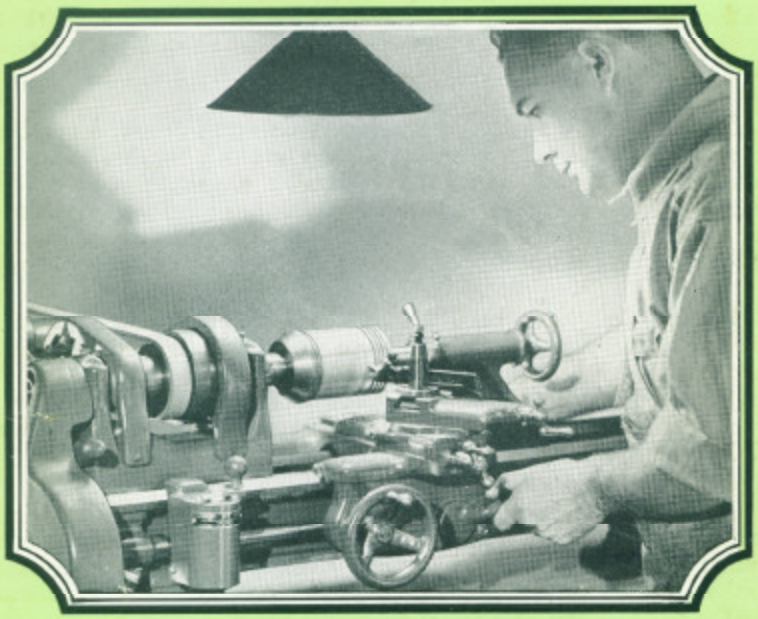
BULLETIN NO. 9

How to Finish Pistons

of Automobiles, Buses and Trucks



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SOUTH BEND LATHE WORKS
949 E. MADISON ST. SOUTH BEND, INDIANA, U. S. A.

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Bulletin No. 9

How to Finish Pistons

In the Motor Service Machine Shop

This bulletin illustrates and describes the latest shop practice and methods for finishing replacement pistons for automobiles, buses, trucks, tractors, stationary engines, motorcycles, air compressors, pumps, etc. A back-geared screw cutting lathe is recommended for doing the work. Pistons can be finished in the lathe either by turning or grinding. We recommend that they be finished by turning as this method is just as satisfactory and three times as fast as grinding.

Modern lathes with fine turning feeds and improved cutting tools are capable of producing a very smooth finish similar in appearance to a ground surface. Turning leaves the pores of the metal open to absorb and retain the oil, thus improving lubrication and reducing the possibility of the piston sticking in the cylinder when in operation.

Pistons that have been finished by turning in the lathe are becoming very popular, and have been adopted as standard equipment by one of the largest manufacturers of automobiles in the United States. Experienced automotive engineers and racing car drivers use and recommend pistons that have been finished by turning in the lathe.

A 9-inch or 11-inch South Bend Lathe is practical for finishing pistons in the small auto service shop. In larger shops which make a business of servicing pistons we recommend the 13-inch lathe. However, pistons can be finished on any size South Bend Lathe from 9-inch to 18-inch swing inclusive.

Fitting pistons to re-finished cylinders has become so important and profitable that large garages and automotive machine shops have established separate departments for this class of work. Many shops have been established for piston service exclusively in cities and towns of 10,000 population and over.

South Bend Lathe Works

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Aluminum Piston Cast Iron Piston Invar Strut Piston

Fig. 1. All Types of Pistons Can Be Finished in the Lathe.

Finishing Semi-Machined Pistons

The methods and operations outlined in this bulletin for finishing semi-machined pistons are simple, practical and efficient. With a little practice, any mechanic can finish pistons quickly and accurately if the instructions and suggestions given are carefully followed.

The most up-to-date method for finishing pistons in the service shop is to turn them in the lathe. In the past, it has been the custom in many shops to grind pistons after they have been turned in the lathe, but this is not necessary because a piston that has been properly finished by turning is just as good as one that has been finished by grinding. By using a fine turning feed and a properly ground and sharpened cutter bit, a very smooth, accurate finish may be obtained in one-third of the time required to finish a piston by grinding.

A set of six aluminum alloy pistons for a Chevrolet can be finished in a South Bend Lathe in less than thirty minutes. This includes rough turning, finish turning and machining the ring lands to the required size.

The method of finishing pistons outlined on the following pages is used in hundreds of successful service shops and is the method used and recommended by the leading automobile, bus and truck manufacturers.

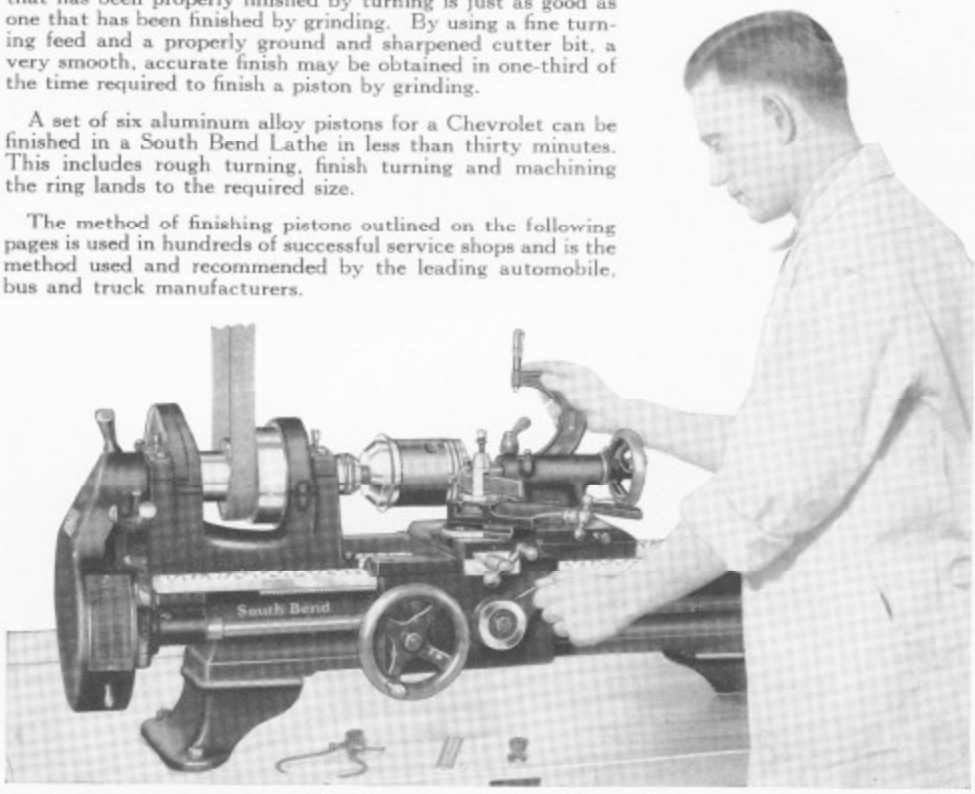


Fig. 2. Taking a Finishing Cut on a Semi-Machined Piston in a 9-inch South Bend Lathe.

Finishing Semi-Machined Pistons in the Lathe

The method of mounting the piston in the lathe, and the operations required for finishing are the same for both aluminum alloy and cast iron pistons. The operations are illustrated and explained in the proper sequence as they should be performed and apply to both types of pistons.

Reaming the Piston Skirt

The first operation in piston finishing is to ream the bevel inside of the piston skirt as shown in Figure 3. This is done to correct any inaccuracy due to the piston warping. The 60-degree piston skirt reamer used for this operation is mounted on the piston adapter shank which fits into the taper of the headstock spindle. (See page 7.)

When reaming the piston skirt, engage the back-gears to lock the lathe spindle as the reamer does not revolve. The piston is turned by hand and is fed against the reamer by turning the tailstock hand wheel. Remove only enough stock to correct the inaccuracy of the piston skirt bevel.

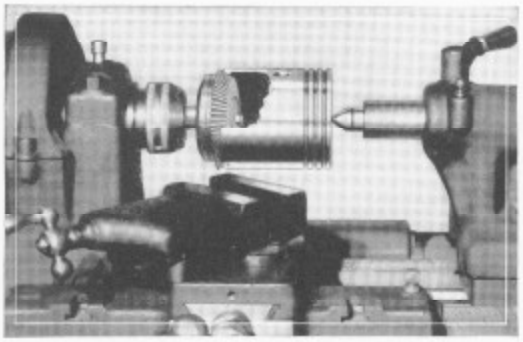


Fig. 3. Reaming the Bevel in the Skirt of a Semi-Machined Piston.

Mounting Piston in Lathe for Machining

To mount the piston in the lathe for machining, select a cone adapter ring of the correct diameter to fit into the piston skirt. (See page 7.) Adjust the driving dog of the piston adapter so that it will strike the center of the wrist pin boss, as shown in Figure 4.

The tailstock spindle should be extended far enough to permit removing the piston and inserting another without changing the position of the tailstock on the lathe bed. Place a drop of oil on the tailstock center point and adjust the tailstock spindle so that the piston will be held firmly but will not be too tight.

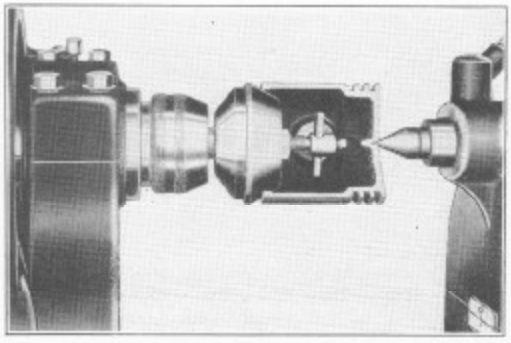


Fig. 4. A Semi-Machined Piston Mounted in the Lathe on a 60-Degree Piston Adapter.

Taking a Trial Cut

When the piston is mounted in the lathe, take a light trial cut across its entire length, as shown in Fig. 5, to check the alignment of the centers. Measure the diameter of the piston skirt at each end with a micrometer caliper, as shown in Fig. 6. If one end is smaller in diameter than the other, loosen the tailstock clamping bolt and adjust the tailstock set-over screws. Continue taking light trial cuts and adjusting set-over screws until the trial cut produces the same diameter at each end of the piston. Information on reading micrometer calipers and aligning lathe centers is given in the handbook, "How to Run a Lathe."

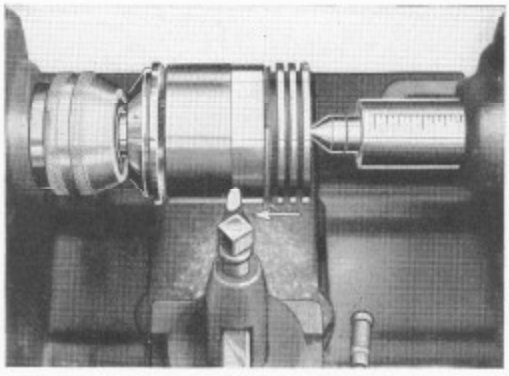


Fig. 5. Taking a Trial Cut to Check the Alignment of Lathe Centers.

Finishing Semi-Machined Pistons in the Lathe

Rough Turning the Piston

Before taking the roughing cuts, measure the diameters of the cylinders and calculate the diameter to which each of the pistons is to be machined. (For piston clearances see pages 4 and 5.)

Grind a cutter bit for rough turning pistons as explained on page 8. A stellite cutter bit is recommended but a good high speed steel cutter bit will give good results if the lathe spindle speed is not too fast.

Arrange the lathe carriage for a fairly coarse feed. Use a spindle speed suitable for turning the piston to be machined. (For spindle speeds see page 6.) Adjust the cutting tool for the first cut.

The roughing cut should be taken over the entire length of each piston in the set without changing position of cutting tool or tailstock. If more than $\frac{1}{8}$" is to be removed from diameter of piston it may be better to take two or more roughing cuts than to remove too much metal in one cut. Allow .005" to .007" on the diameter of the piston for the finishing cut.

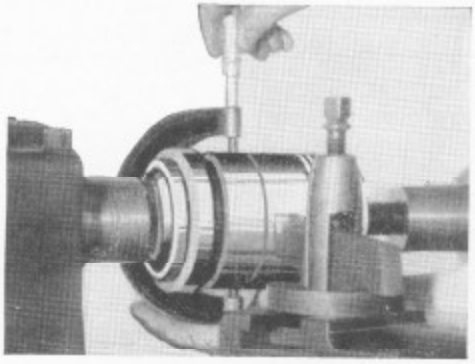


Fig. 6. After Taking the Trial Cut the Piston is Measured at Each End With Micrometer Calipers to Check the Alignment of Centers.

Finish Turning the Piston

Before taking the finishing cut, test the inside bevel edge of the piston skirt. If it is not a true circle, ream until it is true. Grind a cutter bit for the finishing cut, and hone the cutting edge with an oil stone. See Page 8, Fig. 22. Use a fine carriage feed in order to produce a smooth finish on the piston skirt.

Calculate the clearance so that each piston will be the correct diameter for its own cylinder. Number each piston and the cylinder it is intended to fit. Then take a finishing cut on the top land of the piston. Remove piston from lathe and try the top land (inverted) in its cylinder. Measure the land with a micrometer. After the exact finish diameter of the piston is determined, finish turn the skirt of the entire set of pistons without changing position of cutting tool in tool post.

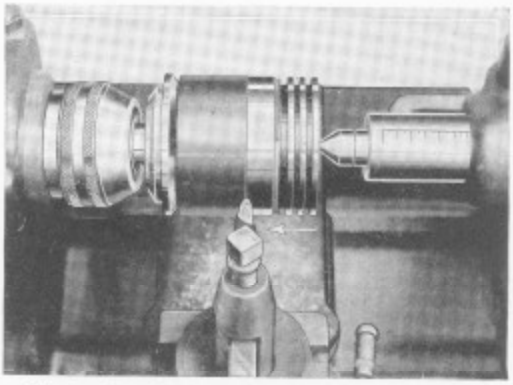


Fig. 7. Finish Turning a Semi-Machined Piston, Using a Fine Feed and Light Cut to Produce a Very Smooth Finish.

Finish Turning Ring Lands

The piston ring lands are finished as shown in Fig. 8. Adjust the cutting tool for the correct finished diameter of the top land and turn the top land on each piston of the entire set without changing the adjustment of the tool. Then adjust the cutting tool for the finished diameter of the second land and turn this land on each piston in the set. Adjust the tool for the finished diameter of the third land and finish turn this land on each piston in the set. See pages 4 and 5 for information on calculating the correct clearance.

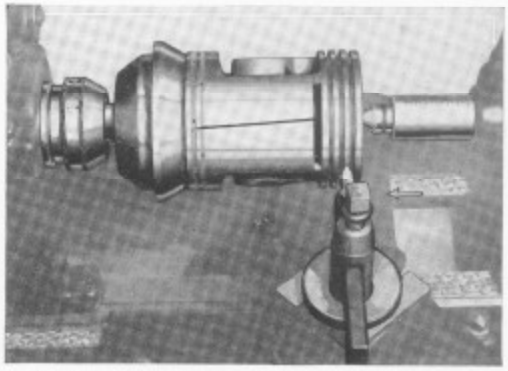
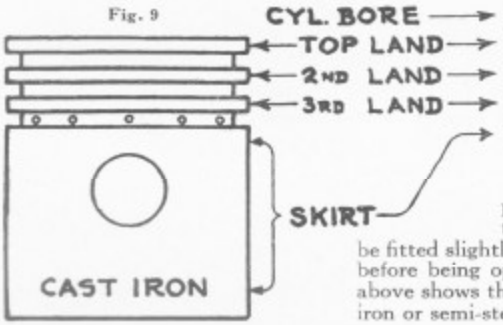


Fig. 8. Finish Turning the Piston Ring Lands of a Semi-Machined Piston to the Exact Diameter Required for Correct Clearance.

Clearance for All Types Cast Iron or Semi-Steel Pistons

Fig. 9



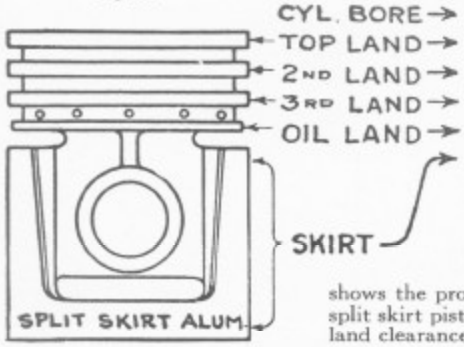
2½" to 3"	3" to 3½"	3½" to 4"	4" to 4½"	4½" to 5"	5" to 5½"	5½" to 6"
.011	.012	.014	.016	.019	.022	.026
.008	.009	.010	.012	.014	.016	.019
.006	.006	.007	.008	.009	.011	.013
.003	.003¼	.003½	.004	.004¾	.005¼	.007

The piston clearance figures shown on this page are calculated for average cylinder condition and are safe for general use. Pistons may be fitted slightly closer if carefully run in at slow engine speed before being operated at maximum speeds. The tabulation above shows the recommended clearances for all types of cast iron or semi-steel pistons.

On four-land cast iron pistons the fourth ring land clearance is the same as the third land. The skirt clearance rule given applies to pistons with or without rings below the piston pin hole.

Clearance for All Aluminum Alloy and Invar Strut Split Skirt Pistons

Fig. 10



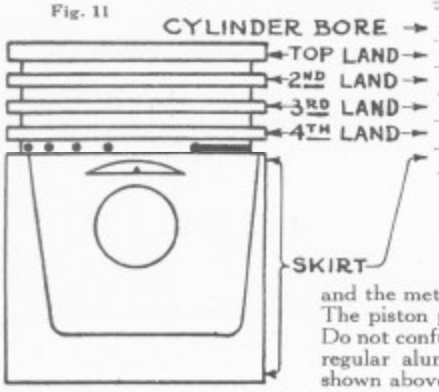
2½" to 3"	3" to 3½"	3½" to 4"	4" to 4½"	4½" to 5"
.019	.023	.028	.034	.041
.014	.016	.019	.023	.028
.014	.016	.019	.023	.028
½" less than Standard Cylinder Bore Diameter				
.002	.002¾	.002½	.003	.003¾

Aluminum alloy pistons require more ring land clearance than cast iron pistons because they expand more when hot. The tabulation above shows the proper clearances for aluminum alloy and invar strut split skirt pistons. On four-land aluminum pistons the fourth ring land clearance is the same as the third land.

Always measure the diameter of the skirt at 90 degrees to the wrist pin hole. After the skirt and lands have been finished and the piston pin fitted, remove the metal tacks at top and bottom of the vertical slit in the skirt with a hacksaw blade.

Clearance for Heavy Duty All Aluminum Pistons

Fig. 11



2½" to 3"	3" to 3½"	3½" to 4"	4" to 4½"	4½" to 5"
.019	.023	.028	.034	.041
.014	.016	.019	.023	.028
.014	.016	.019	.023	.028
.014	.016	.019	.023	.028
.003½	.003¾	.004	.004½	.005½

Always measure the diameter of the piston skirt at the extreme upper end. The skirt of most aluminum alloy pistons is not completely slotted and the metal tack is removed at the lower end of the skirt only. The piston pin should be fitted before removing the metal tack. Do not confuse the heavy duty all aluminum type piston with the regular aluminum alloy and Invar Strut split skirt pistons as shown above in center of page.

Measuring the Diameter of the Cylinder Bore

Checking the Condition of the Cylinder

Fig. 12, at right, shows the application of a dial indicator type cylinder gauge which may be used for checking the condition of a worn cylinder. By a combination sliding and rotary motion of the gauge in the cylinder bore, any inaccuracy or out-of-roundness is registered on the indicator in thousandths of an inch.

Before starting to measure the cylinders they should be carefully cleaned and all carbon or other foreign materials removed. If the indicator shows less than three thousandths of an inch variation, the cylinder does not need to be rebored. However, if there is an error of four-thousandths or more, the cylinder should be rebored before new pistons are installed.

The cylinder bore should be straight, round, smooth and square with the crankshaft, otherwise the piston will bind and cause excessive wear on the piston, connecting rod, cylinder and crankshaft.

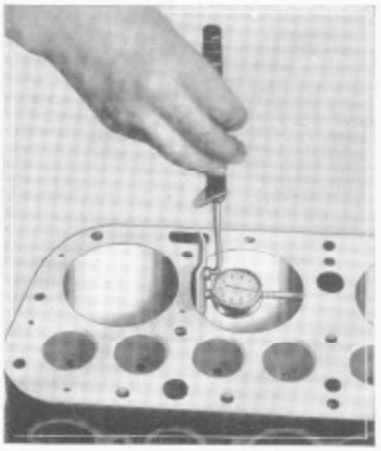


Fig. 12. Application of Cylinder Gauge Checking Cylinder Bore for Wear and Out-of-roundness.

Measuring the Diameter of the Cylinder Bore

The cylinder gauge shown in Fig. 12 may be used to measure the diameter of the cylinder bore. An inside micrometer may also be used as illustrated in Fig. 13, at right. When using the inside micrometer be careful to place it exactly across the center of the cylinder. If the points are placed either to the right or left of the center, an inaccurate measurement will result.

The diameter of the cylinder bore should be transferred direct from the inside micrometer to the outside micrometer. Using the measurement shown on the outside micrometer, the correct amount of piston clearance should be subtracted to obtain the exact diameter for the finished piston. See piston clearance charts on page 4.

The clearance charts shown on page 4 are recommended for general practice. However, there are many special types of pistons which require special clearance allowances. It is always best to refer to the manufacturer's specifications and use them in calculating the piston clearance if they are available.

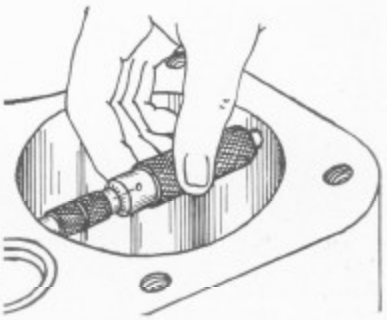


Fig. 13. Measuring Finished Cylinder Bore with Inside Micrometer.

Checking the Piston Clearances

An accurate and practical method for checking the piston clearance is shown in Fig. 14, at the right. Each piston is used as a sort of plug gauge in its respective cylinder and thus the diameter of the piston may be checked as the finishing cuts are being taken.

A feeler gauge is used to check the clearance between the finished piston and the cylinder bore. A gauge not over three-eighths of an inch wide is recommended and the usual practice is to use a feeler gauge that is one-thousandth of an inch thinner than the amount of clearance desired.

For example, if the piston should have three-thousandths of an inch clearance in the cylinder, a feeler gauge two-thousandths of an inch thick and not over three-eighths of an inch wide is used to check the clearance.

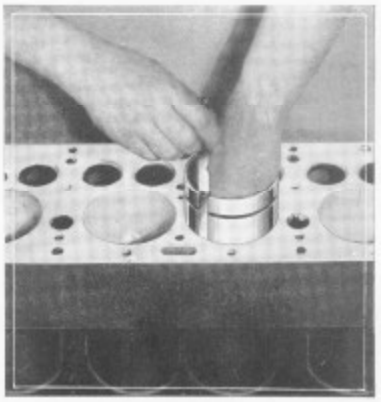


Fig. 14. Checking the Piston Clearance with a Feeler Gauge.

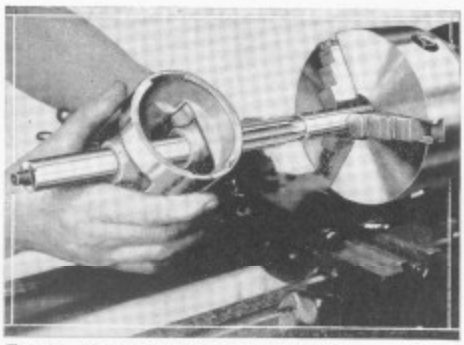


Fig. 15. Using the Lathe as a Power Reamer Drive.

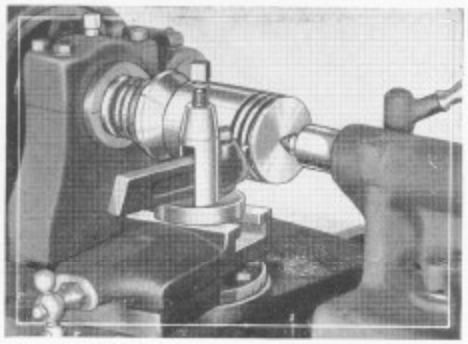


Fig. 16. Re-machining a Piston Ring Groove.

Honing Piston Pin-Hole

The lathe may be used for reaming and honing piston pin-hole bearings, as shown above. The lathe spindle has a wide range of speeds so that the most efficient speed for the work may be selected. The hone or reamer may be held in a lathe chuck or drill chuck.

Widening Piston Ring Grooves

Worn piston ring grooves are often the cause of oil pumping. This trouble is effectively remedied by re-machining the ring groove, as shown above, and installing over-width piston rings. Carbon can also be removed from piston ring grooves in the same manner.

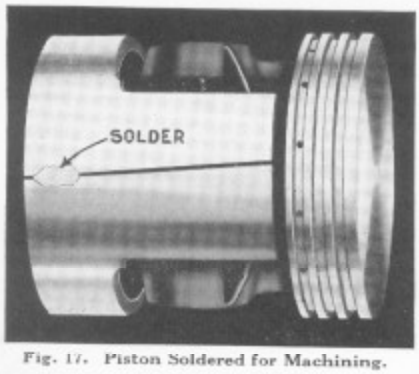


Fig. 17. Piston Soldered for Machining.

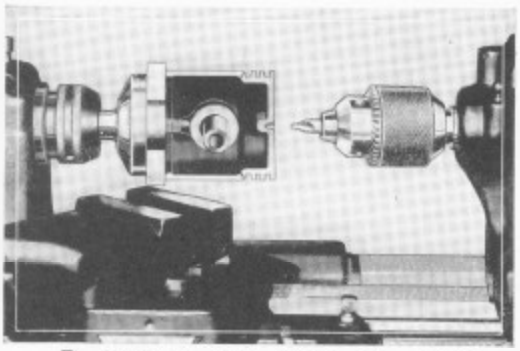


Fig. 18. Drilling Center Hole in Piston Head.

Soldering Slit Skirt Pistons

Finished alloy pistons have a slot cut through the skirt as shown above. Before machining these pistons, solder the slit sides together at the lower end of the skirt, as shown in Fig. 17. After machining, remove the solder with a hacksaw.

Drilling Center Hole in Piston

Some pistons do not have center holes drilled in the head. To machine these pistons, center holes may be drilled as shown above. The piston pin is inserted through an eye bolt driver and the piston is then turned until it is held tightly against the piston adapter centering ring.

Recommended Spindle Speeds for Turning Pistons in the Lathe

The chart shows the recommended spindle speeds for turning various kinds of metals. The spindle speeds listed in column two should be used for machining cast iron pistons and the last column gives the spindle speeds recommended for turning aluminum alloy pistons.

This chart is based on average working conditions. Finishing cuts may sometimes be taken at slightly higher speeds, and slower speeds may produce better results on heavy roughing cuts.

When rough turning, use a coarse feed and take as many cuts as are required to reduce the work nearly to the finished size. When finish turning, use a very fine feed and remove .005" to .007" or less from the diameter in one cut.

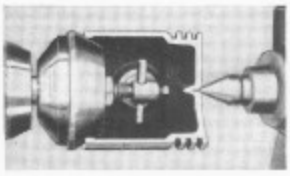
Diameter of Work Inches	Revolutions per Minute			
	Cast Iron 60 F.P.M.	Mild Steel 90 F.P.M.	Brass 150 F.P.M.	Aluminum 200 F.P.M.
1	229	344	573	764
1½	153	229	382	510
2	115	172	287	382
2½	92	138	229	306
3	76	115	191	254
3½	65	98	164	218
4	57	86	143	191
5	46	69	115	153

F.P.M. = Feet per minute at tool point.

Self-Centering Piston Adapters for Mounting Pistons

The Self-Centering Piston Adapter is used for mounting all sizes and types of pistons in the lathe. One end of the adapter has a tapered shank which fits into the lathe spindle taper. The other end of the adapter shank is machined to receive the various sizes of piston adapter cone rings and piston skirt reamers.

The driving dog screws into the adapter and is adjustable for driving any piston with center hole in head. Piston Adapter equipment includes: Adapter Shank, No. 1-D Cone Ring for pistons 2½ to 3⅛ inches in diameter, and Driving Dog, Type "A" as shown below.



A Cross Section of a Piston Mounted on a Piston Adapter Ready for Machining

S. C. Piston Adapters for Various Size Lathes

Size Lathe	Cat. No.	Code Word	Prices
9 in.	44-A	Hanov	Supplied on Request
11 in.	44-B	Hbiol	
13 in.	44-C	Hclaw	
15 in.	44-D	Hdixe	
16 in.	44-E	Hfeota	
18 in.	44-F	Hfadx	

Piston Adapter Equipment with Shank, Cone Ring and Driving Dog

Extra Cone Rings for Piston Adapter

Cone rings are used on the No. 44 Piston Adapter, above, to center pistons in the lathe. Cone Rings are listed below in various sizes for centering pistons from 2½" to 9" outside diameter. No. 44 Piston Adapter equipment includes No. 1-D Cone Ring.

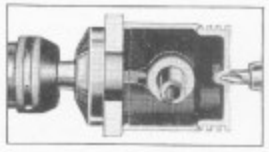
Extra Cone Rings

Cat No.	For Pistons Outside Dia.	Code Word	Prices
1-D	2½ to 3⅛"	Hudso	Supplied on Request
2-D	3⅛ to 3¾"	Hwaki	
3-D	3¾ to 4⅜"	Hyena	
4-D	4⅜ to 5"	Hzage	
5-D	5 to 6¼"	Haeab	
6-D	6 to 7½"	Hasde	
7-D	7½ to 9"	Hapef	

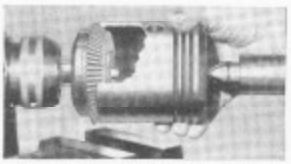
Cone Rings

Piston Centering Ring

The Piston Centering Ring and Eye Bolt Driver illustrated at the right are used with the No. 44 Piston Adapter Shank for holding pistons when it is necessary to drill a center hole in the head of the piston in order to mount it in the lathe. Centering Ring is 5 7/16" in diameter.



Price of Centering Ring, No. 1-Z, and Eye Bolt Driver quoted on request.



Reaming the Bevel Skirt of a Warped Piston so That It Will Fit True on the Adapter

Piston Skirt Reamers

Piston Skirt Reamers

Skirt Reamers are used on the No. 44 Piston Adapter Shank, shown above, for reaming the chamfer in piston skirts to fit 60° cone rings.

Piston Skirt Reamers

Cat. No.	For Pistons Outside Dia.	Code Word	Prices
1-R	2½ to 3⅛ in.	Hacke	Supplied on Request
2-R	3⅛ to 3¾ in.	Heine	
3-R	3¾ to 4⅜ in.	Hiley	
4-R	4⅜ to 5 in.	Holer	

Itemized Quotation on the Lathe and Tool Equipment

An itemized quotation on the lathe and tools required for servicing pistons will be mailed on request. Specify the size lathe you would prefer and the general class of work you wish to do and we will quote on the size of lathe most practical for that work.

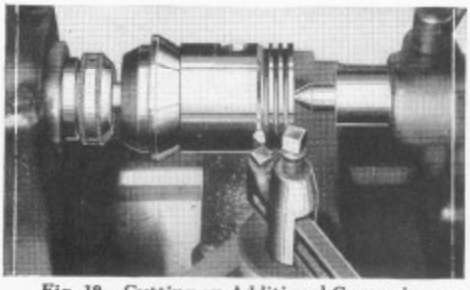


Fig. 19. Cutting an Additional Groove in a Piston to Stop Oil Pumping.

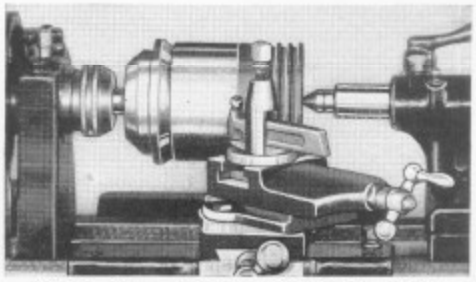


Fig. 20. Re-machining an Old Piston to Fit a Slightly Smaller Cylinder.

Sharpening Cutter Bits for Piston Work

High Speed Steel and Stellite Cutter Bits

High speed steel cutter bits which are held in a tool holder as shown in Fig. 22 are usually used for turning pistons, but some shops prefer Stellite cutter bits as they will hold a cutting edge longer than high speed steel cutter bits.

Fig. 21 at right, shows an excellent method for grinding high speed steel and Stellite cutter bits for use in a standard lathe tool holder. The point of the cutter bit is ground to a $\frac{1}{32}$-inch radius.

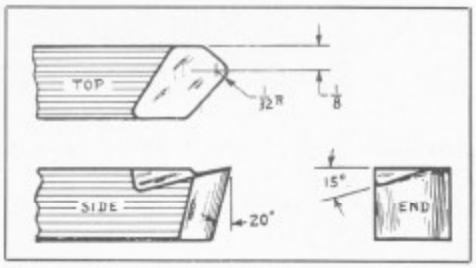


Fig. 21. High Speed Steel and Stellite Cutter Bits for Rough and Finish Turning of Pistons.

Hone Cutting Edge for Finishing

Always hone the cutting edge of the cutter bit before using it for finishing pistons. Honing to a keen edge lengthens the life of the cutter bit and produces a much smoother finish on the surface of the piston. It is advisable to hone the cutting edge of the roughing tool as well as the finishing tool. See Fig. 22.

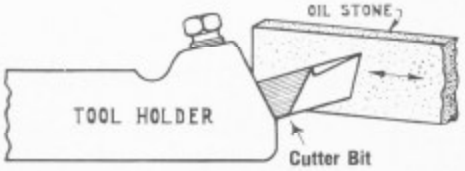


Fig. 22. Honing the Cutting Edge of the Cutter Bit with Oil Stone. Cutter Bit is held in Tool holder.

Cutter Bit for Widening Piston Ring Grooves

Fig. 23 at right, shows a cutter bit ground for widening piston ring grooves. The point of the cutter bit is two-thousandths of an inch wider than the back of the cutter bit, and there is clearance on both sides. Feed the cutter bit straight in. If it is ground to the correct width, the groove may be widened in one cut.

Some mechanics prefer to use a side cutter bit with a narrow point for widening ring grooves. Only one side of the groove is machined at a time when this method is used.

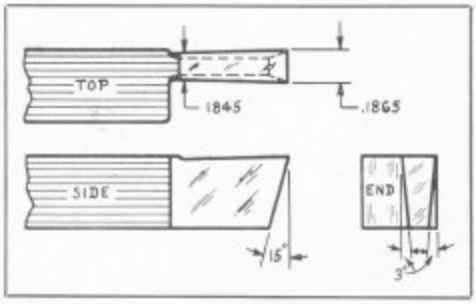


Fig. 23. Cutter Bit for Widening Ring Grooves.

Tungsten-Carbide Tipped Cutter Bits for Piston Finishing

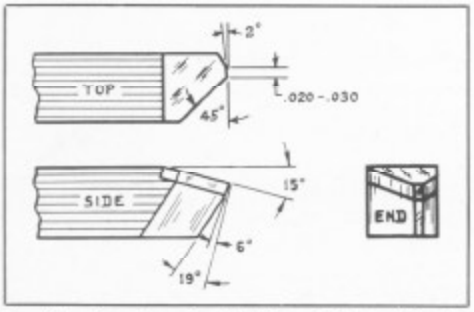


Fig. 24. Tungsten-Carbide Tipped Cutter Bits for Finishing Pistons.

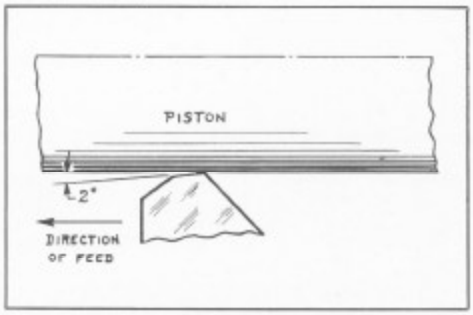


Fig. 25. Enlarged Top View of Tungsten-Carbide Tipped Cutter Bit for Piston Finishing.

If an unusually smooth, bright finish is desired on the piston, a Tungsten-Carbide Tipped Cutter Bit which is held in a tool holder as shown in Fig. 22 may be used. Figs. 24 and 25 show the shape of cutting edge of the bit.

Tungsten-Carbide Tipped Cutter Bits should not be sharpened on an ordinary grinding wheel, but should be lapped on a cast iron lapping disc impregnated with diamond dust. (Information and prices quoted on request.)

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 postpaid 10c

"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 postpaid 10c

"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 postpaid 10c

"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", 23 illustrations. Price postpaid 10c

"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 postpaid 10c

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"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 postpaid 10c

"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 postpaid 10c

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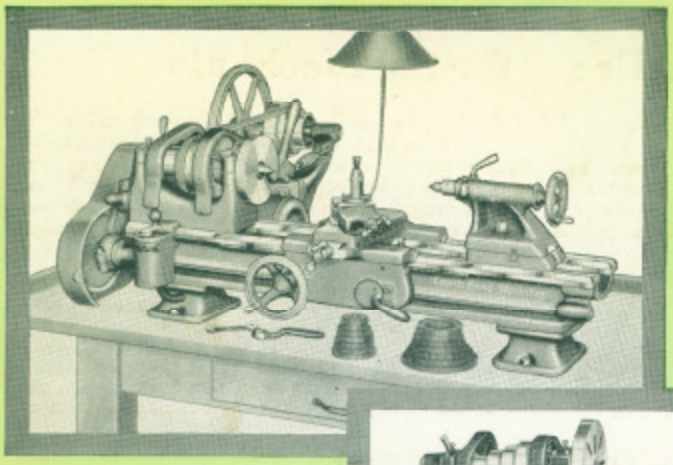
"How to True Brake Drums" Bulletin No. 4-A. (Automotive). Shows how to mount various types of brake drums in the lathe for truing the drum so that it will be concentric, round and true. 16 pages, size 6"x9", 40 illustrations. Price postpaid 10c

"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 postpaid 10c

"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 5¼"x8", and more than 300 illustrations.

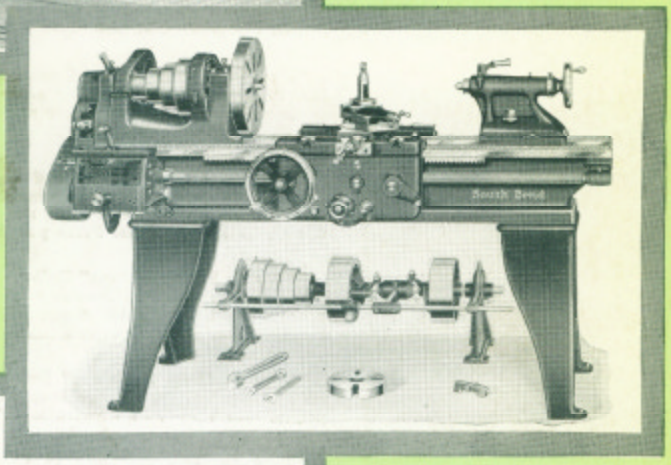
This book is used as a handy reference book by machinists and apprentices in industrial plants, railroad shops and machine shops, and is also used as a text book by students in educational institutions. It is considered the most popular text on lathe work in the world. More than a million and a half copies are in use.
Price postpaid 25c



At Left—No. 415-YA 9" x 3' 1937 Model South Bend "Workshop" Adjustable Horizontal Motor Driven, Back-Geared Screw Cutting Precision Bench Lathe.

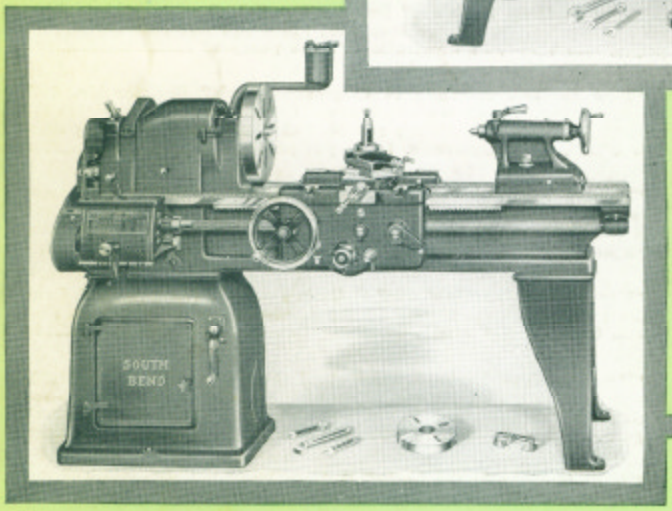
One of the finest small lathes we have ever built.

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



At Right—No. 17-C 16"x6' 1937 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' 1937 Model South Bend Underneath Belt Motor Driven, Quick Change Gear, Back-Geared Screw Cutting Precision Lathe.

A practical, efficient and popular motor driven lathe.

Below—The plant of the South Bend 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 4½ 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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