

THE MONARCH MACHINE TOOL COMPANY. SIDNEY, OHIO. U. S. A.

MONARCH

Helical Geared, Ball Bearing, Geared-Head Lathes



Know Good Lathes by This Trade Mark

MANUFACTURED BY

THE MONARCH
MACHINE TOOL COMPANY

SIDNEY, OHIO, U. S. A.

Introductory



HERE is a constantly increasing demand for the individual motor drive for lathes. Since the first Monarch eight-speed geared head lathe was built, over fourteen years ago, we have followed the usual practice of mounting the auxiliary shafts of the headstock in bronze bushings and making the spindle speed changes through sliding spur gears of heat treated alloy steel.

Monarch lathes have always been noted for their quiet running gears and the efficiency and simplicity of their geared head construction.

In developing the new Monarch Geared Head Lathe with Helical gears, we have profited by over four years of experience in using such lathes in our own shop.

While we are pioneers in developing the Helical Geared Head for lathes, yet we are not offering a design that is new and untried. Other machine tools and other classes of high grade machinery, as well as the automotive industry, have proven the value of the Helical gear and of ball bearings.

We offer the new Monarch geared head lathe as the very last word in design and efficiency. All the objectionable features of present designs, such as noise, shock, vibration and tooth marks on work, have been eliminated in the operation of this new headstock.

The new Monarch ball bearing Helical geared headstock transmits power noiselessly, smoothly and efficiently and is so constructed of such fine materials that its life will be indefinite.

These features, together with the ease of control, starting, stopping, braking and speed changing, will appeal to all lathe users.

The usual Monarch Guarantee of absolutely satisfactory performance covers these new lathes as it has always backed every Monarch lathe in use.

THE MONARCH MACHINE TOOL COMPANY

Exclusive Features of Monarch Ball Bearing Helical Geared Head Lathes

Helical Gears. Noiseless, smooth, constant transmission of power.

Three and one-half teeth always in mesh. No clashing of gears.

Special hard alloy steel drop forgings used for all gears.

Auxiliary shafts mounted in heavy double row combined radial thrust bearings.

Spindle end thrust and all gear developed by Helical gears taken against ball thrust bearings.

The constant smooth rolling action of Helical gearing, eliminating all tooth marks on work.

Higher spindle speeds possible thru Helical gearing than thru spur gearing.

Spindle speeds selective—all changes made with three levers operating heavy, double sided jaw clutches.

Moving double clutch members slide on squared sections of spindle and intermediate shaft.

Operation of headstock absolutely fool proof.

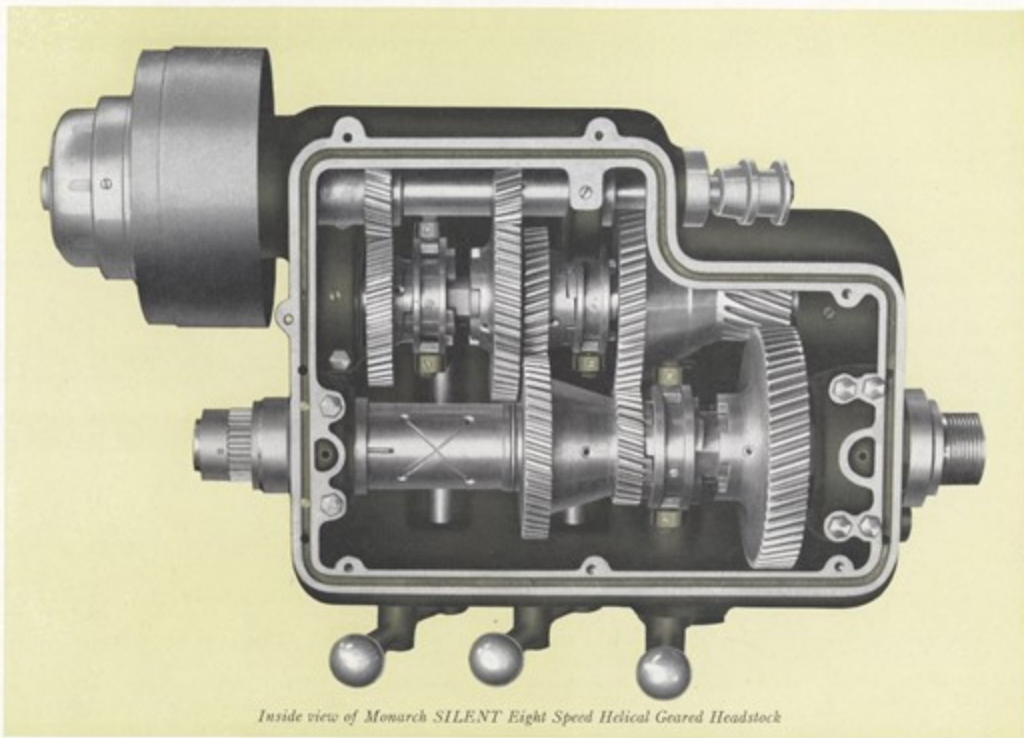
Headstock oil tight; all gears dip in oil.

No gears in top cover plate. Spindle bearings enclosed in headstock protected from dirt. Easily adjustable through cover plates in headstock cover.

Multiple disc type of friction driving clutch with both headstock and apron control for starting, stopping, and braking, instantly stopping spindle.

Spindle and auxiliary shafts with complete gear and clutch assembly fit into place without dis-assembly.

Spindle and auxiliary shafts high carbon crucible steel.



Inside view of Monarch SILENT Eight Speed Helical Geared Headstock

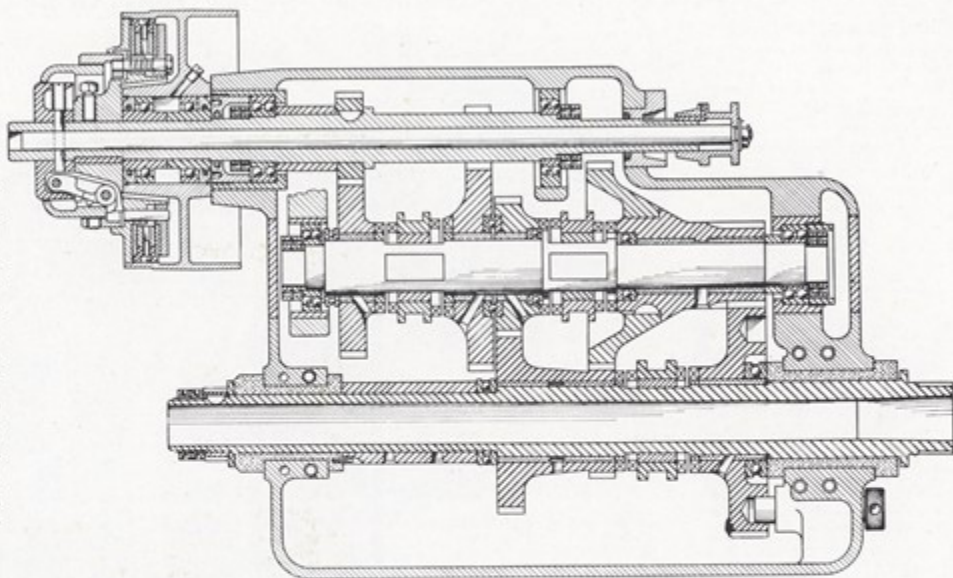
Adjustment on multiple disc driving clutch easily and quickly made from outside. Only one point of adjustment.

All objectionable overhang of headstock eliminated.

Any type of motor mounting furnished; on headstock, rear of headstock leg, or enclosed in headstock leg.

Drive to multiple disc clutch through endless belt with ball bearing adjustable idler pulley or silent chain.

Only ten gears are used in the entire headstock. These gears are chrome nickel steel forgings, the teeth being generated with ground hobs. All gears have from 16 to 18 degree spiral angle. All speed changes are made with the three levers on front of headstock, which operate the double clutches sliding on squared sections of the spindle and intermediate shaft. No other construction could be so strong, simple and trouble proof. Gears shafts and ball bearings are designed with a factor of safety several times greater than any load they will ever carry.



Sectional drawing showing Ball Bearing, Helical Geared Headstock with Multiple Disc Driving Clutch and Cone Brake

The above sectional drawing clearly shows the construction of the Monarch Helical geared ball bearing headstock. The two auxiliary shafts are of high carbon crucible steel and run in heavy double row ball bearings.

Six ball thrust bearings take all thrust wear developed by both the spindle and the Helical Gears. The double clutch operating spools slide on and drive from large squared sections of the intermediate shaft and spindle.

Gears all dip in oil and the splash system carries a flood of oil to all working parts. Spindle bearing cap screws are adjusted by a socket wrench through removable cover plates in top cover.

Spindle bearings are enclosed in the headstock protecting them

from all dirt, yet are quickly adjustable from the outside without removing headstock cover plate.

The initial driving shaft, on which the multiple disc driving clutch is mounted, is hollow and through it extends the clutch operating shaft on the front of which a friction cone clutch is mounted. When the friction clutch is disengaged by either the headstock or apron control lever, the head can be allowed to drift or instantly be brought to stop at the will of the operator. This braking feature is especially simple and effective.

The multiple disc driving clutch is the most efficient type of clutch for machine tool control. It operates as smoothly and efficiently as it does in your motor car and causes no more trouble or adjustment.

SILENT --- SMOOTH --- POWERFUL

The exacting demands of smoothness and silence in operation, long life and high efficiency in the geared headstock of lathes, are only met by **Helical Gearing**.

Such gears are superior to the common spur gear in all features for such service. The obliquity of the teeth in Helical gearing keeps one set in mesh until the following set of teeth is well engaged, so that at no time is there a sudden transference of load from one tooth to the next, as occurs in ordinary spur gearing.

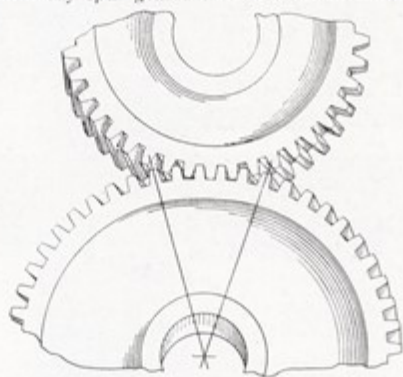
The load is gradually put on a tooth and as gradually taken off, so that the strain on the teeth is kept constant and the sudden shock of impact common to spur gearing, is avoided.

In the ordinary spur gear the teeth come in contact over their

entire length at one time and the whole load is first thrown on the end of the tooth, producing the maximum leverage strain as soon as contact takes place. This leverage strain takes place suddenly, causes vibration, noise and undue wear on the teeth and transmits tooth marks to the work.

In gears with Helical teeth, the load is put on each tooth gradually and as gradually removed so that no severe leverage, noise, vibration or shock is created at any time.

The form of tooth used in the Monarch Helical Geared Headstock is the involute securing true line contact as long as the tooth is in mesh. The helix angle is from 16 to 18 degrees. All gears are generated by the hobbing process with ground hobs.

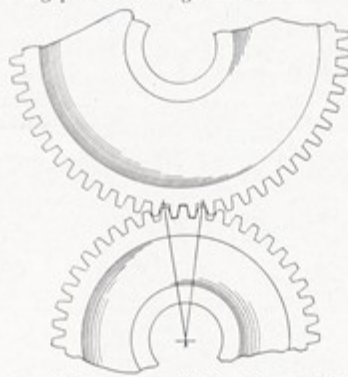


Advantages of Helical Gearing for Geared Head Lathes:

1. Elimination of noise and vibration.
2. Teeth retain their true involute form and do not wear out of shape.
3. Transmit power without jar, shock or vibration.
4. All phases of tooth engagement occur simultaneously, transferring the load from one tooth to the next, gradually producing a perfect continuity of action.

Advantages of Ball Bearing Shafts:

1. Elimination of friction.
2. Large double row oversize ball bearings do not wear.
3. Shafts retain their true alignment and preserve perfect gear center distance, eliminating undue wear on gears.



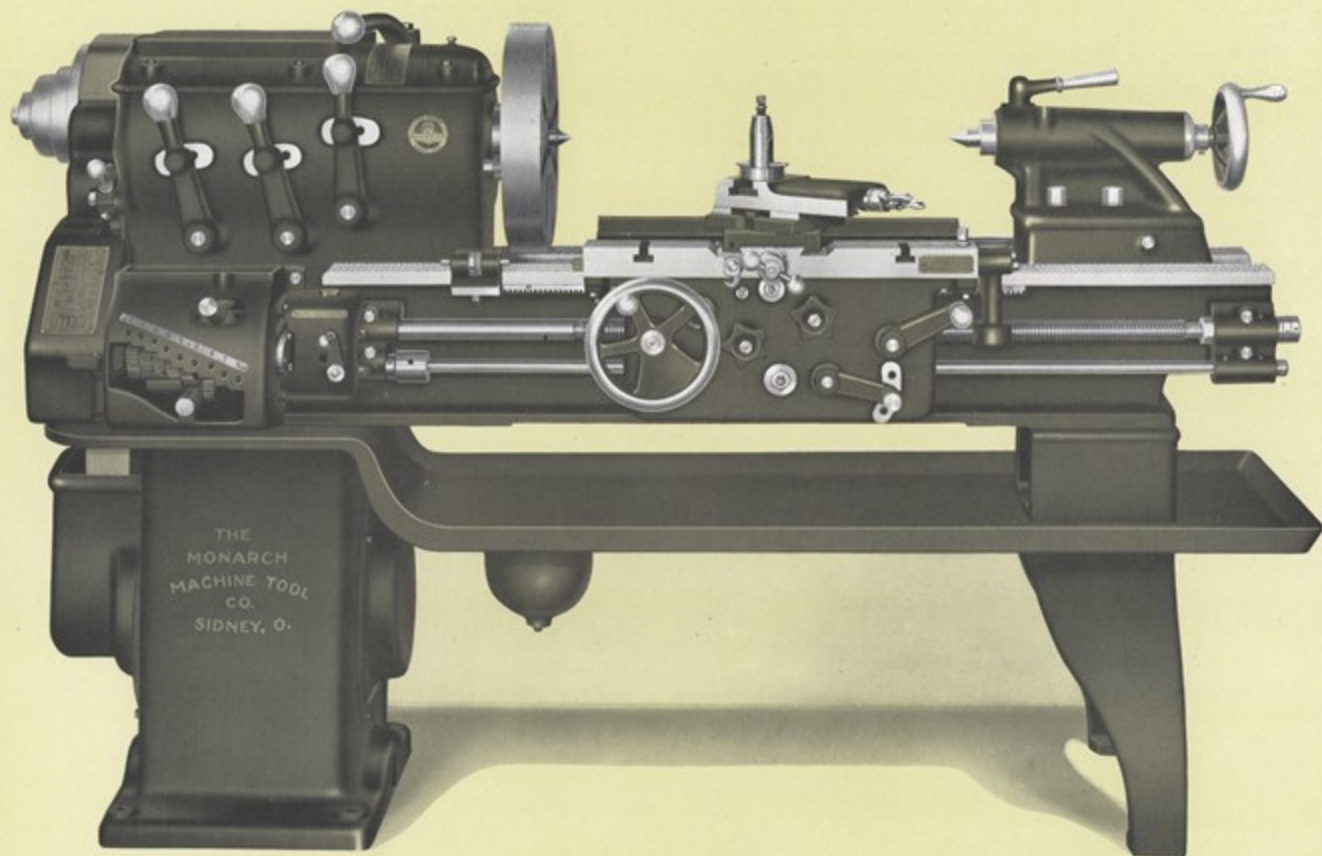
Disadvantages of Spur Gearing for Geared Head Lathes:

1. Excessive noise and vibration causing crystallization and possible breakage.
2. Shock of transference of load from one tooth to the next.
3. Teeth soon wear out of shape, causing mere noise, vibration and back-lash. Cause tooth marks on work.

Disadvantages of bronzed bushed auxiliary shafts for Geared Head Lathes:

1. Bushings wear. Frequent renewals.
2. With worn shaft bushings, correct gear center distance is destroyed causing noise, vibration and excessive wear on gears.
3. Frictional losses, causing greater expense of operation.

THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO, U. S. A.



THE
MONARCH
MACHINE TOOL
CO.
SIDNEY, O.

14"x6" Monarch Helical Geared Eight-Speed Geared Head Lathe with Self-Contained Motor Drive. Cabinet leg under tailstock furnished as an extra when desired. Also furnished without oil pan, or with motor mounted on top of headstock, if desired. Both mechanical apron and headstock control furnished as regular equipment. Front spindle bearing 3"x5". Rear spindle bearing 2 3/4"x4 3/4". Tailstock spindle diameter 2 3/8". Weight without motor, 2600 lbs.

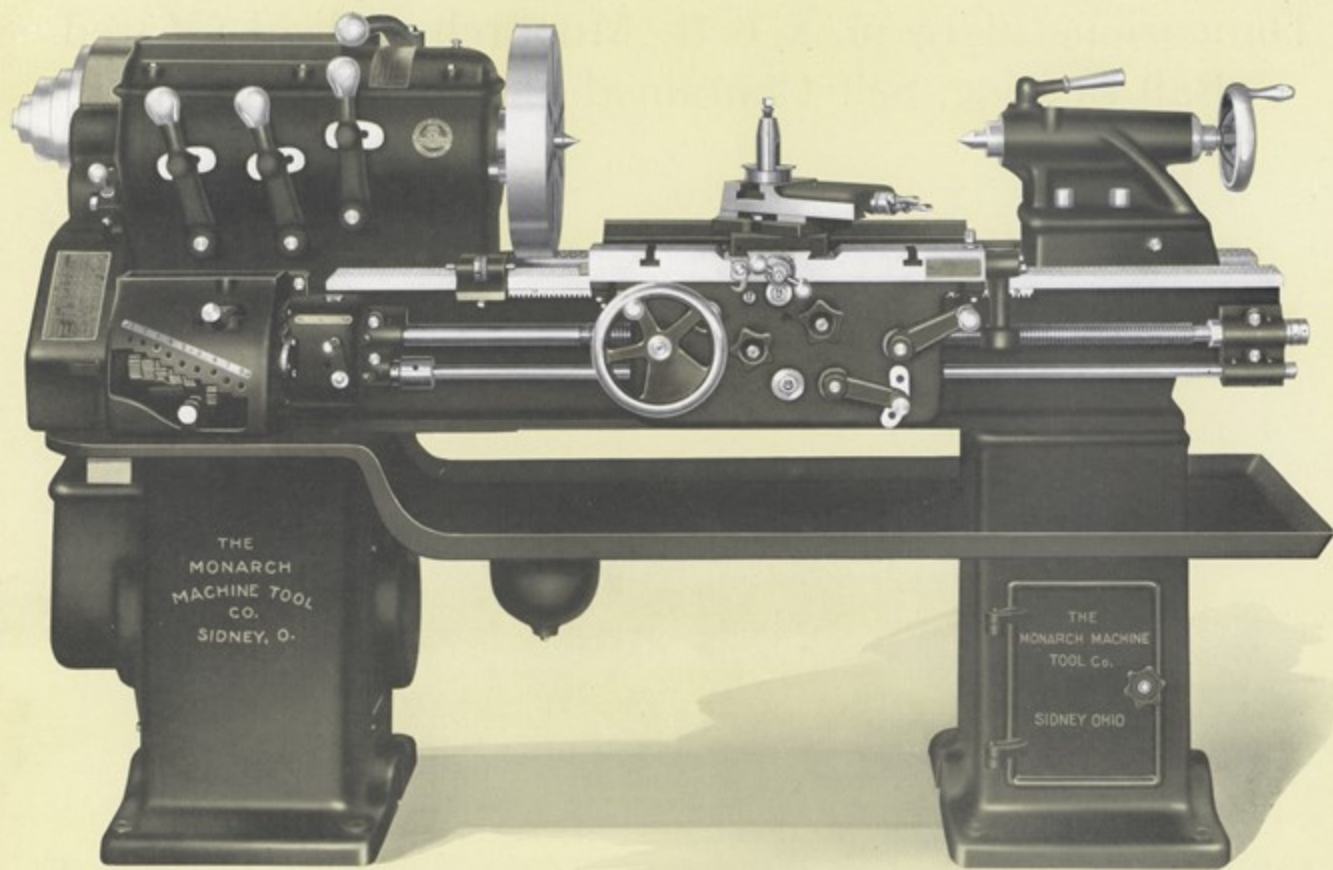
Dimensions of 14 in. x 6 ft. Monarch Helical Geared, Ball Bearing, Self-Contained Motor Drive Lathe

Swing over bed	14 $\frac{1}{4}$ "
Swing over carriage	9 $\frac{3}{4}$ "
Takes between center, tailstock flush	2' 6"
Takes between center, tailstock overhung	3'
Base length shipping weight	2600 lbs.
Weight extra two feet	250 lbs.
Hole through spindle	1 $\frac{3}{8}$ "
Front spindle bearing	3" x 5"
Rear spindle bearing	2 $\frac{1}{4}$ " x 4 $\frac{1}{4}$ "
Center Morse taper	No. 4
Spindle nose, diameter and threads per inch	2 $\frac{3}{8}$ "—6 thd.
Lead screw diameter and threads per inch	1 $\frac{1}{4}$ "—4 thd.
Range of threads per inch, quick change	3 to 46
Range of feed per inch, quick change	7 $\frac{1}{2}$ to 115
Headstock base length	22 $\frac{3}{4}$ "
Tailstock base length	12"
Tailstock, spindle diameter	2 $\frac{3}{8}$ "
Carriage length	24"
Carriage beidge width	6"
Compound rest top slide travel	4 $\frac{1}{8}$ "
Size of lathe tool	5 $\frac{1}{8}$ " x 1 $\frac{3}{8}$ "
Motor, size recommended ordinary service	2 to 3 H. P.
Motor, Constant speed, recommended	1150 R. P. M.
Speed of geared head driving pulley	345 R. P. M.
Geared head driving pulley, diameter, face	10" x 3 $\frac{1}{4}$ "
Width of bed	12"
Depth of bed	11"
Length of bed, 5', 6', and in multiples of 2 feet up to	14'

Spindle speeds obtained on geared head lathe with driving pulley operated at recommended speeds: 13, 22, 32, 55, 75, 127, 183 and 311 R. P. M.

Regular equipment consists of face plate, dog plate, steady rest, compound rest, centers, chasing dial, chasing stop, wrenches.

THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO. U. S. A.



Page eight

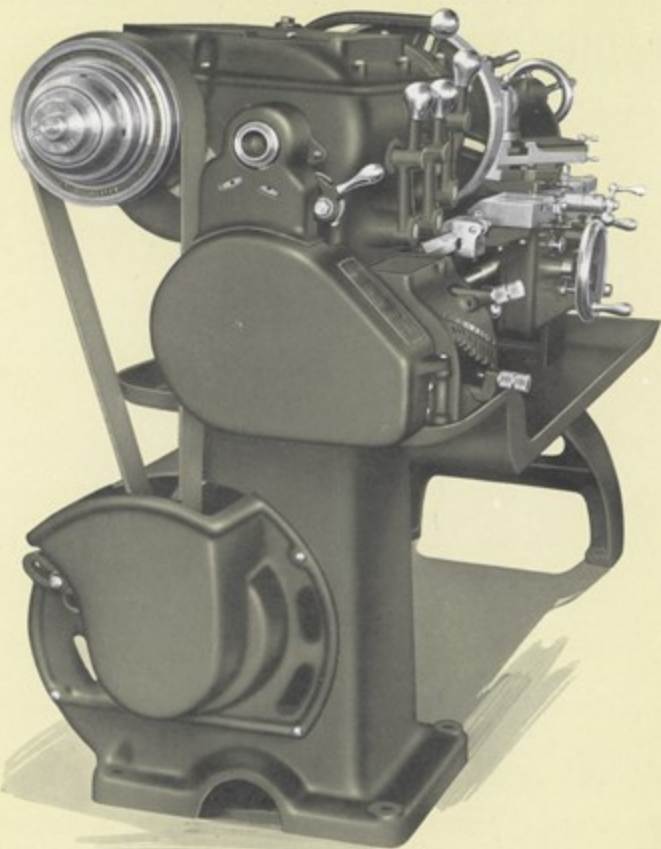
16"x6" Monarch Helical Geared Eight-Speed Geared Head Lathe with Self-Contained Motor Drive. Weight, without motor, 2750 lbs.

Dimensions of 16 in. x 6 ft. Monarch Helical Geared, Ball Bearing, Self-Contained Motor Drive Lathe

Swing over bed.....	16 $\frac{1}{4}$ "
Swing over carriage.....	11 $\frac{3}{4}$ "
Takes between center, tailstock flush.....	2' 6"
Takes between center, tailstock overhung.....	3'
Base length shipping weight.....	2750 lbs.
Weight extra two feet.....	250 lbs.
Hole through spindle.....	1 $\frac{3}{8}$ "
Front spindle bearing.....	3" x 5"
Rear spindle bearing.....	2 $\frac{1}{4}$ " x 4 $\frac{1}{4}$ "
Center Morse taper.....	No. 4
Spindle nose, diameter and threads per inch.....	2 $\frac{3}{4}$ "—6 thd.
Lead screw diameter and threads per inch.....	1 $\frac{1}{4}$ "—4 thd.
Range of threads per inch, quick change.....	3 to 46
Range of feed per inch, quick change.....	7 $\frac{1}{2}$ to 115
Headstock base length.....	22 $\frac{3}{4}$ "
Tailstock base length.....	12"
Tailstock, spindle diameter.....	2 $\frac{3}{8}$ "
Carriage length.....	24"
Carriage beidge width.....	6"
Compound rest top slide travel.....	4 $\frac{1}{8}$ "
Size of lathe tool.....	5 $\frac{8}$ " x 1 $\frac{3}{8}$ "
Motor, size recommended ordinary service.....	2 to 3 H. P.
Motor, Constant speed, recommended.....	1150 R. P. M.
Speed of geared head driving pulley.....	345 R. P. M.
Geared head driving pulley, diameter, face.....	10" x 3 $\frac{1}{4}$ "
Width of bed.....	12"
Depth of bed.....	11"
Length of bed, 5', 6', and in multiples of 2 feet up to.....	14'

Spindle speeds obtained on geared head lathe with driving pulley operated at recommended speeds: 13, 22, 32, 55, 75, 127, 183 and 311 R. P. M.

Regular equipment consists of face plate, dog plate, steady rest, compound rest, centers, chasing dial, chasing stop, wrenches.



End view of 14-inch Monarch Lathe with Cast Iron Belt Guard Removed

The Self Contained Motor Drive

There is an increasing demand among users of individually motor driven lathes to remove the motor from its customary place on top of the headstock and place it inside the cabinet leg.

With the motor inside the Monarch cabinet leg, it is protected from all dirt, oil or other foreign substance. Wiring is enclosed. Vibration caused by an improperly balanced armature is eliminated. A much neater appearance is given the lathe. There is less obstruction of vision and the motor driven Monarch lathe is no higher than a cone driven tool of equal size.

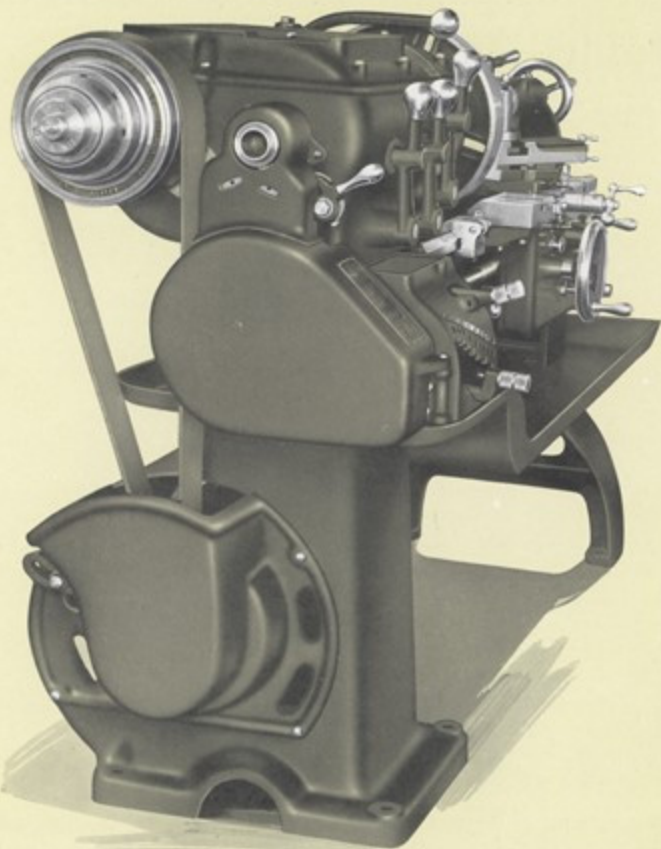
The motor can be removed from either side of the leg. The motor is mounted on a hinged adjustable shelf providing adjustment for belt or silent chain used for driving. This adjustment is easily and quickly made from the outside.

When endless belt is used "Houghton's VIM Brand" of belting is furnished and a ball bearing adjustable idler pulley is furnished. We can furnish either the silent chain or endless belt drive and we consider both equally efficient. The endless belt drive is more noiseless than the silent chain and in view of the fact that the Helical Geared Headstock on Monarch lathes is noiseless, we feel like urging the use of the endless belt drive. Motor starting or control apparatus can either be mounted inside or on the rear of the tailstock leg.

Both headstock lever control and apron lever control for starting, stopping and braking is furnished.

Motor can be mounted on top of headstock instead of inside the leg, when desired. A motor not exceeding 1200 R. P. M. is recommended. Either constant speed A. C. or D. C. or adjustable speed D. C. motor can be mounted inside the cabinet leg.

An adjustable arm is arranged to engage the rear carriage wing which disengages the driving clutch stopping the spindle. This protective feature is valuable in preventing carriage from feeding into headstock, face plate or chuck.



End view of 14-inch Monarch Lathe with Cast Iron Belt Guard Removed

The Self Contained Motor Drive

There is an increasing demand among users of individually motor driven lathes to remove the motor from its customary place on top of the headstock and place it inside the cabinet leg.

With the motor inside the Monarch cabinet leg, it is protected from all dirt, oil or other foreign substance. Wiring is enclosed. Vibration caused by an improperly balanced armature is eliminated. A much neater appearance is given the lathe. There is less obstruction of vision and the motor driven Monarch lathe is no higher than a cone driven tool of equal size.

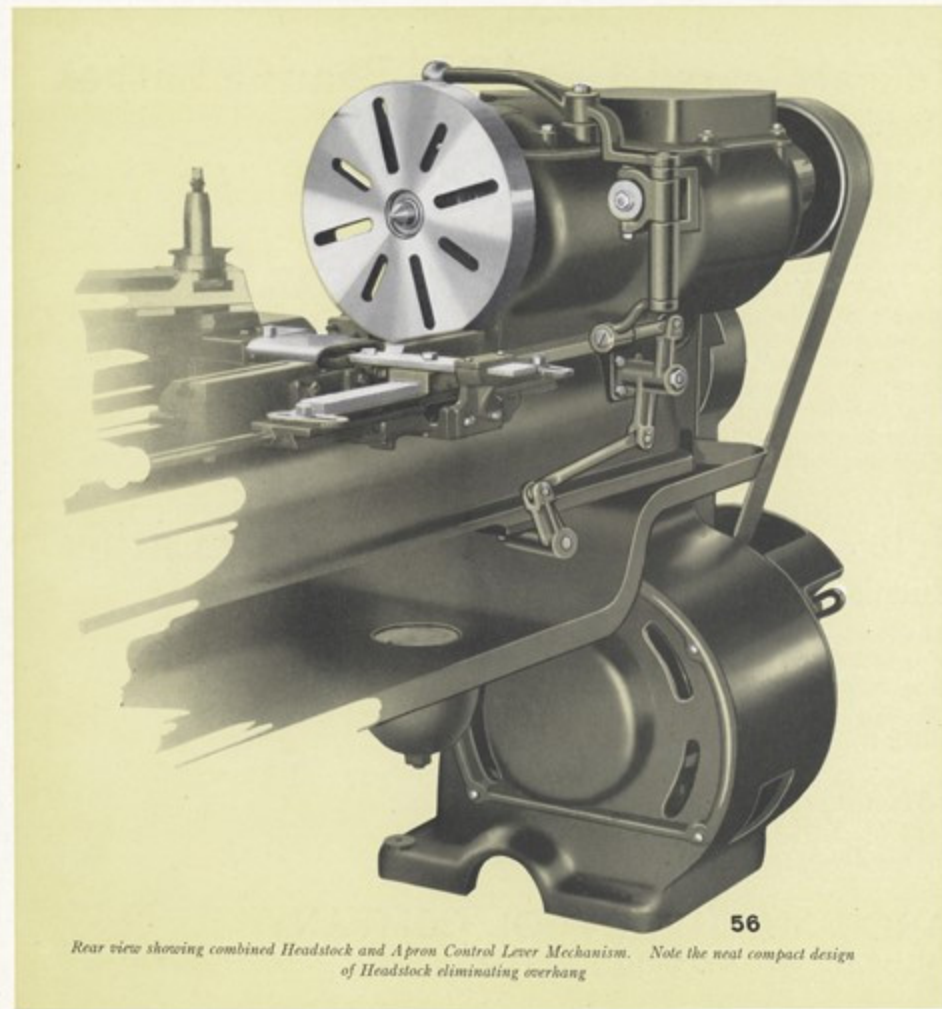
The motor can be removed from either side of the leg. The motor is mounted on a hinged adjustable shelf providing adjustment for belt or silent chain used for driving. This adjustment is easily and quickly made from the outside.

When endless belt is used "Houghton's VIM Brand" of belting is furnished and a ball bearing adjustable idler pulley is furnished. We can furnish either the silent chain or endless belt drive and we consider both equally efficient. The endless belt drive is more noiseless than the silent chain and in view of the fact that the Helical Geared Headstock on Monarch lathes is noiseless, we feel like urging the use of the endless belt drive. Motor starting or control apparatus can either be mounted inside or on the rear of the tailstock leg.

Both headstock lever control and apron lever control for starting, stopping and braking is furnished.

Motor can be mounted on top of headstock instead of inside the leg, when desired. A motor not exceeding 1200 R. P. M. is recommended. Either constant speed A. C. or D. C. or adjustable speed D. C. motor can be mounted inside the cabinet leg.

An adjustable arm is arranged to engage the rear carriage wing which disengages the driving clutch stopping the spindle. This protective feature is valuable in preventing carriage from feeding into headstock, face plate or chuck.



56
Rear view showing combined Headstock and Apron Control Lever Mechanism. Note the neat compact design of Headstock eliminating overhang

The Dual Control

For ease of control starting, stopping and braking the spindle we have provided both a headstock control lever and in addition an apron control lever located on the right hand end of the apron.

This dual control mechanism is standard equipment on all sizes of geared head lathes regardless of length of bed.

This dual control is a big time saver in enabling the operator to start and stop the spindle of the lathe from the apron at any position along the bed and also at the headstock.

If electrical apron control is also desired, it can be furnished as an extra as shown in the price list, in addition to mechanical dual control.

The apron control mechanism is extremely simple, consisting of a bracket and lever attached to the right hand end of the apron through which a square rod passes, being connected to the multiple disc driving clutch and brake by means of a pair of miter gears and levers.

The control levers operate very easily, due to the exceptional ease of operation of the multiple disc driving clutch.

Monarch 8-speed Helical Geared Head Ball Bearing Lathes are Furnished in the Following Sizes:

- 14 inch with bed lengths from 5 feet to 14 feet.
- 16 inch with bed lengths from 5 feet to 14 feet.
- 18 inch with bed lengths from 6 feet to 30 feet.
- 20 inch with bed lengths from 6 feet to 30 feet.
- 20 inch Extra Heavy Duty with bed lengths from 8 feet to 30 feet.
- 22 inch Heavy Duty with bed lengths from 8 feet to 30 feet.
- 24 inch Standard with bed lengths from 8 feet to 30 feet.
- 24 inch Extra Heavy Duty with bed lengths from 10 feet to 30 feet.
- 26 inch Heavy Duty with bed lengths from 10 feet to 30 feet.
- 28 inch Standard with bed lengths from 10 feet to 30 feet.
- 30 inch with bed lengths from 10 feet to 30 feet.
- 26 inch Super-Production with bed lengths from 10 feet to 30 feet.
- 30 inch Super-Production with bed lengths from 10 feet to 30 feet.

Monarch 4-speed Helical Geared Head, Ball Bearing Lathes are Furnished in the Following Sizes:

- 18 inch Extra Heavy Duty Production with bed lengths from 6 feet to 9 feet.
- 26 inch Super-Production type with bed lengths from 10 feet to 30 feet.
- 30 inch Super-Production type with bed lengths from 10 feet to 30 feet.

Any of the above lathes can be fitted with any special attachment for tool work or any special production work within their range of capacity.

*We Guarantee Every Monarch Lathe to Give
Complete Satisfaction to the Purchaser.
And We Do Stand Back of This Guarantee*

THE MONARCH MACHINE TOOL COMPANY
SIDNEY, OHIO