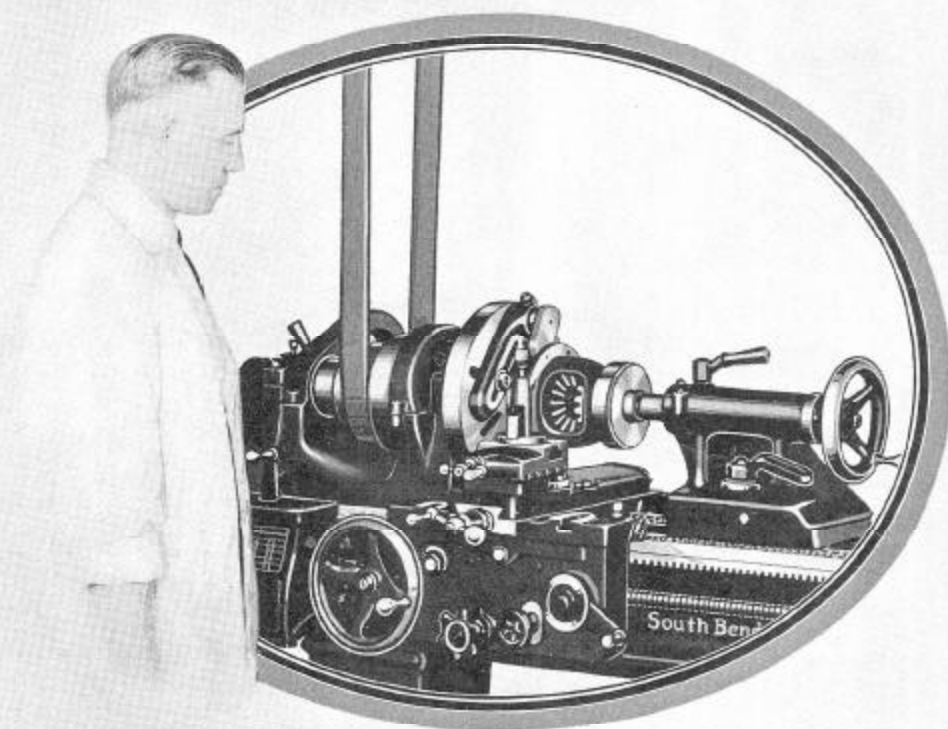


Bulletin No. 5

How to Test and True Differentials

IN THE

Auto Repair Shop



Truing Differential Gear Case Flange for New Ring Gear

A Differential Truing and General Purpose Lathe

The lathe shown in this bulletin is recommended for: Testing differential gear case flange and pilot, truing damaged or bent flange before installing new ring gear, testing differential assembly and drive pinion.

In addition to servicing differentials, the lathe may be used for boring connecting rods, finishing pistons, truing armature commutators, undercutting insulation and other electrical jobs, grinding and servicing valves, making bushings, and for tool and machine work.

South Bend Lathe Works

405 East Madison St., - - - South Bend, Indiana, U. S. A.

Lathe Builders for 26 Years . . More than 55,000 Users

- - 1937

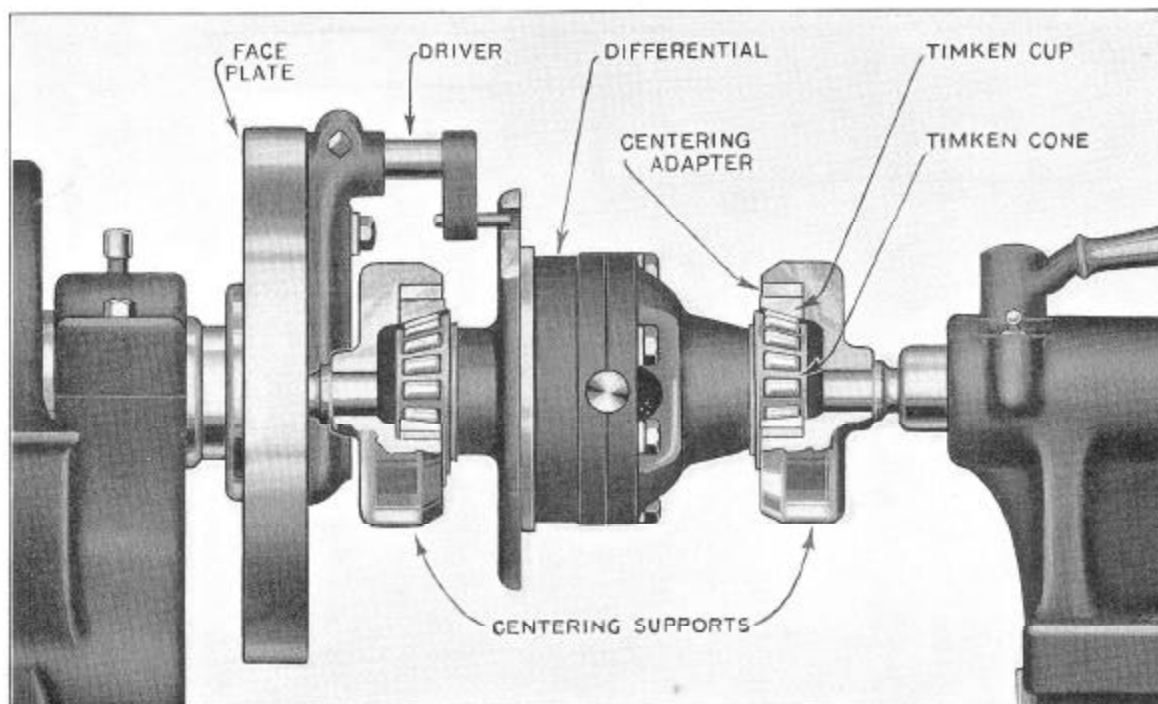


Fig. 1. Cut-away Section of Special Differential Centering Supports used for Mounting Differential Cases in the Lathe for Testing and Truing the Ring Gear Flange.

South Bend Self-Centering Method for Machining Differential Cases

This Modern and Practical Method Insures Precision and Accuracy

The South Bend Self-Centering Method for mounting and machining differentials in the lathe is illustrated above. This method permits the differential to be mounted and centered in the lathe on its own bearings, exactly the same as when it is in operation on the car, and assures truing the flange of the differential with precision and accuracy.

The differential with old drive gear removed, but with differential bearings in place, is mounted in the lathe on special centering supports having tapered shanks which fit into the headstock and tailstock spindles of the lathe. Each centering support is fitted with a centering adapter which is of the correct inside diameter to receive the outside of the bearing cup. See Fig. 3.

In the illustration above a section of each differential centering support has been cut away showing the method of holding the differential case on its own bearings so that any machining done on the flange or case will be concentric to the bearing cups in which the case rotates.

With this equipment consisting of one differential centering support and centering adapter for the headstock and one differential centering support and centering adapter for the tailstock, any type of differential can be mounted in the lathe quickly and accurately. This equipment will handle most models of twenty-five makes of popular automobiles and light trucks. With additional centering adapters, other differentials may be handled.

Truing the Differential Flange

To true the differential flange, a light cut is taken across the face of the ring gear flange, as shown in Fig. 2. The lathe spindle is arranged to operate at a moderate speed. A fine automatic cross feed may be used which will advance the cutting tool smoothly and accurately across the work, leaving an accurately finished surface on which to fit the new ring gear.

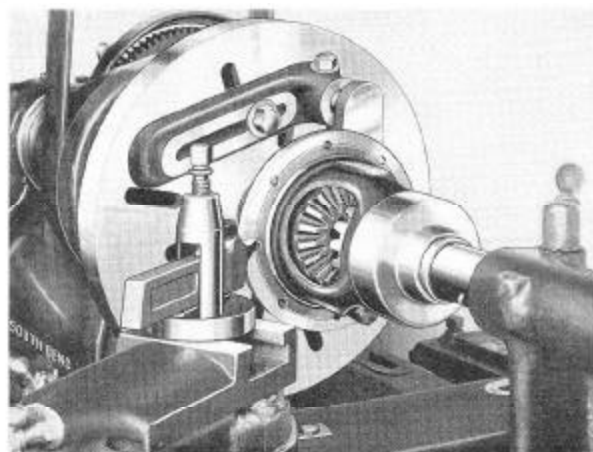


Fig. 2. Truing Drive Gear Flange of a Differential Mounted in the Lathe using South Bend Differential Centering Supports.

Testing Differential Pilot and Flange

All differential cases should be tested for run-out before assembling a new ring gear to the case. The testing is done by mounting the differential case in the lathe and testing for run-out with a dial test indicator, as shown in Fig. 5. The test should be made on both the pilot and flange. After the new gear has been fitted to the flange it should be tested on the back for run-out.

Detailed information and instructions for mounting the differential in the lathe and machining the flange are illustrated and described in Manual No. 5, "How to Test and True Differentials," briefly described on page 5. A copy of this instruction manual is included in the equipment of each South Bend Differential Servicing Lathe.

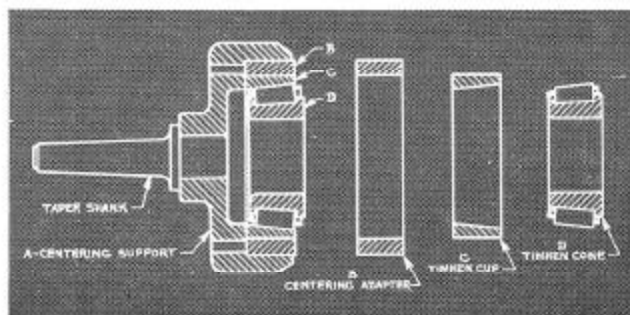


Fig. 3. Sectional View Showing Differential Centering Support, Centering Adapter, Timken Cup, and Timken Cone.

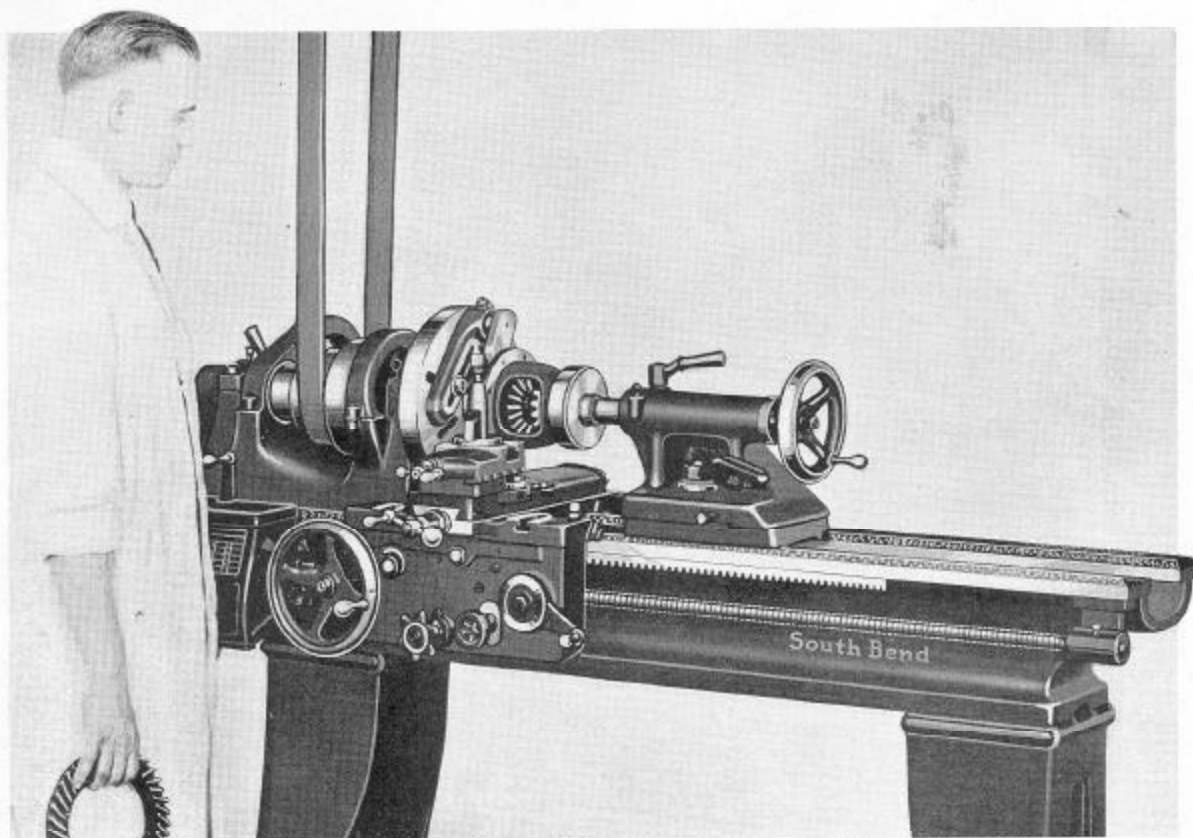


Fig. 4. The New 13-in. x 5-ft. South Bend Differential Servicing Lathe in Operation Truing Differential Flange. For further description and features of this lathe see page 4.

How to Test and True Differentials for New Ring Gear

On the New 13-inch South Bend Differential Servicing Lathe

The 13-inch South Bend Back-Geared, Screw Cutting Differential Servicing Lathe shown above has the power and rigidity for machining differential gear case flanges quickly and accurately. It has the necessary range of spindle speeds and automatic feeds for maximum efficiency in handling the various sizes and types of differentials.

In addition to the differential servicing operations which are handled in the lathe, many other jobs may be machined with little or no additional cost for equipment. These jobs include: Truing wheel hubs and flanges, boring connecting rod bearings, truing commutators, undercutting insulation, grinding and servicing valves, making new and replacement bushings, finishing and fitting pistons, and many other jobs. Several of these jobs are illustrated throughout this bulletin.

Time Required for Machining Differential

The time required to machine a differential and fit it with a new differential drive gear depends somewhat on the skill of the

operator. However, the average mechanic will usually require from ten to twenty minutes to test and machine a differential and install the new gear.

Mounting Differentials on Large Cone Centers

Some differentials may also be mounted in the lathe on large diameter centers for testing and machining. This method is satisfactory for handling differentials that are accurately centered and chamfered, but for general use the best practice is to use the self-centering method as outlined in this bulletin.

Testing Drive Pinion Bearings for Trueness

Before placing the differential case back in the car, the drive pinion shaft should be placed between centers in the lathe and its bearings tested for trueness, see Fig. 6. If bent, the shaft should be straightened or replaced. This is important in order to secure the correct mating and meshing of the pinion and ring gear. No additional equipment is needed for this test when the South Bend Differential Servicing Lathe is available.

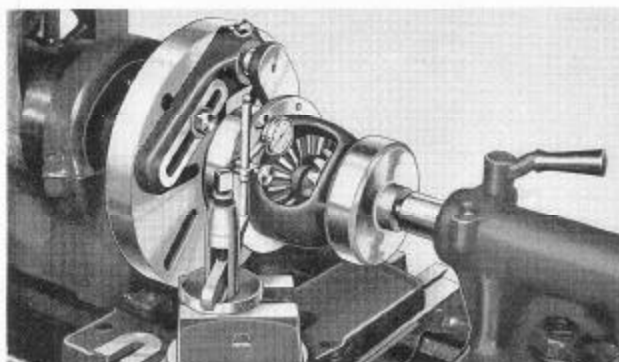


Fig. 5. Testing Flange of Differential with Dial Indicator. This same set up may be used for testing the drive gear pilot.

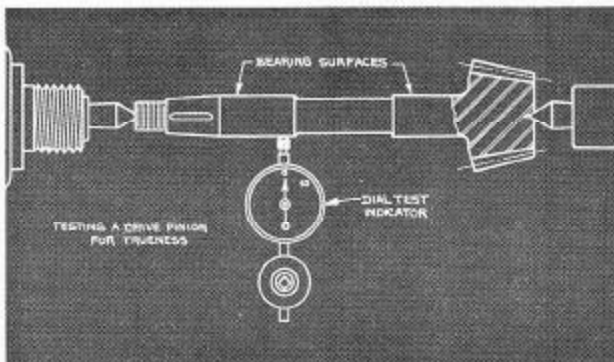


Fig. 6. Testing Bearings of Drive Pinion with Dial Indicator. This test should be made before assembling differential in car.

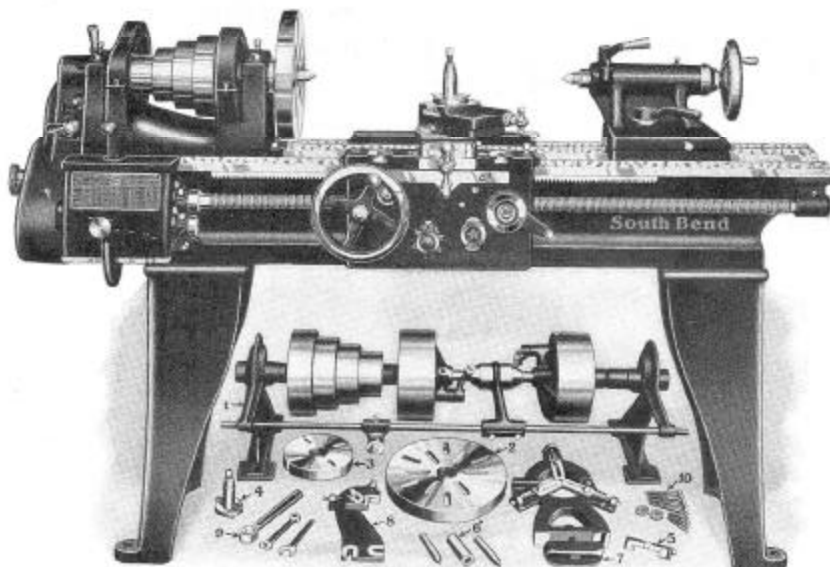


Fig. 7. The New 13-in. x 5-ft. Quick Change Gear South Bend Differential Servicing Lathe.

The New 13-inch South Bend Differential Servicing Lathe

A Universal Tool for the Automotive Repair Shop

The New 13-inch South Bend Differential Servicing Lathe illustrated above will machine all types of differentials up to 13-inches in diameter for automobiles, buses and trucks, quickly and accurately. This is the same lathe that is illustrated on page 3 and is used for handling all the jobs shown throughout this bulletin. This lathe has the power to reduce the diameter of a steel shaft $\frac{1}{4}$ -inch in one cut.

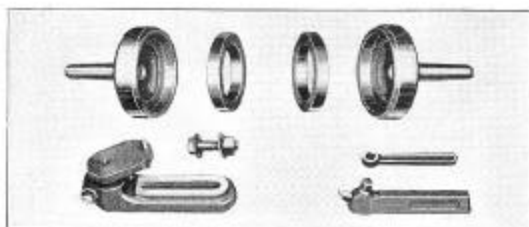


Fig. 8. Differential Servicing Equipment for the 13-inch Lathe.

Lathe Available in Three Types. The 13-inch South Bend Differential Servicing Lathe is available in three types, the Quick Change Gear type (as illustrated above), the Standard Change Gear type, and the Geared Screw Feed type. All three types are priced below. For details see Catalog No. 93.

Quick Change Gear Type Differential Servicing Lathe has quick change gear box providing 48 changes for automatic friction longitudinal feeds and automatic friction cross feeds, and 48 changes for cutting screw threads from 2 to 112 per inch. Equipment includes countershaft (or motor drive), large face plate, small face plate, tool post complete, thread cutting stop, two 60° lathe centers, spindle sleeve, center rest, and follower rest.

Lathe Features

Back-gear headstock gives eight changes of spindle speeds.
Hollow spindle made of special alloy steel, finish ground.
Phosphor bronze bearings for spindle, line bored and lapped.
Graduated compound rest swivels to any angle.
Tailstock is arranged for set-over for taper turning.
Micrometer graduated collar on cross feed and compound rest screws.
Precision lead screw for cutting accurate screw threads.
May be fitted with 38 attachments for special work.

Differential Servicing Equipment priced below includes the attachments and accessories for handling the differentials of most models of twenty-five makes of automobiles and light trucks, including: Chevrolet, Essex, Pontiac, Chrysler, Dodge, Buick, Studebaker, Oldsmobile, Oakland, Hudson, Whippet, Willys, Willys-Overland, Auburn, Hupmobile, Rockne, Reo, Durant, Graham-Paige, Jordan, Marmon, Continental, DeVaux, Cadillac, LaSalle.

Price of Differential Service Equipment

- 1—Differential Centering Support, No. 540-D, and one Centering Adapter, No. 283-A; for use in headstock... \$ 7.00
- 1—Differential Centering Support and one Centering Adapter, same as above, but for use in tailstock... 7.00
- 1—Straight Turning Tool with H.S. cutter. No. 852-S... 2.65
- 1—Universal Driver for all size differentials. No. 267... 2.00
- Total Price, Differential Equipment for 13" Lathe... \$18.65**

Additional Centering Adapters for use with Centering Supports No. 540-D, to receive roller bearing cups and ball bearing races any diameter to 5.1181" can be supplied. Price per pair...\$3.00

Standard Change Gear Type Differential Servicing Lathe is like the Quick Change Gear Lathe, but instead of the quick change gear box, a set of independent change gears provide for various changes of automatic feeds and standard screw threads from 2 to 40 per inch. Lathe equipment is the same as for the Quick Change Gear Lathe.

Geared Screw Feed Type Differential Servicing Lathe is like the Standard Change Gear Lathe, but does not have automatic friction feeds. It has automatic longitudinal geared screw feed to carriage and hand operated cross feed. Cuts standard screw threads, 2 to 40 per inch. Except for the omission of the large face plate, center rest, follower rest, and thread cutting stop, the equipment supplied with this lathe is the same as for the Standard Change Gear Lathe.

Lathe Specifications

Head and tail spindle centers No. 3 Morse Taper
Swing over carriage 9 inches
Hole thru spindle 1 inch
Size of motor required $\frac{3}{4}$ H.P.
Width of cone pulley belt 15 in.
Spindle speeds 23, 35, 55, 86, 102, 252, 385, 605 R.P.M.
Countershaft speed 250 R.P.M.
Angular travel of compound rest top 3 in.

Net Factory Prices of 13-inch New Model South Bend Differential Servicing Lathe

Countershaft Drive Lathes Include Double Friction Countershaft and Regular Lathe Equipment. Motor Drive Lathes Include Regular Lathe Equipment, $\frac{3}{4}$ h.p. 3-Phase, 60-Cycle, A. C. Reversing Motor, Drum Type Reversing Switch and Belting

Size and Type of New Model South Bend Differential Servicing Lathe	Distance Between Centers Inches	Weight Crated Pounds	Geared Screw* Feed Lathes		Standard Change* Gear Lathes		Quick Change* Gear Lathes	
			Cat. No.	Price	Cat. No.	Price	Cat. No.	Price
13-in. x 5-ft. Countershaft Driven Lathe.....	28	1110	42-B	\$292.00	35-B	\$352.00	86-B	\$402.00
13-in. x 6-ft. Countershaft Driven Lathe.....	40	1160	42-C	307.00	35-C	367.00	86-C	417.00
13-in. x 5-ft. Simplex V-Belt Motor Driven Lathe.....	28	1211	542-B	344.20	535-B	404.20	586-B	454.20
13-in. x 6-ft. Simplex V-Belt Motor Driven Lathe.....	40	1261	542-C	359.20	535-C	419.20	586-C	469.20
13-in. x 5-ft. Silent V-Belt Motor Driven Lathe.....	28	1510	342-B	410.00	335-B	470.00	386-B	520.00
13-in. x 6-ft. Silent V-Belt Motor Driven Lathe.....	40	1560	342-C	425.00	335-C	485.00	386-C	535.00

*Differential Servicing Equipment is not included in price of lathe, but is extra as priced above. Price of differential equipment for other size lathes, on request.

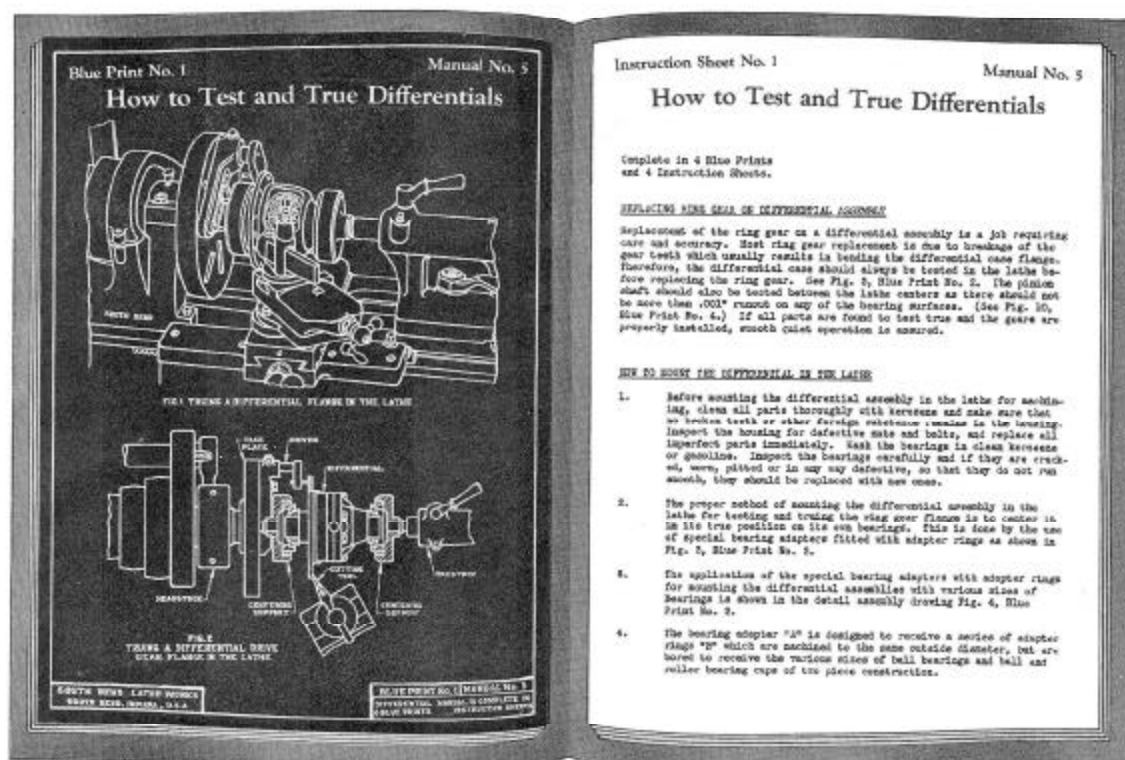


Fig. 9. Illustration Shows Manual No. 5, "How to Test and True Differentials." This Manual contains 4 Blue Prints, 8½" x 11", and 6 Instruction Sheets, 8½" x 11".

Instruction Manual Shows How to Test and True Differentials

Of Various Sizes and Types in the South Bend Differential Servicing Lathe

Job Instruction Manual No. 5, "How to Test and True Differentials," as illustrated above, consists of 4 blue prints and 6 type-written job instruction sheets, 8½" x 11". The blue prints illustrate the various operations described in the job instruction sheets and show how to set up the lathe for doing all the various differential service jobs described in this bulletin.

This Manual, bound in a heavy serviceable cover, is included free of charge with each South Bend Differential Servicing Lathe. To non-users of this lathe, the price is \$1.00 per copy, mailed postpaid, to any address.

In addition to Manual No. 5, we publish twelve similar manuals on servicing armatures, valves, pistons, bushings, connecting rods, flywheels, crankshafts, brake drums, making handy shop tools, etc. Complete information and prices on request.

Differential Service Manual No. 5 Shows How to Do All the Following Jobs:

- How to mount the differential in the lathe.
- How to true the differential flange.
- How to test differential flange before and after truing.
- How to set up the lathe for differential servicing.
- How to remove old differential gear.
- How to test differential pinion shaft bearings.
- How to test assembly with new ring gear in place.
- How to hold and rivet new gear in place.
- Cold and hot riveting.

Reference Book, "How to Run a Lathe," as illustrated and described on page 8, and an instruction manual on "Grinding Lathe Tools" are also supplied free with each 13-inch lathe.

Automotive Demonstration Shop

We have one room in our factory 60-ft. x 100-ft. in which there are thirty-two machines set up for machining the various jobs that come up in the service shop for the maintenance of automobiles, buses and trucks.



Fig. 10. Automotive Service Shop in plant of South Bend Lathe Works.

SOUTH BEND, INDIANA, U. S. A.

These demonstration machines are always ready for operation on the following auto service jobs: Grinding and servicing valves; truing armatures, undercutting insulation, and other electrical jobs; making new and replacement bushings; machining, relieving and fitting pistons; boring connecting rods; truing differential gear case flanges; truing brake drums, hubs and wheel work; testing crankshafts, and machining the bearings; making handy shop tools; and many other machine and repair jobs.

We invite mechanics from service stations and repair shops to see these demonstration machines in operation. We have experts on the job who will show how set-ups are made, how the jobs are done, the kind of tools to use, the proper feeds and speeds for the work. Our mechanics will give you any other information desired on the subject of automotive servicing in the lathe.

It will be worth any mechanic's time to spend a day in this demonstration shop, as he can see the latest shop practice and maintenance methods for turning out the work with speed, accuracy and economy. If your shop is within reasonable distance from South Bend, have your mechanic drive over and visit our automotive demonstration shop. There is no charge whatever and the experience gained will be well worth the time spent.

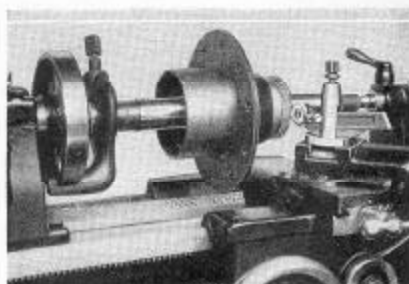


Fig. 11. Re-threading a Damaged Front Wheel Hub Mounted on a Mandrel.

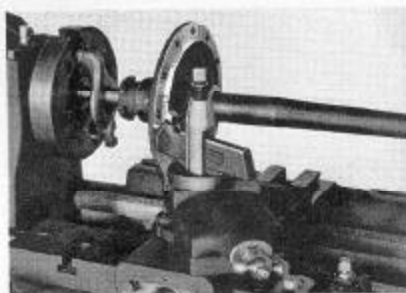


Fig. 12. Truing a Damaged Rear Wheel Hub Flange using Axle to Mount between Centers.

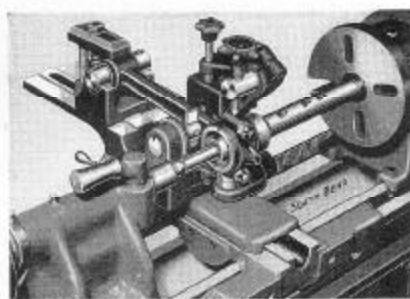


Fig. 13. Boring a Rebabbitted Connecting Rod in the Lathe.

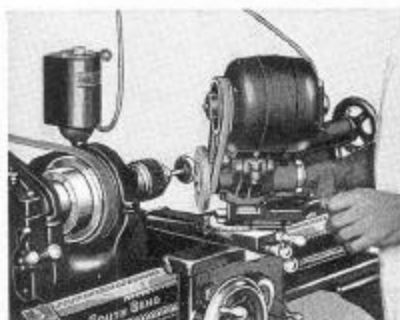


Fig. 17. Grinding a Valve Face in the Auto Shop Lathe, using Electric Valve Grinder.

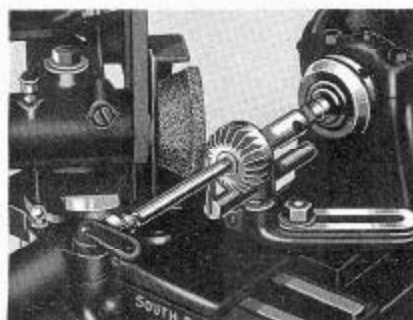


Fig. 19. Sharpening a Valve Seat Reamer using Holding Fixture with Spring Stop.

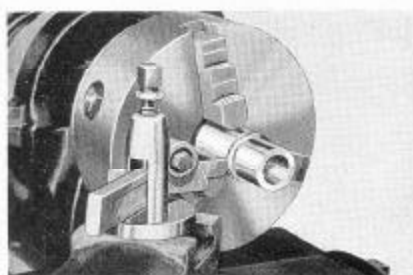


Fig. 21. Cutting-off a Bushing Made Complete in one Set-up, in Chuck.

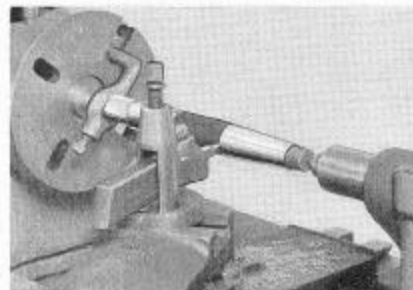


Fig. 23. Turning a Taper on an Axle Shaft with Tailstock Set Over.

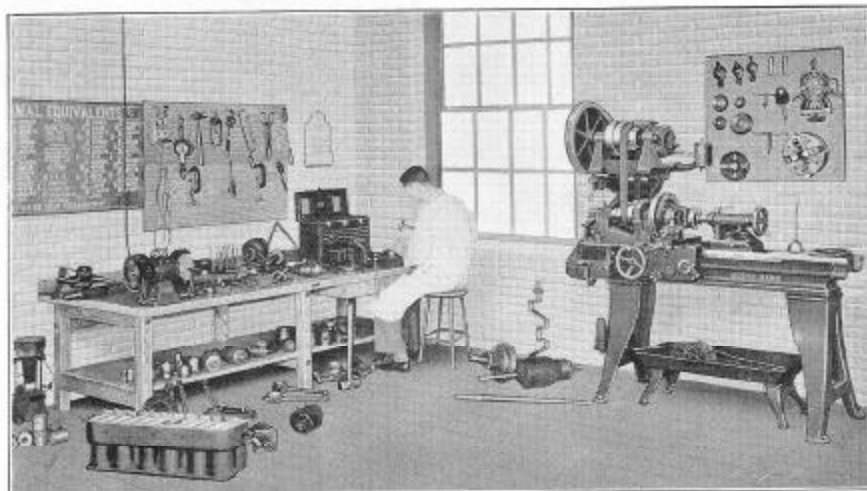


Fig. 27. The No. 13 Auto Service Shop Equipped with Lathe and Equipment for Servicing Differentials, Connecting Rods, Armatures, Valves, Pistons, Bushings, Etc.

The No. 13 Automotive Service Shop

For Medium Size Service and Repair Jobs on the Automobile, Truck and Bus

The Completely Equipped Shop. The auto service shop illustrated above is completely equipped for medium size service and repair jobs on the automobile, truck and bus. The lathe shown is the 13-in. x 5-ft. South Bend Lathe, as illustrated and described on page 4 of this bulletin. In addition to the lathe, the shop has the equipment for servicing differentials, connecting rods, armatures, valves, pistons, bushings, etc.

Shop Handles All These Jobs. All the jobs shown throughout this bulletin were handled on the 13-inch Lathe as shown in the above shop. This lathe, in addition to servicing differentials, is practical for servicing axles and drive shafts, boring connecting rods, truing hubs up to 13 1/4-inches, truing armature commutators, undercutting insulation, grinding and servicing valves, finishing pistons, cutting screw threads, drilling, boring, tapping, sharpening reamers of all kinds, making bushings, making tools, reaming, and hundreds of other jobs.

Attachments May Be Added Later. The shop that intends to install the 13-inch lathe need not buy all of the attachments and equipments at the time of its purchase. At any time later, after the lathe has been installed, attachments, tools and accessories for handling various classes of work may be added, when required.

Over 3,000 Auto Service Shops Equipped. The 13-inch South Bend Back-Geared, Screw Cutting Lathe illustrated in this bulletin is very popular in the repair shops and auto service shops throughout the United States. More than 3,000 automotive shops are using this lathe for servicing automobiles, buses, trucks, tractors, aero engines and electrical equipment.

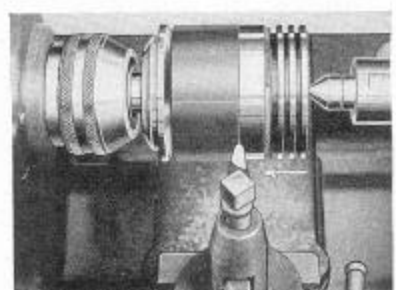


Fig. 24. Finishing a Semi-Machined Cast Iron Piston Mounted on the Piston Adapter.



Fig. 25. Using Lathe as a Variable Speed Reamer Driver, Reaming Wrist Pin Hole.

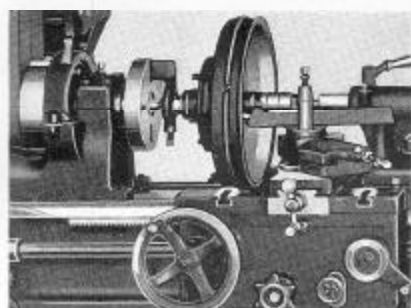


Fig. 14. Truing a Worn Brake Drum of a Demountable type Front Wheel.

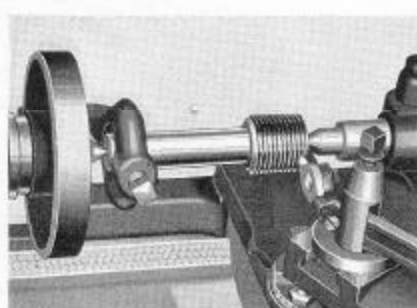


Fig. 15. Cutting the Thread on a Large Diameter Special Tap.

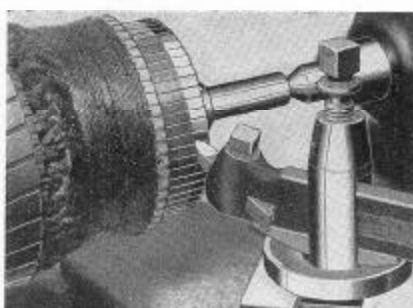


Fig. 16. Armature Commutators of Generators and Starting Motors are Accurately Trued.

Equipments for Servicing Connecting Rods, Armatures, Valves, Pistons and Bushings

Equipments for 13" Lathe. Below we list and price individual equipments consisting of chucks, tools, and fixtures for servicing connecting rods, armatures, valves, pistons, and bushings. These equipments may be fitted to the 13-inch South Bend Lathe as illustrated and priced on pages 4 and 6.

Omit Items Not Wanted. All the equipments, attachments, and accessories, or any combination of them may be ordered with the 13-inch South Bend Lathe; also any item in the equipments can be omitted if the shop has no use for them. The shop wishing to specialize in one job can select the attachments and tools for that work and omit the others.

Connecting Rod Boring Equipment for the 13" Lathe

- | | | |
|--|---------|---------|
| 1—Connecting Rod Boring Attachment consisting of holding jig, V-block and adjustable clamping device for connecting rods from 8" to 11 3/4" between centers and up to 4 1/8" across bolt lugs. No. 1231..... | \$40.00 | |
| 2—Boring Bars with cutter bits for boring, facing, rounding, and turning outside of bearings from 1 1/4" to 2 1/2" diameter. No. 461-B..... | 13.00 | |
| 1—Centering Cone and Driver for boring bars. No. 908..... | 3.50 | \$56.50 |

NOTE: The above equipment will handle the Connecting Rods of all passenger cars also the Connecting Rods of many trucks and buses.

Hub Servicing Equipment for the 13" Lathe

The 13-inch Lathe is practical for testing and truing hub flanges, boring damaged hubs, and re-chasing damaged hub threads. The equipment for handling this work is illustrated and described in Brake Drum Bulletin No. 4, a copy of which will be mailed free, postpaid, upon request.

Armature Commutator Truing Equipment for the 13" Lathe

- | | | |
|---|----------|---------|
| 1—Headstock Driving Chuck with Taper Arbor and Key for centerless armature shafts up to 3/4" diam., complete. No. 327..... | \$ 7.75* | |
| 1—Tailstock Adjustable Bushing for centerless armature shafts from 3/8" to 3/4" diam., with No. 3 Morse Taper Shank. No. 361-C..... | 8.50 | |
| 1—Straight Shank Turning Tool with H.S. steel cutter. No. 852-S..... | 2.65* | |
| 1—Electric Rotary Undercutter (110-volt, 1-phase, A.C. current) complete with 5 cutters, assorted widths. No. 544-D..... | 27.00 | \$45.90 |

Valve Servicing Equipment for the 13" Lathe

- | | | |
|---|---------|---------|
| 1—Electric Grinder with 1/2 H.P. Motor, 110-volt, A.C. 1725 R.P.M., switch, extension cord, Grinding Wheel 5" x 1 1/2", and V-belt. No. 14-D..... | \$55.00 | |
| 1—Precision Valve Chuck, 5/8" capacity, fitted to lathe. No. 907-D..... | 10.50 | |
| 1—Diamond for truing grinding wheel. No. 406..... | 4.50 | |
| 1—Diamond Holding Fixture. No. 91-D..... | 2.75 | |
| 1—Holding Fixture & Spring Stop for reamer and cutter grinding. No. 19-C..... | 10.00 | |
| 1—V-Block for holding valves when grinding end of stem. No. 545..... | 3.00 | |
| 1—Rocker Arm Grinding Fixture. No. 703..... | 3.00 | \$88.75 |

Piston Finishing Equipment for the 13" Lathe

- | | | |
|---|---------|---------|
| 1—Piston Adapter, Driving Dog, and No. 1-D Cone Ring for pistons 2 1/2" to 3 1/8" diam. No. 44-C..... | \$11.00 | |
| 1—Cone Ring for pistons 3 1/8" to 3 3/4" diam. No. 2-D..... | 1.75 | |
| 1—Piston Skirt Reamer for pistons 2 1/8" to 3 1/8" diam. No. 1-R..... | 6.00 | |
| 1—Piston Skirt Reamer for pistons 3 1/8" to 3 3/4" diam. No. 2-R..... | 6.50 | |
| 1—Straight Shank Turning Tool with high speed steel cutter. No. 852-S..... | 2.65* | \$27.90 |

NOTE: An Attachment is available for turning elliptical, relieved or cam shaped pistons.

Bushing Equipment for the 13" Lathe

- | | | |
|---|---------|---------|
| 1—3-Jaw Universal Lathe Chuck, 7 1/2" cap., fitted to lathe. No. 2407..... | \$49.00 | |
| 1—3-Jaw Drill Chuck, 3/4" cap., with arbor fitted to lathe. No. 327..... | 7.75* | |
| 1—Right-Hand Cutting-Off Tool with H.S. steel cutter. No. 883-R..... | 2.95 | |
| 1—Straight Shank Turning Tool with H.S. steel cutter. No. 852-S..... | 2.65* | |
| 1—Boring Tool, Style "D", with 3/8" bar. No. 505-C..... | 3.00 | |
| 4—Malleable Lathe Dogs: No. 2-M, 1 1/2" cap.; No. 4-M, 3/4" cap.; No. 6-M, 1" cap.; No. 10-M, 1 1/2" cap..... | 2.75 | |
| 2—Combination Center Drills and Countersinks, @ \$.020 each. No. 898-B..... | .40 | \$68.50 |

*These items appear in two or more equipment lists and need not be duplicated when ordering.

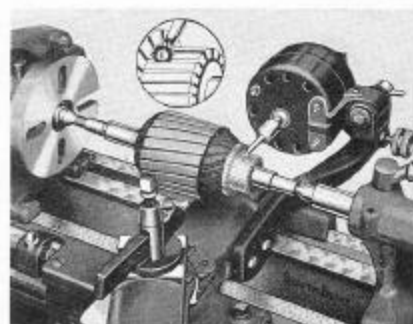


Fig. 18. Undercutting Insulation with Rotary Electric Undercutting Attachment.

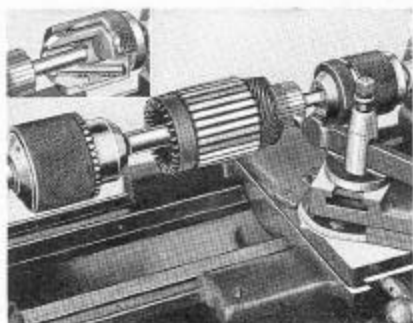


Fig. 20. Centerless Armature Mounted in Lathe using Tailstock Adjustable Bushing.

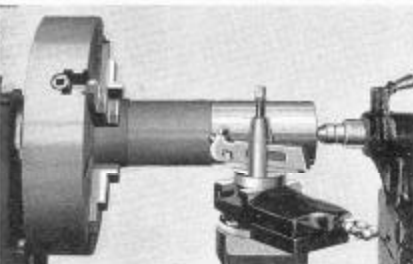


Fig. 22. Finishing a Cast Iron Cylinder Sleeve for press fit in Cylinder Block.



Fig. 26. Lathe used as Drill Press for Drilling Hole in Flat Piece of Work.

Bulletins on Auto Service Work

To Assist the Mechanic in the Motor Service Shop

About ten years ago, we devoted a room in our factory to be used as a laboratory for research on improved methods and equipment for automotive service and maintenance of all makes of automobiles, buses and trucks.

Our experience in this work has enabled us to publish a series of automotive service bulletins of which this Bulletin "How to Test and True Differentials," is a sample. Each Bulletin contains from 8 to 12 pages, 8 1/4" x 11", and 40 illustrations on the latest shop practice and equipment for doing the work.

Copies of these Bulletins will be mailed on request to any address, postpaid, no charge.

"How to Grind Valves," Bulletin No. 1 illustrates and describes the modern methods and equipment for grinding valves of all sizes and types, squaring ends of valve stems, grinding rocker arm face, squaring end of tappet, grinding camshaft, etc.

"How to True and Undercut Armature Commutators," Bulletin No. 2 describes and illustrates the modern methods and equipment for trueing armature commutators, undercutting insulation, testing and straightening bent armature shafts, etc.

"How to Replace Flywheel Starter Gears," Bulletin No. 3 contains many valuable suggestions on turning down flywheels and fitting new starter gears.

"How to True Brake Drums," Bulletin No. 4 describes in detail how brake drums of all kinds are turned true. Also explains the South Bend Method of mounting wheels and hubs.

"How to Bore Rebablitted Connecting Rods," Bulletin No. 6 illustrates the latest methods and equipment for boring rebablitted connecting rods.

"How to Make Replacement Bushings," Bulletin No. 7 explains methods and equipment for making replacement bushings of brass, bronze, steel, cast iron, etc.

"How to True Crankshaft Bearings," Bulletin No. 8 describes methods for testing and trueing throw bearings and main bearings of crankshafts, etc.

"How to Finish Semi-Machined Pistons," Bulletin No. 9 describes methods for finishing semi-machined pistons, also reaming and honing wrist pin hole, etc.

"How to Make Handy Shop Tools," Bulletin No. 10. This bulletin illustrates and describes how to make arbors, mandrels and other handy tools in the lathe from salvaged material. It also shows how to fit chucks, etc.



Illustrated Automotive Service
Bulletins, Size 8 1/4" x 11",
8 Pages, 40 Illustrations

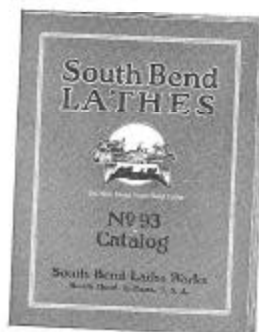
General Catalog No. 93

On South Bend Lathes, Attachments, Chucks, Tools and Accessories

The new 72-page General Catalog No. 93, size 8 1/4" x 10 3/4", illustrates, describes and prices the 1933 line of New Model South Bend Back-Geared, Screw Cutting Lathes, from 8-inch swing to 36-inch swing and in bed lengths 2-ft. to 12-ft.

A valuable reference book for any machinist who is interested in modern industrial methods and latest shop practice in the machining of metals of all kinds.

A complete line of attachments, chucks, tools and accessories for each size South Bend Lathe is shown in this catalog.



A copy of this catalog will be mailed on request, anywhere in the world, postpaid, no charge.

Easy Payment Terms

For Use Only in the United States of America,
and Canada

For the convenience of our customers, we have an Easy Payment Plan that can be used when buying any size South Bend Lathe with attachments, chucks or tools. This plan gives you an opportunity to pay for the lathe while using it. To determine the down payment and monthly payment on your order, see tabulation below.

Schedule of Easy Payment Terms

If Total Price of Your Order Amounts to	Amount to Add for Financing	Amount of Down Payment	Pay- ment Each Month	Approx. No. of Pay- ments
\$275.00 to \$300.00	\$17.50	\$60.00	\$19.50	12
300.01 to 325.00	19.00	65.00	22.00	12
325.01 to 350.00	20.50	70.00	24.00	12
350.01 to 375.00	22.00	75.00	26.00	12
375.01 to 400.00	24.00	80.00	28.00	12
400.01 to 450.00	25.50	85.00	31.00	12
450.01 to 500.00	29.00	95.00	34.00	12
500.01 to 550.00	32.50	105.00	38.00	12
550.01 to 600.00	35.50	115.00	42.00	12
600.01 to 650.00	38.00	125.00	45.00	12
650.01 to 700.00	41.50	135.00	49.00	12
700.01 to 750.00	44.50	145.00	52.00	12
750.01 to 800.00	47.50	155.00	57.00	12
800.01 to 850.00	50.00	165.00	60.00	12
850.01 to 900.00	52.50	175.00	63.00	12

"How to Run a Lathe"—30th Edition

For the Mechanic and Apprentice

"How to Run a Lathe" is an authoritative manual covering the fundamental operations of the modern back-geared, screw cutting engine lathe. It contains 160 pages, 5 1/4" x 8", and more than 300 illustrations showing the most modern and practical methods for handling over 400 machine operations on the lathe.

More than one million two hundred and fifty thousand copies of this book are in use throughout the world. Used as a text book in the shops of vocational schools, trade and industrial schools, also by apprentices and mechanics in machine shops of all kinds. A copy of this book is included with the equipment of each South Bend Lathe.

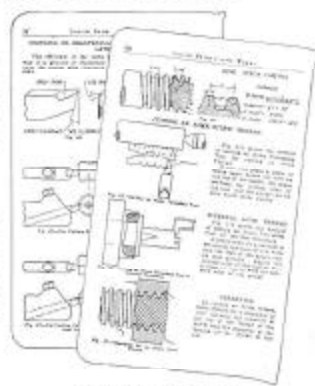
Mailed anywhere in the world, postpaid, price 25 cents.
Coin or stamps of any country accepted.

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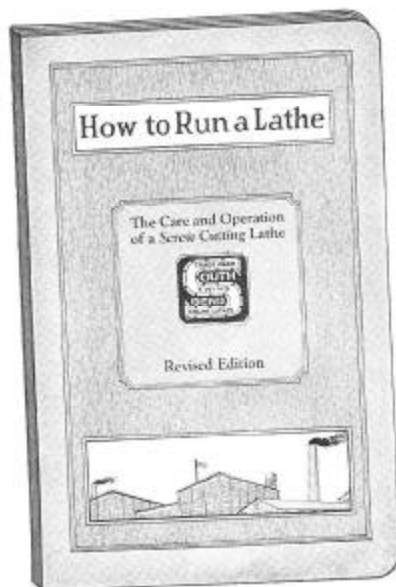
How to Set Up the Lathe
Care of the Lathe
How to Lay Out a Shop
How to Level a Lathe
How to Hang a Countershaft
Calculating Size and Speed of Pulleys
How to Lace a Belt
Grinding and Setting Lathe Tools

Cutting Screw Threads
Turning and Boring Tapers
Grinding and Milling Work
Chucks and Face Plates
Cutting Speeds and Feeds on
All Kinds of Metals
Operating Automatic Feeds
Reading Micrometer Calipers

Using Outside and Inside Calipers
Locating Center Holes
Aligning Lathe Centers
Drilling, Boring, Reaming, Tapping
Use of Compound Rest
Table of Decimal Equivalents
Table of Metric Measures
300 Other Shop Kinks



Two Sample Pages



South Bend Lathe Works

405 East Madison Street,
South Bend, Indiana, U. S. A.

(Established 1906 - - - Lathe Builders for 26 Years)