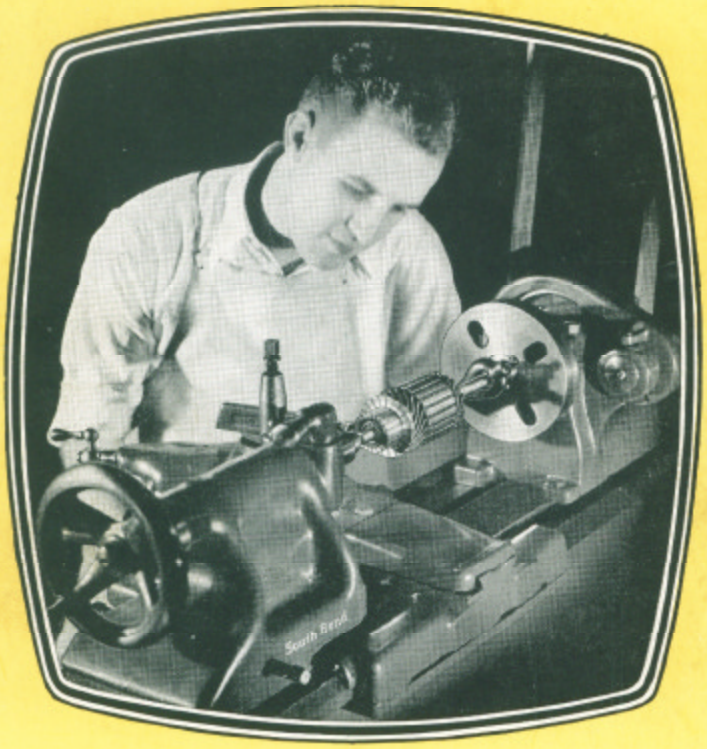
BULLETIN NO. 2A

How to True Armatures

of Automobiles, Buses and Trucks



Price 10 Cents
Postpaid to Any Address
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SOUTH BEND LATHE WORKS
474 NILES AVE., SOUTH BEND, INDIANA, U. S. A.

The Correct Equipment
For The Automotive Service Shop

In the past, the equipment of a great many automotive service shops has been limited to a work bench, a vise, a jack and a few hand tools. This type of equipment is no longer adequate. The modern shop is expected to have the precision tools and machinery necessary to repair and adjust the complicated and delicate mechanism of the latest type of automobiles, buses and trucks.

A good back-geared screw cutting lathe is the most important piece of equipment in the automotive service shop of today and is known among mechanics as "The Universal Tool" because it can be used for such a wide variety of jobs. Only a few minutes are required to set up the lathe for any of the various classes of work.

The lathe is recognized as the most practical and economical tool for truing and undercutting armature commutators, as outlined in this booklet. The same lathe with a few additional accessories may be used for finishing semi-machined pistons, refacing valves, boring rebabbitted connecting rods, making bushings, cutting right and left-hand screw threads, and for hundreds of other jobs, a few of which are illustrated on page 8.

South Bend Lathe Works

The Lathe illustrated throughout this bulletin on the servicing of armatures is a 9"x3' "Workshop" Back-Geared, Screw Cutting Precision Lathe.

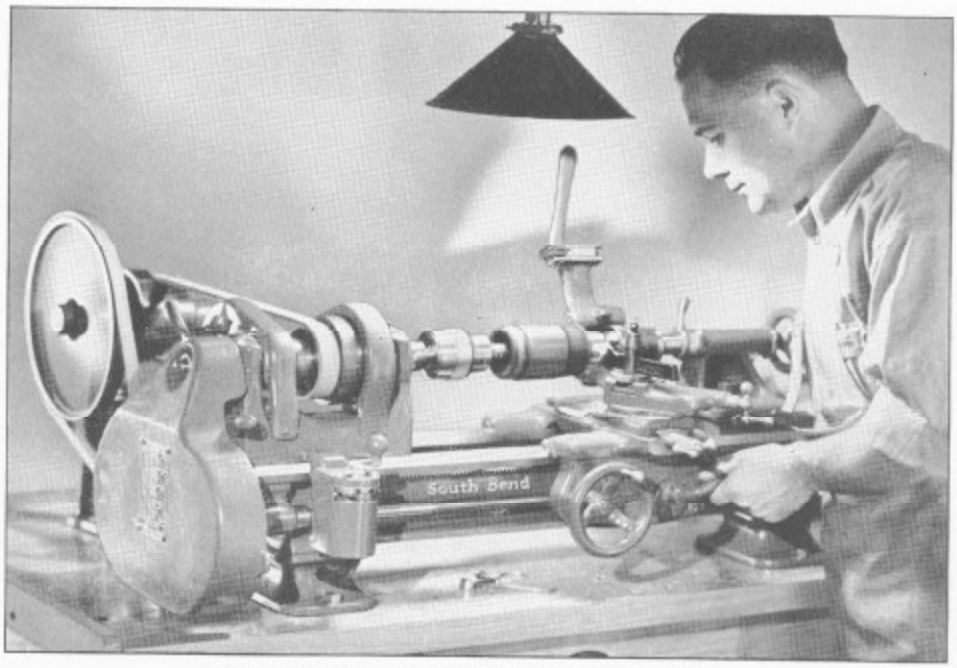


Fig. 1. Truing an armature commutator in the lathe.

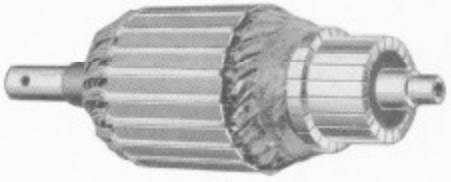
How To True Armatures

Of Automobiles, Buses and Trucks

After an armature has been in service for some time the commutator becomes worn and the mica insulation projects above the copper segments, because the mica is harder than the copper. This prevents a good contact between the brushes and the commutator and causes arcing and burning of the copper segments.

When the surface of a commutator has become worn so that it is no longer smooth and round, the only remedy is to machine the surface of the commutator true in the lathe. This will restore the original smoothness and accuracy of the commutator surface and the armature will be as good as new. Perfect contact is then assured between the brushes and the surface of the commutator.

It is very important that the commutator be machined perfectly true and concentric with the shaft. If the commutator is not true it will throw the armature off balance so that there will be vibration, and it will also prevent the brushes from making a good contact with the commutator when the commutator is revolving at high speed.



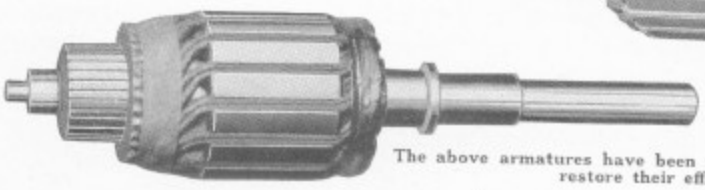


Fig. 2. Above. Generator Armature.

Fig. 2A. Left. Starter Armature.

The above armatures have been machined in the lathe to restore their efficiency.

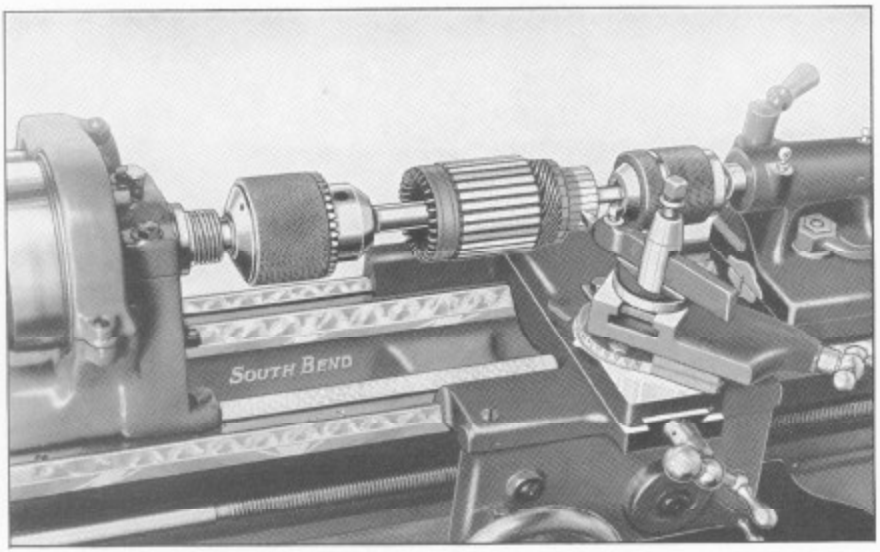


Fig. 3. An armature mounted in the lathe for truing and undercutting the commutator.

How To Mount The Armature In Lathe

The armature should be mounted in the lathe as shown in Fig. 3 above for truing and undercutting the commutator. The left end of the armature shaft is gripped in a chuck which automatically centers the shaft with the bearing surface and at the same time acts as a driver. A ¾" drill chuck is shown in the illustration, but any type of chuck having the necessary accuracy may be used.

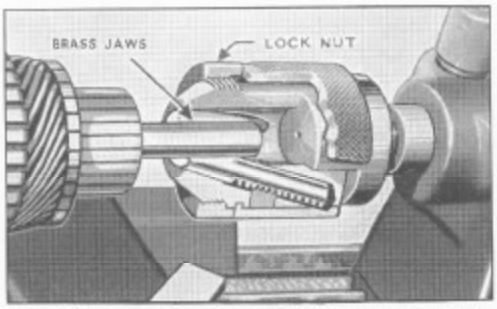


Fig. 4. Cutaway view of special chuck used in tailstock of lathe for supporting armature shaft.

A special chuck is used in the tailstock of the lathe for supporting the right end of the armature shaft. This chuck has three brass jaws which are adjusted simultaneously to center the shaft and may be locked in position by tightening the lock nut. The jaws should be just tight enough to provide a good running fit on the shaft. The shaft should turn freely in the jaws, but there should be no play.

Before starting the lathe a few drops of oil should be placed on the shaft where it revolves in the jaws of the special chuck mounted in the tailstock spindle of the lathe. This will prevent the jaws of the chuck from wearing and will also avoid possible scoring of the shaft.

The method outlined above permits mounting all types of centerless armature shafts in the lathe and may also be used for mounting armatures which have center holes in the ends of the shaft. It is not advisable to machine the commutator with the armature mounted on centers because the center holes in the armature shaft are seldom true and concentric with the bearings and often they are damaged in removing the armature.

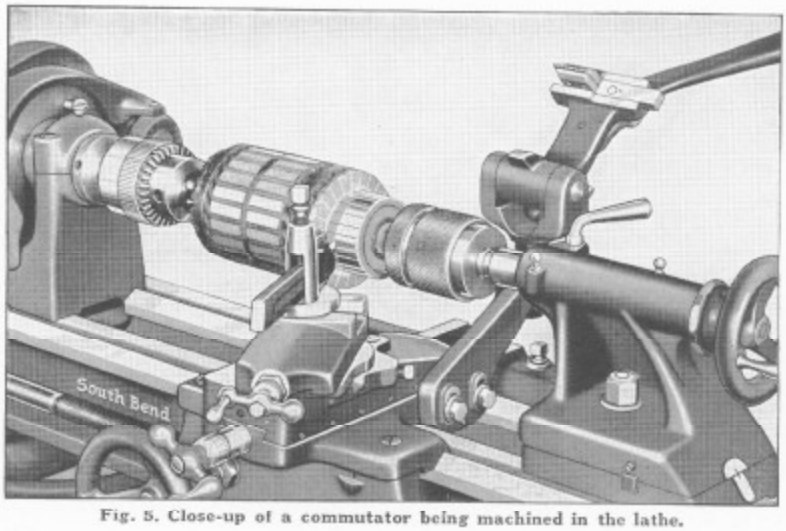


Fig. 5. Close-up of a commutator being machined in the lathe.

How to True the Commutator

The lathe should be arranged to operate at a spindle speed between 300 and 400 R.P.M. for truing armature commutators. This is a moderate speed and can usually be obtained by disengaging the back gears and placing the belt on the middle step of the cone pulley. The power longitudinal feed should be used to obtain a smooth finish on the surface of the commutator.

Figs. 6 and 7 show an excellent type of cutter bit for truing armature commutators. The shape of the cutter bit permits truing the commutator to the shoulder and also permits cutting a neck or groove in the end of the commutator next to the shoulder to facilitate undercutting.

The cutter bit should be set exactly on center, as shown in Fig. 8. Notice that the top of the cutter bit is ground perfectly flat on top, and there is no side rake or back rake. This is to prevent the cutter bit from digging in and chattering.

After grinding the cutter bit to the shape shown in Fig. 7, the cutting edge should be carefully honed with an oil stone. If the cutter bit is properly sharpened and honed to a keen edge an exceptionally smooth finish can be obtained.

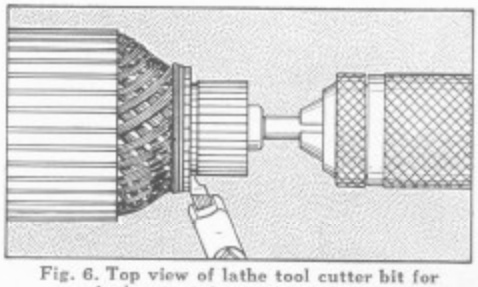


Fig. 6. Top view of lathe tool cutter bit for truing armature commutators.

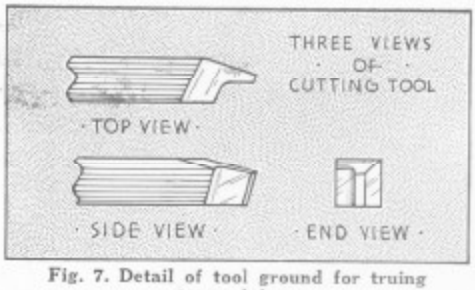


Fig. 7. Detail of tool ground for truing commutators.

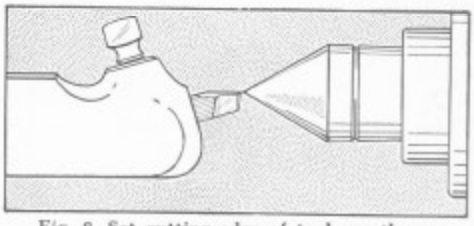


Fig. 8. Set cutting edge of tool exactly on center for truing commutators.

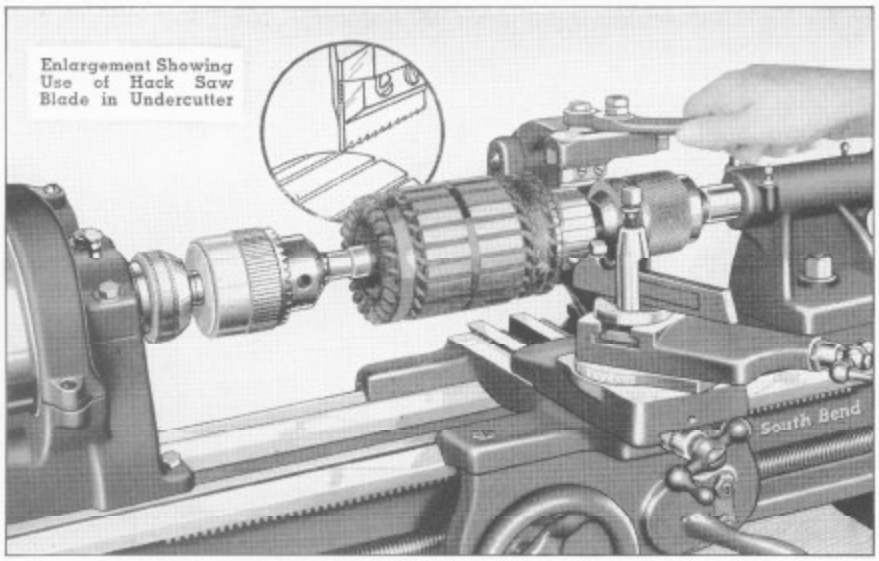


Fig. 9. Undercutting mica with hand type mica undercutting attachment.

How to Undercut and Polish Commutators

After truing the commutator of a generator armature, the mica insulation between the segments should be undercut. The commutators of starting motors usually are not undercut.

The Mica Undercutting Attachment shown in Figs. 9 and 10 is used for undercutting the commutator. With this attachment short pieces of ordinary hack saw blades may be used. Holes need not be drilled in the blade.

Use a hack saw blade the same width as the insulation. See Fig. 11.

Lock the lathe carriage in position so that when the lever of the mica undercutting attachment is pushed to the extreme left the blade of the undercutter will almost but not quite touch the shoulder of the armature.

Turn the adjusting screw as shown in Fig. 10, so that the mica will be undercut about 1/64" deep. Also adjust the undercutter swivel so that the blade is aligned with the segments, regardless of whether or not they are parallel to the armature shaft.

After undercutting, the surface of the commutator should be polished with very fine sandpaper, as shown in Fig. 12.

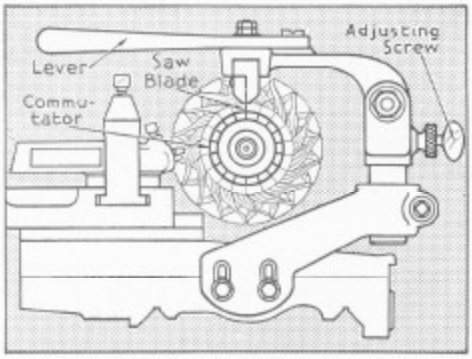


Fig 10. End view of Mica Undercutting Attachment mounted on lathe.

Fig. 11. Correct and incorrect methods of undercutting mica insulation.

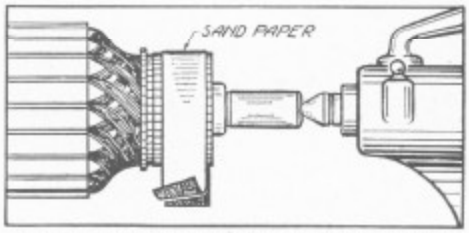


Fig. 12. Polishing the commutator after truing and undercutting.

Auto Electric Service Jobs

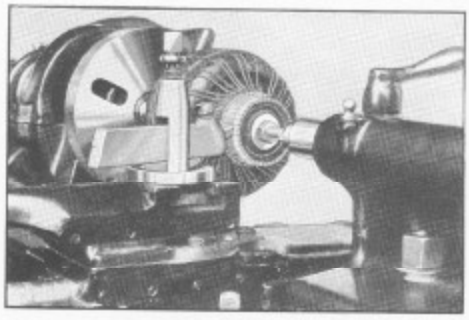


Fig. 13. Machining commutator of Model A Ford generator armature.

The Ford 1928 Model A generator armature is so constructed that the armature shaft is not removed from the car with the armature. This type of armature must be mounted on a special taper mandrel, as shown above, for truing and undercutting the commutator. See Fig. 14 at right.

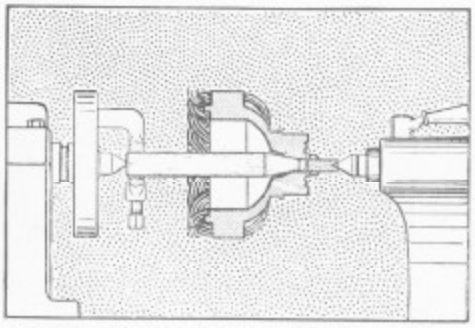


Fig. 14. Special taper mandrel for mounting 1928-29 Model A Ford armatures in the lathe.

The drawing shows a cross section of the 1928-1929 Model A Ford generator armature mounted on a special mandrel for truing and undercutting the commutator. This mandrel may be made, or it may be purchased. Catalog No. 312—Special mandrel for Model A Ford generator—$3.00.

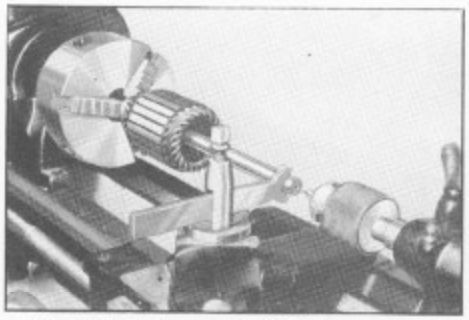


Fig. 15. Drilling a center hole in an armature shaft.

Although center holes are not necessary for truing and undercutting armature commutators, it is sometimes necessary to drill center holes in centerless armature shafts. This may be done with the aid of a V-shaped rest held in the tool post of the lathe, as shown above.

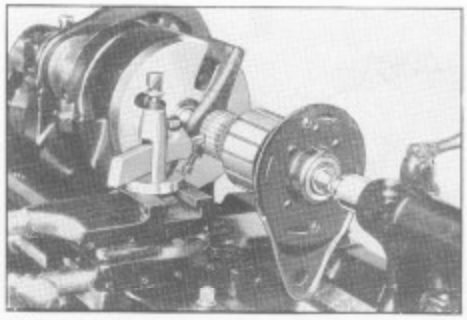


Fig. 16. Truing commutator of Model A Ford generator armature.

The end plate of some Ford generators is removed from the car with the armature. These armatures may be machined without removing the end plate by mounting in the lathe with the commutator next to the headstock, as shown in the above illustration.

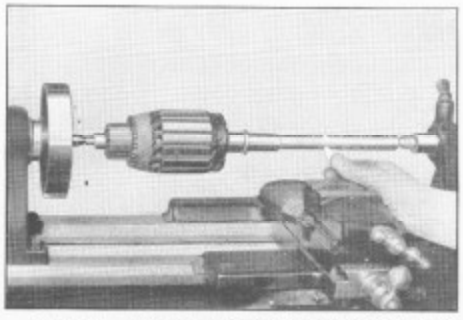


Fig. 17. Testing and straightening a bent armature shaft.

Bent armature shafts may be tested in the lathe, as shown above, for straightening. The centers in the shaft should be carefully examined to make sure that they have not been damaged. The point where the shaft is bent is located and marked with chalk.

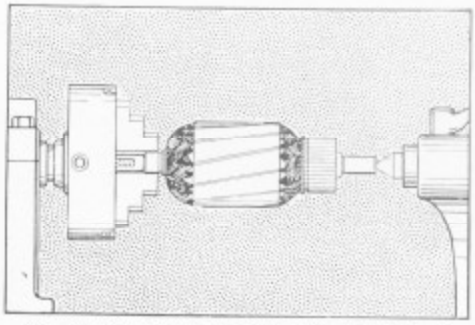


Fig. 18. Mounting armature with slotted shaft in lathe.

Some armature shafts have a large slot, making it difficult to mount them in the lathe in the usual method. A three-jaw universal lathe chuck may be used for supporting the slotted end of this type of armature shaft, as shown in the drawing above.

Auto Electric Service Jobs

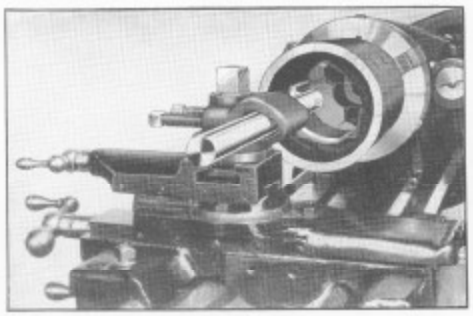


Fig. 19. Boring field poles of generator in a back-geared, screw cutting lathe.

Sometimes the clearance between the armature and the field poles is too small for satisfactory service. This can easily be remedied by mounting the generator frame in the lathe and boring out the field poles as shown above.

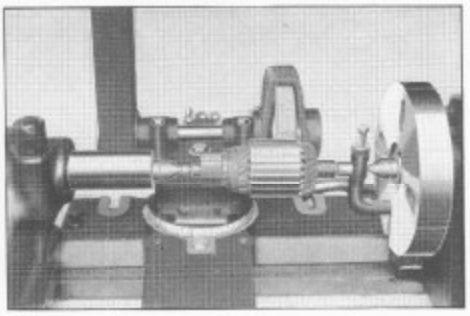


Fig. 20. Truing outside diameter of armature by grinding in the lathe.

The outside diameter of the armature occasionally becomes damaged. The construction of the armature makes it difficult to turn the outside diameter, but it may be trued by grinding as shown above.

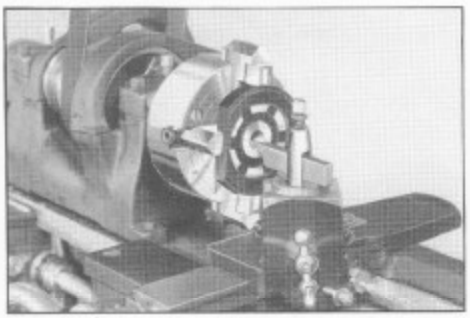


Fig. 21. Truing worn distributor contact points.

Worn distributor contact points are quickly machined smooth and true in the lathe. The distributor may be held in a four-jaw independent chuck, as shown in the illustration above, or it may be mounted in a three-jaw universal chuck.

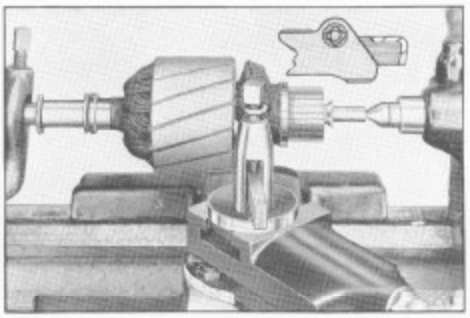


Fig. 22. Cutting wires off of armatures.

The wires can be quickly cut off of armatures that are to be rewound, as shown in the illustration above. A standard cutting-off tool is used for this operation. The blade of the cutting-off tool is ground as shown in the small sketch.

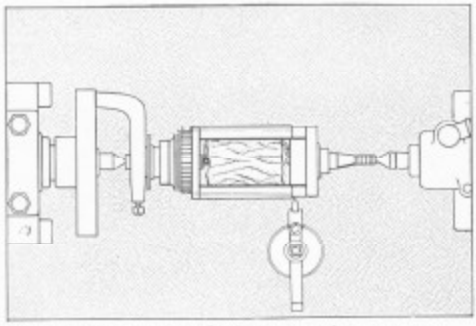


Fig. 23. Truing outside diameter of a magneto armature.

If the outside diameter of a magneto armature has been damaged, or if the clearance between the armature and the field poles is too small, the outside diameter can easily be machined true by mounting in the lathe centers, as shown in the illustration above.

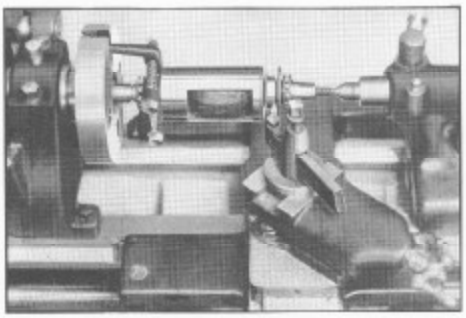


Fig. 24. Truing a magneto collector ring in the lathe.

Worn magneto collector rings are easily turned true, as shown in the illustration above. Damaged field poles of magneto armatures can also be turned true in a small Back-Geared Screw Cutting Lathe. After truing with the lathe tool, the machined surface should be polished smooth.

Lathe Attachments and Accessories for Armature Service Work

(Prices Supplied on Request)

Mica Undercutting Attachment
(Hand Type)

The Mica Undercutting Attachment illustrated at the right is mounted on the lathe for undercutting armature commutators. This attachment does not need to be removed from the lathe while the commutator is being machined, and it can be left on the lathe all of the time if desired. The undercutter may be tilted back out of the way when not in use.

Adjustment is provided so that armature commutators up to 3 inches in diameter may be undercut. The hack saw blade can be aligned with the segments of the commutator regardless of whether or not they are parallel with the armature shaft. Screw adjustment is provided for adjusting the depth of cut.

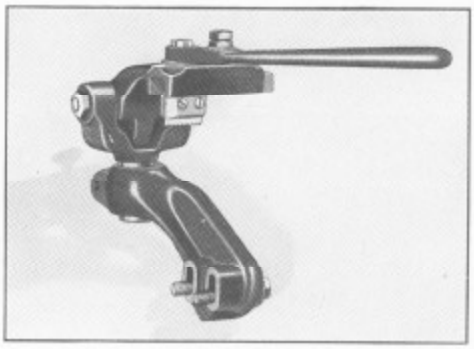


Fig. 25. Hand type mica undercutting attachment for undercutting armature commutators.

Chuck for Headstock Spindle

A ¾-inch capacity 3-jaw drill chuck is recommended for use in the headstock spindle of the lathe when truing armature commutators. The jaws of the chuck are hardened and will center the shaft accurately.

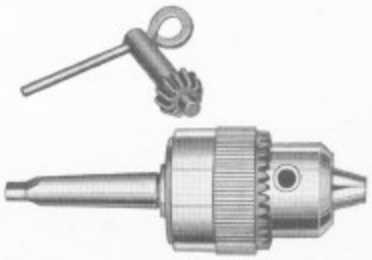


Fig. 26. ¾-inch capacity 3-jaw drill chuck for headstock spindle of the lathe.

Special Chuck for Tailstock Spindle

A special 3-jaw chuck is recommended for use in the tailstock spindle of the lathe. This chuck has ¾ inch capacity and is fitted with three brass jaws in which the armature shaft may revolve. A lock nut permits locking the jaws in position after they have been adjusted to the shaft.

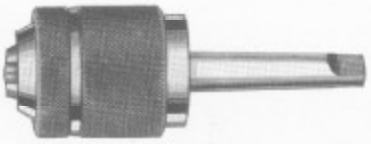


Fig. 27. Special chuck with brass jaws for tailstock spindle of the lathe.

Straight Shank Turning Tool Holder

The straight shank turning tool holder as illustrated at right is recommended for truing armature commutators.

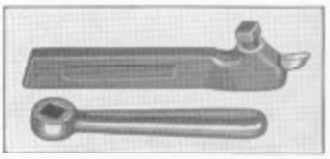


Fig. 28. Straight shank turning tool holder fitted with a ground cutter bit.

Universal Lathe Chuck

The Universal Lathe Chuck shown at the right may be used instead of the ¾-inch capacity drill chuck for the headstock spindle. This chuck is preferred by some mechanics because it can also be used for general work.

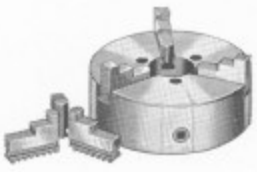


Fig. 29. Three-jaw universal geared scroll chuck for headstock spindle of lathe.

Other Auto Service Jobs Which Can Be Done

On the 9-inch Back-Geared, Screw Cutting Lathe

The Back-Geared Screw Cutting Lathe is the most useful tool in the automotive service shop because it can be used for such a wide variety of work. The illustrations below show six important classes of work which may be handled on one lathe. The same lathe may be used for hundreds of other profitable automotive service jobs.

Fig. 30.—Making Bushings

Fig. 31.—Finishing Pistons

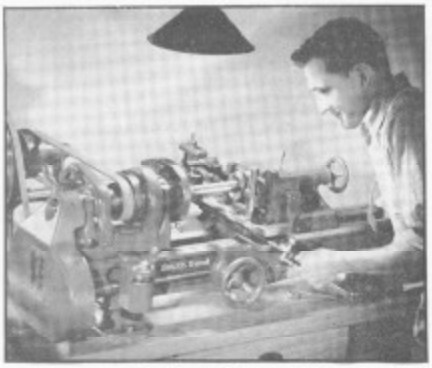


Fig. 32.—Boring Connecting Rods

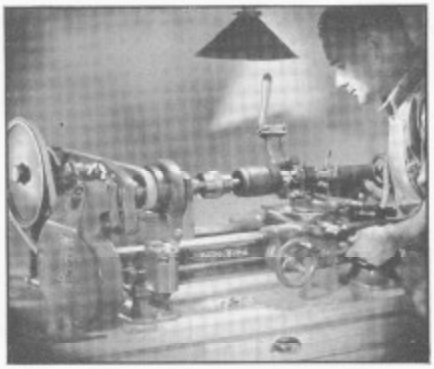


Fig. 33.—Truing Armature Commutators

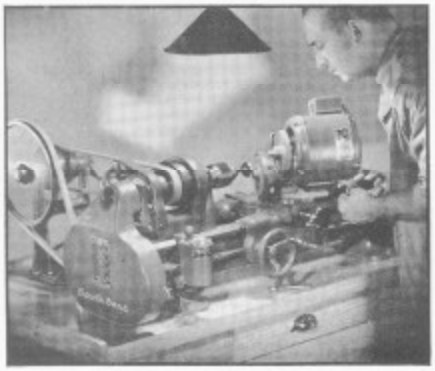


Fig. 34.—Refacing Valves

Fig. 35.—Cutting Screw Threads

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.

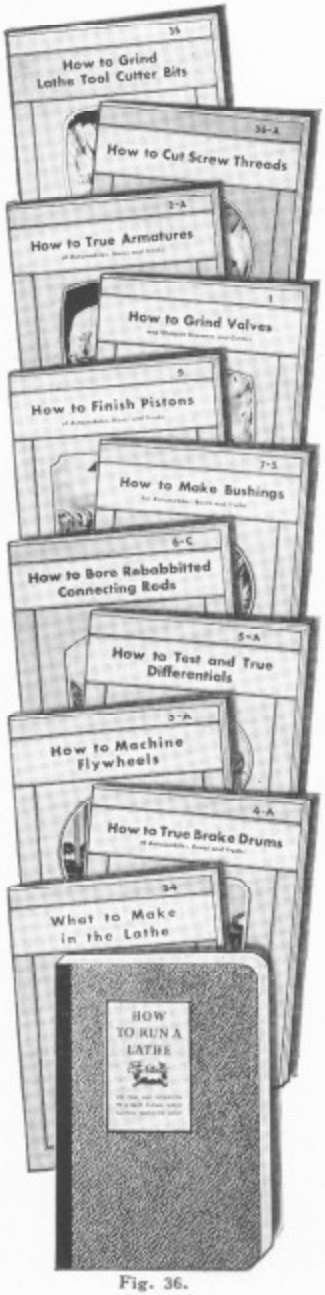


Fig. 36.

"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

"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 postpaid 10c

"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

"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 postpaid 10c

"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

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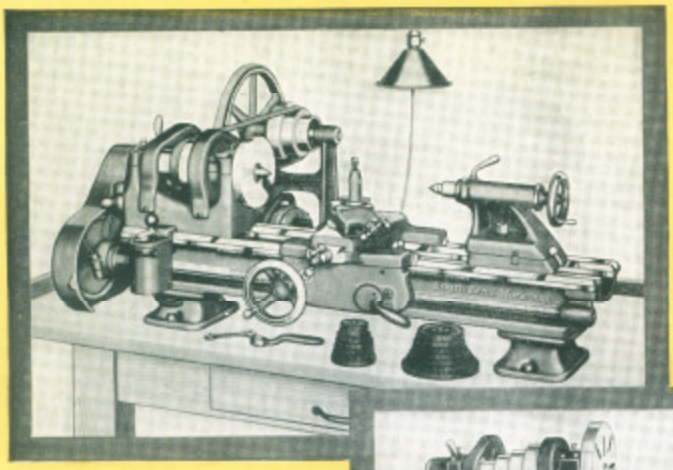
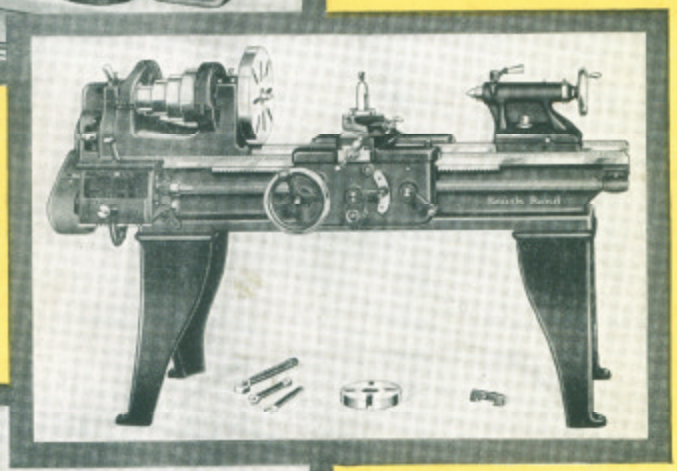


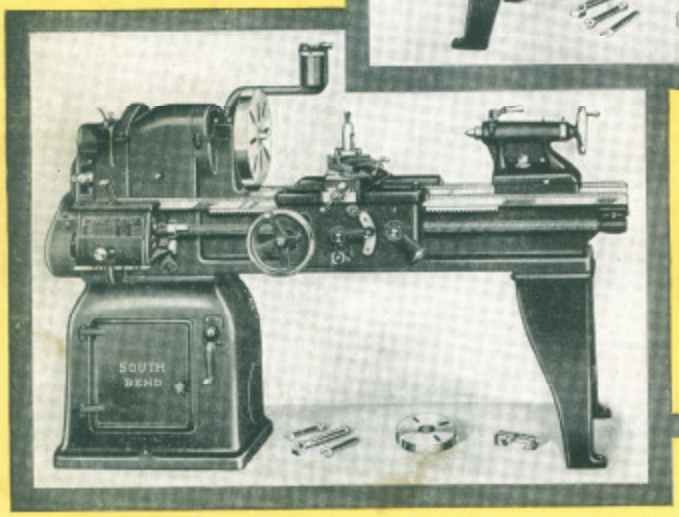
At Left—No. 415-Y 9" x 3' 1936 Model South Bend "Workshop" Horizontal Motor Driven, Back-Geared Screw Cutting Precision Bench Lathe.

One of the finest small lathes we have ever built.



At Right—No. 17-C 15" 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.

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.