MONARCH

MODEL 'C'

TOOL-ROOM LATHES

THE DAWN OF A NEW ERA IN TOOL ROOM LATHES!

THE Monarch far-reaching policy of service, progress and achievement has resulted in the creation of the outstanding Tool Room Lathe of all time . . a new lathe for a new industrial age. It has upset all precedent and revolutionized commonly accepted standards of lathe performance.

Monarch Model "C" Lathes incorporate all the important modern developments . . . most of which, since 1924, were pioneered by Monarch. They are smoother, quieter, more powerful, more accurate . . . they excel in every standard of lathe performance on which comparisons of value can be based. They are capable of producing work to extreme limits of accuracy . . . of retaining this original accuracy over a longer period of years . . . at a lower cost.

THE MONARCH MACHINE TOOL CO., Sidney, Ohio, U. S. A.

Chicago Sales Office:
547 W. Washington Blvd.

Monarch Lathes
Helical Gears - Timken Bearings
SMOOTHER . . QUIETER . . MORE POWERFUL

New York Sales Office:
857 Graybar Building

REPRESENTATIVES IN ALL PRINCIPAL INDUSTRIAL CENTERS THROUGHOUT THE WORLD.

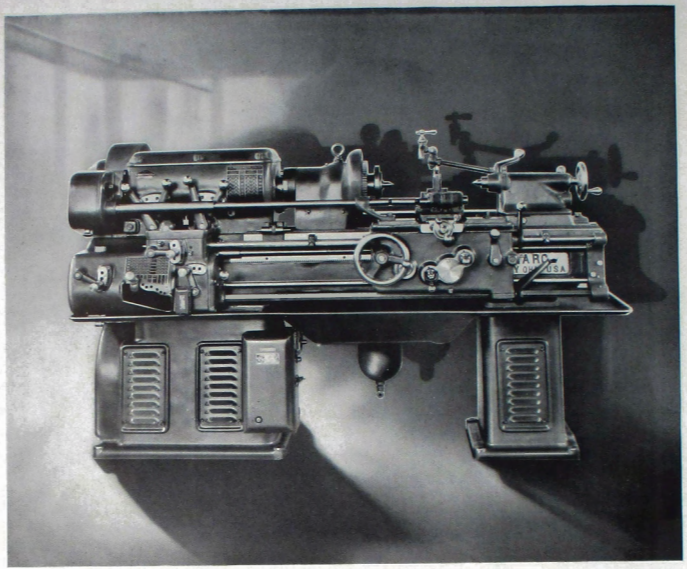
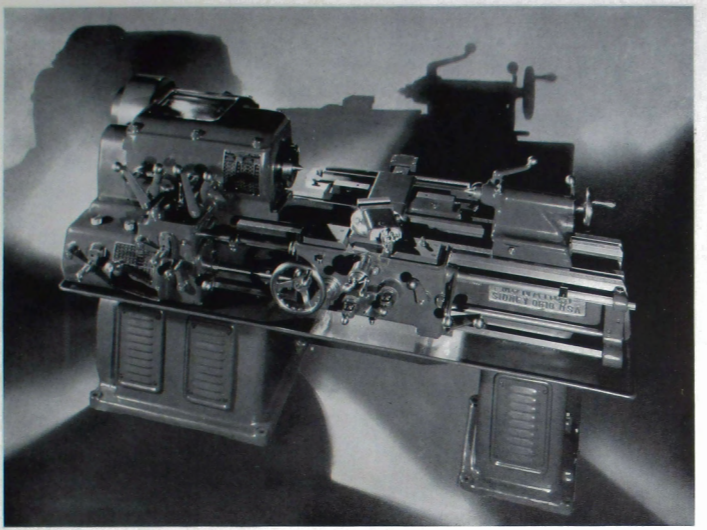


Fig. 145

THE FINEST 13" PRECISION LATHE OF TODAY

THIS photograph shows the Monarch 13" x 30", 16-speed, completely Timkenized Tool Room Lathe, equipped with Timkenized sub-headstock speed reducer and new universal relieving attachment. This lathe has a total of 55 anti-friction bearings. It is a marvel of accuracy and will handle a wide range of work.



ANOTHER MONARCH 13" TOOL ROOM LATHE

Fig. 376

THIS 13" x 30" Monarch Timkenized Tool Room Lathe is new in design, new in construction, new in operating efficiency. It incorporates a wealth of new features, most of which, since 1924, were pioneered by Monarch. There are three other sizes . . . 16", 18", and 20" . . . a size for almost every tool room requirement. Monarch Model "C" Tool Room Lathes were first introduced in 1929, at the time of the Machine Tool Show in Cleveland, where they met an enthusiastic reception.

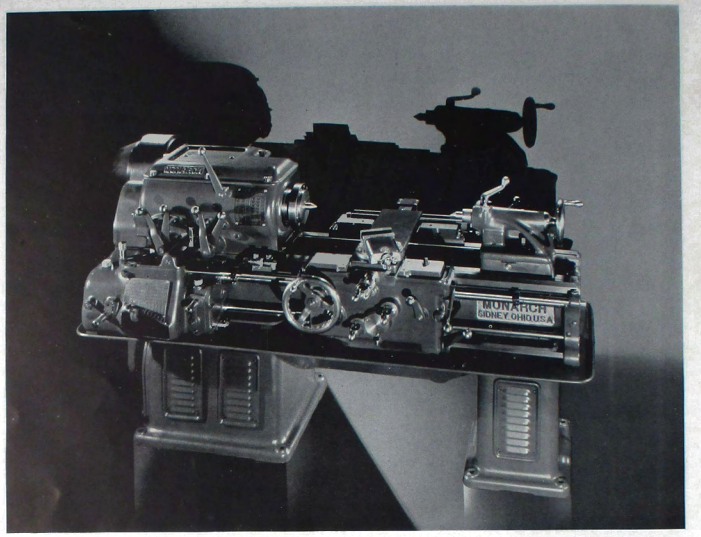


Fig. 377

MONARCH 16"
TOOL ROOM LATHE

THE 16" x 30" Monarch Model "C" Tool Room Lathe shown here has many exclusive features of design and construction that make it easier to handle and more economical to operate than lathes of much smaller size. It will handle a wider range of tool room jobs with unusual ease, smoothness and extreme accuracy.

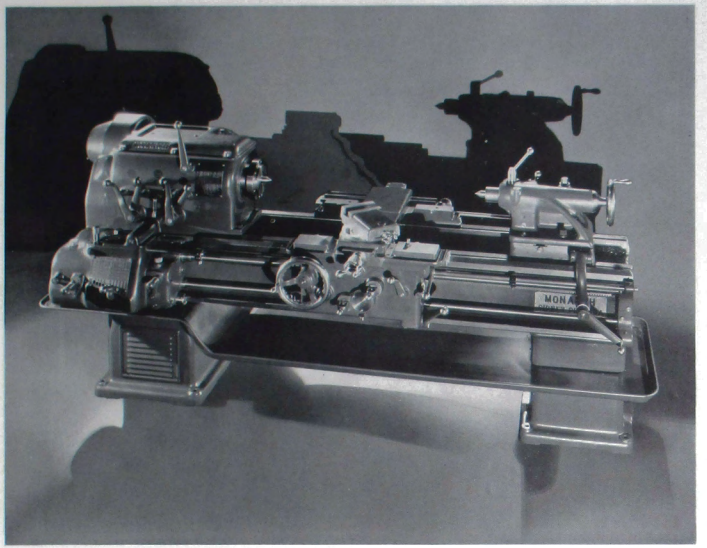


Fig. 378

MONARCH 20" TOOL ROOM LATHE

DESIGNED especially for tool room use, this 20" x 48" Monarch Model "C" Tool Room Lathe is today's finest development in precision lathes. The almost complete elimination of wear . . . due to the use of 55 anti-friction bearings, finer materials and better workmanship . . . gives this lathe an extreme original accuracy that lasts an incredibly long time.

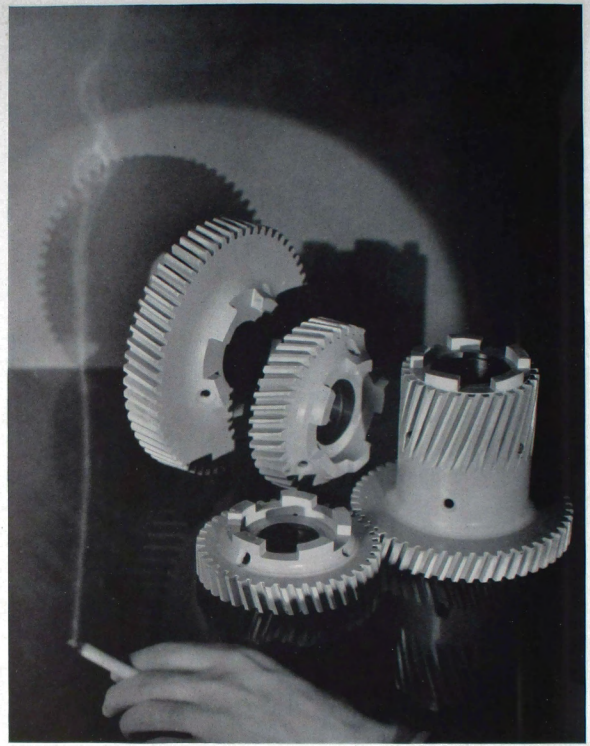


Fig. 373

SMOOTHER!

HELICAL GEARS MAKE MONARCH TIMKENIZED LATHES SMOOTHER

SYNCRO-MESH gears are widely used in automobile transmissions because they function MORE SMOOTHLY. Monarch Lathes have been SMOOTHER in operation since September, 1924 . . . when helical (syncro-mesh type) gears were adopted for the headstock.

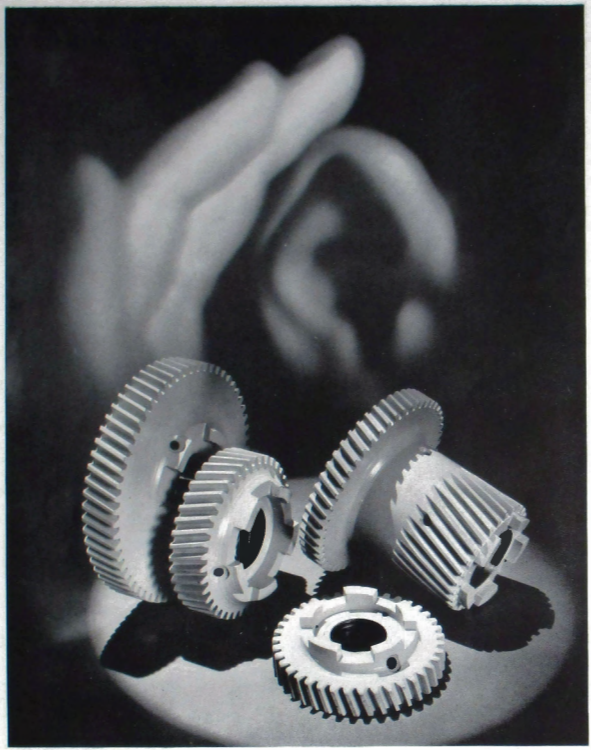


Fig. 374

QUIETER!

HELICAL GEARS MAKE MONARCH TIMKENIZED LATHES QUIETER

YOUR automobile transmission is QUIETER because of syncro-mesh and helical gears. Monarch Lathes have been QUIETER since September, 1924. . . . when helical (syncro-mesh type) gears were adopted for the headstock.

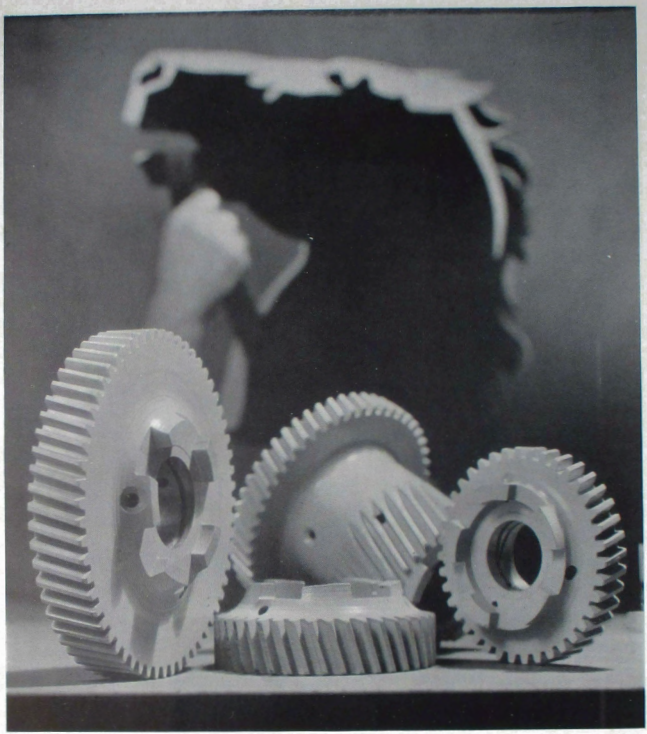


Fig. 375

MORE POWERFUL!

HELICAL GEARS MAKE MONARCH TIMKENIZED LATHES MORE POWERFUL

BECAUSE of the extra area of tooth contact, helical gears transmit more power than spur gears of corresponding size. Monarch Lathes have been MORE POWERFUL since September, 1924 . . . when helical (syncro-mesh type) gears were adopted for the headstock.

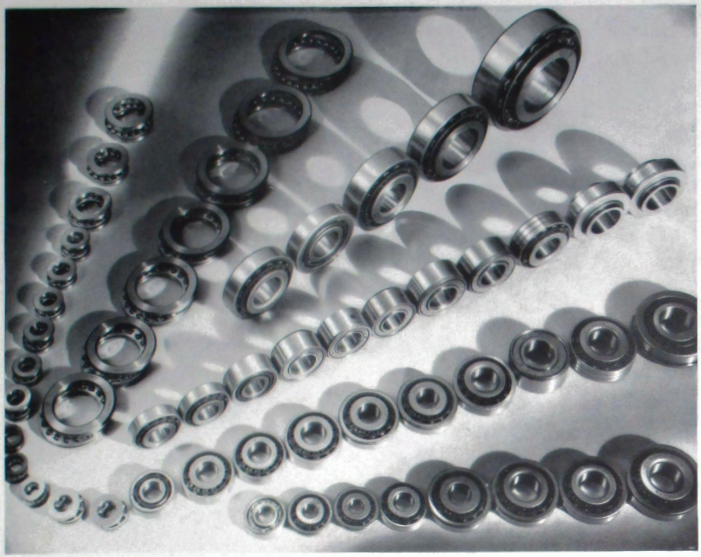


Fig. 372

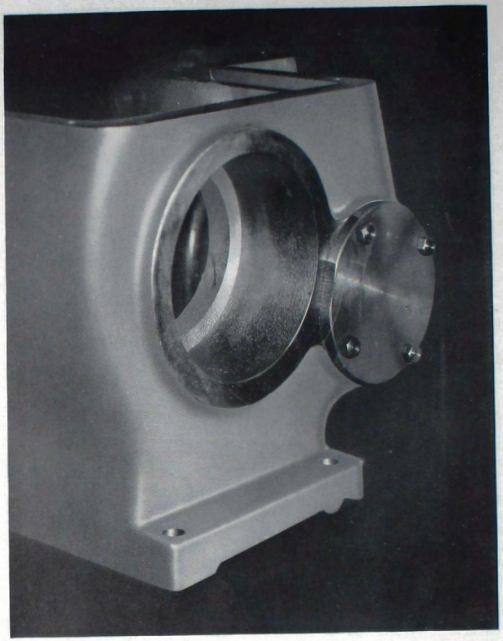
55

ANTI-FRICTION BEARINGS!

THIS record-breaking number of anti-friction bearings, together with many other exclusive Monarch features, result in important operating advantages and economies such as greater accuracy, elimination of friction, reduced power consumption, conservation of lubricant, prolonged life of machine, lowered maintenance cost.

Wherever there are moving parts in a Monarch Model "C" Lathe, there you will find an anti-friction bearing. These bearings help make Monarch lathes easier to handle and more economical to operate than lathes of much smaller size. MONARCH PIONEERED THE COMPLETE TIMKENIZING OF LATHES.

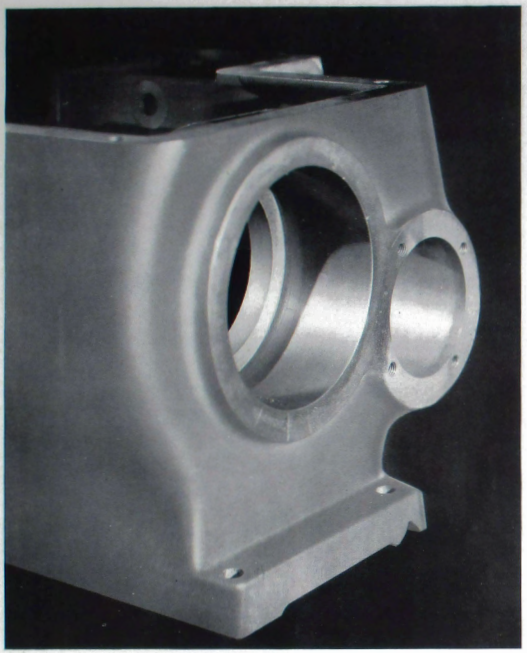
This Monarch headstock has been bored but not honed. Ordinary lathe practice goes no farther than this.



HEADSTOCK . . . BORED BUT NOT HONED

Fig. 148

THIS photograph shows the bore after the finish boring operation and before honing. While it may be round and accurate to .0005" . . . this is not sufficiently accurate for Monarch. As there is no known method of boring a headstock casting to a degree of accuracy comparable to the perimeter of Timken bearings, Monarch developed a special honing or lapping process for this particular job.

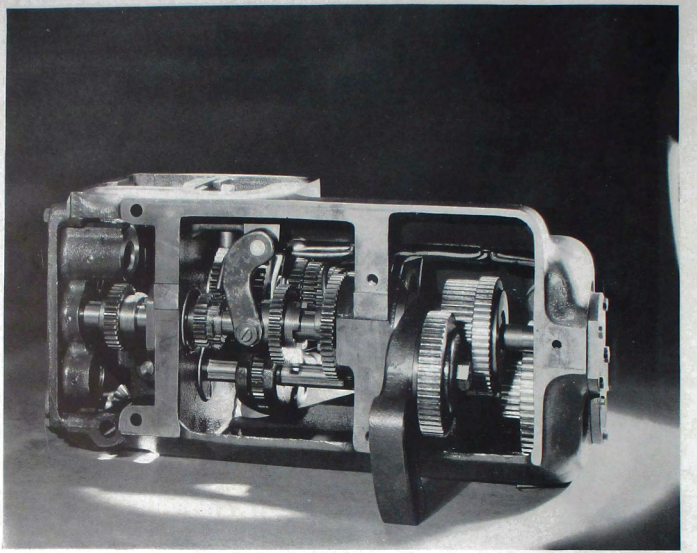


The bore of this Monarch headstock has been honed in accordance with special Monarch practice.

Fig. 149

HEADSTOCK...HONED TO ACCURACY OF .0001"

AFTER the bore has been honed it is perfectly concentric with the outer Timken cup. All high spots in the bore are removed. Its tolerance limit is within .0001". As a result of this extreme care in the fitting, Timken bearings are never distorted from their extreme accuracy when mounted by Monarch. Monarch tailstocks are also honed to receive the tailstock spindle.



MONARCH TIMKENIZED QUICK-CHANGE GEAR BOX

Fig. 371

ALL shafts are supported in Timken roller bearings which will not wear in use. Consequently, the correct gear center distance will always be maintained, thereby eliminating undue wear on the gears. The gears are all high carbon steel forgings. The idler gear, in the tumbler lever, is mounted on a ball bearing. All gear box bearings are lubricated from a central reservoir that requires replenishment only about once a week.

PROOFS OF MONARCH ACCURACY

Fig. 369

CHECKING MONARCH HEADSTOCK BORE FOR ACCURACY

AFTER Monarch headstocks are bored and honed to receive the Timken spindle bearing, the roundness and uniformity of bore are checked by a direct-reading gauge as shown above. The limit of error in roundness of the bore is .0001". The degree of accuracy obtained by this process is the same as is secured in the honing of automobile cylinders.

A TRULY HARD BED

TESTING THE HARDNESS OF A MONARCH LATHE BED

Fig. 366

THIS test shows that Monarch beds have an average hardness of 40 on the Shore scale. This photograph shows one of the Monarch engineers checking the hardness of a Monarch Lathe bed with the Shore scleroscope. The corresponding Brinnell test will average about 250.

NO DEFECTS CAN PASS THIS TEST

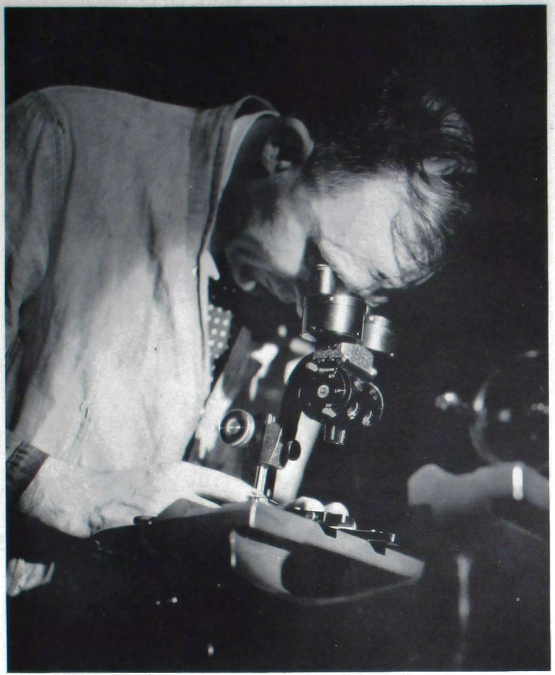
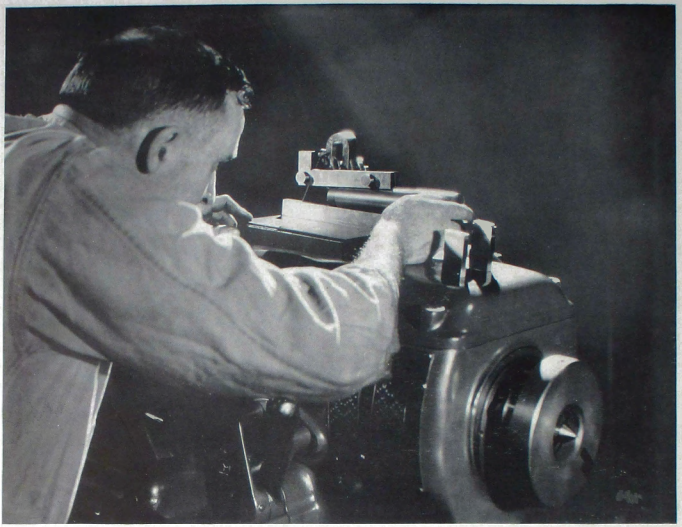


Fig. 367

A MICROSCOPIC TEST OF THE MONARCH LATHE BED

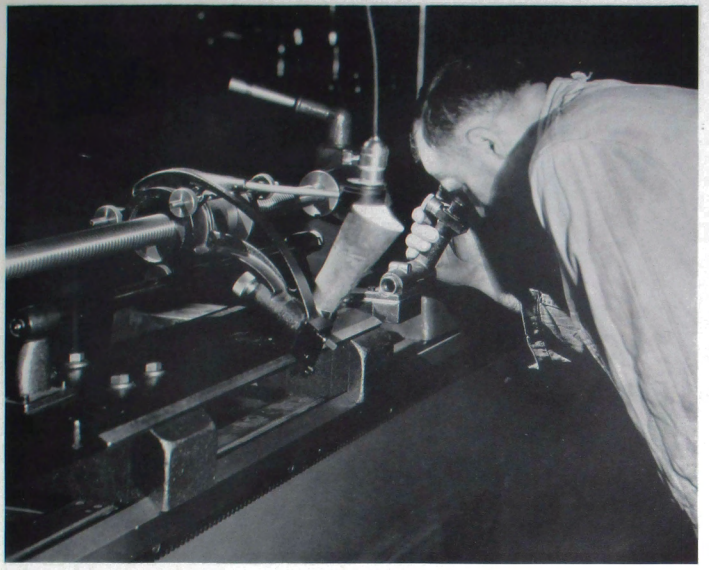
SURFACES of Monarch Lathe beds are carefully inspected with a Bausch & Lamb binocular inspection miscroscope. Due to the high power of magnification, minute detail of the grain structure and surface finish are shown with vivid realism. Because Monarch beds are cast from an alloy containing approximately 80% steel, special iron, nickel, chromium and other elements, they stand the most rigid inspection. The finish is as near flawless as any produced in this type of casting.



TESTING THE TAPER ANGLE OF A TURNED PIECE...

Fig. 364

THE Sine-Bar is used to test the accuracy of taper turning on Monarch Model "C" Tool Room Lathes. The Monarch improved taper attachment turns an especially accurate and smooth taper. Any size Monarch Model "C" Tool Room Lathe may be equipped with this highly improved taper attachment. The cross feed screw is telescoping, so the taper attachment is always connected and ready for instant use.



TESTING LEAD SCREW ACCURACY...

Fig. 365

ALL lead screws used in Monarch Model "C" Tool Room Lathes are tested for accuracy on a Zeiss Lead Testing Machine that records errors as small as .0002". This method of lead testing is the most accurate and positive method of checking the accuracy of lead screws. The standard of accuracy for Monarch lead screws is .001" non-cumulative error per foot of lead of the screw. The lead screw is made of high carbon, free-cutting steel. It is specially turned and ground, and is carefully chased with an extremely fine finish on the Acme thread.

Fig. 370

TESTING FOR LEAD SCREW CAMMING ACTION

THIS photograph shows an operator testing the camming action of the lead screw on a Monarch Model "C" Lathe. The limit of camming action permitted on these lathes is .0005". The average error is much less. Even tho the lead screw is perfectly accurate in lead, a camming action of either the lead screw itself or the lathe spindle would cause the lathe to chase an inaccurate thread.

TESTING FOR ERROR IN LEAD

Fig. 368

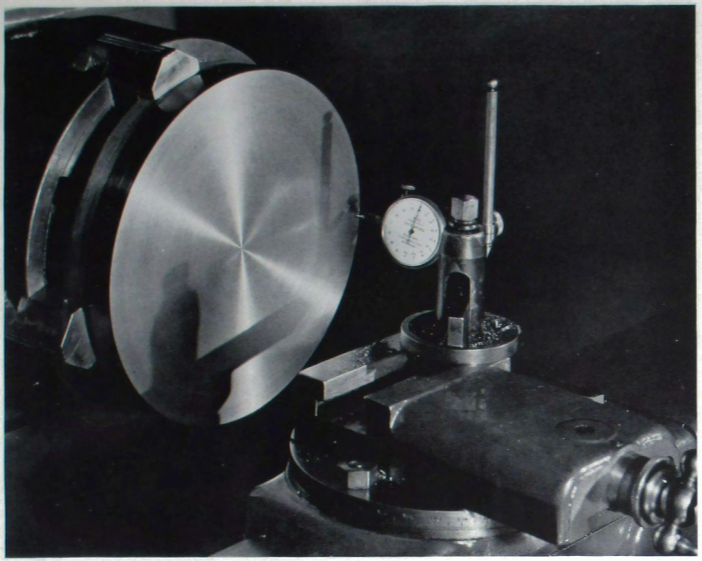
THE accuracy of lead in Monarch lead screws is tested by holding Gauge Blocks between the work held in the chuck and the dial test indicator. Starting from a fixed point and rotating the spindle slowly a given number of revolutions, with the apron half nut engaged, should advance the work a definite distance. The gauge blocks instantly show any error in lead. On Monarch Model "C" Lathes, this error is held to .001", non-cumulative, per foot of the lead screw.

PROVING MONARCH ACCURACY ON THE FINEST PRECISION MEASURING INSTRUMENTS IN THE WORLD!

MEASURING ROUNDNESS, SMOOTHNESS AND STRAIGHTNESS OF WORK

Fig. 147

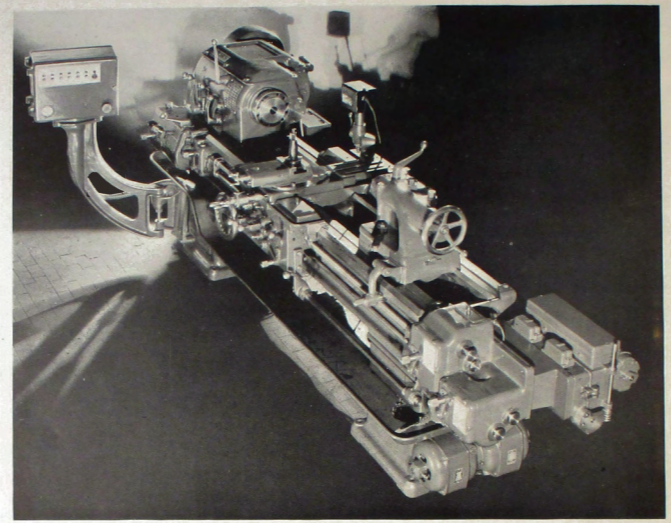
MONARCH engineers do not guess as to the roundness or straightness of a piece of work . . . they do not take the smoothness of a finished surface for granted . . . they do not wonder whether gear tooth marks or tool marks show. They use the finest testing instruments . . . and triple check . . . to insure absolute accuracy. In the above photograph an operator, using the Zeiss optometer which records errors as small as .000012", is shown measuring the roundness, smoothness and straightness of work turned on a Model "C" Tool Room Lathe.



TESTING THE EXTREME ACCURACY AND SMOOTHNESS OF A FACING CUT

Fig. 152

A finish cut was taken across the face of this 10" steel forging. The dial test indicator showed that this was faced to an accuracy of .00015" The dial test indicator, placed on the O.D. of the piece, showed a total "run out" of .0001". There was a complete absence of gear-tooth marks. The face of the piece was extremely smooth due to the fact that there is no end movement in the spindle of a Monarch Helical-geared Timkenized Lathe.



ANOTHER MONARCH ACHIEVEMENT!

Fig. 146

By combining the well-known Keller automatic electric control with the Monarch Helical-geared Timkenized Lathe, Monarch engineers developed the Monarch-Keller Form Turning Machine. Its electrical "brain" makes possible the turning of intricate shapes and the accurate duplication of parts in a fraction of the time ordinarily required . . . and at a fraction of the cost, with an error of less than .001".