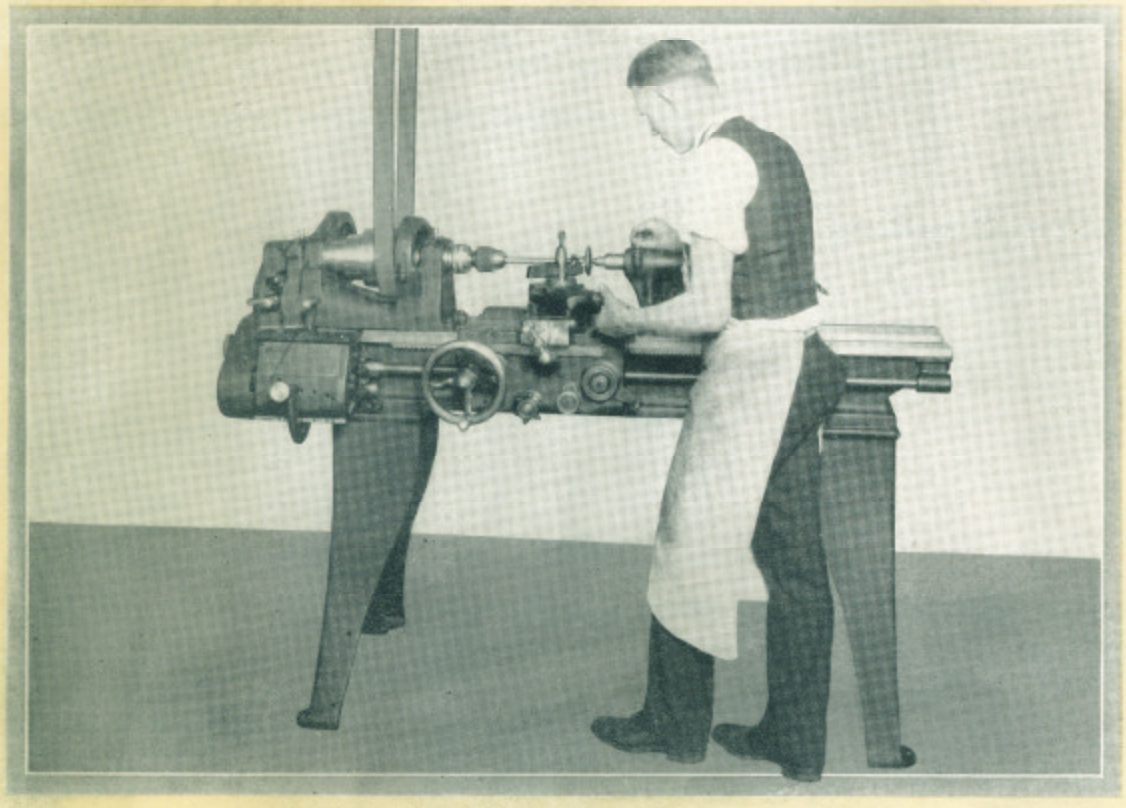
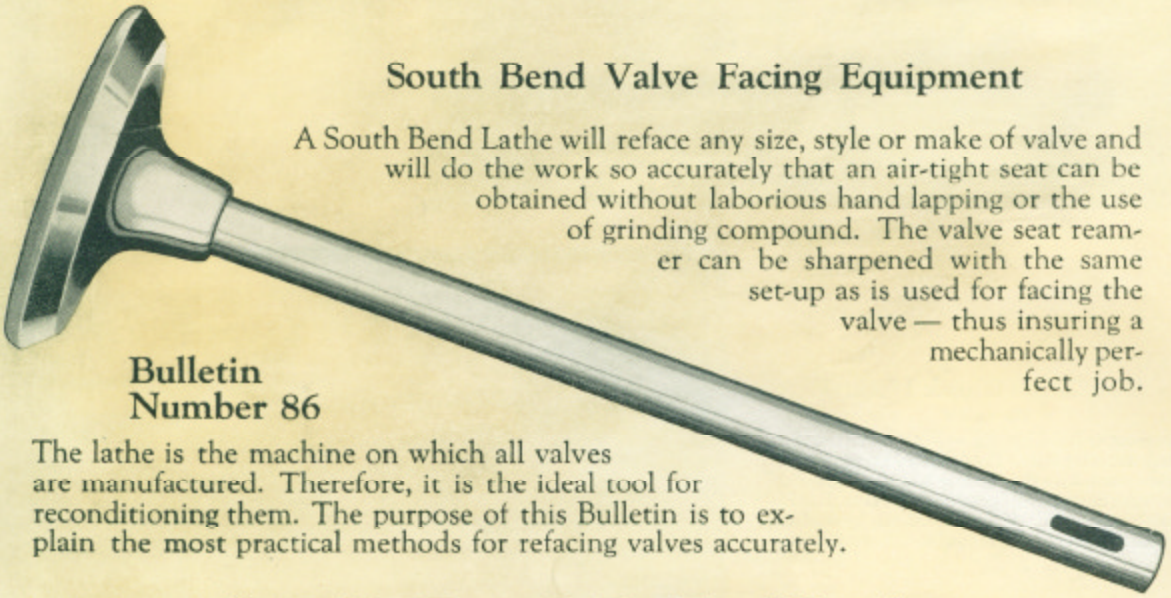
The South Bend Method for Refacing Valves in the Lathe



Refacing a Worn Valve on a 13 inch South Bend Lathe



South Bend Valve Facing Equipment

A South Bend Lathe will reface any size, style or make of valve and will do the work so accurately that an air-tight seat can be obtained without laborious hand lapping or the use of grinding compound. The valve seat reamer can be sharpened with the same set-up as is used for facing the valve — thus insuring a mechanically perfect job.

Bulletin Number 86

The lathe is the machine on which all valves are manufactured. Therefore, it is the ideal tool for reconditioning them. The purpose of this Bulletin is to explain the most practical methods for refacing valves accurately.

South Bend Lathe Works
425 East Madison St., South Bend, Indiana

Three Methods of Holding the Valve for Refacing

Three practical methods for holding valves while being refaced are illustrated below. The tail stock center is used to support the valve head so that it will run true. This insures accuracy and prevents the valve from being refaced eccentric to the original center. See page 4.

The Drill Chuck Method

Figure 3 V

The end of the valve stem is held in a drill chuck fitted to the head stock spindle of the lathe—the valve head being supported by the tail stock center. The graduations of the compound rest are used to obtain the required angle of the valve face. See Figure 6 V, page 3.

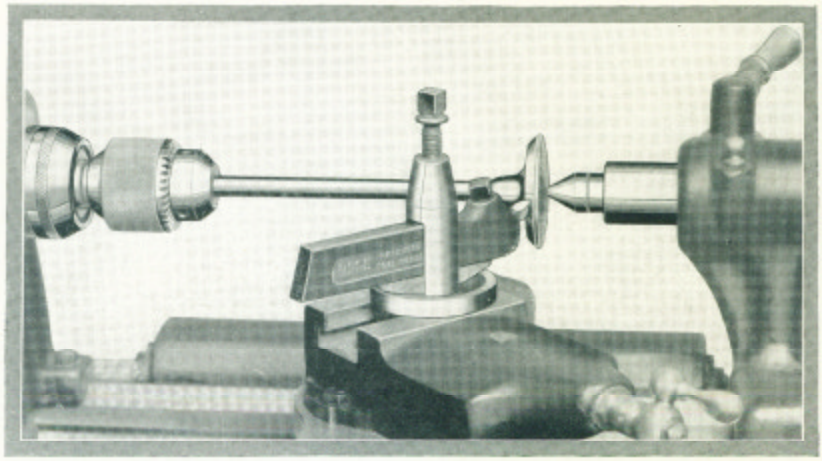
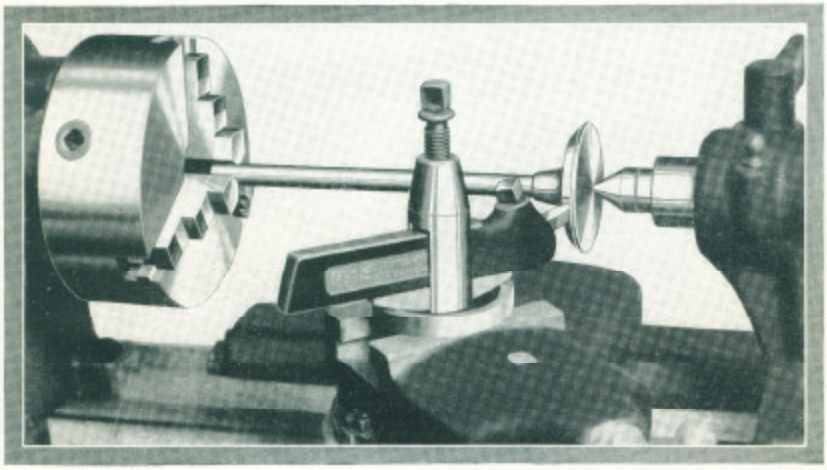


Figure 3 V



The Universal Chuck Method

Figure 4 V

This method is convenient when a drill chuck is not available. The valve stem is held by the Universal Lathe Chuck—the valve head being accurately centered by the tail stock center. The cutting tool is fed across the valve face by turning the compound rest screw by hand.

Figure 4 V

The Collet Chuck Method

Figure 5 V

The stem is held by the collet of the draw-in chuck attachment—the head of the valve being supported by the tail stock center. A separate collet is required for each size valve. Job Instruction Sheets on Valve Work tell how to set the cutting edge of the tool for angle turning.

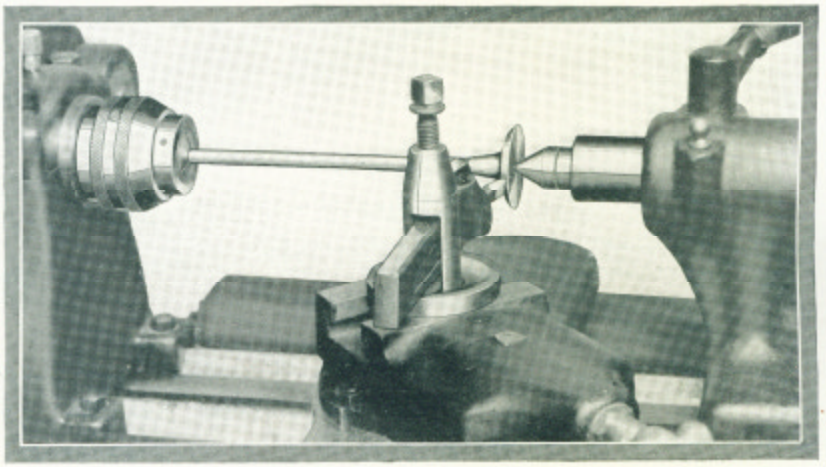


Figure 5 V

Setting the Compound Rest to the Proper Angle

In order to reface a valve so that it will seat perfectly, the Compound Rest of the Lathe must be set at the correct angle. The illustrations below show how to set up the lathe and prepare the valve for refacing. More complete information is given in Job Instruction Sheet No. 86. See back cover.

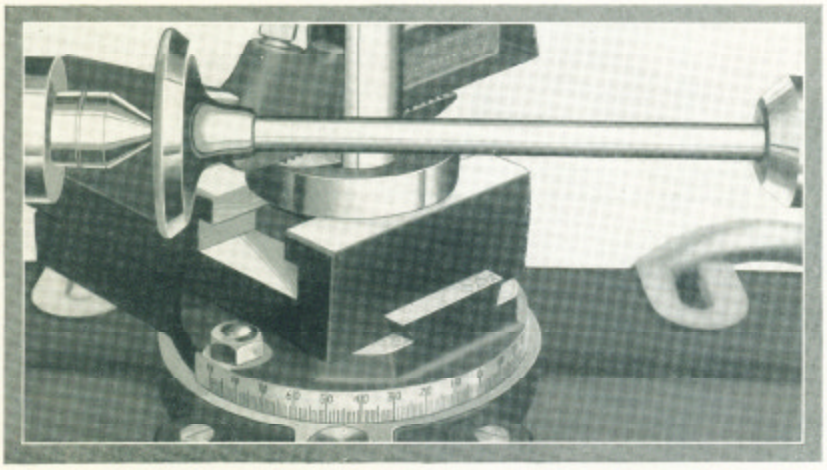


Figure 6 V

Graduations Enable Operator to Obtain Any Angle Desired

Figure 6 V

If the angle of the valve face is 45°, the swivel is set so that graduation 45 is in line with the "O" mark on the compound rest base as is illustrated. The graduations are plainly marked so that the operator can obtain any angle desired.

Testing and Straightening a Valve Stem

Figure 7 V

Before a valve is refaced it should be tested to see if the stem is running true with the head. If the stem is bent, it should be straightened before the valve face is machined. Testing and straightening a valve stem are simple operations thoroughly explained in the Job Instruction Sheets on Valve Work.

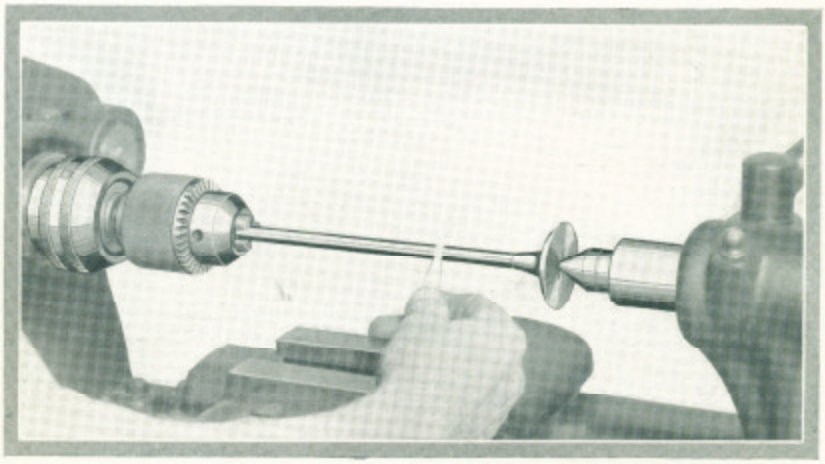


Figure 7 V

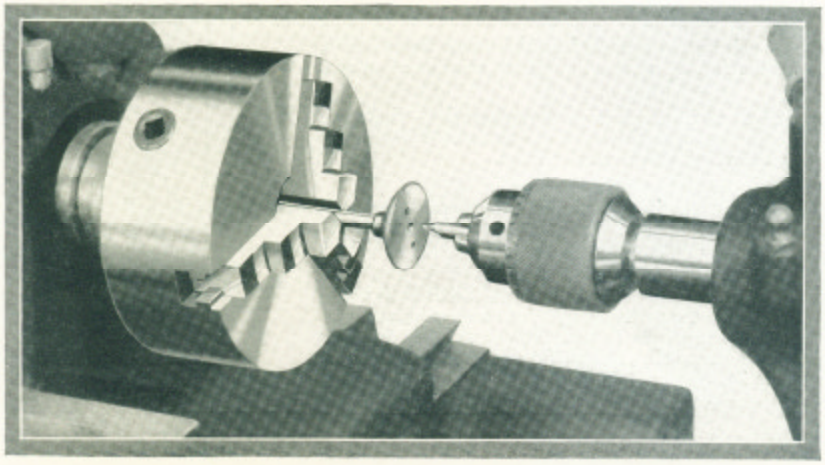


Figure 8 V

Centering a Valve Head

Figure 8 V

When a valve having no center hole in the head is to be refaced, it should be centered before it is machined. A valve that is to be centered should first be straightened, then placed in the chuck and center drilled as is illustrated in Figure 8 V. See Job Instruction Sheets on Valve Work.

The South Bend Method of Holding the True Center of the Valve

Figure 9 V illustrates the South Bend Method of holding a valve in the lathe for accurate refacing. The valve head is centered and supported by the tail stock center—the valve stem being held in a chuck fitted to the head stock spindle of the lathe. This insures refacing the valve concentric to the original center, which is the only correct way.

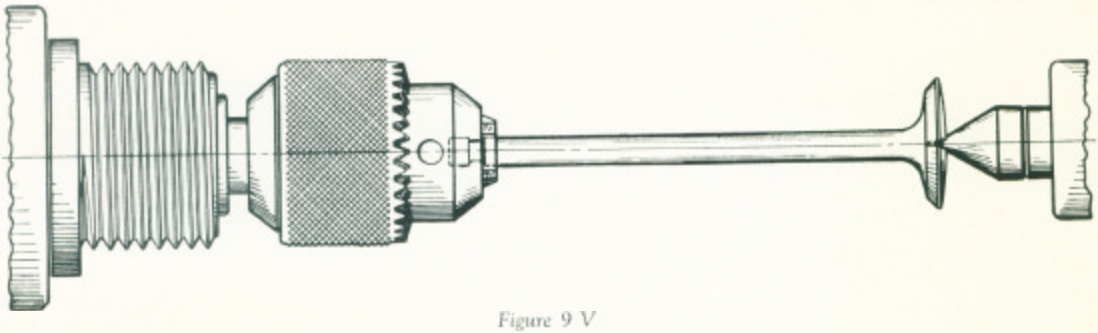


Figure 9 V

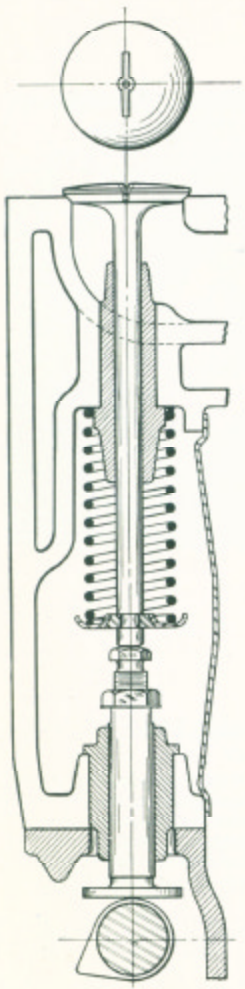


Figure 10 V

A Perfect Fitting Valve

Figure 10 V

Figure 10 V shows a perfect fitting valve. This valve was refaced in the lathe according to the South Bend Method. The valve head was held to its true center, by the tail stock center of the lathe, so that the valve face was machined concentric to the axis of the stem.

An Imperfect Fitting Valve

Figure 11 V

Figure 11 V shows an exaggerated example of an imperfect fitting valve. In order to secure accurate results when refacing the valve, the stem must be straight, the lower end held in a chuck, and the head centered by the tail stock center of the lathe.

Notes on Valve Work

1. All valves should be tested and straightened before refacing. Job Instruction Sheets on Valve Work explain how to do this.
2. Valve stems wear unevenly in the valve guide so that they can not be chucked accurately at this point.
3. The important point in a perfect seating valve is that the center of the head, the face, the stem, and the tappet must be all on one true center line, as shown in Figure 10 V.
4. Any size, style or make of valve can be refaced on the South Bend Lathe, regardless of the angle of the face or material of which the valve is made.
5. The lathe is the machine on which all valves are manufactured—therefore it is the logical equipment on which to reface valves accurately. No special attachment is required for refacing valves on the lathe.
6. Any valve, regardless of the material from which it is made, can be refaced by turning in the lathe. The turning tool will machine a smooth, accurate surface on valves made of special alloy steels.
7. Valves can be refaced by either turning or grinding in the lathe. Both methods do equally good work but some mechanics prefer turning because it is quicker and easier. The important point is to hold the valve so that the face will be true with the original center of the stem. To do this, the valve must be held as shown in Figure 9 V.

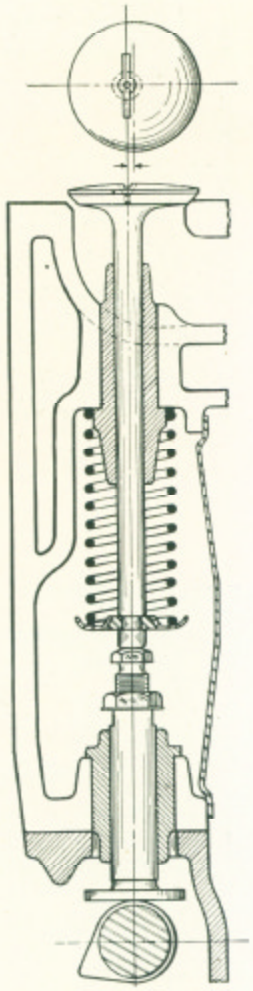


Figure 11 V

Refacing Valves by Grinding in the Lathe

There are some who prefer to reface valves by grinding, even though turning with the lathe tool is just as accurate, twice as fast and a more simple operation. The grinding methods and the equipment illustrated below are recommended to those whose customers demand ground valves. Grinding attachments for South Bend Lathes are priced on the back cover page of this Bulletin.

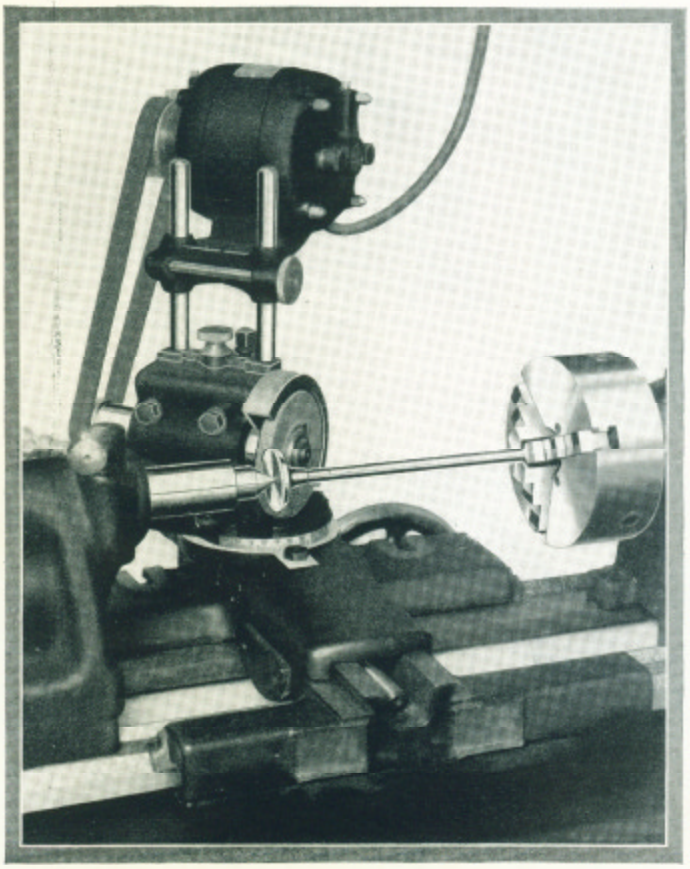


Figure 12 V

Grinding a Valve in the Lathe with the No. 9 Grinder

Figure 12 V

The valve stem is held by a chuck fitted to the head stock spindle of the lathe—the valve head being accurately centered by the tail stock center. The No. 9 Electric Tool Post Grinder is operated from an electric light socket and is mounted on the compound rest which is set at the desired angle. The grinding wheel is fed across the face of the valve by turning the compound rest handle.

Grinding a Valve in the Lathe with the No. 10 Grinder

Figure 13 V

The method employed is the same as is illustrated above except that the No. 10 Countershaft Grinder is used instead of the No. 9 Electric Tool Post Grinder. The No. 10 Grinder is operated from a special Drum Countershaft overhead.

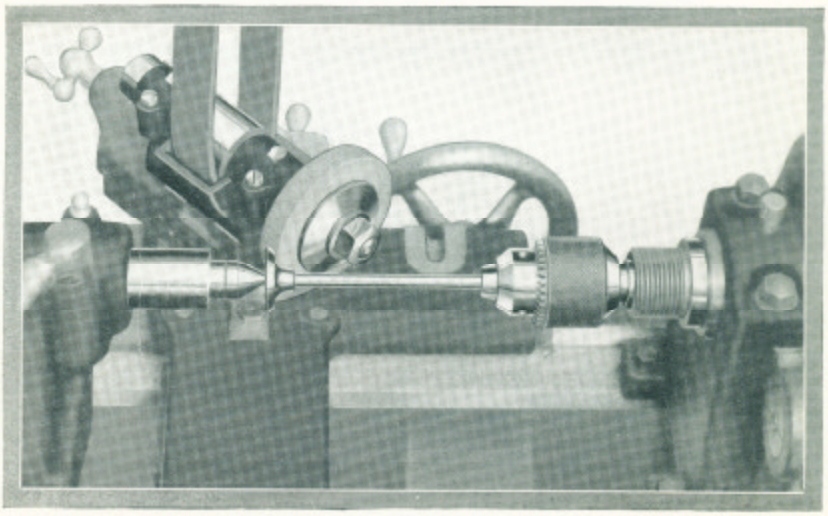


Figure 13 V

Sharpening Cutters and Reamers in the Lathe

Cutters and reamers of all kinds having straight, taper, or spiral flutes, can be sharpened with the finest precision in the South Bend Lathe. Grinding attachments for South Bend Lathes are illustrated and described on the back page of this bulletin.

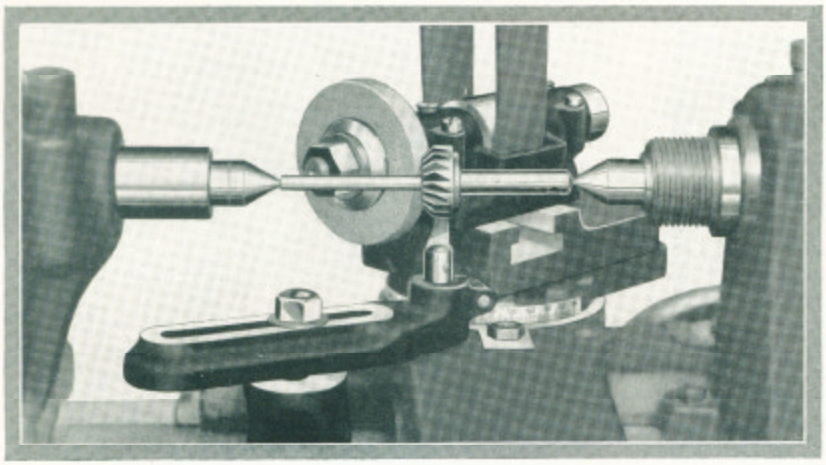


Figure 14 V

Sharpening a Valve Seat Reamer in the Lathe

Figure 14 V

The valve seat reamer is placed on a holder between the lathe centers—each tooth being held in position by the spring stop illustrated below. The grinder is clamped to the compound rest which is set at the desired angle. The grinding wheel is fed across each tooth of the reamer by turning the compound rest handle. See Job Instruction Sheet No. 86 for further details.

Spring Stop to Support Cutter for Proper Clearance

Figure 15 V

The spring stop supports the tooth of the cutter that is being ground and locates it at a point just below the center of the grinding wheel. This provides the proper clearance of the cutting edge of the reamer so that it will remain sharp and cut freely. See Job Sheet No. 86 for more detailed instructions.

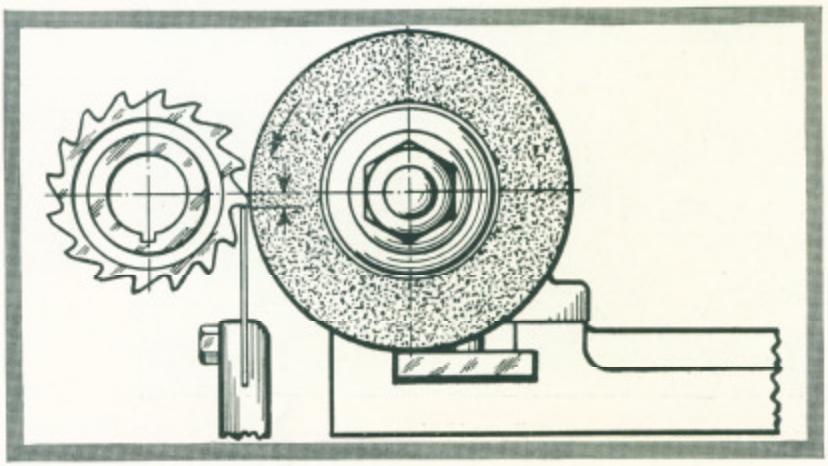


Figure 15 V

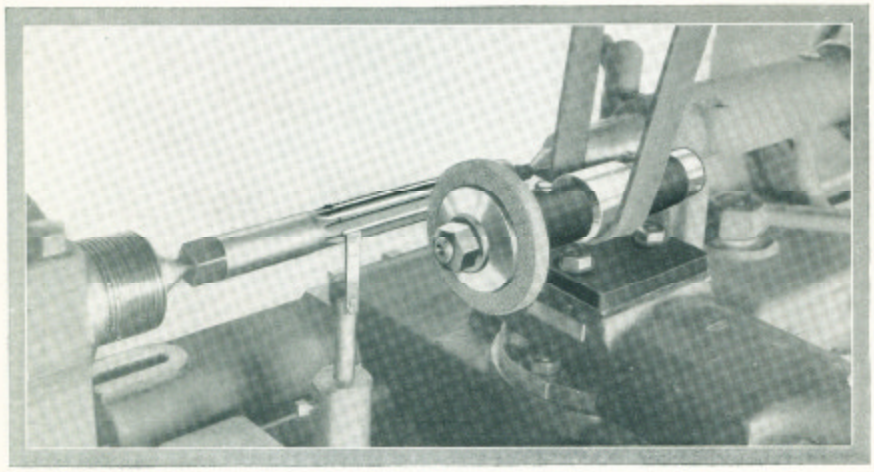


Figure 16 V

Sharpening All Types of Reamers in the Lathe

Figure 16 V

Valve guide reamers with straight or spiral flutes, taper reamers, expansion reamers, milling cutters, keyseat cutters, etc., can be sharpened in the lathe equipped with a grinding attachment. The illustration shows a wrist pin reamer being sharpened with a No. 10 Grinder. An electric tool post grinder can be used for this purpose equally as well.

Machining a Valve Stem Guide in the Lathe

In addition to refacing valves, the lathe can be used to make hundreds of replacement parts. The illustrations below show the various steps in turning a valve stem guide. Brass or bronze bearings, bushings and other similar parts are made in the same way.

Drilling a Valve Stem Guide in the Lathe

Figure 17 V

A piece of cast iron of the proper size for a valve stem guide is revolved in the chuck—the drill being fed through it by turning the hand wheel of the tail stock. See illustration Figure 17 V. After the drilling operation, the hole is reamed to size before the work is removed from the chuck.

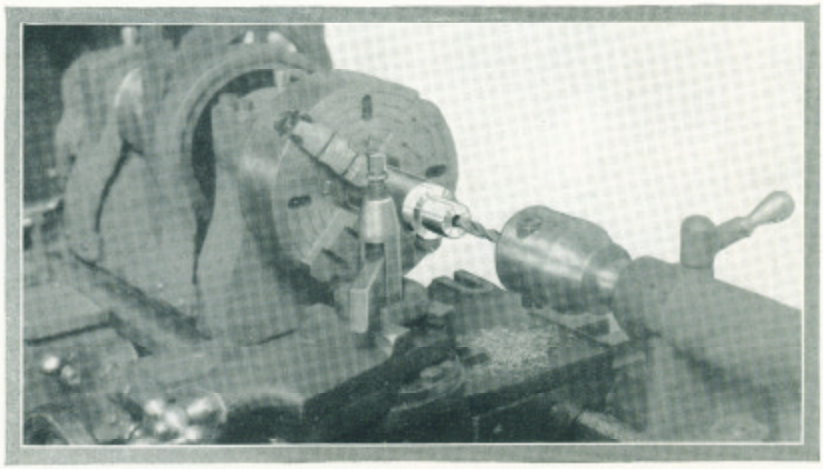


Figure 17 V

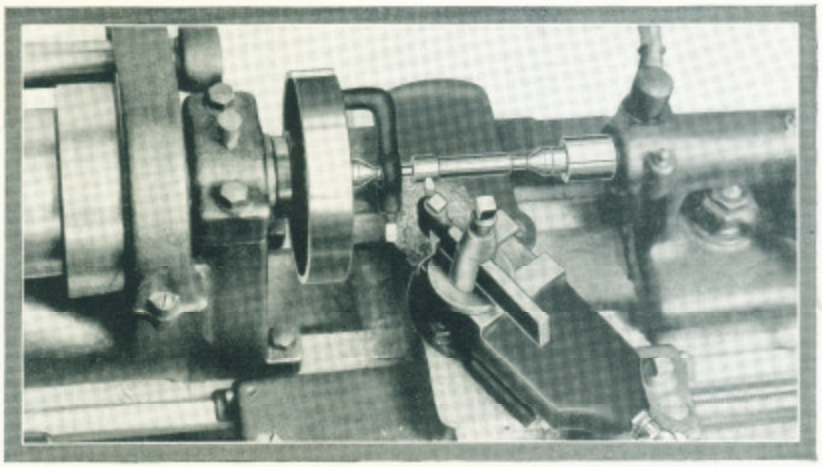


Figure 18 V

Turning the Guide to the Proper Diameter

Figure 18 V

A lathe mandrel is used to hold the valve stem guide while it is machined between centers. Both ends of the guide are faced and the diameter turned to the required dimension. The handbook, "How to Run a Lathe" listed on back cover page explains this work in detail.

Grinding a Worn Valve Tappet

Figure 19 V

The illustration shows a No. 10 Grinder refacing a worn tappet. If the tappet is not hardened, it can be machined with the lathe tool just as accurately and in less time than by grinding. Job Instruction Sheet No. 86 gives complete information on this subject.

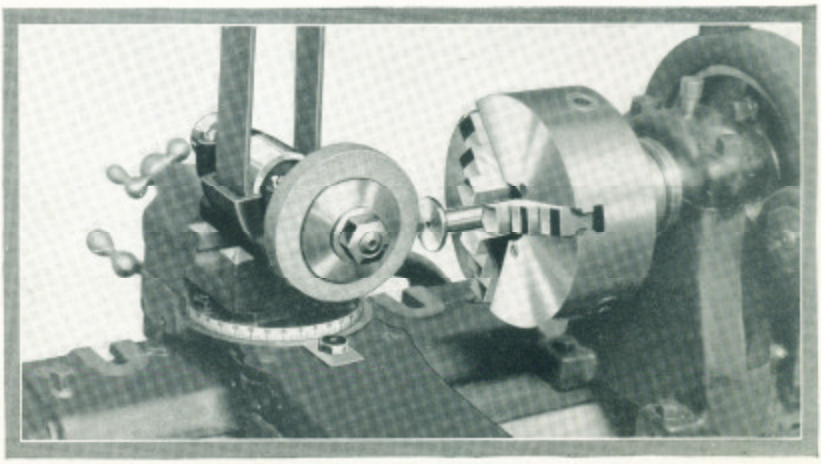
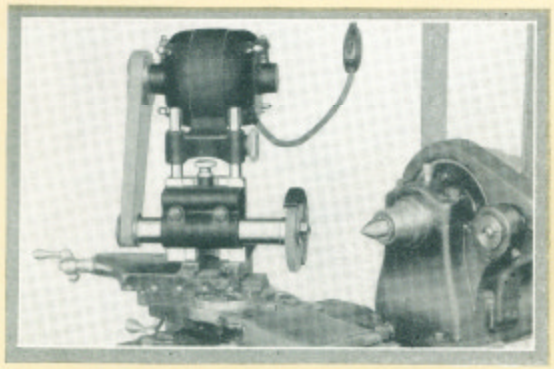


Figure 19 V

Grinding Attachments for South Bend Lathes

The two grinding attachments illustrated below are suitable for refacing valves and for many other purposes such as grinding valve seat reamers, straight and taper reamers of all kinds, wrist pins, bushings, pistons, lathe centers, taps, etc. Each Grinder will produce an accurate, highly finished surface.

No. 9 Electric Drive Grinder



Operated from Electric Lamp Socket

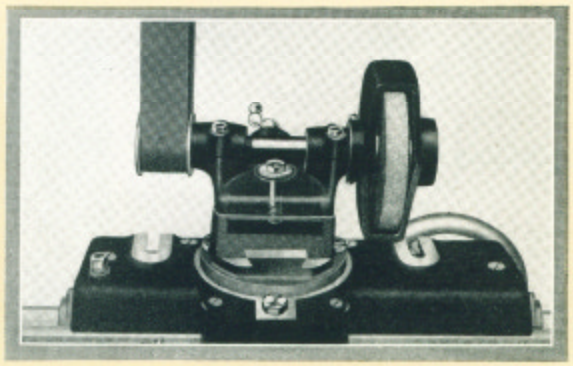
The No. 9 Electric Grinding Attachment may be set for straight cylindrical grinding, or at any angle required for grinding valves, taper reamers, cutters, etc. Adjustment is provided for tightening the drive belt so that the full power of the motor can be delivered to the grinding spindle.

For Any Size Lathe

This Grinder is suitable for any size of South Bend Lathe from 11 in. to 24 in. swing. No special clamps or fittings are required for attaching to the Compound Rest. When ordering, state size of lathe and the electric current available in your shop.

No. 9 Electric Grinder Complete, including Switch, Extension Cord and one 5 in. Emery Wheel, Shipping Weight 50 lbs. Net Factory Price.....$75.00

No. 10 Countershaft Drive Grinder



Operated from Special Drum Countershaft

The Grinder is securely clamped to the Compound Rest and swivels to any angle for grinding bevels and tapers. The bearings are adjustable for wear and are provided with patent oil cups and felt wicks. When ordering, give size of lathe and state kind of work Grinder is to be used for.

Net Factory Prices No. 10 Grinder

Catalog No.	Size of Lathe	Grinding Wheel Diam.	Grinding Wheel Width	Width of Belt	Shipping Weight	Price of Grinder
10-A	9 in. and 21 in.	4 in.	½ in.	1 in.	20 lbs.	$17.50
10-C	13 in. and 15 in.	6 in.	¾ in.	1½ in.	25 lbs.	20.00
10-E	16 in. and 18 in.	5 in.	¾ in.	1½ in.	30 lbs.	25.00
10-G	21 in. and 24 in.	6 in.	¾ in.	2½ in.	30 lbs.	25.00

No. 11 South Bend Drum Countershaft complete for any size No. 10 Grinder, Shipping Weight 100 lbs. Net Factory Price.....$25.00

The Bulletins Listed Below Show How to Do Important Jobs in Auto Repair Shops. They are Free. Order by Number.

No. 85 Piston Bulletin
Machining oversize and semi-finished pistons on the lathe.

No. 86 Valve Bulletin
Turning and grinding valve faces. Straightening valve stems, etc.

No. 87 Electrical Bulletin
Truing commutators, undercutting mica, making bushings, etc.

No. 88 Ring Gear Work
Machining flywheels for starter ring gears and truing crankshafts.

No. 89 Cylinder Regrinding
Regrinding and reboring cylinders on the lathe.

No. 90 Milling Attachment
Milling and keyway cutting on the lathe.

No. 91 Precision Grinding Bulletin
External and internal grinding on the lathe.

No. 92 Draw-in Collect Chuck
The draw-in collect chuck attachment for fine, accurate work on the lathe.

No. 93 The Lathe as a Screw Machine
The lathe as a screw machine for making studs and small parts.

No. 94 Turret Attachment Bulletin
The lathe as a turret lathe for manufacturing.

No. 95 Special Jigs and Fixtures
Special jigs and fixtures for holding work on the lathe in manufacturing operations where accuracy and interchangeability of parts are required.

No. 96 Taper Attachment Bulletin
Boring and turning tapers on the lathe. Also the practical use of the center rest and follower rest.

No. 97 Chucking Work on the Lathe
The use of Independent, Universal and Combination Chucks for holding work on the lathe.

No. 98 Other Lathe Attachments
Various lathe attachments to insure accuracy and precision on a special machine work.

Job Instruction Sheets

Explain How to Do the Work Shown in Each Bulletin

The work outlined in each Bulletin is explained step by step in special Job Instruction Sheets supplied with each attachment, making it easy for the mechanic to do the work.

How to Run a Lathe

An Authoritative Manual Containing Over 300 Practical Illustrations

In the 160 pages of **How to Run a Lathe**, the best and most practical methods of the fundamentals of modern lathe practice are put at your service.

Price 25¢

How to Run a Lathe furnished free with Lathe or Attachment orders

South Bend Lathe Works

725 East Madison St., South Bend, Indiana

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