

# PEARL

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Precision Electro-Acoustic Research Laboratory.



Hand-Builders of Fine Music-Reproduction Equipment

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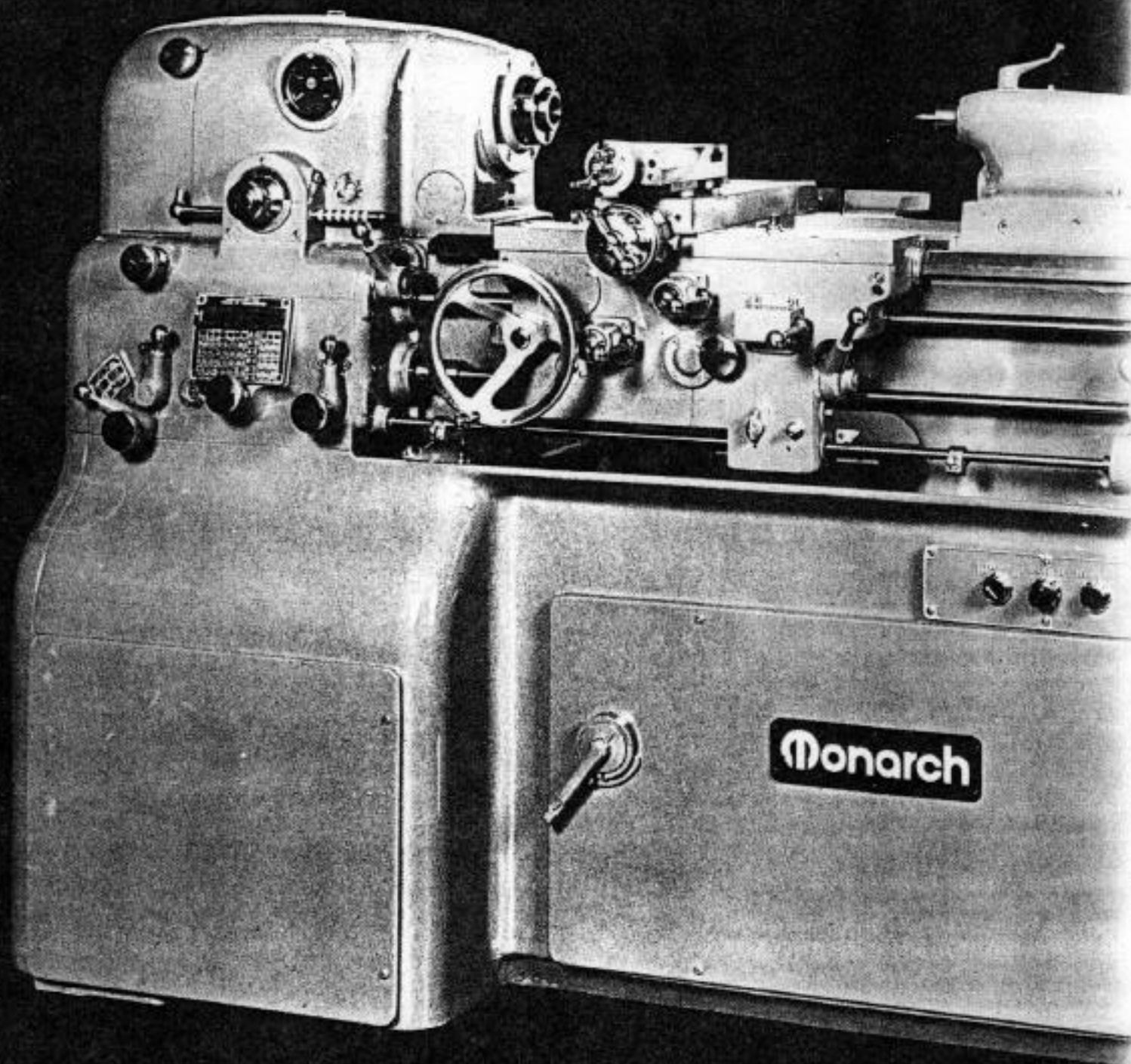
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# Monarch 10" Model EE Precision Toolmaker's Lathe

(Available with Leadscrew Reverse)



Profitable operation of any precision machine depends heavily on that machine's stamina . . . the ability to stay on the job year after year, turning out work with virtually the same precision as the day it started.

## Precision and Sensitivity

**Outer and inner bed ways flame hardened and precision ground to a tolerance of .0005" over-all.** Scientifically programmed heat treatment imparts lifelong accuracy to the tailstock ways and to the carriage ways.

**Bed and base made of special alloy cast iron.** No metal absorbs vibration as well as cast iron. Wear-resistant construction further strengthens smooth operation and precision performance.

**Base has three point bearing on floor.** A simple way to insure accurate alignment for accurate results.

**Drive from driving unit to spindle through one set of multiple V-belts at all speeds.** This smooth, practically vibrationless method is without peer for super-precision results. Positioning of back gear unit on motor (rather than in head) eliminates gear tooth marks.

**Infinitely variable speed ratio of 100 to 1 when drive is direct from motor.** Very low speeds secured through speed reduction elements of drive. **Total ratio: 500 to 1.** Under all operating conditions, the EXACT speed needed is obtainable.

**Drive from spindle to gear box through an endless belt.** The gear train is thus preserved solely for thread chasing.

**Drive motor power secured through an electronic conversion unit.** Vibration and noise are minimized by the absence of revolving equipment in the power supply. Speed regulation is better maintained at lower speeds. There is reserve power for normal overload operations.

**Carriage held in secure alignment to non-wearing bed ways by four self-aligning ball bearing gibs, mounted on eccentric studs.** Alignment integrity facilitates easy hand feed; carriage never lifts regardless of the cut. Superb built-in accuracy is maintained for the life of the lathe.

**All sliding movements smooth and effortless.** Precise machining and assembly are responsible for that sensitive feel which makes an operator confident of superior results.

**Every lever, every handwheel, every adjustment performs its function with ease and sureness.** You expect such refined sensitivity on a precision instrument and you get it on this lathe.

**Anti-friction bearings used throughout.** Cool running properties maximize efficiency of operation and sensitivity.

**Automatic lubrication.** Oil precisely where and when needed for highest performance consistency and equipment longevity.

**All critical parts made of heat treated steel, accurately finished.** Gears precision shaved. Leadscrew, cross feed screw and compound screw induction hardened and ground. Additional reasons why the Monarch 10" Model EE keeps its precision long after so-called "bargains" have lost theirs.

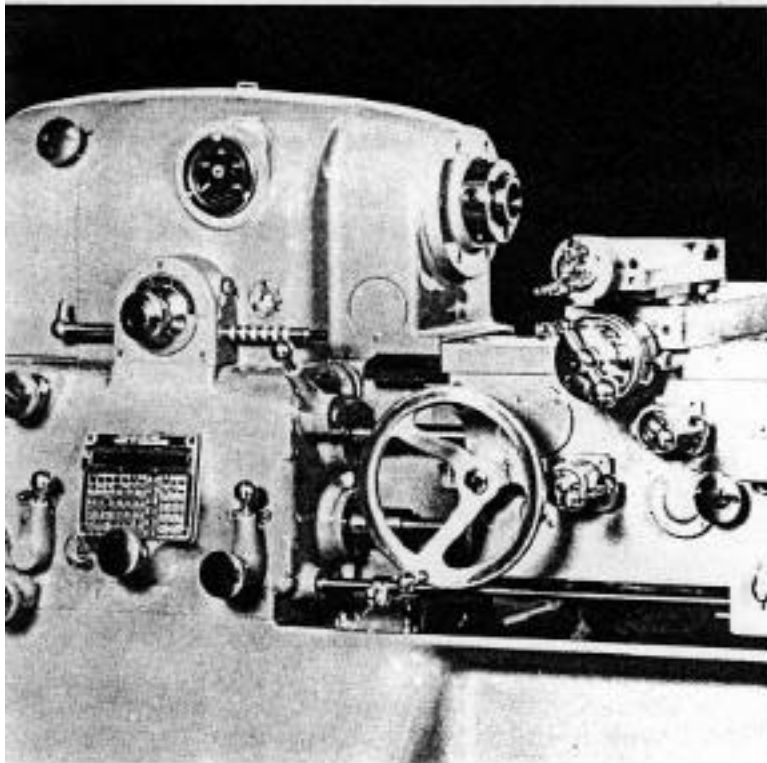
**Machine available with exclusive combination of electric leadscrew reverse and variable reverse speed control.** Here is an unbeatable combination for thread chasing. Time in some instances is reduced as much as 50%.

**The 10" Model EE is also a successful production lathe.** Hundreds are being used profitably for precision production. No other machine of comparable capacity matches it for speed and accuracy.

## Headstock

Drive to spindle direct through multiple "V" belts

- No gears in the spindle drive
- Spindle range infinitely variable, forward or reverse, between 8 and 4000 rpm
- Spindle comes to dead stop in less than two seconds, attains full speed in less than three seconds
- Large tachometer indicates any spindle speed within entire range forward or reverse
- USASI cam lock spindle nose for quick, rigid and accurate chuck and fixture mounting
- Spindle lock knob provided. Interlock prevents starting main motor drive with lock knob engaged
- Another safety interlock prevents engagement of speed reducing unit above a spindle speed of 250 rpm.

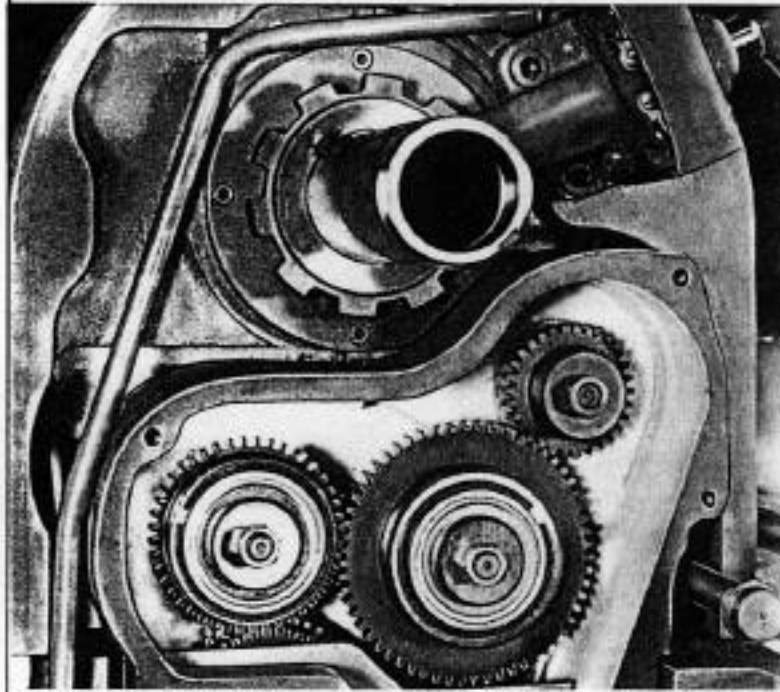


## Gear Box

Totally enclosed and automatically lubricated

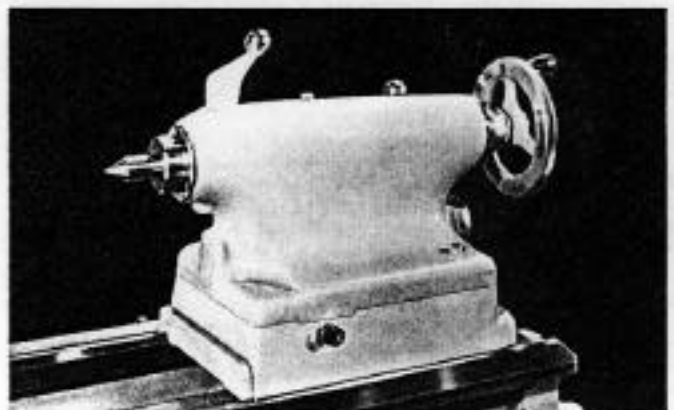
- Drive from spindle to gear box through endless belt for all feeds, thereby reserving gear train solely for thread chasing
- Settings made by large knurled knob in conjunction with a particularly legible index plate
- A combined English-Metric gear box is available on request.

## End Gearing



Totally enclosed and automatically lubricated

- Gear train used only for thread chasing
- Removal of cover permits quick change of gears for the securing of odd leads or the substitution of Metric transposing gears.



## Tailstock

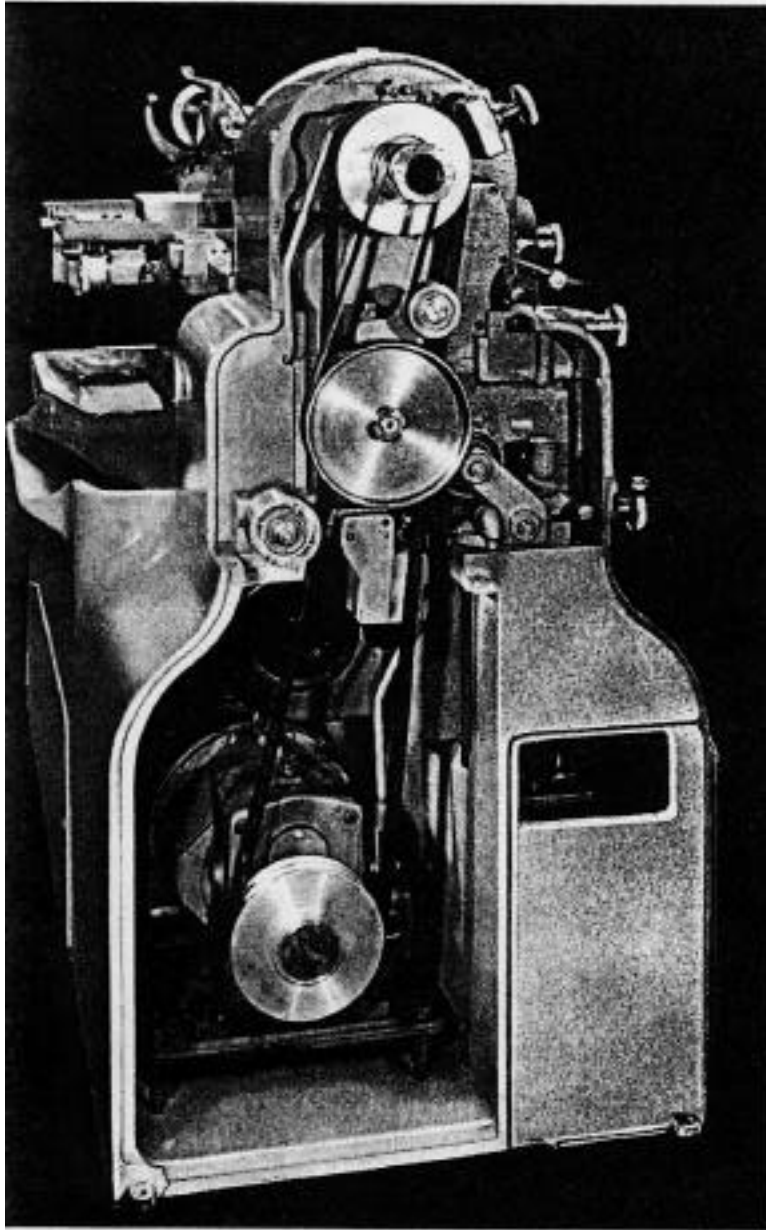
Hardened spindle graduated at front end to facilitate drilling operations

- Graduated micrometer feed also provided
- Quickly clamped to bed by lever action.



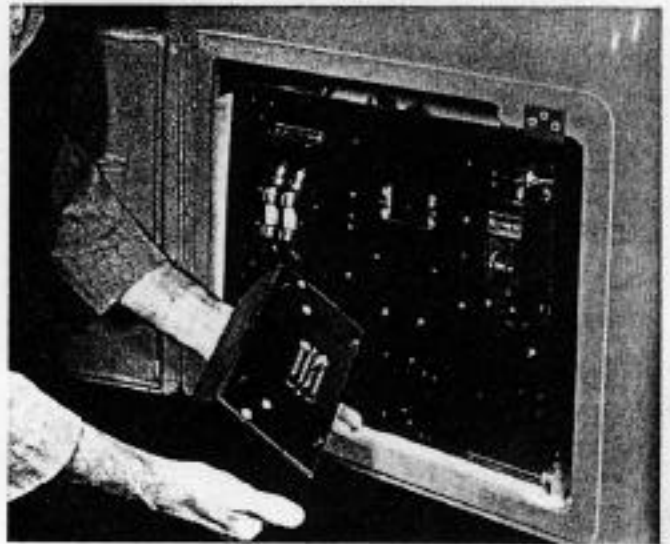
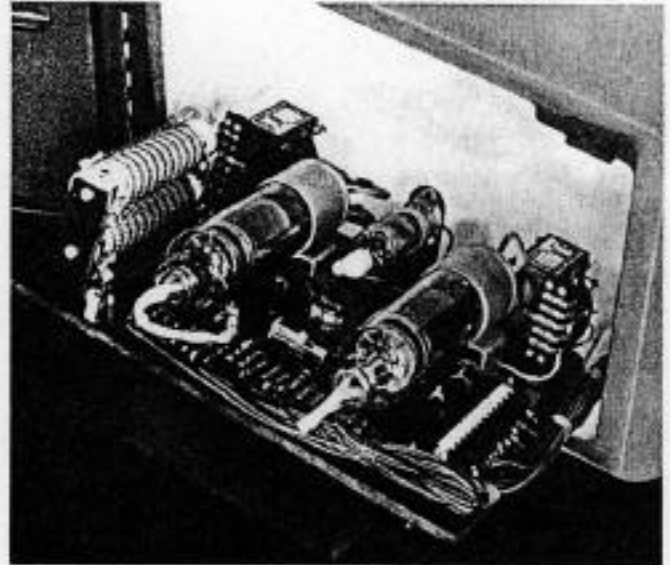
## Main Drive

5 hp motor along with integral, 5 to 1 speed reduction unit mounted on adjustable plate for altering of tension on driving belts • Speed reduction unit separately bolted to plate for extra rigidity • All normal driving belt tension adjustment secured through repositioning of two adjustable idlers • Flat endless belt drive from end of spindle to gear box.

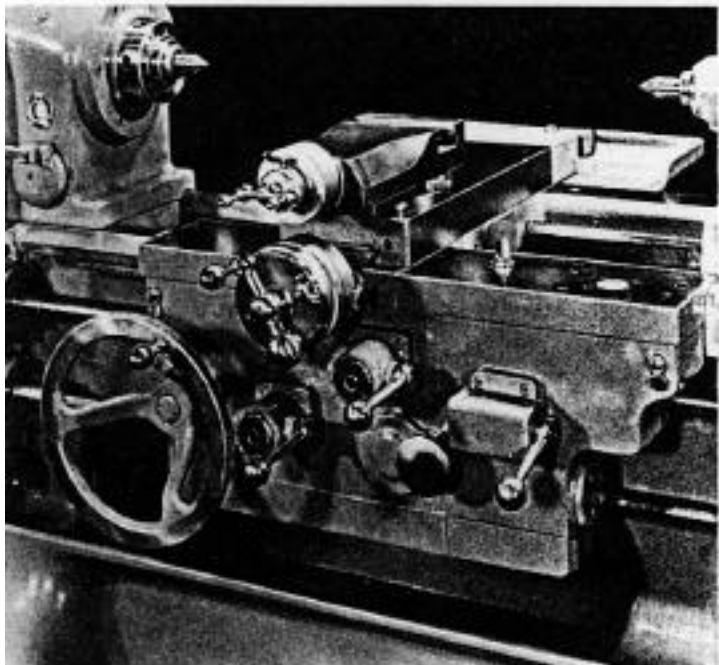


## Power Supply

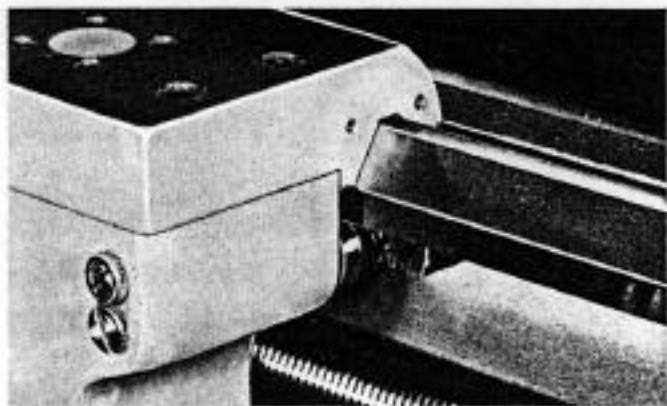
5 hp, dc main drive motor secures its power through an electronic unit which utilizes almost any source of ac current • Electronic elements located in force-ventilated compartment at front of base • Control circuitry in form of plug-in module for ease of maintenance • Only three tubes used along with silicon diodes and other static types of electronic components • This machine is wired to agree with the principles of J.I.C. electrical standard (EGP-1-1967) for general purpose machine tool.



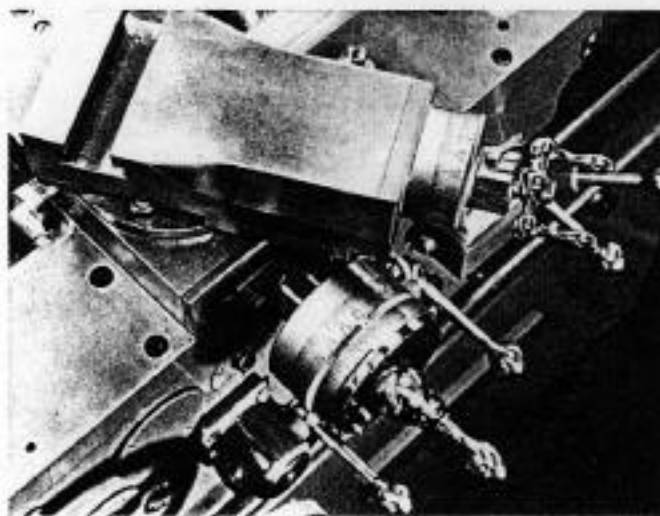
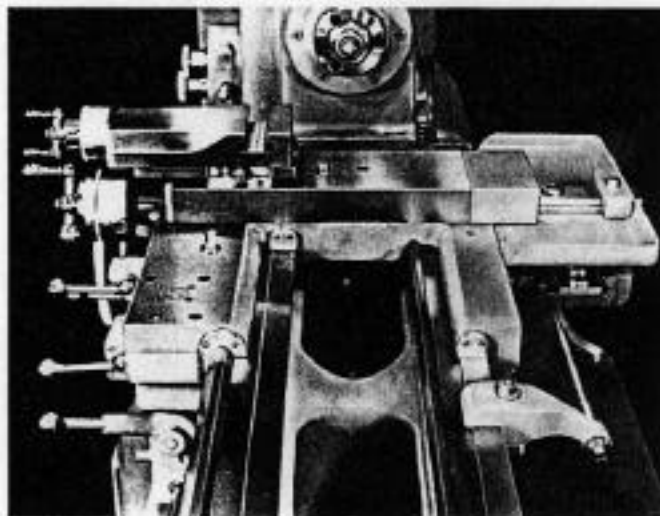
## Apron



Fast, sensitive control of longitudinal feed, cross feed, half nut and feed reverse • Downward motion of their respective control levers engages longitudinal feed, cross feed and half nut; upward motion disengages them. Both longitudinal feed and cross feed through large, cone type, friction clutches • Leadscrew used only when threading • Feed rod and leadscrew cannot be engaged simultaneously • Four, permanent, oil-sealed, self-aligning, ball bearing gibs are mounted on eccentric studs directly under the carriage wings.

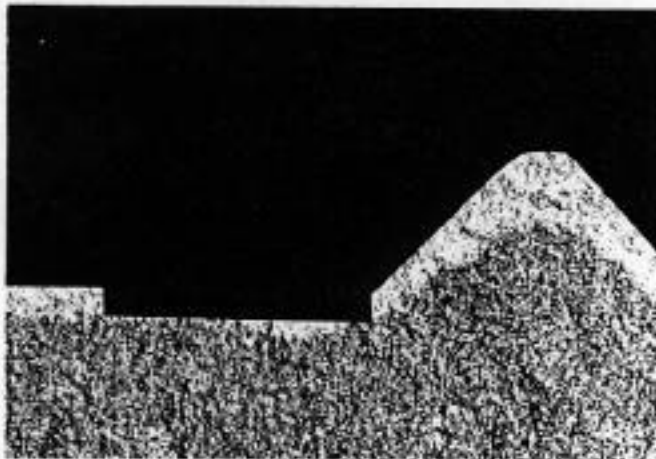


## Carriage, Cross Slide and Compound



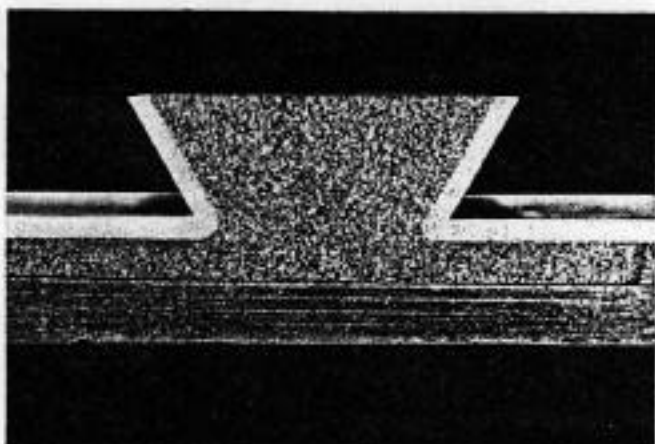
Sturdy tool support for ultra-precision work assured by generously proportioned slides • Large diameter cross feed and compound micrometer dials graduated in thousandths to read in diameter • Dials are chrome plated and vapor blasted to prevent glare • Illustration indicates the excellent graduation legibility so necessary for critical tool adjustment • Compound may be rotated through 360° on its accurately graduated swivel • When chasing threads, cross slide chasing stop allows quick tool withdrawal and repositioning to depth of last cut without disturbing original setup • Additional outer dial enables operator to clean up thread on final pass.

## Bed



Strong, dense and wear-resistant bed casting made of chromium-alloy iron • All four bed ways flame hardened to a depth of  $\frac{1}{8}$ " plus and a Scleroscope reading of 70 to 72 • Ways ground to a tolerance of .0005" over-all • Microscopic reservoirs on ground way surfaces retain lubricant more tenaciously than is the case on a hardened steel surface • Hardened surface area blends into tough, resilient cast iron underbody which has unequalled vibration-dampening effect.

## Carriage Cross Bridge



The dovetail of the carriage crossbridge is completely hardened to Scleroscope reading of 70 to 72 and ground.

## The Inspection Record

### Final Proof of Precision

An inspection report accompanies every Monarch lathe. Besides the filled-in record of the final inspection checks, both ANSI standards and Monarch standards are shown. Following are some of the more critical of these standards as they apply to the 10" Model EE.

	ANSI Standard	Monarch Standard
<b>Bed</b>		
Level—longitudinal .....	.0005"	.0005"
Level—transverse .....	.0005"	.0001"
<b>Headstock Spindle</b>		
Face runout .....	.0003"	.000050"
Taper runout .....	.0003"	.000050"
Taper hole runout .....	.0003"	.000050"
<b>Spindle Rotational Accuracy</b>		
Radial runout .....	—	.000030"
Axial runout .....	—	.000030"
<b>Cross Slide Alignment</b>		
Concave .....	.0005"	.0004"
<b>Headstock Alignment</b>		
Back of center at end of bar ..	.0003"	.0003"
High at end of bar .....	.0005"	.0002"
<b>Tailstock and Headstock Centers Alignment</b>		
High at tailstock .....	.002"	.0005"
<b>Leadscrew Alignment</b>		
Vertical .....	.004"	.0015"
Horizontal .....	.004"	.0015"
<b>Leadscrew</b>		
Cam action .....	.0003"	.0002"
Lead per foot .....	.001"	.001"
Lead per 4" section .....	.0004"	.0004"

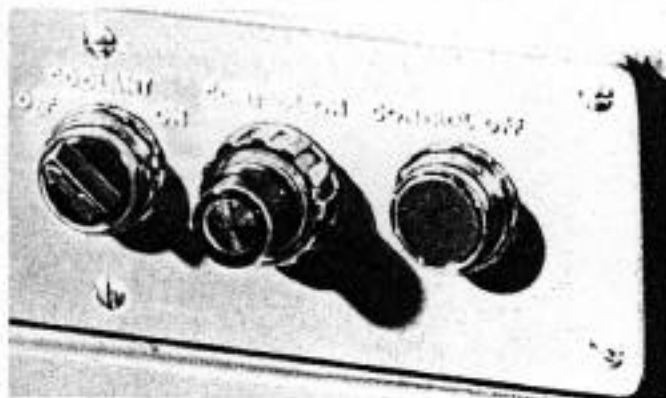
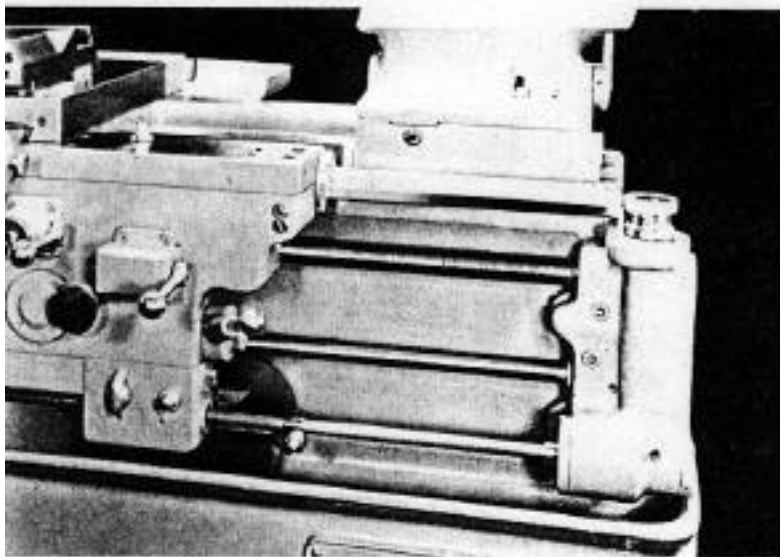
Note that, as close as the ANSI standards are, we set our standards higher to achieve super-precision results. Even here users receive an additional plus because many of the final inspection checks are closer than the above Monarch standards.



# Accessory Equipment

## Electric Leadscrew Reverse

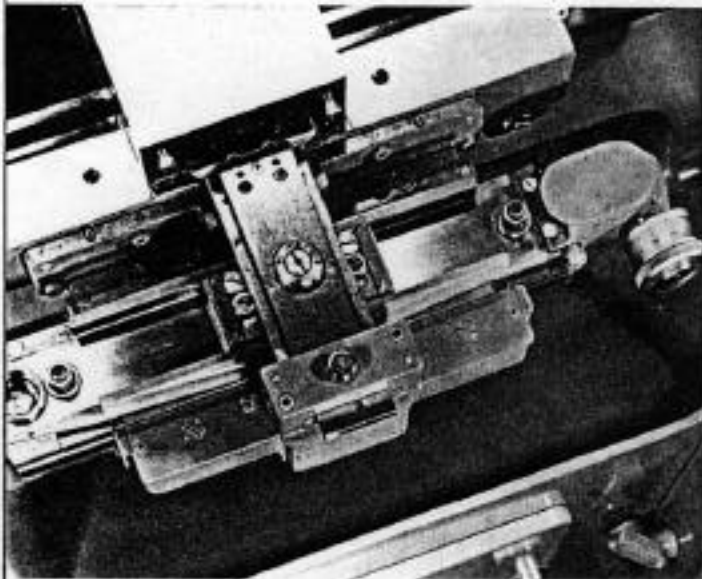
A great time saver when chasing external or internal threads • Particularly valuable for internal threading of blind holes or short threaded lengths • Twist of convenient knob adapts mechanism for either right or left hand thread or makes it inoperative • Automatic stops in both directions of travel • Work rotation stops automatically at end of each cut • Operation of one lever reverses entire machine for return of cutting tool to starting position for next cut, thus retaining perfect timing between tool and work.



## Variable Reverse Speed Control

Saves still additional time when used in conjunction with electric leadscrew reverse • Permits operator to preset reverse speed of main drive motor, thereby accelerating return of threading tool.

## Taper Turning Attachment

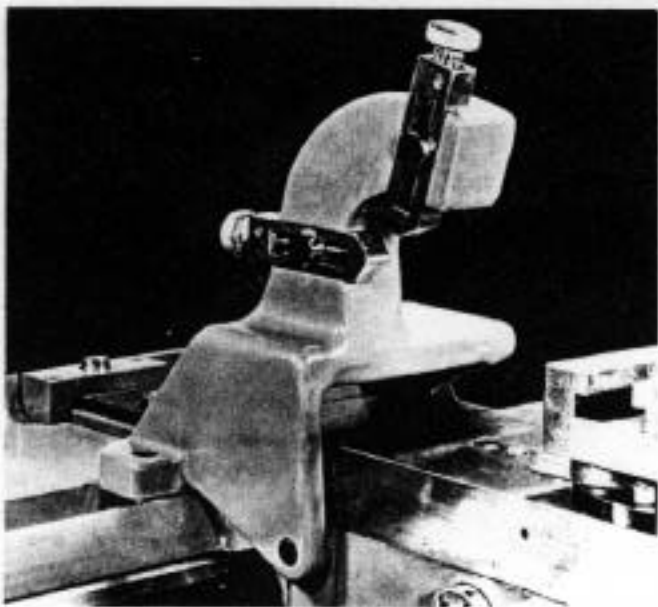
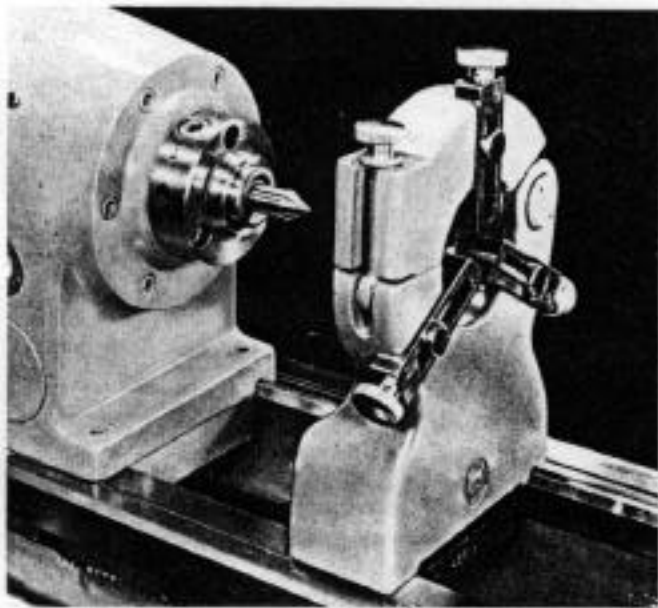


All ball bearing design which practically eliminates lost motion, backlash and friction • Ball bearings have permanent, sealed-in lubrication and are mounted on adjustable eccentric studs • Bearing surfaces against which ball bearings take a bearing are flame hardened and precision ground • Vernier setting at headstock end • Graduations both in degrees and inches per foot protected by glass cover with lucite magnifier • Turns up to 6" length at one setting, 15° included angle.



## Steady Rest

Three-jaw type with a capacity of 3" • Bronze jaws, each with a knurled screw adjustment • Friction hinged top.

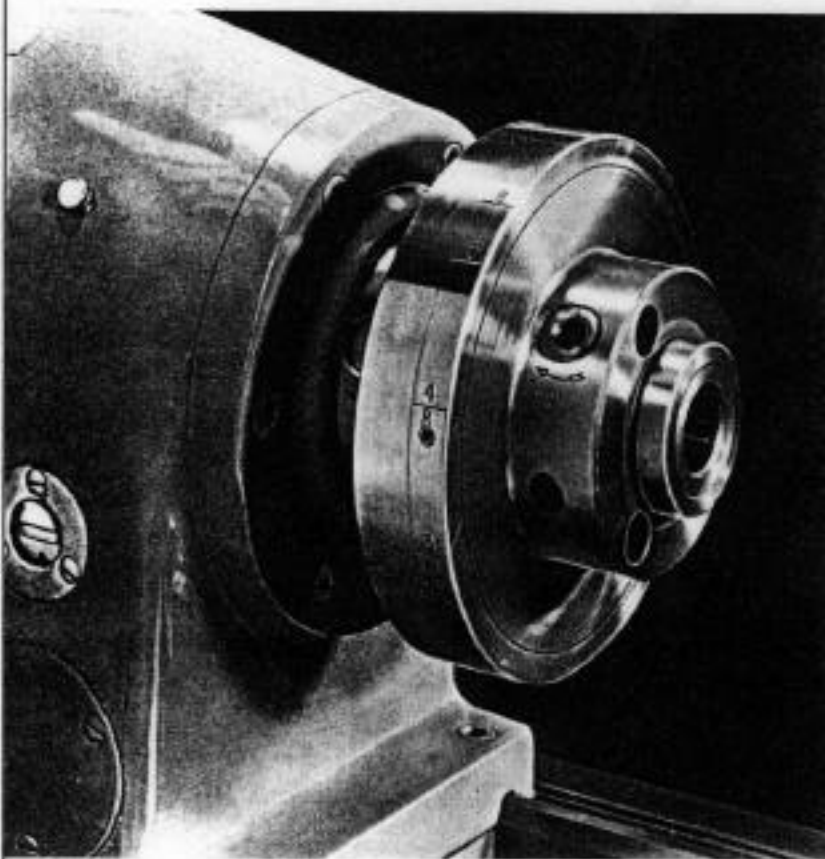


## Follow Rest

Two renewable tip jaws, each with a knurled hand wheel screw adjustment • Capacity 1/4" to 2".

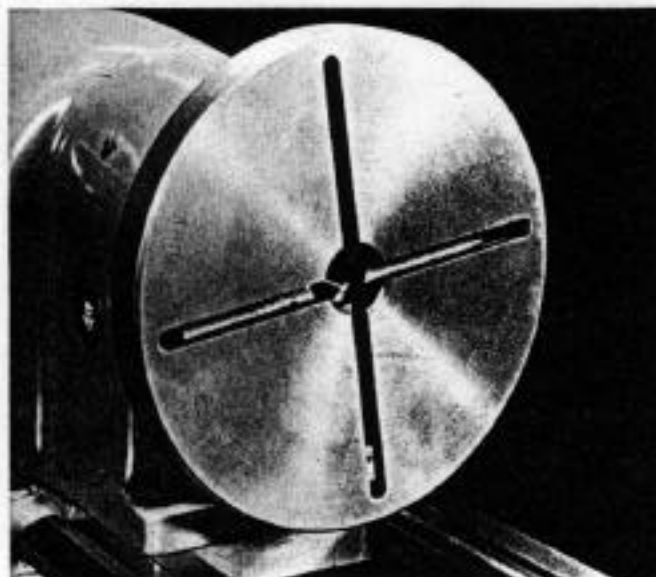
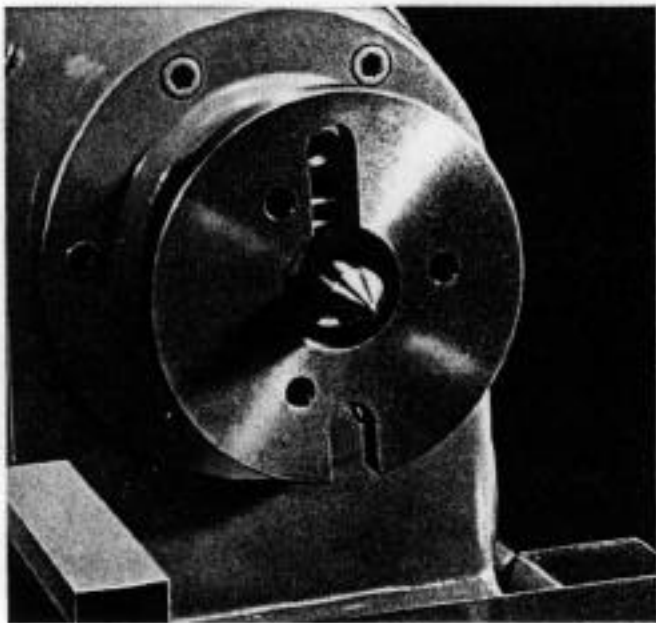
## Multiple Index Face Plate

Graduated for engaging teeth of index gear for 2, 3, 4, 6 and 8 multiple start threading • Fits cam lock spindle nose • Provided with same size cam lock nose as spindle for interchangeability of chucks, plates and fixtures.



## Dog Plate

5" in diameter • Two driving slots • Fits cam lock spindle nose.

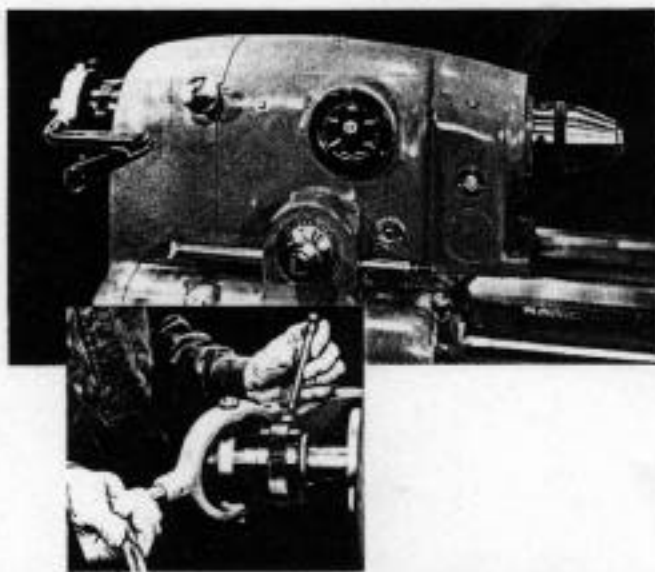


## Face Plate

11" in diameter • Four milled T-slots • Fits cam lock spindle nose.

## Collet Attachment

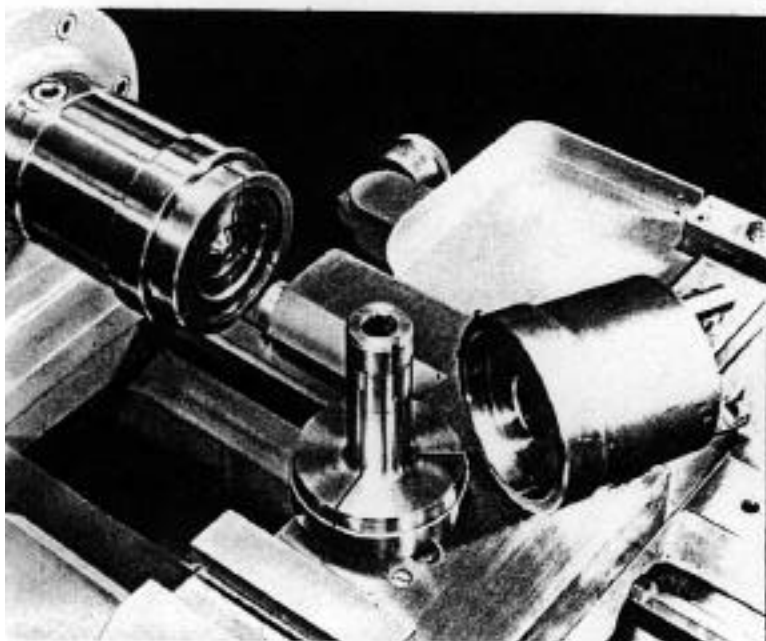
Lever operated, pull type collet attachment • Tube will accommodate up to 1-inch bar stock • Inset shows ease of collet attachment removal for use of standard chucks.



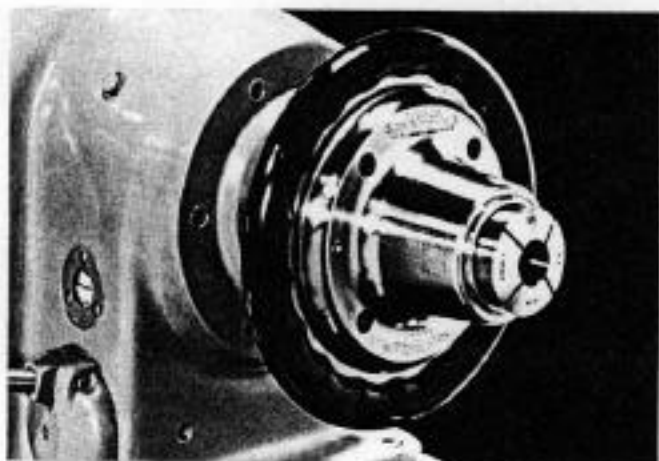
## Drawbar Type Collet Attachment

Up to 1" round maximum collet capacity • Operated by handwheel • Collet closer fits on cam lock spindle nose.

## Step Chuck and Closer



Available in 3", 4", 5" or 6" capacity • Attaches directly to cam lock spindle nose • Operated by either simple handwheel type drawbar (same as supplied with drawbar type collet attachment) or by lever operated pull type collet attachment.

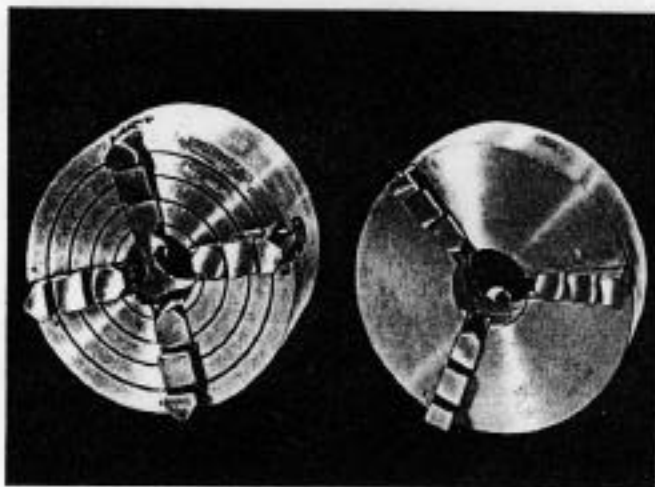
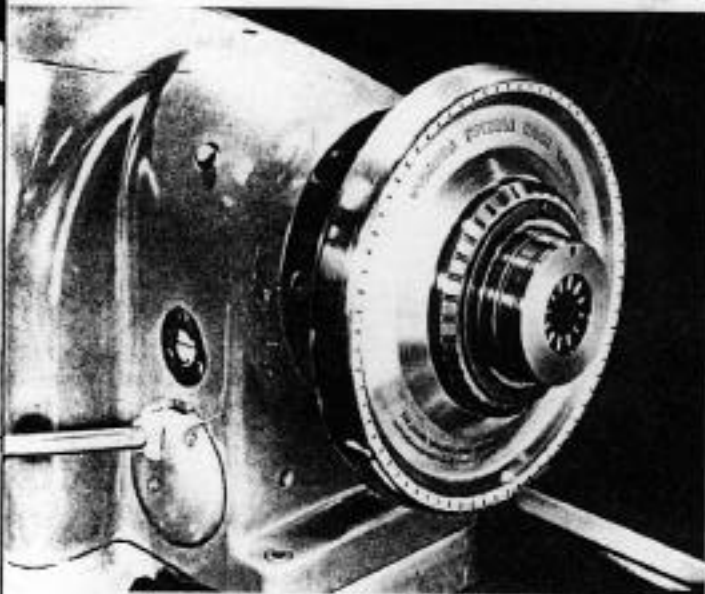


## Sjogren Handwheel Type Collet Chuck

Maximum collet capacity, 1 $\frac{3}{8}$ " • Fits directly on cam lock spindle nose.

## Jacobs Spindle Nose Chuck and Rubber-Flex Collets

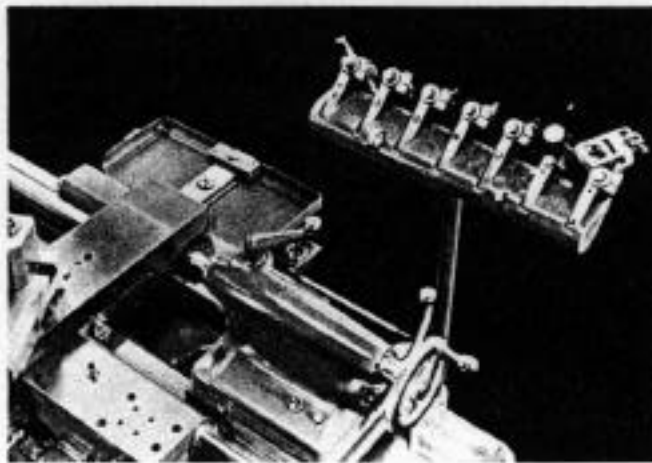
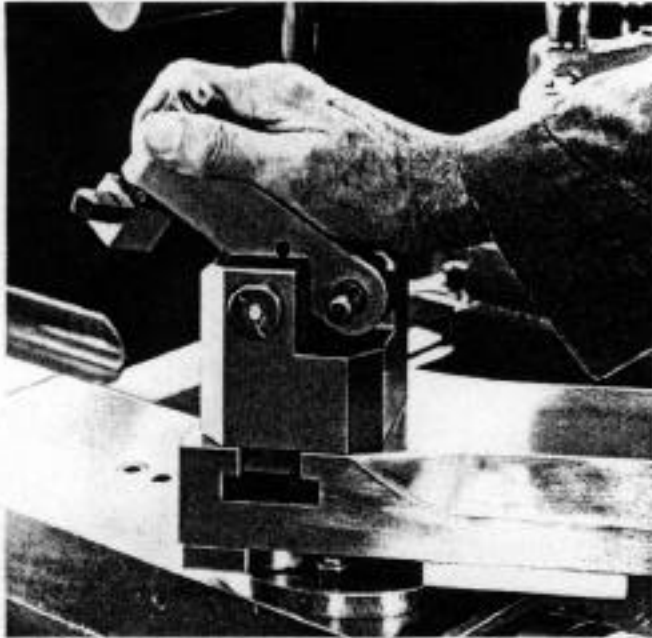
Impact tightening chuck mounts directly on cam lock spindle nose • Used only with Jacobs Rubber-Flex collets • Each collet handles wide range of work diameters, the standard set of eleven taking all diameters from  $\frac{1}{8}$ " through 1 $\frac{1}{2}$ ".



## Mechanical Chucks

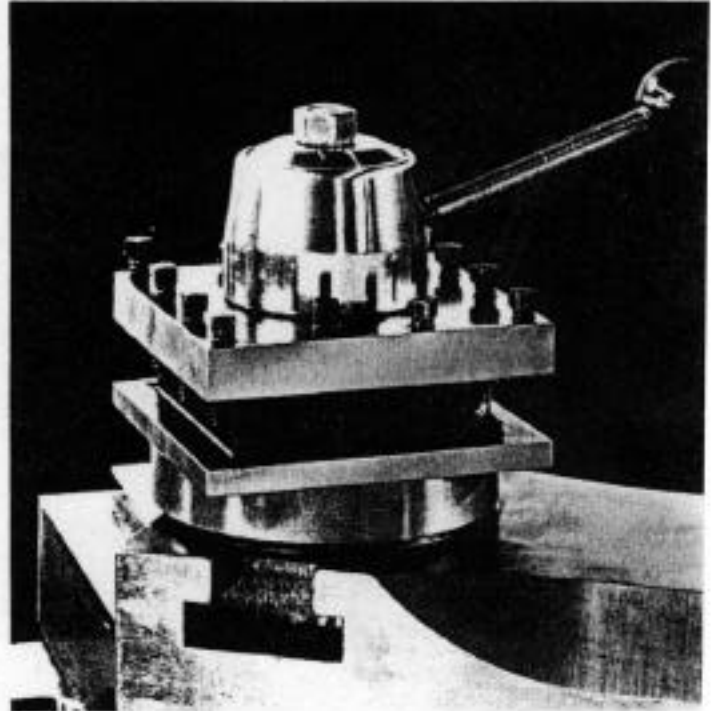
Four-jaw independent chucks available in 6" and 8" sizes; three-jaw universal chucks in 5", 6" and 8" sizes • Both types and all sizes have steel bodies and solid reversible jaws.

## Quick-Tool Ready-Set Tooling

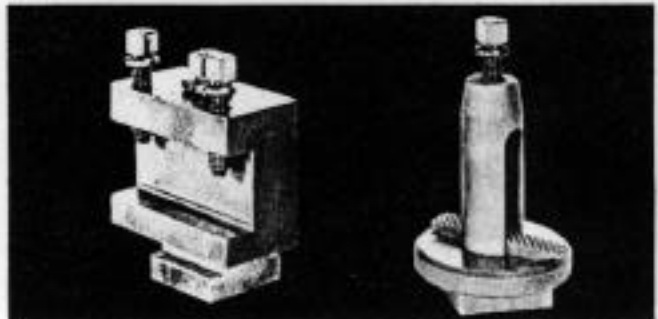


Precision made tool block and holders permit immediate tool change for different operations without need for lengthy setup time • Tools, preset at beginning of run, automatically position themselves when slipped on locating pin and swung into slot of tool block • Standard tooling used • Regular Quik-Tool set consists of seven holders; three for turning tools, one for boring, one for cut-off, one for knurling including knurling tool and six sets of knurling wheels and one for indicating including indicator calibrated in ten thousandths of an inch • Tray and pipe mounting also furnished.

## Monarch 4-Way Turret



Indexes accurately to four positions • Fits directly to T-slot of compound • Size of square,  $3\frac{1}{2}$ " ; maximum tool capacity,  $\frac{3}{8}$ " x  $\frac{3}{8}$ ".



## Heavy Duty Tool Block

Alloy steel block provided with two large, unbreakable screws. Maximum size tool accommodated,  $\frac{1}{2}$ " x  $\frac{3}{4}$ ".

## Round Tool Post

Compound mounted. Maximum size tool accommodated,  $\frac{3}{8}$ " x  $\frac{3}{8}$ ".

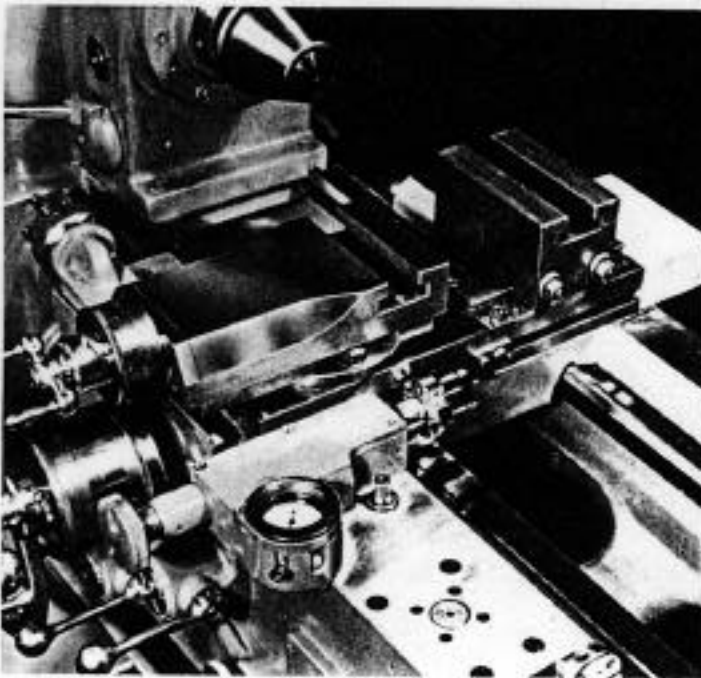


## Connected Compound and Plain Block Rear Rest

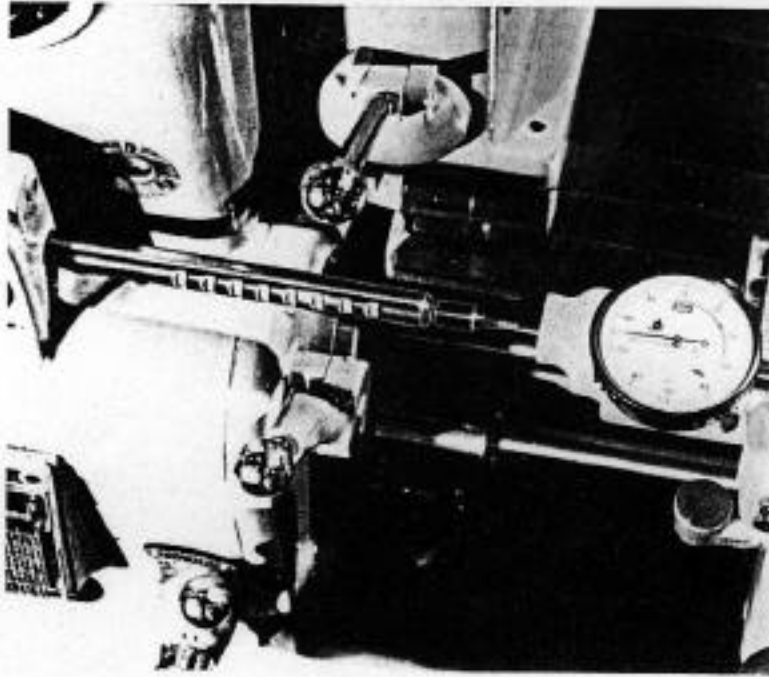
Both the compound rest and rear tool block mounted on same bottom slide • Bottom slide dovetailed at rear for mounting of rear block, thus permitting in and out positioning of block • T-slot of rear block accommodates the regular round tool post and heavy duty tool block.

## Dial Type Indicator Cross Feed Stop

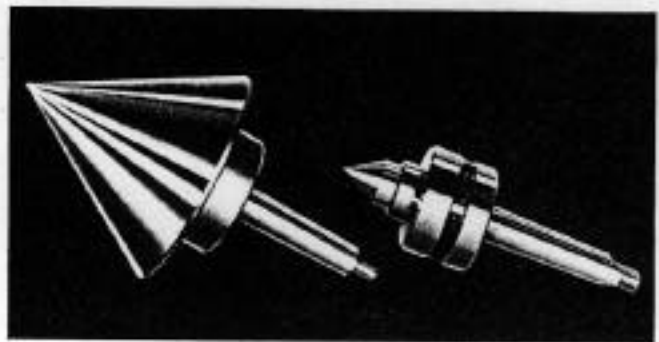
Provides four diameter stops which may be indexed by knob at front of carriage • Precision type dial indicator graduated in ten thousandths for ultra-precision results • Adjustable stop dog clamped in T-slot at side of cross slide • Frequently used with rear adjustable tool block as illustrated.



## Dial Indicator Carriage Stop



Precision type dial indicator, graduated in thousandths, mounted in bracket on left hand carriage wing • Stop bar with micrometer head carried by housing at front of headstock • Micrometer head in bed-mounted bracket also supplied for long work beyond lateral movement of regular stop bar.

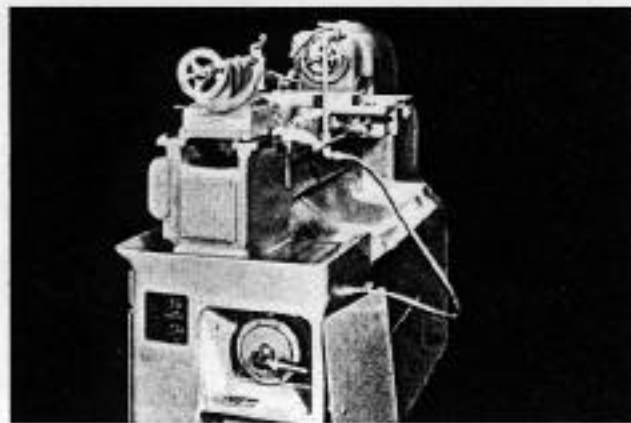
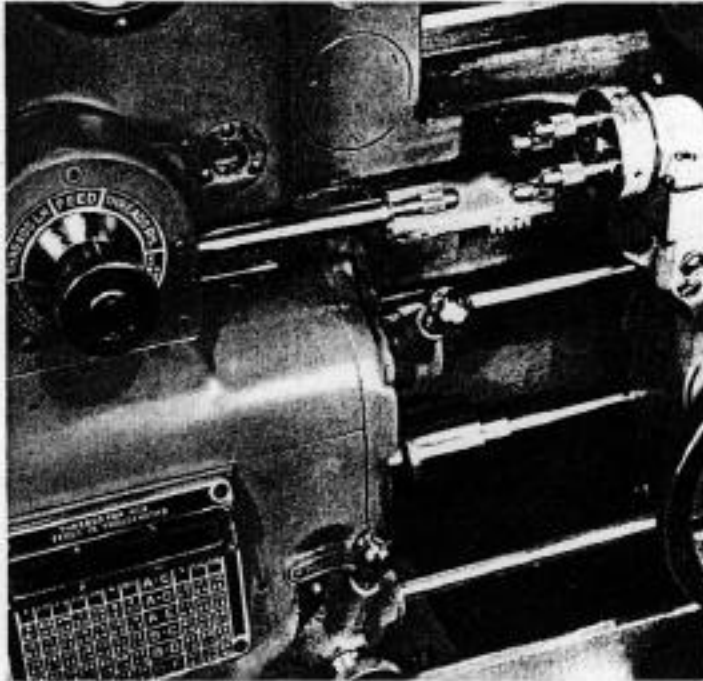


## Centers

In addition to regular work centers furnished with all machines, pipe center and anti-friction center also available • All are interchangeable • Pipe center of anti-friction type has capacity of 0 to 4".

## Multiple Positive Length Stops

Indexing cylinder with four micrometer heads attached to left hand carriage wing • Detent plunger in cylinder provides positive stop at proper position for each head to engage stop bar • Stop bar with micrometer head carried by housing at front of headstock.



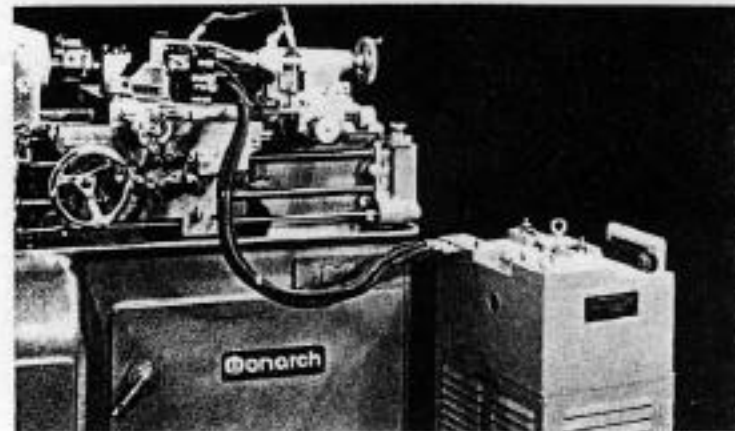
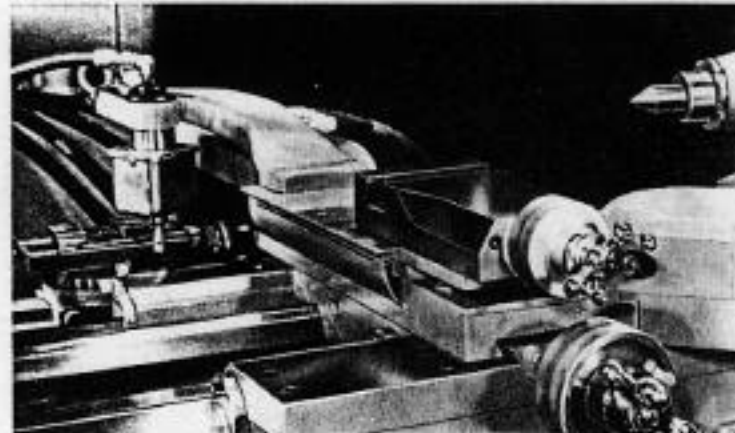
## Coolant System

Individually motor driven coolant pump of the impeller type mounted in compartment at right end of base • Quickly accessible by removal of one cover.

## Air-Gage Tracer

A versatile means for making the 10" Model EE quickly convertible to a production machine for straight or contour turning, boring or facing • Template controlled • Reproduces accuracy of template within  $\pm .001"$  when roughing;  $\pm .0005"$  when finishing • Imparts a smooth, stepless finish on almost any combination of cuts because of the use of a single, running tool.

Often halves amount of stock left for grinding; sometimes eliminates grinding and polishing operations. Allows a complete setup change in as little as 15 to 20 minutes; tool change in 1 minute • Factory applied to new machines • Ask your Monarch representative for more information, or write for separate bulletin.

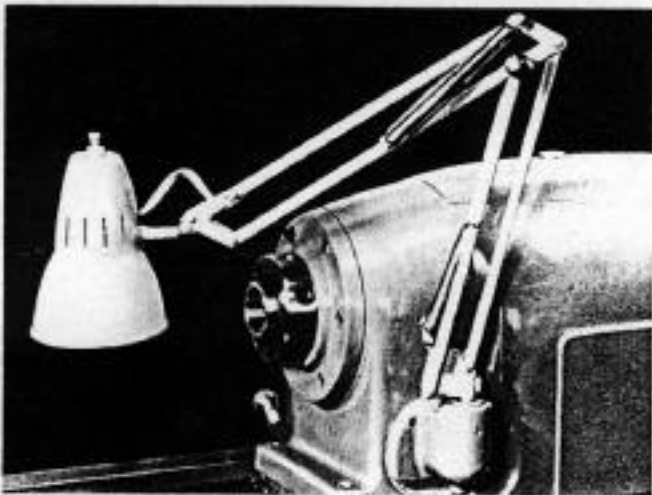


## Air-Tracer Pak

The Air-Tracer Pak, a completely self-contained Air-Gage Tracer unit designed for field application, may also be applied and used without reduction of swing capacity.

## Tool Cabinet

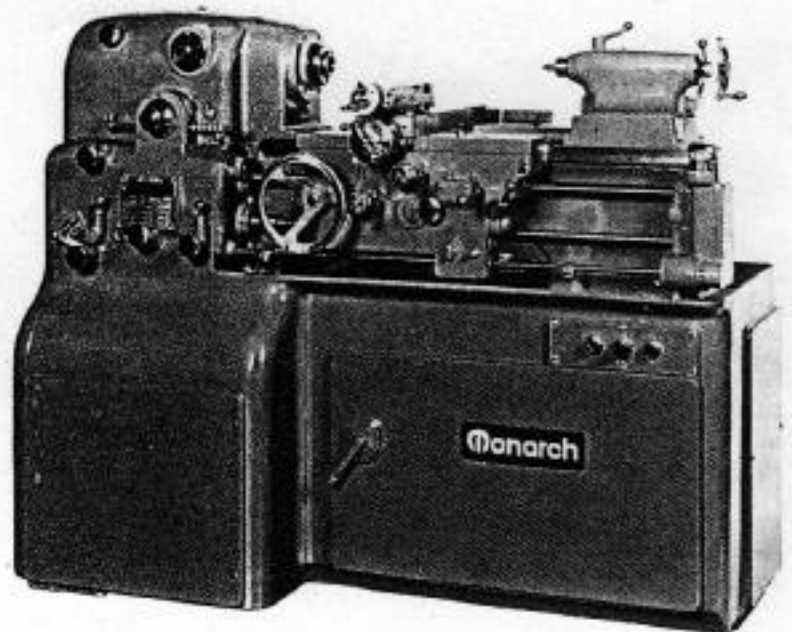
Sturdy steel cabinet has generous storage space for chucks, rests, plates, wrenches, collets and assorted tools • Top of cabinet is convenient location for operator's personal tool box.



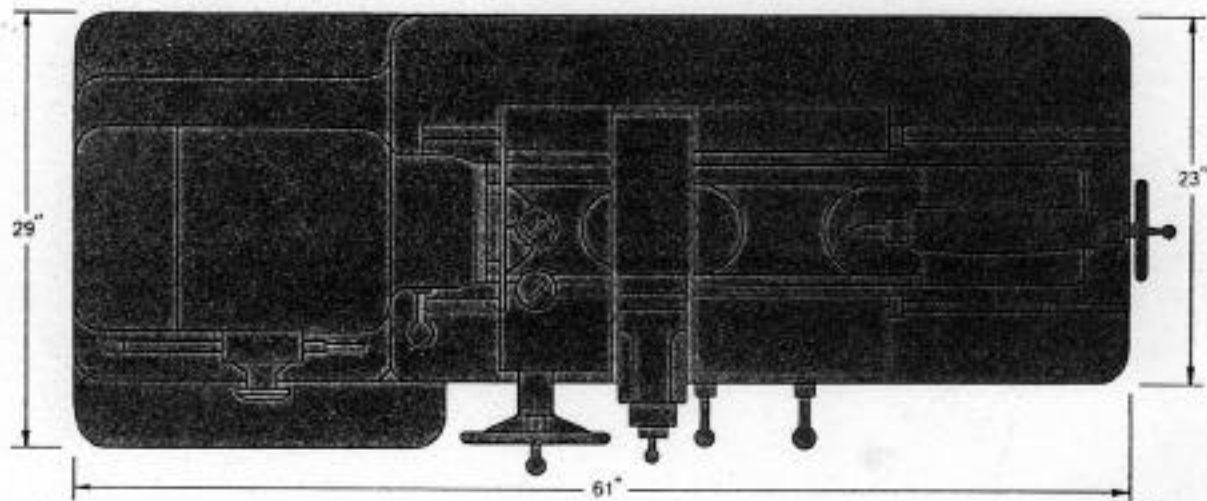
## Work Light Mounting

Work light may be positioned at any desired angle by means of universal joint arrangement.

This brochure has given you the facts about the Monarch 10" Model EE Precision Toolmaker's Lathe... and an idea of its flexibility in scope. You can't buy a better lathe. It's been tested...not just in manufacture...but by year-in, year-out use...by toolmakers. It's been proven...not by designers...but by toolmakers. That's why it's called the Precision Toolmaker's Lathe.



# Floor Space Requirements



## Model EE Toolmaker's Lathe Specifications

### General

Swing over bed	12½"
Swing over cross slide	7¼"
Distance between centers	20"
Distance, spindle center to floor	43½"
Floor space	29" x 61"

### Headstock

Hole through spindle	1½"
Center, Morse taper	No. 2
Spindle bearings, ball	Precision
USASI cam lock spindle nose	3"—D-1
Spindle speed range—high	40 to 4000 rpm
Spindle speed range—low	8 to 800 rpm

### Gear Box

Leadscrew diameter and threads per inch	1"—8 tld.
Range of threads	.3 to 184
Range of feeds through endless belt	.0005" to .016"
Number of thread changes	60
Number of feed changes	50
Actual threads cut:	3, 3¼, 3½, 3¾, 4, 4½, 5, 5½, 6, 6½, 7, 7½, 8, 9, 10, 11, 11½, 12, 13, 13½, 14, 15, 16, 18, 20, 22, 23, 24, 26, 27, 28, 30, 32, 36, 40, 44, 46, 48, 52, 54, 56, 60, 64, 72, 80, 88, 92, 96, 104, 108, 112, 120, 144, 160, 176 and 184

### Tailstock Spindle

Diameter	1¾"
Traverse	3½"

### Steady Rest

Steady rest opening	3"
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### Carriage and Compound

Carriage length	20½"
Carriage bridge width	5"
Compound rest top slide travel	2"
Size of lathe tool	¾" x ¾"

### Bed

Width	10½"
Depth	10½"

### Motor Size

5 hp.

### Shipping Data

Net, weight, with regular equipment only, including electrical equipment	3250 lbs.
Domestic shipping weight, as above	3450 lbs.
Export shipping weight, as above	4100 lbs.
Cubic content—boxed for export, as above	105 cu. ft.
All Monarch 10" Model EE Precision Toolmaker's	

## Regular Equipment

All Monarch 10" Model EE Precision Toolmaker's Lathes are furnished with the following regular equipment: 5 H.P. 100 to 1 variable speed electric drive with magnetic switch with start and stop push button station • Built-in lead-screw reverse operated from headstock • Built-in oil pan of the Reservoir type • Cabinet base • Large T-slotted face plate • Dog plate • Compound rest • Precision dial-type indicator carriage stop • Chasing dial • Chasing stop • Tool post • Center sleeve • Two centers • Wrenches

For additional information or a demonstration of performance on your own parts, contact:

# Monarch

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