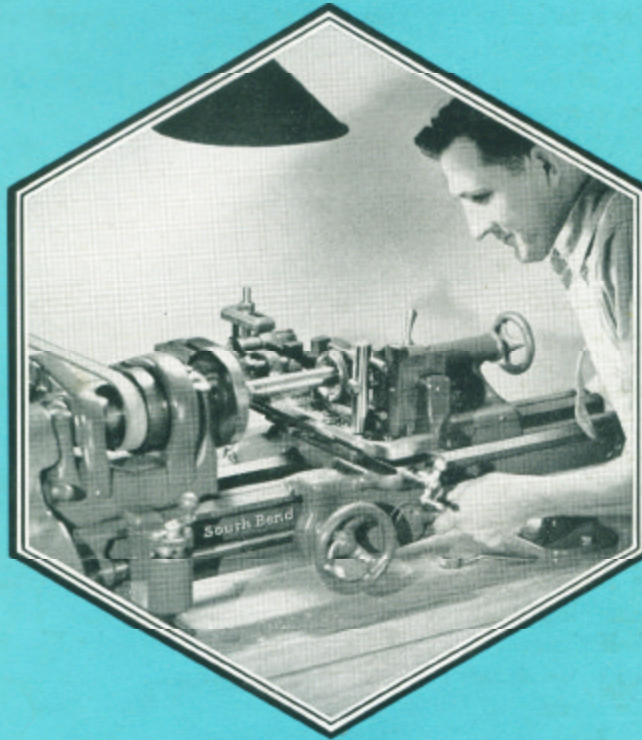


BULLETIN NO. 6-C

How to Bore Rebabbitted Connecting Rods



Price 10 Cents
Postpaid to Any Address
Coin or Stamps of Any Country Accepted

SOUTH BEND LATHE WORKS

477 NILES AVE.

SOUTH BEND, INDIANA, U. S. A.

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Connecting Rod Service

Connecting rod service is one of the most important and most profitable branches of the automotive service industry. Replacement connecting rods are required in large quantities for older cars, as well as for current models. All first class automotive service shops should be equipped to take care of this work.

The methods and equipment described in this bulletin are simple, efficient and practical. A South Bend Back-Geared Screw Cutting Lathe is ideal for boring rebabbitted connecting rods because it has the precision accuracy, the power and the necessary range spindle speeds and power carriage feeds required for doing the work. Some of the largest manufacturers of replacement connecting rods are using South Bend Lathes.

In addition to boring rebabbitted connecting rods, the South Bend Lathe, being a universal tool, can be used for many other practical jobs in the auto service shop, such as truing differential flanges, refacing valves, finishing semi-machined pistons, cutting right and left hand screw threads, and for general machine work of all kinds.

Some auto mechanics believe they should have a special, single purpose machine for each important automotive service job, such as boring rebabbitted connecting rods, truing differential gear flanges, refacing valves, finishing pistons, truing differentials, etc. One lathe will take care of most all of the various classes of automotive service work and will do the work better than it can be done on most single purpose machines. The cost of the lathe complete with necessary attachments and accessories is less than half the cost of single purpose machines required for handling the same classes of work, also a great deal of valuable floor space is saved.

South Bend Lathe Works

The Lathe illustrated throughout this bulletin on the servicing of connecting rods is a 9" x 3' "Workshop" Back-Geared, Screw Cutting Precision Lathe.

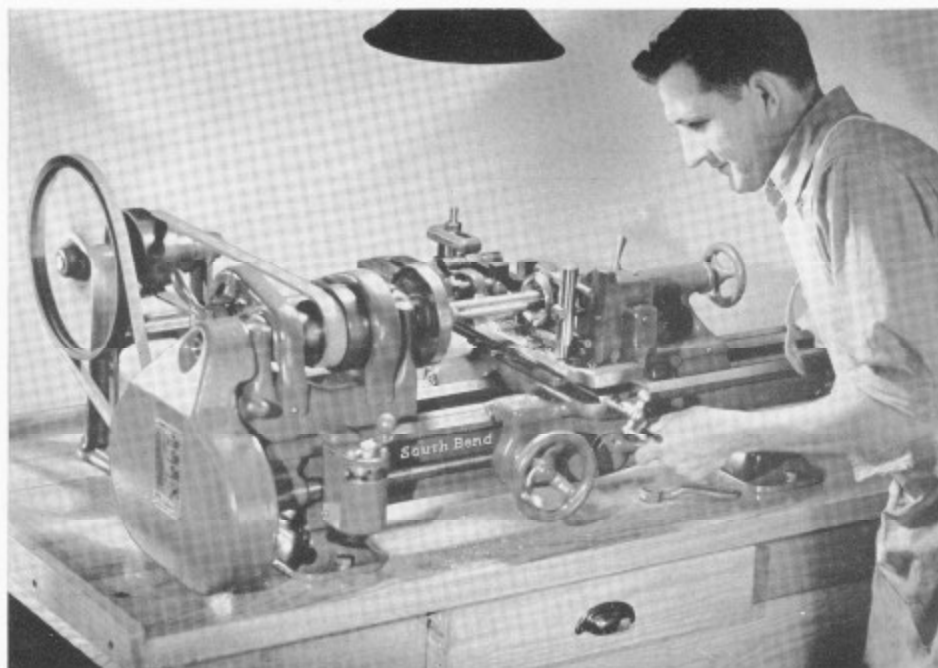


Fig. 1. Boring a re-babbitted connecting rod on a 9-inch "Workshop" South Bend Lathe.

How to Bore Re-babbitted Connecting Rods Of Automobiles, Buses, Trucks, Compressors, Etc.

A back-geared, screw cutting lathe is the ideal tool for boring re-babbitted connecting rods, because it has a wide range of automatic longitudinal feeds and a wide range of spindle speeds which permit doing the work with precision accuracy and in minimum time. Coarse feeds may be used for the roughing cuts; for the finishing cut a very fine feed may be used to obtain a smooth, accurate surface. The lathe spindle may be arranged to operate at high speed for boring small bearings, and at slower spindle speeds for large diameter bearings.

With the South Bend connecting rod boring attachment and other equipment described in this bulletin, connecting rods can be accurately bored so that the bearing is in perfect alignment with the piston pin hole bearing, as shown in Fig. 2.

In addition to boring re-babbitted connecting rods for automobiles, buses and trucks, the lathe can be used for boring bronze backed bearings of all kinds and for boring connecting rods of refrigerator compressors, air compressors, etc.; also for many other important auto service jobs, such as; truing armature commutators; making bushings; finishing semi-machined pistons; cutting right- and left-hand screw threads; etc.

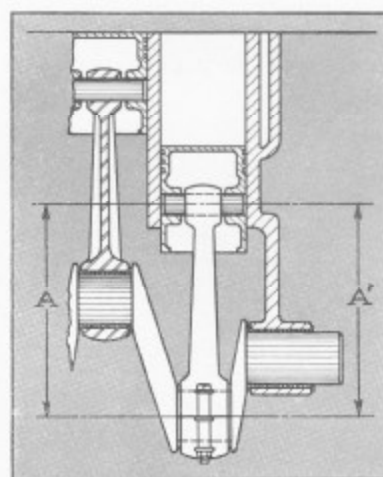


Fig. 2. Correctly bored connecting rod holds piston in perfect alignment with cylinder.

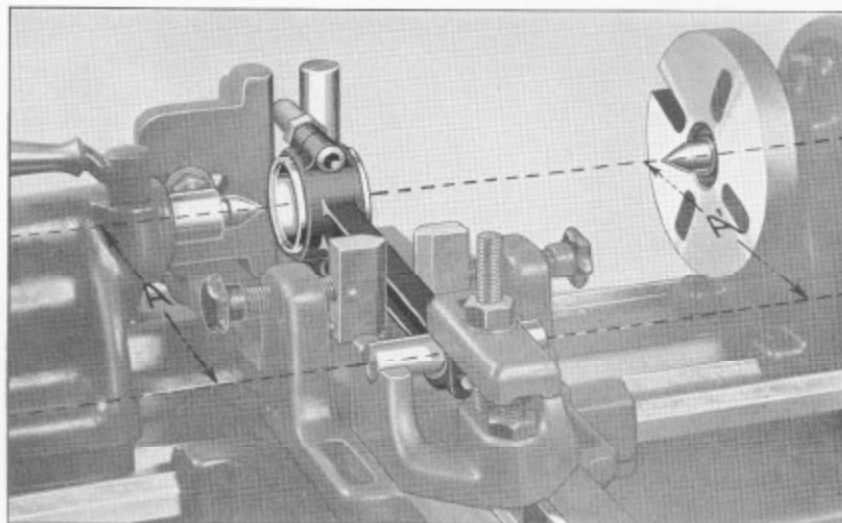


Fig. 3. Connecting rod boring attachment mounted on lathe for holding and aligning connecting rod.

How to Mount the Connecting Rod in Lathe Attachment Mounted on Lathe Carriage Holds Connecting Rod

A special fixture known as the connecting rod boring attachment is mounted on the lathe carriage, as shown in Fig. 3, for boring re-babbitted connecting rods. This is a universal attachment having adjustable stops, which permit mounting various sizes and types of connecting rods. A finished surface along the left edge of the attachment is provided for aligning it with the face plate of the lathe.

The connecting rod is aligned with the lathe centers by an adjustable V-block in which the piston pin is clamped. The opposite end of the connecting rod is held securely on both sides of the re-babbitted bearing by adjustable clamps which are so constructed that they may be tightened without springing the connecting rod out of alignment. These clamps should be carefully adjusted and tightened after the piston pin is clamped on the V-block.

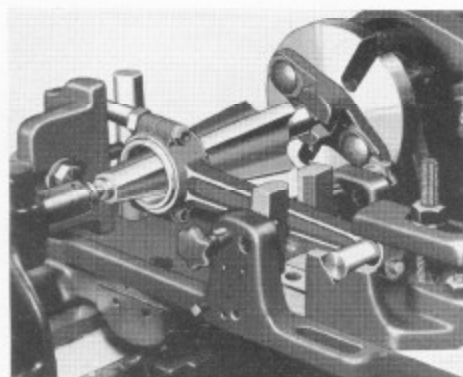


Fig. 4. Aligning connecting rod bearing with centering cone between centers.

Centering the Bearing

A centering cone is mounted between the lathe centers, as shown in Fig. 4, to aid in centering the connecting rod bearing, either before or after it is babbitted.

The connecting rod should be clamped loosely in the connecting rod boring attachment until the bearing is properly centered, after which the clamps may be tightened.

The cross feed screw of the lathe and the vertical adjusting screw of the connecting rod boring attachment are adjusted simultaneously to align the bearing with the spindle centers of lathe.

After the connecting rod has been aligned, the compound rest base should be locked by tightening the dovetail gib screws.

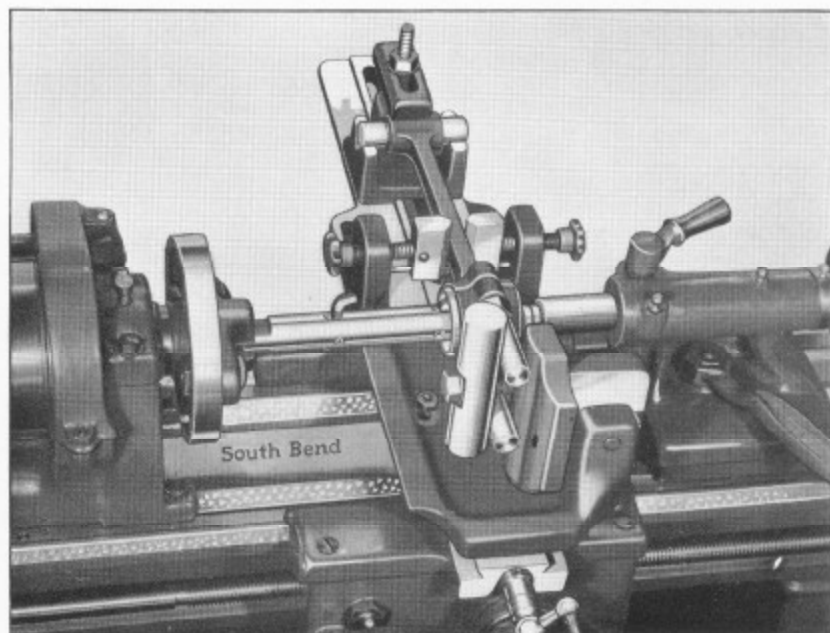


Fig. 5. Boring a re-babbitted connecting rod in the lathe.

How to Bore the Bearing to Exact Size

Special Micrometers Used to Set Cutter Bit

A boring bar is mounted between the lathe centers, as shown in Fig 5, for boring the connecting rod bearing and for finishing the ends of the bearing. A special direct reading micrometer (Fig. 6) is used for adjusting the cutter bit in the boring bar for boring the bearing to the exact diameter required.

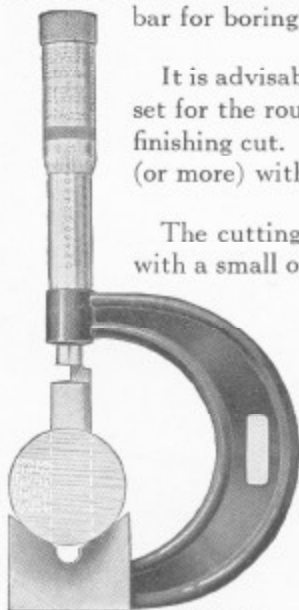


Fig. 6. Special V-block micrometer for adjusting bar cutter bit.

It is advisable to use a set of two boring bars, one with the cutter bit set for the roughing cut, and the other, with the cutter bit set for the finishing cut. This permits finishing a complete set of connecting rods (or more) without changing the adjustment of the cutter bits.

The cutting edge of the cutter bit should be honed to a keen edge with a small oil stone in order to obtain a smooth, bright finish. High speed steel cutter bits may be used with excellent results, although in some shops where a great deal of connecting rod boring is done a diamond lapped tungsten-carbide tipped cutter bit is used for the finish boring operation.



Fig. 7. Tungsten-carbide tipped cutter bit.

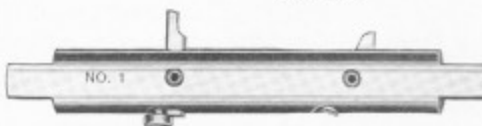


Fig. 8. Boring bar for boring connecting rods.

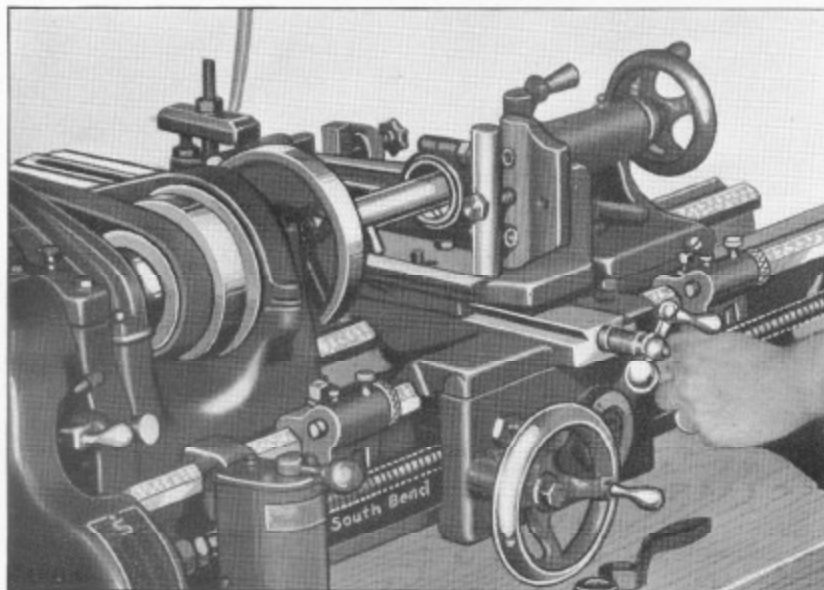


Fig. 9. Lathe equipped with micrometer carriage stops on both sides of carriage for facing connecting rods to exact length.

How to Face Ends of Bearing to Exact Length

Micrometer Carriage Stops Eliminate Guesswork

The ends of the connecting rod bearing may be faced, trimmed and chamfered to the exact length required by using micrometer carriage stops on each side of the lathe carriage. The stops may be adjusted for any length of bearing. After the stops have been properly set, any number of bearings can be faced to the same length without making additional measurements.

A cutter inserted in the boring bar is used for machining the ends of the bearings. The lathe spindle should revolve slowly for this operation. The boring bars are reversible so that after one end of the bearing has been faced, the bar may be turned end for end and the opposite end of the bearing machined. In addition to the cutter for facing the ends of the bearing, each boring bar also carries a boring cutter. This saves time as it permits boring the bearing and facing the end at one setting. (See Fig. 10.)

If the lathe is not equipped with micrometer carriage stops it is advisable to use micrometer calipers in checking the length of the bearing. Care should be taken to remove an equal amount of stock from each end of the bearing.

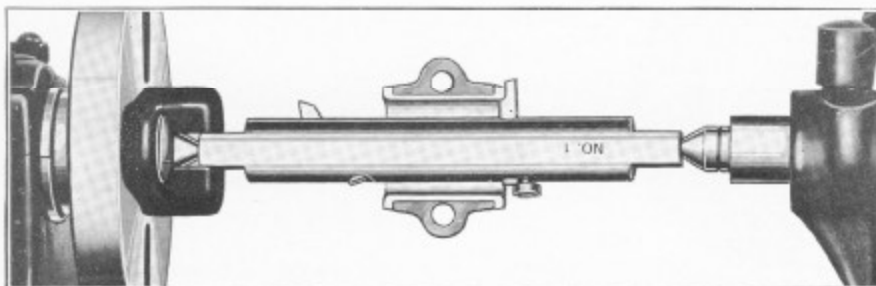


Fig. 10. Facing and rounding the end of a connecting rod bearing.

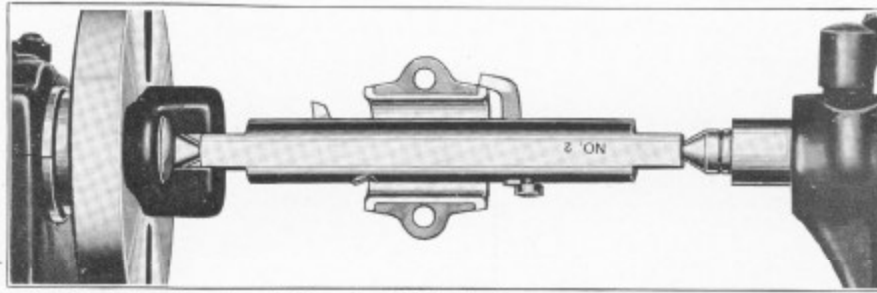


Fig. 11. Trimming the end of bearing with boring bar mounted between the lathe centers.

How to Trim Ends of Bearing

Bent Cutter Bit Used for Taking Cut

A bent cutter mounted in the boring bar is used for trimming the ends of the bearings. This cutter may be adjusted for various diameters of bearings and may be ground to form any desired angle. The lathe spindle should be operated at a slow speed for this operation. (See Fig. 12.)

After one end of the bearing has been trimmed, the boring bar should be turned end for end and the opposite end of the bearing trimmed.

How to Test Alignment of Bearings

Ways of Lathe Bed Used

The lathe bed may be used, as shown in Fig. 12, for testing the twist and accuracy of alignment of connecting rod bearings.

To test the connecting rod bearings for twist, test bars are inserted in the piston pin bearing and crankshaft bearing and the entire assembly placed on top of the lathe bed so that the ends of the test bars rest across the tops of the V-ways.

If there is any twist in the connecting rod, the ends of the bars will rest unevenly on the V-ways. The amount of twist can be determined by measuring with a feeler gauge between the end of the test bar and the V-way of the lathe bed. The connecting rod should be removed to a vise for straightening if it proves to be bent.

To test the connecting rod bearings for alignment, measure between the test bars at each end with inside calipers, as shown in Fig. 12. If there is any misalignment of the bearings it can easily be detected and the connecting rod may be straightened in a vise.

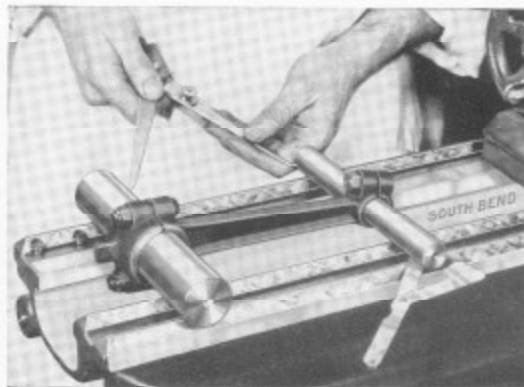


Fig. 12. Testing connecting rod for alignment and twist, using test bars across V-ways of lathe bed.

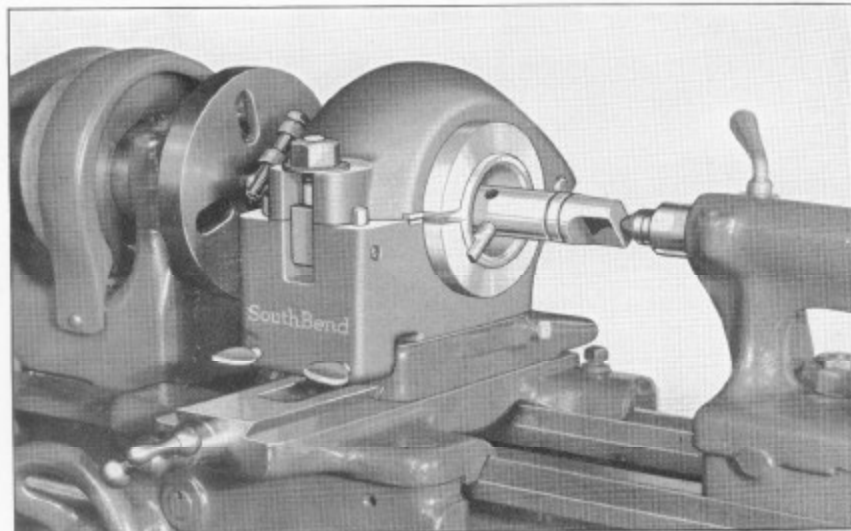


Fig. 13. Boring a bronze backed bearing in special fixture mounted on lathe carriage.

How to Bore Bronze Backed Bearings

Special Fixture Mounted on Carriage Holds Bearing

Bronze backed bearings are widely used for automobile connecting rods, airplane connecting rods, main bearings of crankshafts, etc. A special fixture is mounted on the lathe for boring re-babbitted bronze backed bearings, as shown in Fig. 13 above.

The boring bars used for boring re-babbitted connecting rods may also be used for boring bronze backed bearings. The only difference is in the fixture used for holding the bearing.

The fixture for holding the bronze backed bearings is fitted with a lead bushing which must be bored to fit the outside diameter of the re-babbitted bearing. Before boring the lead bushing, the compound rest base of the lathe should be locked by tightening the compound rest base gib screws.

The fixture is hinged so that after the lead bushing is bored it may be opened and the re-babbitted bearing may easily be inserted. The lead bushing may be used repeatedly, as it may be rebored for any larger diameter bearing.



Fig. 14. Master connecting rod bearing for rotary airplane engine bored on 9-inch Workshop "Lathe"

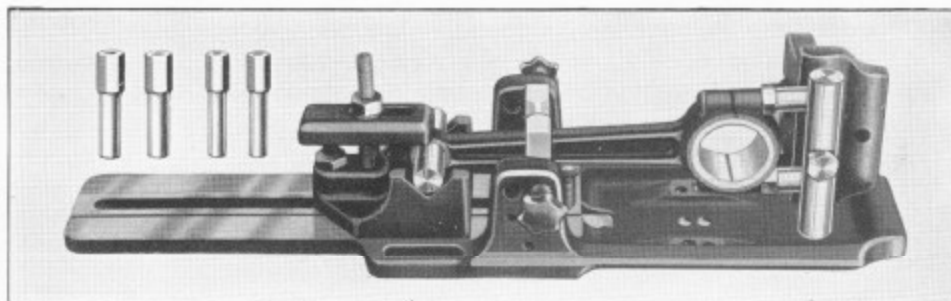


Fig. 15. Connecting rod boring attachment for South Bend Lathes.

Equipment for Boring Connecting Rods

Connecting Rod Boring Attachment

A connecting rod boring attachment, as shown in Fig. 15, is used for holding the connecting rods on the lathe while they are being bored. This attachment is mounted on the compound rest base of the lathe in place of the compound rest swivel and top.

Adjustments are provided so that various sizes and makes of connecting rods may be held. Several sizes of extension nuts are furnished to aid in clamping connecting rods in the fixture.

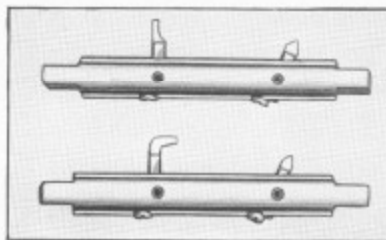


Fig. 16. Set of two boring bars for boring connecting rods.

Double End Boring Bars

A set of two double end boring bars, shown in Fig. 16, are used for boring re-babbitted connecting rods. One of these bars is fitted with cutters for rough boring and trimming the ends of the bearing. The other boring bar is fitted with cutters for finish boring, facing and chamfering the bearing. Both boring bars are reversible and may be turned end for end so that both ends of the bearing may be machined.



Fig. 17. Quick change drive for connecting rod boring bars.

Driver for Boring Bars

A special driver, Fig. 17, is clamped to the face plate of the lathe for driving the double end boring bars shown above. This permits changing the bars quickly.

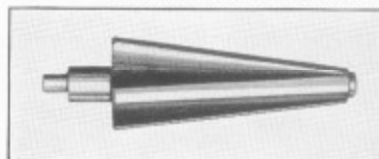


Fig. 18. Centering cone for centering connecting rods.

Centering Cone

A centering cone, Fig. 18, is mounted between the lathe centers to aid in centering the connecting rod so that the re-babbitted bearing may be bored concentric.

Cutter Bits for Boring Bars

High speed steel cutter bits ground to various shapes, as shown in Figs. 19, 20, 21 and 22, are used with the boring bars shown above for boring, facing, filing, trimming and chamfering the bearings. Special tungsten-carbide tipped cutter bits, Fig. 23, are sometimes used for finish boring the connecting rod bearing.



Fig. 19. Trimming cutter.



Fig. 20. Boring cutter.



Fig. 21. Facing and rounding cutter.



Fig. 22. 45° Chamfer forming cutter.



Fig. 23. Tungsten-carbide cutter bit.

Other Jobs That Can Be Done on the Lathe

The lathe, besides doing all the jobs shown on the preceding pages, will handle many other classes of auto service jobs, a few of which are illustrated below.

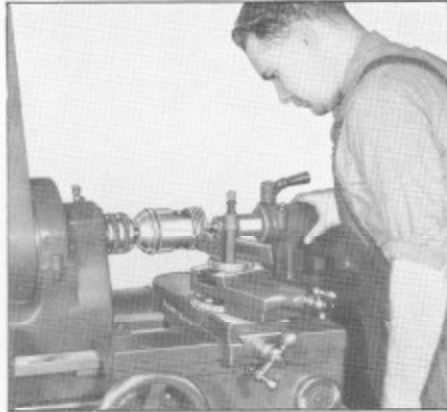


Fig. 24. Machining a piston.

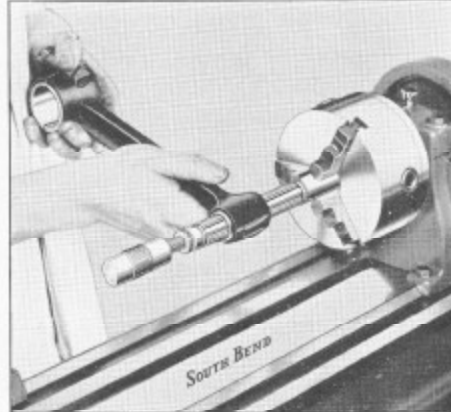


Fig. 25. Honing connecting rod bearing.

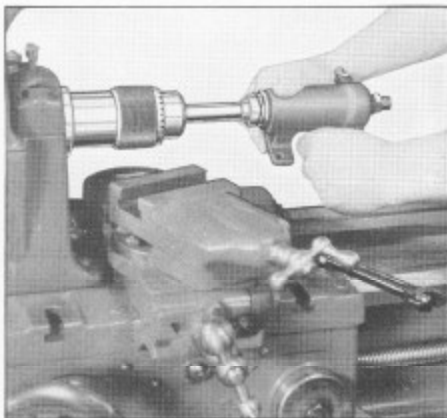


Fig. 26. Honing a brake cylinder.

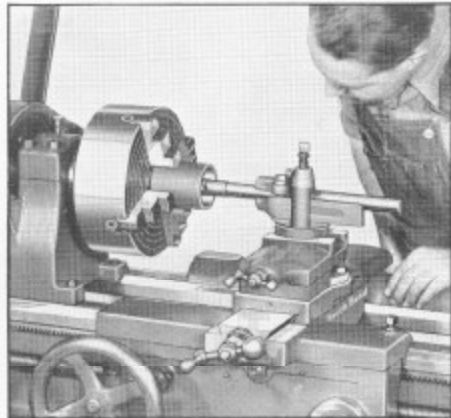


Fig. 27. Making a bearing.

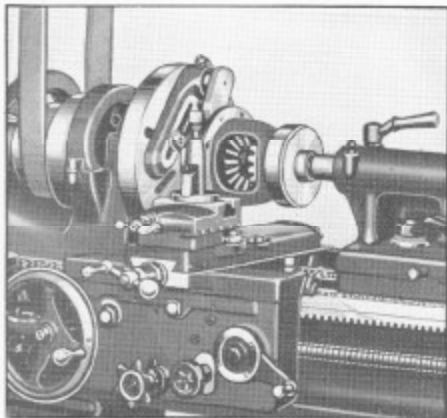


Fig. 28. Truing differential flange.

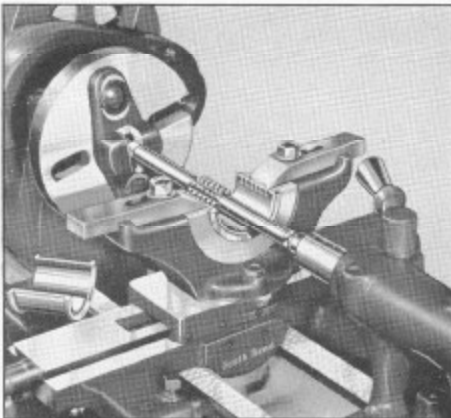
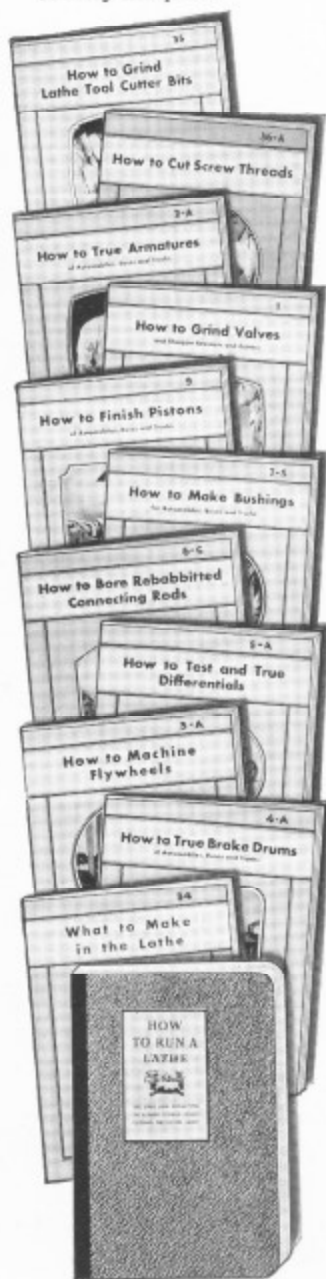


Fig. 29. Milling oil relief grooves in bearing.

Valuable Books for the Mechanic

The bulletins listed below illustrate and describe how to handle general lathe work and seven major auto service jobs according to the latest shop practice that is followed in the most successful shops and plants in the United States. Thousands of mechanics are using these bulletins in their work. Order some of these for your mechanics—they may be helpful. Bulletins are 6" x 9" in size and contain from 8 to 160 pages each. When ordering specify the titles of the bulletins wanted and they will be mailed postpaid on receipt of price indicated. Coin or stamps of any country accepted.



"How to Grind Lathe Tool Cutter Bits" Bulletin No. 35. Explains in detail how to sharpen various types of cutter bits for lathe work. 16 pages, size 6"x9", 50 illustrations. Price postpaid10c

"How to Cut Screw Threads" Bulletin No. 36-A. Explains various screw thread forms and how to cut screw threads in the lathe. 24 pages, size 6"x9", 65 illustrations. Price postpaid10c

"How to True Armature Commutators and Undercut Mica" Bulletin No. 2-A. (Automotive). Contains information on truing armature commutators and undercutting mica in the lathe. 12 pages, size 6"x9", 35 illustrations. Price postpaid10c

"How to Grind Valves and Sharpen Reamers" Bulletin No. 1. (Automotive). Contains information on refacing automobile engine valves, sharpening valve seat reamers, cutters, etc. 12 pages, size 6"x9", 25 illustrations. Price postpaid10c

"How to Finish Pistons" Bulletin No. 9. (Automotive) Contains detailed information on finishing semi-machined pistons in the lathe, reaming and honing wrist pin holes, etc. 12 pages, size 6"x9", 31 illustrations. Price postpaid10c

"How to Make Bushings" Bulletin No. 7-S. Contains information on making bushings, lathe mandrels, press fits and running fits. 12 pages, size 6"x9", 28 illustrations. Price postpaid10c

"How to Bore Rebabbitted Connecting Rods" Bulletin No. 6-C. (Automotive). Illustrates and describes the latest shop practice for boring, facing, and finishing rebabbitted connecting rods. 8 pages, size 6"x9", 25 illustrations. Price postpaid10c

"How to Test and True Differentials" Bulletin No. 5-A. (Automotive). Contains information on removing the old ring gear, testing and truing the ring gear seat, testing bearings of drive pinions, etc. 8 pages, size 6"x9", 20 illustrations. Price postpaid10c

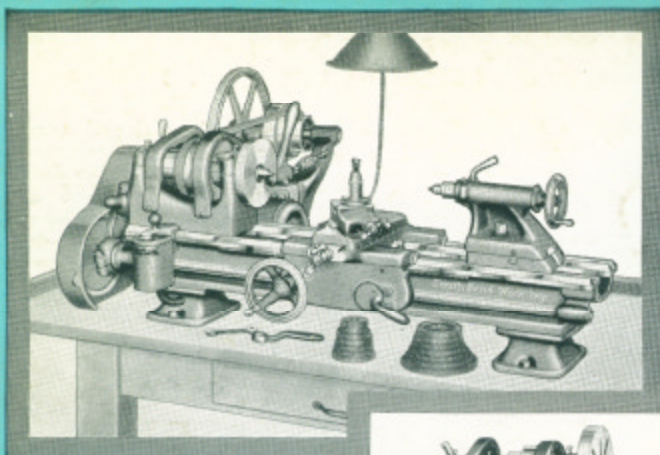
"How to Machine Flywheels" Bulletin No. 3-A. (Automotive) Contains information on turning down flywheels for new starter ring gears. 8 pages, size 6"x9", 24 illustrations. Price postpaid10c

"How to True Brake Drums" Bulletin No. 4-A. (Automotive). Shows how to mount various types of brake drums in the lathe for truing the drum so that it will be concentric, round and true. 16 pages, size 6"x9", 40 illustrations. Price postpaid10c

"What to Make in the Lathe" Bulletin No. 34. Illustrates and describes over 65 useful projects for the home and shop including tools, grinders, and other useful objects, also various models such as steam and gas engines, locomotives, airplanes, etc. 28 pages, size 6"x9", 75 illustrations. Price postpaid10c

"How to Run a Lathe" (32nd Edition). This is an authoritative and instructive manual on the care and operation of a back-geared, screw cutting lathe. It gives the fundamentals of lathe operation in detail with illustrations of various classes of work. Contains 160 pages, size 5 1/4"x8", and more than 300 illustrations.

This book is used as a handy reference book by machinists and apprentices in industrial plants, railroad shops and machine shops, and is also used as a text book by students in educational institutions. It is considered the most popular text on lathe work in the world. More than a million and a half copies are in use. Price postpaid25c



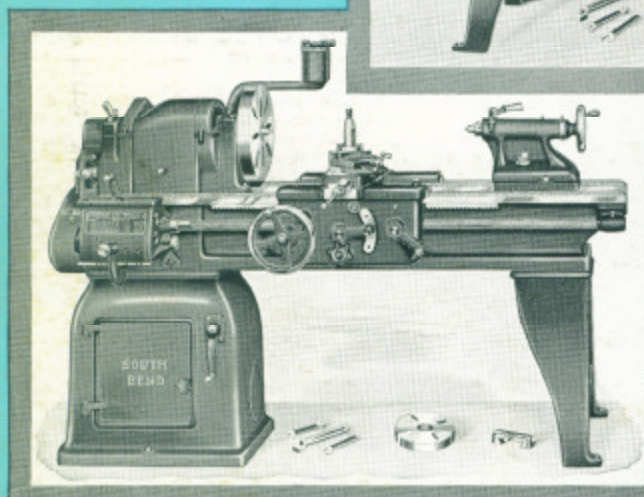
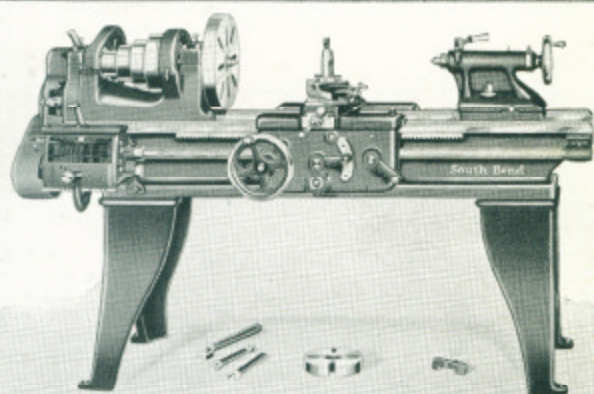
At Left—No. 415-YA 9" x 3' 1936 Model South Bend "Workshop" Adjustable Horizontal Motor Driven, Back-Geared Screw Cutting Precision Bench Lathe.

One of the finest small lathes we have ever built.

Prices of lathe, less motor drive, range from \$75.00 up.

At Right—No. 17-C 16" x 6' 1936 Model South Bend Overhead Countershaft Driven, Quick Change Gear, Back-Geared Screw Cutting Precision Lathe.

A popular type high quality precision lathe.



At Left—No. 117-C 16" x 6' 1936 Model South Bend Underneath Belt Motor Driven, Quick Change Gear, Back-Geared Screw Cutting Precision Lathe.

A practical, efficient and popular motor driven lathe.

Works at South Bend, Indiana. This organization was founded in 1906 and has grown and developed to an enterprise occupying the buildings shown here, which have a floor space of 180,000 square feet and with a ground area of $4\frac{1}{2}$ acres devoted exclusively to the manufacture of South Bend Back-Geared Screw Cutting Precision Lathes.

South Bend Lathe Works
SOUTH BEND, INDIANA, U. S. A.



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