *Tool Holders:*
YOPKO 1—Threading Tool Holder, No. 2 P. & W., with "V" Single Cutter.
YOPLU 1—Cutter "V" Double Off-set.
YOPMY 1—Cutter for Center Turning.
YOPOL 12—Cutters, U. S. S., from 6 to 20 Pi. (English Equipment).
YORAH 12—Cutters, Int. Std., from 1 to .5 m/m P. (Metric Equipment).
YOREK 12—Cutters, Whitworth Std., 5 to 20 Pi. (to order only).
YORGA 1—Knurling Tool Holder with 3 pairs of Knurls, fine, medium and coarse.

YORHE 1—Combination Tool Holder with 13 High Speed Cutters,

CABLE AND TELEGRAPH CODE—Continued

2 Small Boring Bars and Holder, 1 Centering Tool, 1 Wrench.

YORIL 1—Cutting-off Tool Holder, No. 0 Johnson, with 12 Blades.

YORKI 18—Center Reamers, 6 each ¼″, ⅜″ and ½″ cut.

YORLO 1—Screw Pitch Gauge

YORNY 1—Center Gauge.

YOROM 1—Female Center

YOSAK 1—Cabinet for Tools.

YOSEL 1—Pyramid for Chucks, etc.

YOSHA Tool Equipment Complete, English.

YOSIM Tool Equipment Complete, Metric.

YOSKE Tool Equipment Complete, Whitworth.

YOSLI **Lathe, 14-inch.**

YOSMO *6′ Bed, Regular Equipment, English.*

YOSON 6′ Bed, Regular Equipment, English, also Pan (no Oil Pump).

YOSPY 6′ Bed, Regular Equipment, English, also Pan and Oil Pump.

YOSUP 6′ Bed, Regular Equipment, English, also Regular Relieving Attachment, Spiral Relieving Attachment, Draw-back Collet Attachment, complete with Collets, Expansion Arbors and Bushings, complete set.

YOTAL Above Equipment, ditto, also Pan (no Oil Pump).

YOTEM Above Equipment, ditto, also Pan and Oil Pump.

YOTIN *8′ Bed, Regular Equipment, English.*

YOTKA 8′ Bed, Regular Equipment, English, also Pan (no Oil Pump).

YOTLE 8′ Bed, Regular Equipment, English, also Pan and Oil Pump.

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.

YOTNO Above Equipment, ditto, also Pan (no Oil Pump).

YOTOP Above Equipment, ditto, also Pan and Oil Pump.

YOTPU *10′ Bed, Regular Equipment English.*

YOTRY 10′ Bed, Regular Equipment, English, also Pan (no Oil Pump).

YOTUR 10′ Bed, Regular Equipment, English, also Pan and Oil Pump.

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.

YOVEN Above Equipment, ditto, also Pan (no Oil Pump).

YOVIP Above Equipment, ditto, also Pan and Oil Pump.

YOVLA *6′ Bed, Regular Equipment, Metric.*

YOVME 6′ Bed, Regular Equipment, Metric, also Pan (no Oil Pump).

YOVOR 6′ Bed, Regular Equipment, Metric, also Pan and Oil Pump.

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.

YOVRU Above Equipment, ditto, also Pan (no 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 ⅜″ to ⅞″ 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 ¾″ to 1⅞″ diameter, advancing by sixteenths and from 1½″ to 2″, advancing by eighths.

YOXSO *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 ⅜″ to ⅞″ 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 ¾″ to 1⅞″ diameter, advancing by sixteenths and from 1½″ 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 ⅜″ to ⅞″ 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 ¾″ to 1⅞″ diameter, advancing by sixteenths and from 1½″ 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, Oil Pan, Cabinet and Reservoir Legs.

YUBAT *Taper Attachment:*
YUBOX Taper Attachment not wanted.

YUBSA *Relieving Attachment:*
YUBTE Regular Relieving Attachment.
YUBUZ Spiral Relieving Attachment.

YUBVI *Collet Attachment:*
YUBWO Collet Attachment Complete with Collets.
YUBZY Collet Attachment without Collets.
YUCBY Collets, English or Metric (specify sizes).
YUCIX Rack for Collets and Expansion Arbors.

YUCOZ *Expansion Arbors and Bushings:*
YUCTA No. 1 Arbor.
YUCUB No. 2 Arbor.
YUCWI No. 3 Arbor.
YUCXO 4—Bushings for No. 1 Arbor, Regular Sizes, English.
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, 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.*

YUGFY 6′ Bed, Regular Equipment, English, also Pan (no Oil Pump).

YUGIC 6′ Bed, Regular Equipment, English, 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.

YUGUF Above Equipment, ditto, also Pan (no Oil Pump).

YUGXA Above Equipment, ditto, also Pan and Oil Pump.

YUGZE *8′ Bed, Regular Equipment, English.*

YUHAB 8′ Bed Regular Equipment, English, also Pan (no Oil Pump).

YUHBE 8′ Bed, Regular Equipment, English, 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.

YUHDO Above Equipment, ditto, also Pan (no Oil Pump).

YUHEC Above Equipment, ditto, also Pan and Oil Pump.

YUHFU *10′ Bed, Regular Equipment, English.*

YUHGY 10′ Bed, Regular Equipment, English, also Pan (no Oil Pump).

YUHID 10′ Bed, Regular Equipment, English, also Pan and Oil Pump.

YUHOF 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.

YUHUG Above Equipment, ditto, also Pan (no Oil Pump).

YUHZA Above Equipment, ditto, also Pan and Oil Pump.

YUKAC *6′ Bed, Regular Equipment, Metric.*

YUKBA 6′ Bed, Regular Equipment, Metric, also Pan (no Oil Pump).

YUKCE 6′ Bed, Regular Equipment, Metric, also Pan and Oil Pump.

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.

YUKED Above Equipment, ditto, also Pan (no Oil Pump).

YUKFO Above Equipment, ditto, also Pan and Oil Pump.

YUKGU *8′ Bed, Regular Equipment, Metric.*

YUKHY 8′ Bed, Regular Equipment, Metric, also Pan (no Oil Pump).

YUKIF 8′ Bed, Regular Equipment, Metric, also Pan and Oil Pump.

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.

YUKUH Above Equipment, ditto, also Pan (no Oil Pump).

YULAD Above Equipment, ditto, also Pan and Oil Pump.

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 ⅜″ to 1¼″ 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 ¾″ to 1⅞″ diameter, advancing by sixteenths and from 1½″ 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 ⅜″ to 1¼″ 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 ¾″ to 1⅞″ diameter, advancing by sixteenths and from 1½″ 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 ⅜″ to 1¼″ 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, ¾″ to 1⅞″ diameter, advancing by sixteenths, and from 1½″ 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.
YUNKO Ball Turning Rest.
YUNLU Roller Follow Rest.

YUNOL *Taper Attachment:*
YUPAH Taper Attachment not wanted.

YUPEK *Relieving Attachment:*
YUPGA Regular Relieving Attachment.
YUPHE Spiral Relieving Attachment.
YUPIL Side Relieving Attachment.

YUPKI *Collet Attachment:*
YUPLO Collet Attachment Complete.
YUPNY Collet Attachment without Collets.
YUPOM Collets, English or Metric (specify sizes).
YURAK Rack for Collets and Expansion Arbors.

YUREL *Expansion Arbors and Bushings:*
YURHA No. 1 Arbor.
YURKE No. 2 Arbor.
YURLI No. 3 Arbor.
YURMO 4—Bushings for No. 1 Arbor, Regular Sizes, English.
YURON 8—Bushings for No. 2 Arbor, Regular Sizes, English.
YURPY 5—Bushings for No. 3 Arbor, Regular Sizes, English.
YUSAL* 5—Bushings for No. 1 Arbor, Regular Sizes, Metric.
YUSEM 6—Bushings for No. 2 Arbor, Regular Sizes, Metric.
YUSIN 6—Bushings for No. 3 Arbor, Regular Sizes, Metric.
YUSKA Draw-in Spindle.
YUSLE Complete Set of Arbors and Bushings with Draw-in Spindle, English.
YUSMI Complete Set of Arbors and Bushings without Draw-in Spindle, English.
YUSNO Complete Set of Arbors and Bushings with Draw-in Spindle, Metric.
YUSOP Complete Set of Arbors and Bushings without Draw-in Spindle, Metric.

YUSPU *Step-chuck and Closer Attachment:*
YUSRY 2—Step-chucks, 7/8″ to 3¾″ Capacity.
YUTAM 1—Step-chuck, 3¾″ to 7″ Capacity.
YUTEN 1—Step-chuck with 4 Adjustable Jaws, 4½″ Capacity.
YUTIP 1—Closer for 3¾″ Chuck.
YUTLA 1—Closer for 7″ and 4½″ Chucks.
YUTME 1—Spindle Bushing for Step-chucks.
YUTNI 1—Draw-in Spindle.
YUTOR Complete Set of Chucks and Closers with Draw-in Spindle.
YUTPO Complete Set of Chucks and Closers without Draw-in Spindle.

YUTRU *Chuck-plates:*
YUTSY 7″ dia. (Blank) ready to receive Chuck.
YUTUS 3½″ dia. (Blank) ready to receive Chuck.
YUXAR Indexing Face-plates for Multiple Thread Cutting.

YUXES *Micrometer Stop Clamp.*

YUXIT ***Lathe, 5/8 x 4½-inch Turret.**
YUXPA Equipment "A", English.
YUXRE Equipment "B", English.
YUXSI Equipment "A", Metric.
YUXTO Equipment "B", Metric.
YUXWY Equipment "B", Whitworth.
YUZAS Machine without Rod Chuck or Rod Feed Mechanism.
YUZET Internal Oiling Arrangement to Turret.
YUZRA Collets, Round (specify sizes).
YUZSE Collets, Hexagon (specify sizes).
YUZTI Collets, Square (specify sizes).
YUZVO Two-jaw Chuck (specify jaws).
ZABAV Step-chuck and Closer Attachment.
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.
ZABUB Multiple Turner with two Tangent Cutters.
ZABWI Extra Cutter and Holder for Multiple Tangent Turner.
ZABXO Multiple Turner with two Radial Cutters.
ZABZU Extra Cutter and Holder for Multiple Radial Turner.
ZACAW End Forming and Pointing Tool.
ZACBU Reamer Holder, Floating Type.
ZACCY Tap Holder, Releasing Type.
ZACEX Drill and Counterbore Holder.
ZACIZ Dovetail Forming Tool Holder.
ZACOB Die-head, $\frac{9}{16}$″, Self-opening (specify chasers, sizes and form of thread).
ZACUC Die-head, $\frac{5}{16}$″, Self-opening, with seven sets of Standard Chasers, U. S. S.
ZACVA *Lathe, 1 x 15-inch Turret.
ZACWE Equipment "A" without Power Feed, English.
ZACXI Equipment "A" with Power Feed, English.
ZACZO Equipment "B" without Power Feed, English.
ZADAX Equipment "B" with Power Feed, English.
ZADBO Equipment "A" without Power Feed, Metric.
ZADCU Equipment "A" with Power Feed, Metric.
ZADDY Equipment "B" without Power Feed, Metric.
ZADEZ Equipment "B" with Power Feed, Metric.
ZADIB Equipment "B" without Power Feed, Whitworth.
ZADOC Equipment "B" with Power Feed, Whitworth.
ZADUD Machine without Rod Chuck or Rod Feed Mechanism.
ZADWA Internal Oiling Arrangement to Turret.
ZADXE Collets, Round (specify sizes).
ZADZI Collets, Hexagon (specify sizes).
ZAFAZ Collets, Square (specify sizes).
ZAFBI Two-jaw Chuck (specify jaws).
ZAFCO Step-chuck and Closer Attachment.
ZAFDU Extra Step-chucks (specify number).
ZAFEB Turret Stop for Rod Feed.
ZAFFY Single Turner with Tangent Cutter and "V" Back-rests.
ZAFIC Single Turner with Radial Cutter.
ZAFOD Multiple Turner with two Tangent Cutters.
ZAFUF Extra Cutter and Holder for Multiple Tangent Turner.
ZAFXA Multiple Turner with two Radial Cutters.
ZAFZE Extra Cutter and Holder for Multiple Radial Turner.
ZAGAB End Forming and Pointing Tool.
ZAGBE Tape Turner.
ZAGCI Reamer Holder, Floating Type.
ZAGDO Tap Holder, Releasing Type.
ZAGEC Drill and Counterbore Holder.
ZAGFU Dovetail Forming Tool Holder.
ZAGGY Die-head, ¾″, Self-opening (specify chasers, sizes and form of thread).
ZAGID Die-head, ¾″, Self-opening, with eight sets of Standard Chasers, U. S. S.
ZAGOF *Lathe, 1½ x 18-inch Turret.
ZAGUG Equipment "A", English.
ZAGZA Equipment "B", English.
ZAHAC Equipment "A", Metric.
ZAHBA Equipment "B", Metric.
ZAHCE Equipment "B", Whitworth.
ZAHDI Machine without Rod Chuck or Rod Feed Mechanism.
ZAHED Internal Oiling Arrangement to Turret.
ZAHFO Chuck Jaws, Round (specify sizes).
ZAHGU Chuck Jaws, Hexagon (specify sizes).
ZAHIF Chuck Jaws, Square (specify sizes).
ZAHOG 7½″, ZAHUH 9″, ZAKAD 12″ — Three-jaw Geared Scroll Chuck with two sets of Jaws for inside and outside gripping.
ZAKCA Two-jaw Chuck (specify jaws).

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

CABLE AND TELEGRAPH CODE—Continued

ZAKDE Drill Chuck, 1″ capacity, fitted to Turret.
ZAKEF Three-taper Split Sleeves for Drill Chuck (specify tapers).
ZAKFI Drill and Counterbore Holder.
ZAKGO Step-chuck and Closer Attachment.
ZAKHU Extra Step-chucks (specify number).
ZAKIG Universal Turner with "V" Back-rests.
ZAKKY Universal Turner with Roller Back-rests.
ZAKOH Bell-mouth Pointing Tool.
ZAKUK End Forming and Pointing Tool.
ZALAF Open Side Turner.
ZALDA Taper Turner.
ZALEG Reamer Holder, Floating Type.
ZALFE Tap Holder, Releasing Type.
ZALGI Dovetail Forming Tool Holder.
ZALHO Die-head, 1″, Self-opening (specify chasers, sizes and form of thread).
ZALIH Die-head, 1″, Self-opening, with eight sets of Standard Chasers, U. S. S.
ZALKU Die-head, 1¼″, Self-opening (specify chasers, sizes and form of thread).
ZALLY Die-head, 1¼″, Self-opening, with eight sets of Standard Chasers, U. S. S.
ZALOK Die-head, 1½″, Self-opening (specify chasers, sizes and form of thread).
ZALUL Die-head, 1½″, Self-opening, with eight sets of Standard Chasers, U. S. S.
ZAMAG Round Tool Holder, 2¼″, for 1¼″ Die-head.

ZAMEH ***Lathe, 2 x 26-inch Turret.**
ZAMFA Equipment "A", English.
ZAMGE Equipment "B", English.
ZAMHI Equipment "C", English.
ZAMIK Equipment "A", Metric.
ZAMKO Equipment "B" Metric.
ZAMLU Equipment "C", Metric.
ZAMOL Equipment "B", Whitworth.
ZANAH Equipment "C", Whitworth.

ZANEK Machine without Rod Chuck or Rod Feed Mechanism.
ZANGA Internal Oiling Arrangement to Turret.
ZANHE Chuck Jaws, Round (specify sizes).
ZANIL Chuck Jaws, Hexagon (specify sizes).
ZANKI Chuck Jaws, Square (specify sizes).

ZANLO 7½″
ZANNY 9″
ZANOM 12″
Three-jaw Geared Scroll Chuck with two sets of Jaws for inside and outside gripping.

ZAPAK Forging Chuck with 2″ Shank.
ZAPEL Lever Scroll Chuck, 6″ fitted to Turret.
ZAPHA Two-jaw Chuck (specify jaws).
ZAPIM Drill Chuck, 1½″ capacity, fitted to Turret.
ZAPKE Four-taper Split Sleeves for Drill Chuck (specify tapers).
ZAPLI Step-chuck and Closer Attachment.
ZAPMO Extra Step-chucks (specify number).
ZAPON Universal Turner with "V" Back-rests.
ZAPPY Universal Turner with Roller Back-rests.
ZAPUP Bell-mouth Pointing Tool.
ZARAL End Forming and Pointing Tool.
ZAREM Open Side Turner.
ZARIN Taper Turner.
ZARKA Reamer Holder, Floating Type.
ZARLE Tap Holder, Releasing Type.
ZARMI Dovetail Forming Tool Holder.
ZARNO Die-head, 1¼″, Self-opening (specify chasers, sizes and form of thread).
ZAROP Die-head, 1¼″, Self-opening, with eight sets of Standard Chasers, U. S. S.
ZARRY Die-head, 1½″, Self-opening (specify chasers, sizes and form of thread).
ZARUR Die-head, 1½″, Self-opening with eight sets of Standard Chasers, U. S. S.

*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).

ZASEN Die-head, 2″, Self-opening, with eight sets of Standard Chasers, U. S. S.

ZASIP Round Tool Holder, 3″, for 2″ Die-head.

ZASLA ***Lathe, 3 x 36-inch Turret.**

ZASME Equipment "A" English.

ZASNI Equipment "B" English.

ZASOR Equipment "A" Metric.

ZASPO Equipment "B" Metric.

ZASRU Equipment "B" Whitworth.

ZASSY Machine without Rod Chuck or Rod Feed Mechanism.

ZASUS Internal Oiling Arrangement to Turret.

ZATAN Chuck Jaws, Round (specify sizes).

ZATEP Chuck Jaws, Hexagon (specify sizes).

ZATIR Chuck Jaws, Square (specify sizes).

ZATMA 9″, ZATNE 12″, ZATOS 15″ — Three-jaw Geared Scroll Chuck with two sets of Jaws for inside and outside gripping.

ZATPI Forging Chuck.

ZATRO 8½″ Lever Scroll Chuck with Holder.

YATSU Two-jaw Chuck (specify jaws).

ZATTY Drill Chuck, 2″ capacity, with 2¼″ Round Shank.

ZATUT Five-taper Split Sleeves for 2″ Drill Chuck (specify taper).

ZAVAP Step-chuck and Closer Attachment.

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.

ZAVVY Tap Holder, Releasing Type.

ZAWAR Dovetail Forming Tool Holder.

ZAWES Die-head, 1½″, Self-opening (specify chasers, sizes and form of thread).

ZAWIT Die-head, 1½″, Self-opening, with eight sets of Standard Chasers, U. S. S.

ZAWPA Die-head, 2″, Self-opening (specify chasers, sizes and form of thread).

ZAWRE Die-head, 2″, Self-opening, with eight sets of Standard Chasers, U. S. S.

ZAWSI Die-head, 3″, Self-opening (specify chasers, sizes and form of thread).

ZAWTO Die-head, 3″, Self-opening, with eight sets of Standard Chasers, U. S. S.

ZAXAS Round Tool Holder, 2¼″, for 1½″ Die-head.

ZAXET Round Tool Holder, 3″, for 2″ Die-head.

ZAXRA Round Tool Holder, 4″, for 3″ Die-head.

ZAXSE ***Lathe, 2½ x 26-inch Turntable.**

ZAXTI Equipment "A".

ZAXVO Equipment "B", English.

ZAZAT Equipment "B", Metric.

ZAZOX Equipment "C".

ZAZSA Equipment "D".

ZAZTE Equipment "E", English.

ZAZUZ Equipment "E", Metric.

ZAZVI Special Forming Slide with Power Transverse Feed.

ZAZWO Lead Screw and Change Gears for Thread Cutting.

ZAZZY Tool Holder for inside and outside Thread Cutting.

ZEBBU 15″, Three-jaw Geared Scroll Chuck, with three sets of Jaws.

ZEBCY Two-jaw Chuck, 6¼″ diameter (specify jaws).

ZEBEX Two-jaw Chuck, 8¾″ diameter (specify jaws).

ZEBIZ Forging Chuck.

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

CABLE AND TELEGRAPH CODE—Continued

ZEBOB Lever Scroll Chuck, 6″.
ZEBUC Chuck Jaws for Rod Chuck (specify sizes).
ZEBVA Chuck Plate, Blank.
ZEBWE Step-chuck and Closer Attachment.
ZEBXI Extra Step-chucks (specify number).
ZEBZO Face-plate Equipment.
ZECAX Universal Turner with "V" Back-rests.
ZECBO Universal Turner with Roller Back-rests, Leading.
ZECCU Universal Turner with Roller Back-rests, Following.
ZECDY Universal Turner (Blank).
ZECEZ Roller Back-rest, Leading.
ZECIB Roller Back-rest, Following.
ZECOC "V" Back-rest Holders.
ZECUD "V" Back-rest, Large.
ZECWA "V" Back-rest, Small.
ZECXE Open Side Turner.
ZECZI Bell-mouth Pointing Tool.
ZEDAZ End Forming and Pointing Tool.
ZEDBI Turntable Cut-off and Pointing Tool.
ZEDCO Triple Tool Holder.
ZEDDU Tool Post Holder with two Tool Posts.
ZEDEB Off-set Tool Post Holder with two Tool Posts.
ZEDFY Round Tool Holder, 3″, without Bushings.
ZEDIC Bushings for 3″ Round Tool Holder (specify size).
ZEDOD Round Tool Holder, 2¼″, without Bushings.
ZEDUF Bushings for 2¼″ Round Tool Holder (specify size).
ZEDXA Multiple Tool Holder.
ZEDZE Boring Bar with Adjustable Cutter, 1⅛″ x 10″.
ZEFAB Boring Bar with Adjustable Cutter, 1½″ x 12″.
ZEFBE Taper Adapter, No. 2 Morse.
ZEFCI Taper Adapter, No. 3 Morse.
ZEFDO Taper Adapter, No. 4 Morse.
ZEFEC Taper Adapter, No. 5 Morse.
ZEFFU Reamer Holder, Floating Type.
ZEFGY Tap Holder, Releasing Type.
ZEFID Taper Turner.
ZEFOF Double End Cutter Bar with two Cutters and Holding Blocks.
ZEFUG Die-head, 1½″, Self-opening (specify chasers, sizes and form of thread).
ZEFZA Die-head, 1½″, Self-opening, with eight sets of Standard Chasers, U. S. S.
ZEGAC Die-head, 2″, Self-opening (specify chasers, sizes and form of thread).
ZEGBA Die-head, 2″, Self-opening, with eight sets of Standard Chasers, U. S. S.

ZEGCE **Measuring Machine.**
ZEGDI 12-inch.
ZEGED 24-inch.
ZEGFO 36-inch.
ZEGHY 48-inch.
ZEGIF 80-inch.
ZEGOG 300-millimeter.
ZEGUH 600-millimeter.
ZEHAD 1000-millimeter.
ZEHCA 1200-millimeter.
ZEHDE 2000-millimeter.
ZEHEF Combination English and Metric Machine.

ZEHFI **Milling Machine, No. 00 Bench.**
ZEHGO Regular Equipment.
ZEHIG Index Quill and Center.
ZEHKY Swivel Vise.
ZEHOH Right Angle Piece.

ZEHUK ***Milling Machine, No. 10 Hand.**
ZEKAF Regular Equipment, no Arm, no Vise.
ZEKDA Regular Equipment, no Arm, with Vise.
ZEKEG Regular Equipment with Arm, no Vise.
ZEKFE Regular Equipment with Arm and Vise.
ZEKGI Combination Screw and Rack Transverse Feed.

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

CABLE AND TELEGRAPH CODE—Continued

ZEKHO Vertical Milling Attachment.
ZEKIH Vise, No. 2½.
ZEKKU Arbor, no Arm (specify diameter and cutter length).
ZEKLY Arbor with Arm (specify diameter and cutter length).

ZEKOK ***Milling Machine, No. 2 Hand, Regular.**
ZEKUL Regular Equipment, no Arm, no Vise.
ZELAG Regular Equipment, no Arm, with Vise.
ZELEH Regular Equipment with Arm, no Vise.
ZELFA Regular Equipment with Arm and Vise.
ZELGE Vertical Milling Attachment.
ZELIK Vise, No. 11.
ZELKO Arbor, no Arm (specify diameter and cutter length).
ZELMY Arbor with Arm (specify diameter and cutter length).

ZELOL ***Milling Machine, No. 2 Hand, Vertical Vise Slide.**
ZEMAH Regular Equipment, no Arm, no Vise.
ZEMEK Regular Equipment, no Arm, with Vise.
ZEMGA Regular Equipment with Arm, no Vise.
ZEMHE Regular Equipment with Arm and Vise.
ZEMIL Vertical Milling Attachment.
ZEMKI Vise, No. 2½.
ZEMLO Arbor, no Arm (specify diameter and cutter length).
ZEMOM Arbor with Arm (specify diameter and cutter length).

ZENAK ***Milling Machine, No. 2 Column Power.**
ZENEL Regular Equipment, no Vise.
ZENHA Regular Equipment with Vise.
ZENIM Vertical Milling Attachment.
ZENKE Vise, No. 11.
ZENLI Arbor (specify diameter and cutter length).

ZENON **Milling Machine, No. 2 Lincoln.**
ZENPY Regular Equipment, no Vise.
ZEPAL Regular Equipment with Vise.
ZEPEM Vise, No. 4, with Extension Crank Wrench.
ZEPIN Vise, No. 4, with Plain Crank Wrench.
ZEPKA Arbor (specify diameter and cutter length).

ZEPLE **Milling Machine, No. 12 Lincoln.**
ZEPMI Regular Equipment, no Vise.
ZEPNO Regular Equipment with Vise.
ZEPOP Oil Pump Equipment not wanted
ZEPRY Vise, No. 12, with Extension Crank Wrench.
ZEPUR Vise, No. 12, with Plain Crank Wrench.
ZERAM Arbor (specify diameter and cutter length).

ZEREN **Milling Machine, No. 13 Lincoln.**
ZERIP Regular Equipment, no Vise.
ZERLA Regular Equipment with Vise
ZERME Oil Pump Equipment not wanted.
ZERNI Vise, No. 12, with Extension Crank Wrench.
ZEROR Vise, No. 12, with Plain Crank Wrench.
ZERPO Arbor (specify diameter and cutter length).

ZERRU **Milling Machine, No. 3½ Power.**
ZERSY Regular Equipment (specify length of table).

ZERUS **Milling Machine, No. 2 Vertical.**
ZESAN Regular Equipment (specify length of table).

ZESEP **Milling Fixture, Index.**
ZESIR Regular Equipment.

ZESMA ***Milling Machine, Spline.**
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.
ZESRO Taper Bushing Chuck (small), no Bushings.
ZESTY Bushings for Small Taper Bushing Chuck (specify tapers).
ZESUT Taper Bushing Chuck (large), no Bushings.
ZETAP Bushings for Large Taper Bushing Chuck (specify tapers).
ZETER Cutters, Two-lip (specify sizes).
ZETIS Cutters, Four-lip (specify sizes).

ZETNA ***Milling Machine, 4½ x 12-inch Thread.**
ZETOT Regular Equipment, English.
ZETPE Regular Equipment, Metric.
ZETRI Machine arranged for Internal Milling.
ZETSO Spindle Collets (specify sizes).
ZETVY Follow Rest Bushings (specify sizes).
ZEVAR Draw-back Collet Mechanism with one Collet (specify sizes).
ZEVES Draw-back Collets (specify sizes).
ZEVIT Cutters (specify form, diameter and pitch).

ZEVPA ***Milling Machine, 6-inch Thread.**
ZEVRE 6 x 14″ Regular Equipment, English.
ZEVSI 6 x 14″ Regular Equipment, Metric.
ZEVTO 6 x 48″ Regular Equipment, English.
ZEWAS 6 x 48″ Regular Equipment, Metric.
ZEWET 6 x 80″ Regular Equipment, English.
ZEWRA 6 x 80″ Regular Equipment, Metric.
ZEWSE 6 x 132″ Regular Equipment, English.
ZEWTI 6 x 132″ Regular Equipment, Metric.
ZEWXY Oversize Head, Tailstock and Follow Rest in place of Regular.
ZEXAT Oversize Cutter Head in place of Regular.
ZEXOX Backing-out Attachment.
ZEXSA Compound Taper Attachment.
ZEXTE Stationary Rest.
ZEXUZ Power Quick Return Device.
ZEXVI Draw-back Collet Attachment with one Collet (Regular Head).
ZEXZY Draw-back Collet Attachment with one Collet, Oversize Head.
ZEZBY Draw-back Collets for Regular or Oversize Head (specify sizes).
ZEZIX Spindle Collets Regular Head (specify sizes).
ZEZOZ Spindle Collets Oversize Head (specify sizes).
ZEZTA Bushings, Collet for Regular Head (specify sizes).
ZEZUB Bushings, Collet for Oversize Head (specify sizes).
ZEZWI Bushings, Follow Rest, Regular Head (specify sizes).
ZIBAX Bushings, Follow Rest Oversize Head (specify sizes).
ZIBBO Bushings, Tailstock, Regular Head (specify sizes).
ZIBCU Bushings, Tailstock, Oversize Head (specify sizes).
ZIBDY Cutters (specify form, diameter and pitch).

ZIBEZ ***Milling Machine, 12 x 48-inch Thread.**
ZIBIB Regular Equipment, English.
ZIBOC Regular Equipment, Metric.
ZIBUD Oversize Cutter Head in place of Regular.
ZIBWA Bushings, Collet (specify sizes).
ZIBZI Bushings, Tailstock, H. & G. (specify sizes).
ZICAZ Bushings, Tailstock, C. I. (specify sizes).
ZICBI Cutters (specify form, diameter and pitch).
ZICCO ***Profiling Machine, No. 11.**
ZICDU Regular Equipment, Gear Drive.
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).
ZICUF ***Profiling Machine, No. 12.**
ZICXA Regular Equipment, Gear Drive.
ZICZE Regular Equipment, Belt Drive.
ZIDAB Oil Pump Equipment not wanted.
ZIDBE Raising Blocks (specify height).
ZIDCI Spindles with special Tapers (specify tapers).
ZIDDO Cutters (specify style and size).

ZIDEC ***Profiling Machine, No. 13.**
ZIDFU Regular Equipment, Gear Drive.
ZIDGY Regular Equipment, Belt Drive.
ZIDID Oil Pump Equipment not wanted.
ZIDOF Raising Blocks (specify height).
ZIDUG Spindle with special Taper (specify taper).
ZIDZA Cutters (specify style and size).

ZIFAC ***Profiling Machine, No. 14.**
ZIFBA Regular Equipment, Gear Drive.
ZIFCE Regular Equipment, Belt Drive.
ZIFDI Oil Pump Equipment not wanted.
ZIFED Raising Blocks (specify height).
ZIFFO Spindles with special Tapers (specify tapers).
ZIFGU Cutters (specify style and size).

ZIFHY **Pumps, Rotary.**
ZIFIF No. 0.
ZIFOG No. 2.
ZIGAD No. 3.
ZIGCA No. 12.

ZIGDE **Roll Grooving Machine, No. 1.**
ZIGEF Regular Equipment.

ZIGFI **Roll Grooving Machine, No. 2.**
ZIGGO Regular Equipment.

ZIGHU **Screw Machine, No. 1 Automatic.**
ZIGIG Regular Equipment cammed.
ZIGKY Regular Equipment Uncammed.
ZIGUK Collets (specify sizes).
ZIHAF Feed Tubes (specify sizes).

ZIHDA **Screw Machine, No. 2 Automatic.**
ZIHEG Regular Equipment, Cammed.
ZIHFE Regular Equipment, Uncammed.
ZIHGI Collets (specify sizes).
ZIHLY Feed Tubes (specify sizes).

ZIHOK **Screw Machine, No. 1 Hand.**
ZIHUL Regular Equipment.
ZIKAG Collets (specify sizes).

ZIKEH **Screw Machine, No. 2 Hand.**
ZIKFA Regular Equipment, Regular Head.
ZIKGE Regular Equipment, Oversize Head.
ZIKHI Screw Cut-off in place of Lever.
ZIKIK Rack and Pinion Feed for Turret Slide.
ZIKKO Collets (specify sizes).

ZIKLU **Shaving Machine, No. 2.**
ZIKMY Regular Equipment.
ZIKOL Screw Cut-off in place of Lever.
ZILAH Collets (specify sizes).

ZILEK **Sub-press Bases and Stands.**
ZILGA No. 1.
ZILHE No. 2.
ZILIL No. 3.
ZILKI No. 4.
ZILLO No. 5.
ZILNY No. 6.

INUWI **Motor driven.**
INUXO Motor driven, including constant speed, alternating current motor (——— volts).
INUZU Motor driven, including constant speed, direct current motor (——— volts).
INVAZ Motor driven, including variable speed, direct current motor (——— volts).
INVEG Motor driven, purchaser to furnish constant speed, alternating current motor.
INVIB Motor driven, purchaser to furnish constant speed, direct current motor.
INVOC Motor driven, purchaser to furnish variable speed, direct current motor.

*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
		VOXHE	VUBEN	VUCRO
110		VOXIL	VUBIP	VUCSU
110	25	VOXKI	VUBLA	VUCTY
110	40	VOXLO	VUBME	VUDAP
110	60	VOXNY	VUBNI	VUDER
220		VOXOM	VUBOR	VUDIS
220	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
VUFSI	125	VUGAS	440	VUGSE	600
VUFTO	220	VUGET	500	VUGTI	

HORSE-POWER MOTORS

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

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Bartlett-Orr Press, New York