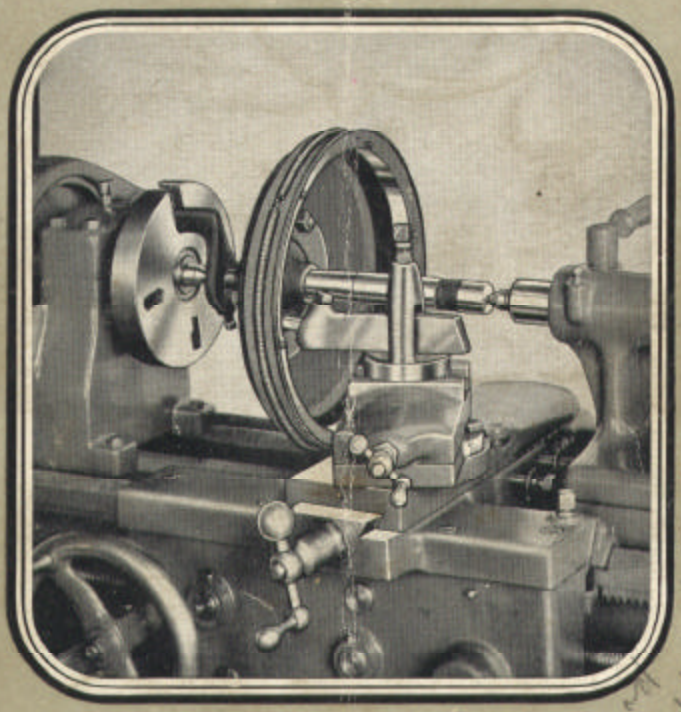
BULLETIN NO. 4-A

How to True Brake Drums

of Automobiles, Buses and Trucks



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SOUTH BEND LATHE WORKS
469 NILES AVE. SOUTH BEND, INDIANA, U. S. A.

Bulletin No. 4-A

How to True Brake Drums

In the Motor Service Machine Shop

Good brakes are essential to safe driving and are required by law in most localities. Since the brake drum must be round and true if the brakes are to operate efficiently, it is important that the brake service shop have good equipment for testing and truing brake drums.

The methods and equipment described in this bulletin have been endorsed by leading automobile manufacturers and automotive engineers and are being used in hundreds of motor service machine shops, brake service shops, and fleet service shops throughout the country.

Demountable type brake drums can be machined on the 13-inch lathes fitted with raising blocks (to increase the swing to 18-inches) and on the 16-inch or 16-24-inch lathes. A 36-inch swing South Bend Lathe is the most popular size for the shop specializing in brake drum, wheel and hub service. This lathe has the capacity to swing all types of wheels, single or dual, with tire attached, up to 36¼ inches in diameter, and it will true all types of brake drums up to 23½ inches in diameter.

The South Bend Lathe not only has a wide range of spindle speeds and turning feeds most practical for machining brake drums of all sizes and materials, but it has the accuracy and precision necessary for this type of work. With South Bend equipment in your shop, you can true brake drums of all types with greater speed and accuracy than with any other equipment.

In addition to truing brake drums, the South Bend Lathe, being a universal tool, can be used for general wheel and hub service, and for many other practical jobs in the auto service shop, such as machining flywheels for new starter gears, boring rebabbitted connecting rods, truing differential flanges, machining crankshafts, refacing valves, finishing semi-machined pistons, truing and undercutting armature commutators, making bushings, cutting right and left hand screw threads, and for general machine work of all kinds.

South Bend Lathe Works

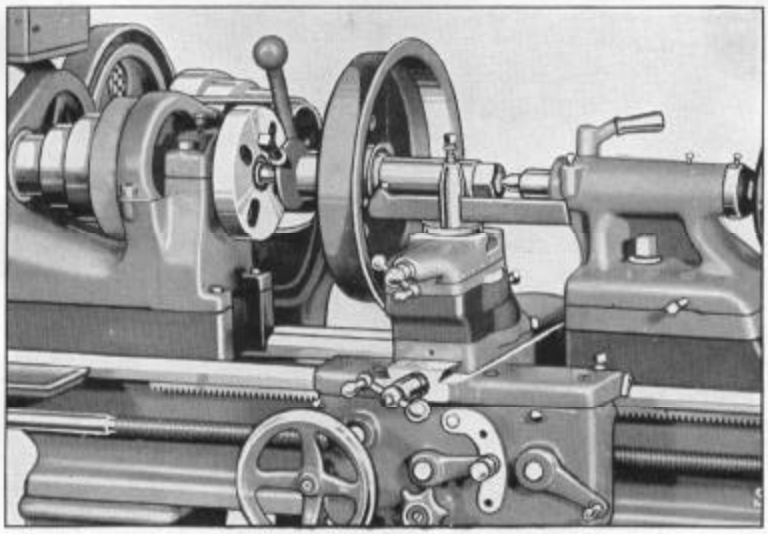


Fig. 1. Truing a brake drum on a 13-inch South Bend Lathe equipped with raising blocks.

How to True Brake Drums

Hundreds of safety campaigns held throughout the United States have impressed on car owners everywhere the importance of having good brakes. Compulsory brake examination has been established in many localities, and many of the cars tested have defective or inefficient brakes.

Since the efficiency of the brake depends more on the accuracy of the brake drum than anything else, it is important that the brake drum be perfectly true and concentric. If the brake drum is irregular or out of round, or if the surface of the brake drum is not smooth, it will be difficult to equalize the brakes so that maximum brake efficiency may be obtained and so that all sidesway, grabbing, and squeaking may be eliminated.

Testing Accuracy of Brake Drum

By mounting the wheel assembly in the lathe, as shown in Fig. 2, and inserting a dial test indicator in the tool post of the lathe, any irregularity in the brake drum may be detected. The indicator may be moved across the face of the brake drum, and the brake drum may also be revolved to show the variation in the surface. The pointer on the indicator will show the variation in thousandths of an inch, and not only discloses the out of roundness or eccentricity of the drum, but also any taper, bell mouth or barrel condition.

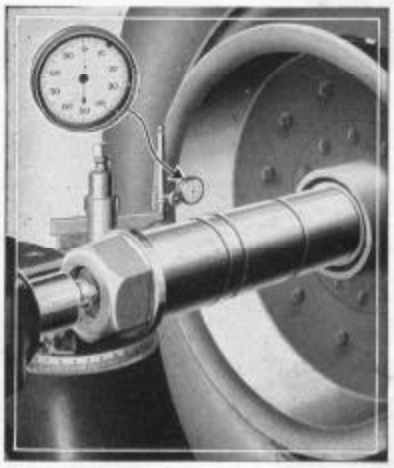


Fig. 2. Testing the accuracy of a brake drum with dial test indicator.

Why Brake Drums Should Be True

A Smooth Accurate Surface is Essential

Braking effect is directly proportional to the area of contact between the surface of the drum and the brake lining. For this reason, the brake drum should be true and should have a smooth, accurate surface, as shown in Fig. 3 at the right. This will allow the entire surface of the brake lining to bear against the revolving surface of the brake drum, so that very little effort will be required to obtain an efficient and effective brake action.

For well balanced and uniform braking power on all four wheels, it is necessary that the brake drums and linings of all wheels fit together properly, as shown in Fig. 3.

If the brake drum or lining on any one of the four wheels is in any way defective or inaccurate, satisfactory service cannot be expected. If the brakes are of the mechanical type it will be difficult to balance them, and even though they are adjusted so that a uniform braking is obtained they will not remain balanced very long. It will be impossible to balance brakes if they are the hydraulic type.

Scored Brake Drum. Fig. 4 shows a brake drum that has been scored. The drawing has been slightly exaggerated to show the irregular surface. Only a small area of contact is possible between the brake lining and the brake drum, and, as the lining will wear rapidly, frequent adjustments will be necessary. However, if this brake drum is remachined, brakes will operate just as efficiently as when new.

Barrel Shaped Drum. Fig. 5 shows a brake drum that has been worn barrel shaped. If a brake drum in this condition is used with a new lining it will not operate efficiently, as the lining will touch the brake drum only on the edges. Frequent adjustments will not be necessary if brake drum is remachined perfectly smooth and straight.

Bell Mouthed Drum. Fig. 6 shows a brake drum that has been worn bell mouthed. This condition is similar to that shown in Fig. 5, but is even worse so far as braking efficiency is concerned as the brake lining touches the brake drum only on one edge.

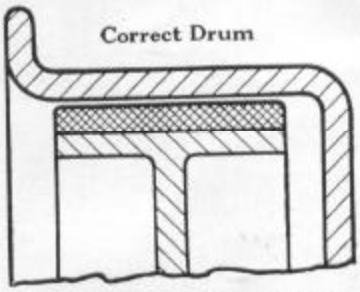


Fig. 3. Correctly machined brake drum providing perfect contact for entire surface of brake lining.

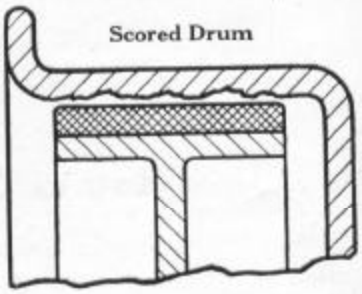


Fig. 4. Scored brake drum providing very small area of contact for brake lining.

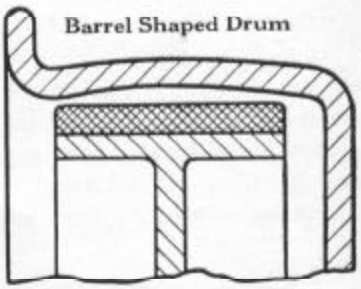


Fig. 5. Brake drum worn barrel shaped so that lining touches drum only at the edges.

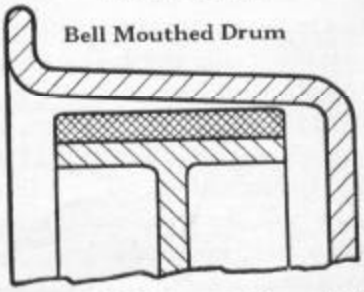


Fig. 6. Brake drum worn bell mouthed so that lining touches only on one edge.

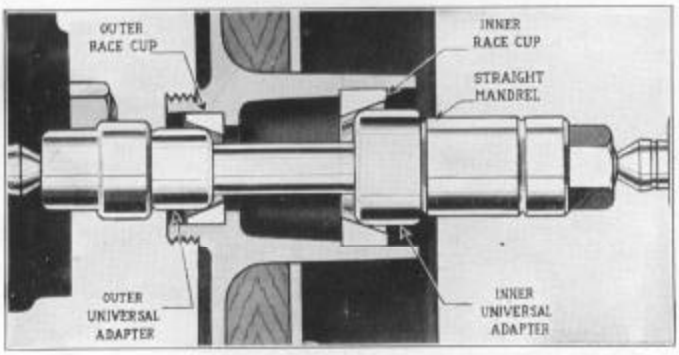


Fig. 7. A front wheel with taper roller bearings mounted on a straight mandrel fitted with universal bearing adapters.

Mounting Front and Full Floating Rear Wheels

Method for Truing Brake Drums in Lathe

All front wheels and full-floating rear wheels having tapered roller bearings or ball bearings in both sides of the hub are mounted in the lathe on a self-centering straight mandrel fitted with universal bearing adapters, as shown in Figs. 7 and 8. (See page 10 for specifications of mandrels and adapters.)

The rounded corners of the bearing adapters contact the inside surface of the bearing races (or cups), and automatically center the assembly. The mandrel on which the brake drum and hub assembly is mounted is then placed in the lathe and is rigidly supported on both ends by the headstock and tailstock of the lathe. This method is much more substantial than the stub arbor method and permits machining the brake drum quickly, as heavier cuts and higher turning speeds may be used.

The self-centering mandrel and universal adapter method is the most accurate and practical method for mounting the wheel in the lathe for truing the brake drum because it centers the wheel from the bearing cups in hub.

Brake drums that are mounted in the lathe by this method and machined will run true when replaced on the axle, because during the process of machining the drum, the wheel and brake drum assembly is mounted and centered on its own bearings exactly the same as when in operation on the car.

The universal bearing adapters are designed to fit all types and sizes of Timken, New Departure, S.K.F., Bower and other makes of tapered roller bearings and ball bearings used in the wheels of automobiles.

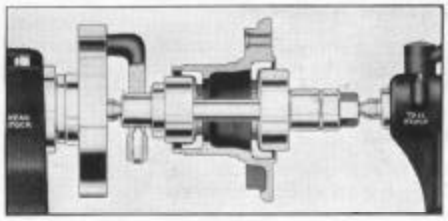


Fig. 8. A front wheel with ball bearings mounted on a straight mandrel fitted with universal bearing adapters.

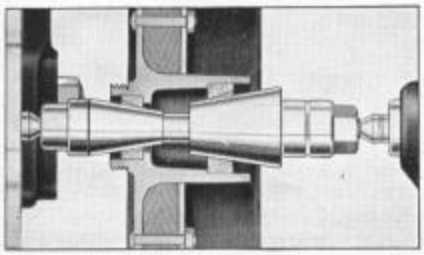


Fig. 9. A front wheel mounted on a straight mandrel with cone adapters.

Cone Adapters for Mounting Wheels in the Lathe

Wheels may also be mounted on cone adapters for truing brake drums, as shown in Fig. 9 at left. Cone adapters are preferred by some shops because they are less expensive than the universal bearing adapters described above. One mandrel with a few cones will take care of practically all sizes of wheels.

For this reason the straight mandrel with cone adapters is popular with auto service shops that do not need extensive brake drum equipment.

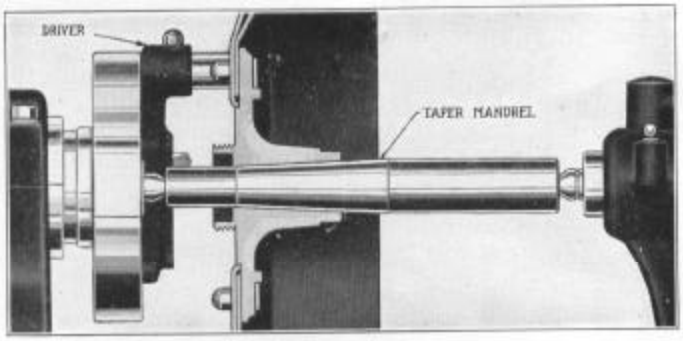


Fig. 10. Rear wheel mounted on a self-centering taper mandrel.

Mounting Semi-Floating Rear Wheels in Lathe

Semi-floating rear wheels that are mounted and centered from taper bored hubs are mounted in the lathe on self-centering taper mandrels for truing the brake drums as shown above. (See page 11 for specifications of taper mandrels.)

The tapered portion of the mandrel is driven into the hub and automatically centers the assembly. The mandrel on which the brake drum and hub assembly is mounted is then placed in the lathe and is rigidly supported on both ends by the headstock and tailstock of the lathe. This method is much more substantial than the stub arbor method and permits heavier cuts and higher turning speeds.

The taper mandrels are made in several sizes and tapers to fit the taper holes in the hubs of various types and makes of rear wheels, including wood wheels, and demountable wire and disc wheels, single or dual types.

The taper mandrels have a long taper so that one mandrel will fit the wheels of a number of different makes and models of cars having hubs with the same taper per foot, even though the diameter of the holes may vary in size.

For example, the No. 1822 taper mandrel having a taper of one inch per foot will fit the rear wheel hubs of 83 different models of automobiles from fourteen popular makes of motor cars manufactured in the United States from 1929 to 1936 inclusive, including Auburn, Chrysler, DeSoto, Dodge, Essex, Terraplane, Graham-Paige, Hudson, Hupmobile, Marmon, Nash, Plymouth, Reo and Studebaker.

A good straight axle with true running center holes in each end may be used for mounting a wheel if no suitable taper mandrel is available.

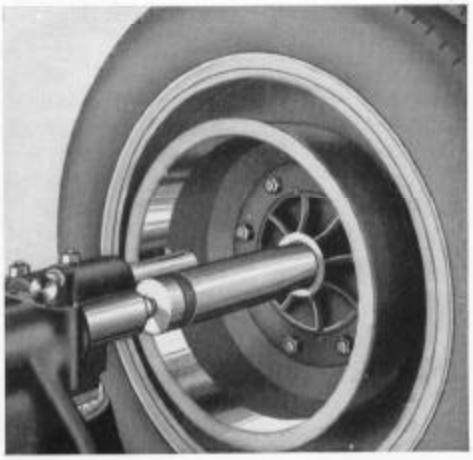


Fig. 11. Close-up of wheel mounted on taper mandrel for machining brake drum.

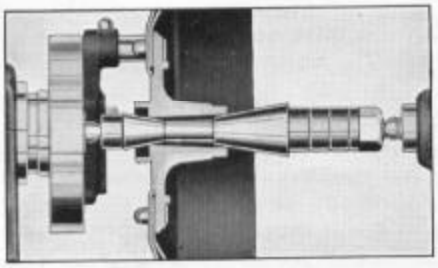


Fig. 12. Straight mandrel and taper cone adapters for mounting rear wheels in the lathe.

Cone Adapters for Mounting Rear Wheels in Lathe

A straight mandrel with two cone adapters, as shown in Fig. 11 at left, may be used instead of tapered mandrels for mounting rear wheels in the lathe. This equipment is less expensive than the tapered mandrels described above, as one mandrel with a few adapters will take care of practically all rear wheels. Shops having a limited amount of brake drum work usually prefer this type of mandrel because of its ability to handle so many types and sizes of automobile wheels.

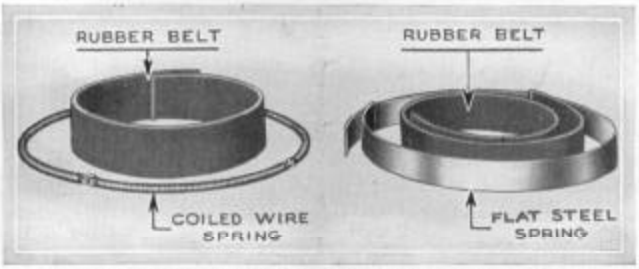


Fig. 13. Rubber belts and springs for brake drum truing.

Rubber Belt Used to Prevent Vibration

The design and construction of most brake drums are such that they will vibrate easily, and unless some precautions are taken to prevent vibration while the brake drum is being machined it will chatter and cause a rough and unsatisfactory finish.

A heavy rubber belt is used as a damper to prevent vibration of the brake drum. The rubber belt is placed on the outside of the drum when machining internal brake drums and is held in place by a coil spring, as shown in Fig. 14. For machining external drums, the belt is placed inside of the drum and held in place by a piece of flat spring steel. A leather or fabric belt may be used if a rubber one is not available. A buckle or cord may be used to hold the belt onto the drum.

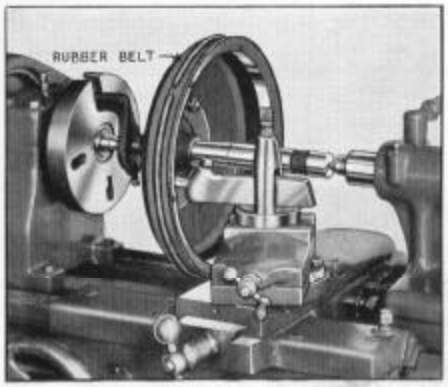


Fig. 14. Using a rubber belt to prevent vibration while brake drum is being machined.

Grinding and Setting the Cutter Bit

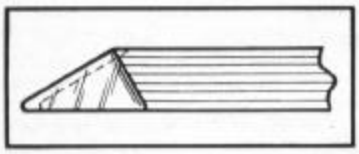


Fig. 15. Top view of cutter bit ground for machining brake drums

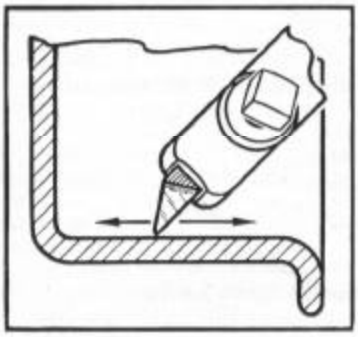


Fig. 16. Application of cutter bit for machining brake drums.

Narrow Pointed Tool is Best for Truing Brake Drums

A narrow tool with a small radius on the point, as shown in Fig. 15 at left, is best for truing brake drums. A tool of this shape will cut freely and does not have a tendency to cause the brake drum to vibrate or chatter. A broad-nosed tool should not be used.

The top of the cutter bit should be ground with plenty of back slope to facilitate free cutting, and the front of the bit must have sufficient clearance to prevent the heel of the tool from rubbing. The cutting edge should be set on center.

The cutter bit may be ground to cut in either direction so that the tool may be fed either in or out while the cut is being taken. In busy shops it is customary to grind the tool so that the cut may be started in the back of the drum and the tool fed out from left to right. This permits the operator to leave the lathe after the cut has been started and do other work, as there is no possibility of damaging the work when the end of the cut is reached.

Speeds and Feeds for Truing Drums

Size and Type of Brake Drum Governs Spindle Speed

The spindle speed that should be used for truing a brake drum depends entirely on the diameter of the brake drum and the material from which it is made. If the drum is made of soft steel and is of moderate size a spindle speed of 150 to 200 R.P.M. may be used. Spindle speeds as low as 15 or 20 R.P.M. may be necessary for machining brake drums of very hard steel or cast iron in order to avoid chatter and overheating the tool.

It is advisable to operate the lathe at as high a spindle speed as possible for satisfactory results, as this permits doing the work with a minimum amount of time required from the operator.

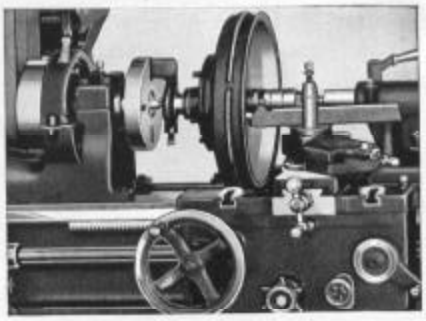


Fig. 17. Truing the brake drum of a demountable type front wheel.

Fine Feed Used for Finishing Cut on Brake Drums

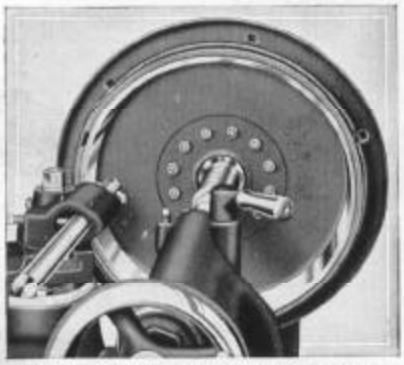


Fig. 18. A Lincoln car brake drum being trued by turning in the lathe.

A rather coarse feed may be used for roughing cuts, but for finishing cuts a fine feed should be used in order to produce a smooth accurate surface. Always hone the cutting edge of the cutter bit with a small oil stone before taking the finishing cut.

In some shops the lead screw and half-nuts are used for the roughing cut, and without changing the gearing, the automatic longitudinal feed is engaged for taking the finishing cut. Since the automatic longitudinal feed is three or four times as fine as the lead screw and half-nut feed, very satisfactory results may be obtained by this method. The brake drum may be polished with emery cloth and oil if a bright finish is desired to complete the job.

Time Required for Truing a Brake Drum

A rough estimate of the time required to true any average brake drum is ½-inch width of surface per minute. Actual turning or machining time for truing one brake drum on the South Bend Lathe is shown below.

Automobile, Light Truck or Bus

Truing Time—5 Minutes

Brake Drum Size, 10½ x 2 inches
Front Wheel
Passenger Car: Chevrolet
Tire Size: 30 x 4.50 inches
Lathe Used for Work:
South Bend Brake Drum and General Purpose Lathe

Medium Size Bus or Truck

Truing Time—12 Minutes

Brake Drum, 18 x 5⅜ inches
Rear Wheel
Truck: International SF46, 2-Ton
Tire Size: 34 x 7 inches
Lathe Used for Work:
South Bend Brake Drum and General Purpose Lathe

CAUTION: When truing a brake drum remove the least possible amount of metal necessary to obtain a smooth, true, accurate surface.

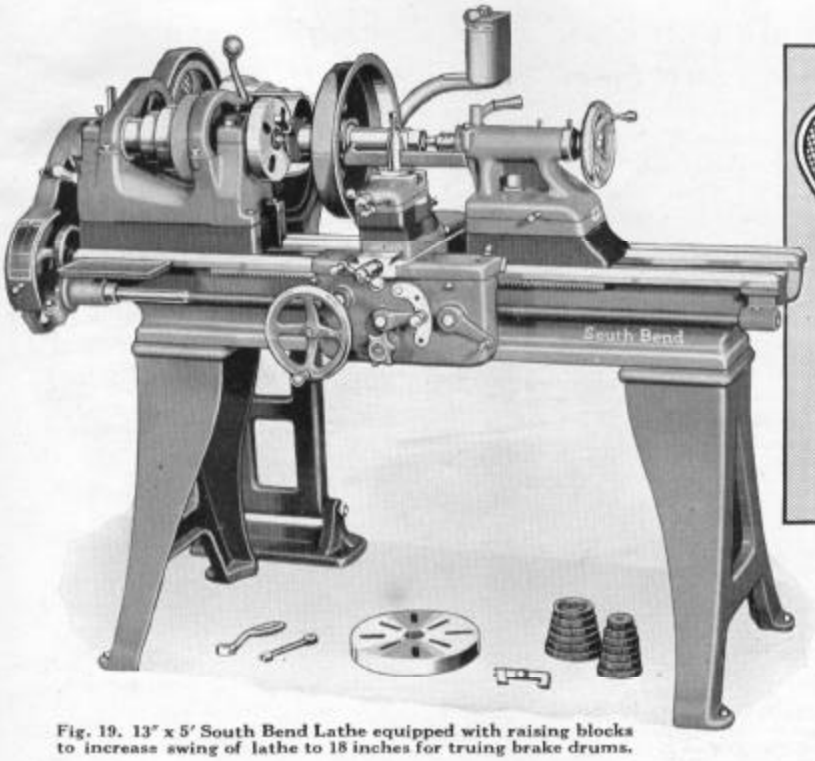


Fig. 19. 13" x 5' South Bend Lathe equipped with raising blocks to increase swing of lathe to 18 inches for truing brake drums.

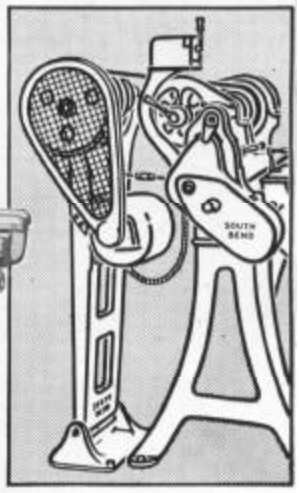


Fig. 19A. End View of Lathe showing Pedestal Adjustable Motor Drive. 2 V-Belts enclosed in a guard transmit power from motor to countershaft.

13-18-inch Lathe Takes Passenger Car Drums

Brake Drums of Demountable Wheels Measure 14-16 Inches

Demountable type wheels are now used on most of the popular makes and models of automobiles. On this type of wheel, the brake drum is attached direct to the hub, and the hub and brake drum may be removed from the wheel.

The outside diameter of the brake drum on the popular models of automobiles varies from 14 inches to 16 inches, so that any lathe having a swing of 16 inches or more may be used for truing this type of brake drum. On some of the larger and heavier models of automobiles the outside diameter of the brake drum is approximately 18 inches, which would necessitate a lathe having a swing over the bed of at least this dimension.

A 13-inch lathe equipped with raising blocks has a swing of 18 inches over the bed, which permits truing brake drums up to 18 inches in diameter and accommodates practically all passenger car drums from demountable type wheels.

Brake Drums Attached Permanently to Axle

Brake drums for the rear wheels of 1933, '34, and '35 Chevrolet and Pontiac automobiles are permanently attached to the axle and should be put in the lathe together for truing brake drum.

A special steady rest fixture is necessary for truing this type of brake drum. The axle is supported on the bearing surface next to the brake drum by the steady rest fixture as shown at right and is driven by the lathe chuck.

1936 Model Chevrolet and Pontiac brake drums may be machined as shown in Fig. 20 or they may be removed from the axle and machined on a mandrel between the lathe centers.

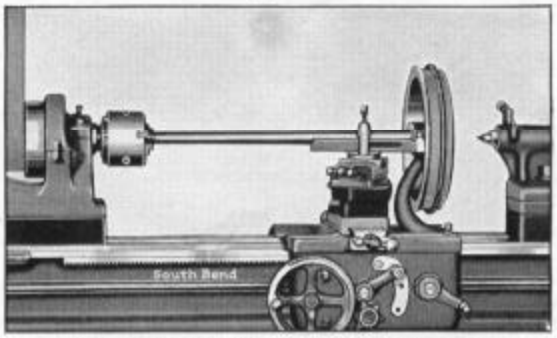


Fig. 20. Special steady rest fixture for truing brake drums attached to axle.

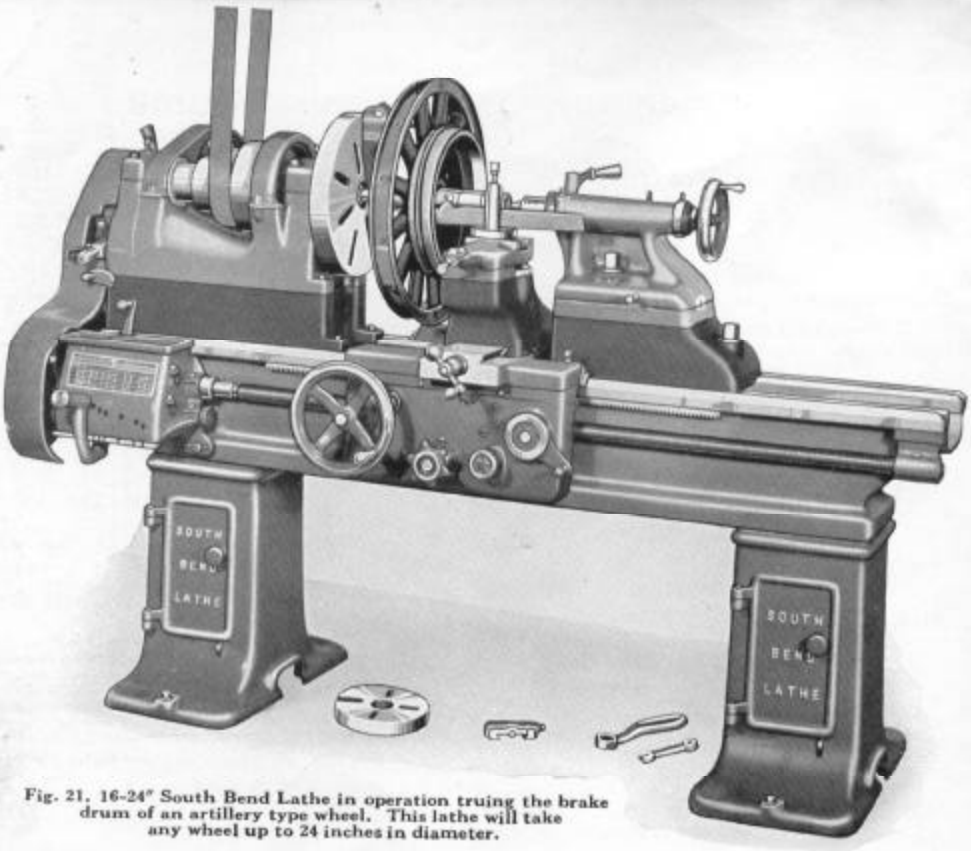


Fig. 21. 16-24" South Bend Lathe in operation truing the brake drum of an artillery type wheel. This lathe will take any wheel up to 24 inches in diameter.

Heavy Brake Drum Work Requires 16-24" Lathe

For Artillery Wheels, Truck and Bus Wheels

Artillery type wheels and some old model steel and wire wheels have the brake drum permanently attached to the wheel and the drum should not be removed from the wheel for machining. This necessitates a larger size lathe than is required for truing the brake drums of demountable type wheels, used on the more recent models of automobiles.

Since practically all artillery type wheels have rims less than 24 inches in diameter, the 16-24 inch South Bend Brake Drum and General Purpose Lathe, shown above, is ideal for this class of work. This lathe has also sufficient capacity for truing brake drums of bus and truck wheels on which outside diameter of wheel or drum does not exceed 24 inches.

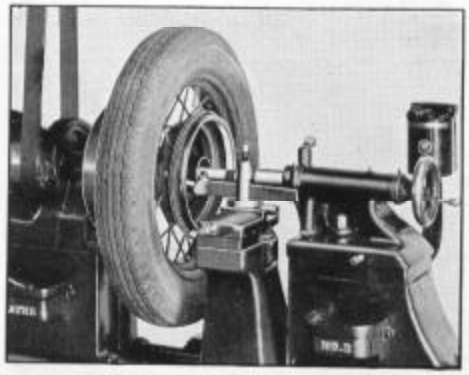


Fig. 22. Truing brake drum of wire wheel with tire attached in 36-inch swing South Bend brake drum lathe.

16-36-inch Lathe Handles All Brake Drum Truing Jobs

In large shops where a great deal of brake and wheel service work is taken care of, it is desirable to have a lathe with sufficient capacity to permit truing brake drums without removing tires from the wheel, and also to permit truing brake drums of large bus and truck wheels. For this class of work the 36-inch swing South Bend Brake Drum and General Purpose Lathe is recommended. This lathe will take wheels with tires attached up to and including 36¼ inches in diameter when doing brake drum work.

In addition this lathe is suitable for handling all kinds of precision machine work. And because of its large swing, jobs may be undertaken which would be impossible with a smaller lathe.

Equipment for Truing Brake Drums

Special Tool Holders with Extra Long Shanks

Special tool holders with extra long shanks, as shown in Fig. 23 at right, are used for truing brake drums. The extra long shank permits machining across the entire width of the brake drum. The right hand bent tool No. 10 is used for turning the inside of the drum, and the left hand bent tool No. 7 for turning the outside of the drum. High speed steel cutter bits, as described below, are used in these tool holders.

Fig. 23. Right and left hand tool holders with extra long shanks for truing brake drums.

Fig. 24. High speed steel cutter bit.

Fig. 25. Stellite cutter bit.

Fig. 26. Tungsten-carbide tipped cutter bit.

Cutter Bits Used for Truing Brake Drums

High speed steel cutter bits, as shown in Fig. 24, are used in the special tool holders described above for truing brake drums. The cutter bits are sharpened by grinding to the shape shown in Fig. 15 on page 5.

For truing very hard cast iron or cast steel brake drums, a stellite cutter bit or tungsten-carbide tipped cutter bit, as shown in Figs. 25 and 26, may be required. These cutter bits are much harder than the high speed steel cutter bits. Tungsten-carbide cutter bits will machine very hard metal, but are difficult to use, because they are brittle.

Rubber Belt and Spring

A heavy rubber belt and spring, as shown in Fig. 27 at right, are used to prevent vibration of the brake drum while it is being machined. The rubber belt is placed around the outside of the drum and is held in place by the spring. This permits the cutting tool to produce a smooth, uniform surface as it prevents chatter.

For machining external brake drums the belt is placed around the inside of the drum and held in position by a flat steel spring.

The application of the rubber belt and spring for truing drums internally is shown on page 5.

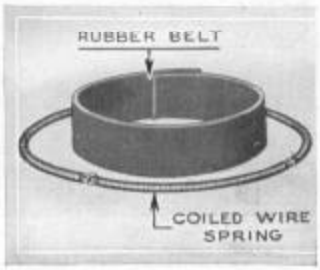


Fig. 27. Belt and spring for preventing brake drum chatter.

Special Combination Boring and Turning Tool

Fig. 28. Heavy duty combination boring and turning tool.

A special heavy duty combination boring and turning tool, as shown in Fig. 28 at left, may be used for truing both the inside and the outside of the brake drum. This tool uses cutter bits shown above in Figs. 24, 25 and 26 and permits boring and turning to a greater depth than is possible with the extra long shank tool holders.

The combination boring and turning tool is heavily constructed and is very convenient for many classes of work, in addition to truing brake drums. It may be used for regular turning and boring operations of all kinds, and is especially desirable for heavy duty work.

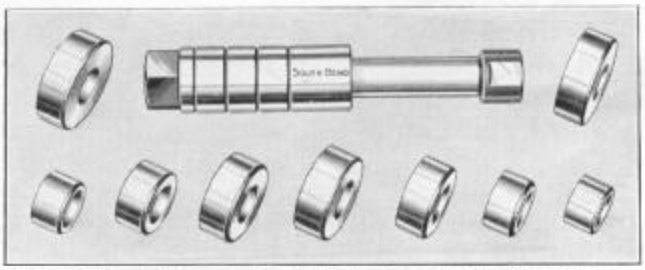


Fig. 29. Straight mandrel and adapters for mounting front wheels and full floating rear wheels in the lathe.

Straight Mandrels and Adapters

For Front Wheels and Full Floating Rear Wheels

Straight mandrels with universal bearing adapters, as illustrated in Fig. 29 above, are used for mounting the front wheels and full floating rear wheels in the lathe for truing brake drums and other wheel and hub service operations. The application of these mandrels and adapters is described on page 3.

Straight mandrels are made in three sizes, and the universal bearing adapters are also made in three sizes to fit each of the three mandrels, as listed in the tabulation below. A set of universal bearing adapters is required for each of the three mandrels, as the adapters are made in several sizes to conform with the various sizes of bearings used in different makes and models of wheels.

Fig. 30. Straight mandrel with spacing collars for use with universal bearing adapters.

Fig. 31. Universal bearing adapters for straight mandrels.

Straight Mandrels and Universal Bearing Adapters

Cat. No.	Diam. of Mandrel	Length of Mandrel	Fits Adapters with	Used for	Diam. of Universal Bearing Adapters
1800	1¼"	12"	1¼" hole	Automobiles	1⅝" to 3⅜" in 8ths
1810	1¾"	18"	1¾" hole	Light Trucks	2⅛" to 4¾" in 4ths
1840	2½"	20"	2½" hole	Heavy Trucks	3½" to 7" in 4ths

Fig. 32. Face plate and radial adapter for three-quarters floating wheel.

Face Plate Adapters for Mounting Wheels

A special face plate and radial bearing adapters are used with No. 1800 straight mandrel for mounting three-quarters floating wheels in the lathe for truing the brake drum and other wheel and hub service operations. Several models of Buick and Willys-Knight automobiles have wheels of this construction. Extension nuts and clamps are used to clamp the wheel to the face plate adapter and the radial bearing adapter centers the wheel. See Figs. 32 and 33.

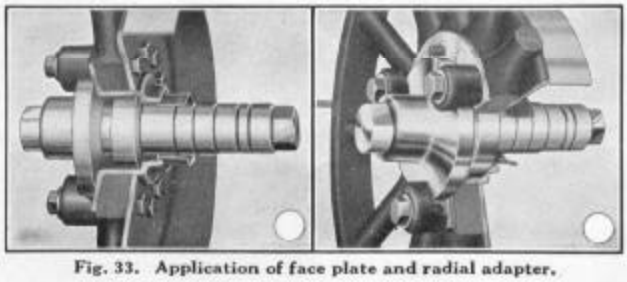


Fig. 33. Application of face plate and radial adapter.

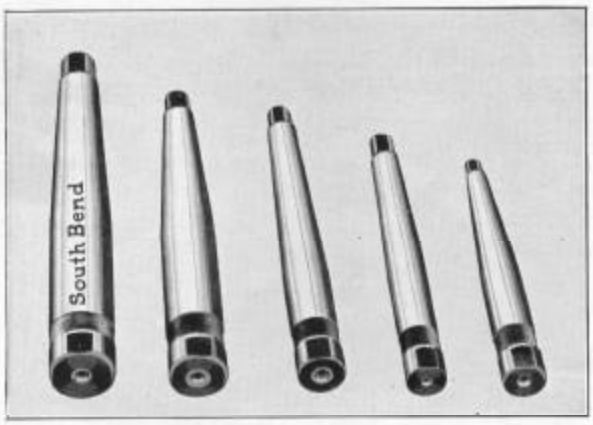


Fig. 34. Taper mandrels for mounting semi-floating rear wheels.

Taper Mandrels for Rear Wheels

Semi-floating rear wheels having taper bored hubs are mounted on taper mandrels for truing brake drums and other wheel and hub service operations. The taper mandrels are supplied in several sizes and with various tapers to conform to the different makes and models of wheels.

The specifications in the tabulation below show the size and taper per foot of the various taper mandrels that are required for popular makes and models of automobiles, buses and trucks.

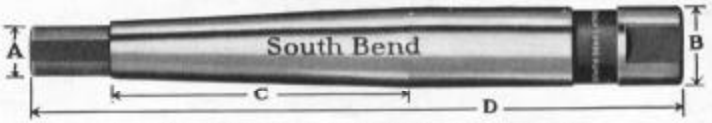


Fig. 35. Taper mandrel for mounting semi-floating rear wheels in the lathe.

Specifications of Standard Taper Mandrels

Cat. No.	Diameter of Mandrel	Length of Mandrel	Taper per Foot	Used for
1820	1" to 1⅜"	13¼"	⅝"	Autos and Trucks
1820-B	1⅝" to 1¹¹⁄₁₆"	15¼"	⅝"	Autos and Trucks
1821	¾" to 1¼"	11⅞"	1"	Autos and Trucks
1822	1" to 1⅜"	13¼"	1"	Autos and Trucks
1823	1¼" to 1⅝"	15"	1"	Autos and Trucks
1824	1⅛" to 1⅞"	11⅞"	1½"	Autos and Trucks
1825	1⅝" to 2"	15¾"	1½"	Trucks Mostly

Taper Cone Mandrels and Adapters

Straight mandrels with taper cone adapters, as shown in Fig. 36 at right, are used in some shops for mounting both the front wheels and the rear wheels in the lathe for turning the brake drum. (See pages 3 and 4 for further details.)

This type of equipment is less expensive than the straight mandrels with universal bearing adapters and the taper mandrels because one or two mandrels with a few cone adapters are sufficient for mounting both the front and rear wheels on practically all makes and models of automobiles.

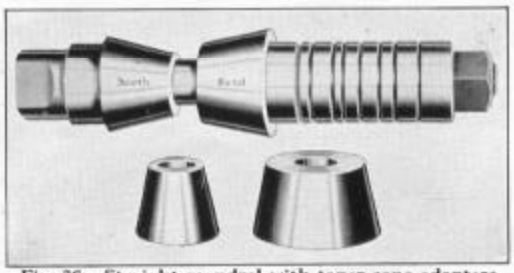


Fig. 36. Straight mandrel with taper cone adapters for mounting front and rear wheels in lathe.

Other Jobs That Can Be Done on the Lathe

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

Fig. 37. Machining a piston.

Fig. 38. Boring a connecting rod.

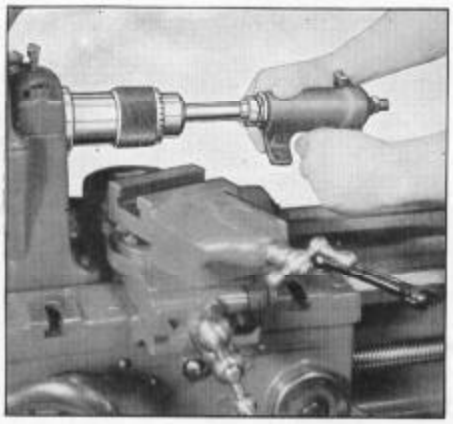


Fig. 39. Honing a brake cylinder.

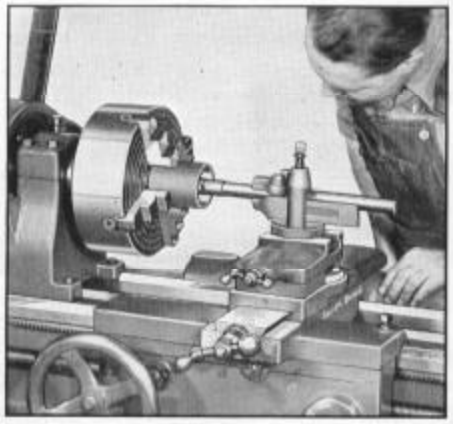


Fig. 40. Making a bearing.

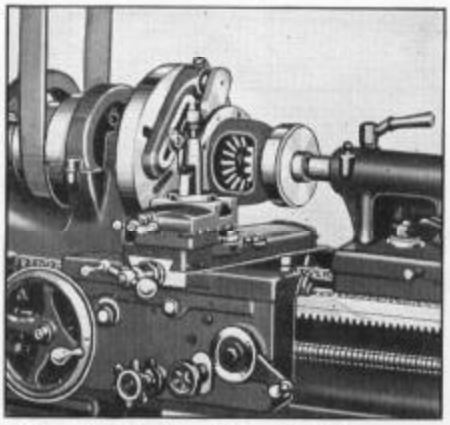


Fig. 41. Truing differential flange.

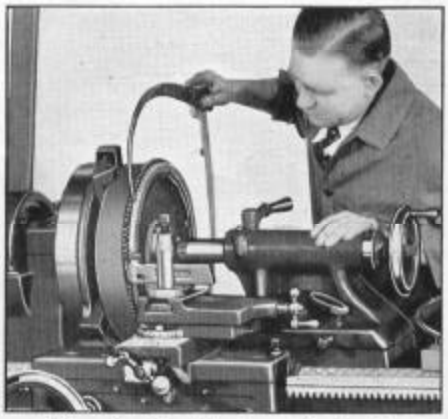


Fig. 42. Machining a flywheel.

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

"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

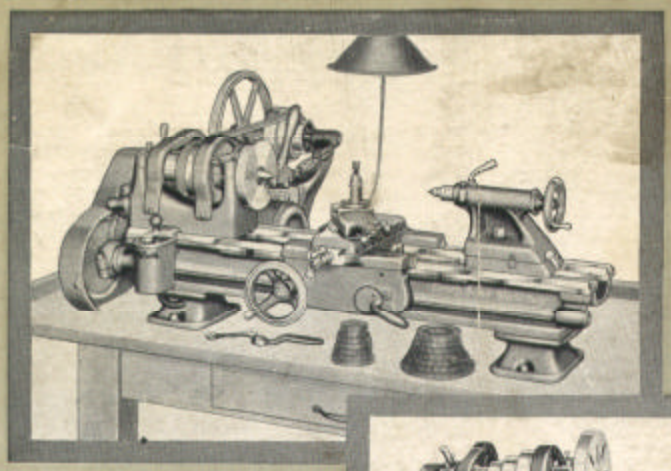
"How to Machine Flywheels" Bulletin No. 3-A. (Automotive) Contains information on turning down flywheels for new starter ring gears. 8 pages, size 6"x9", 24 illustrations. Price postpaid 10c

"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.

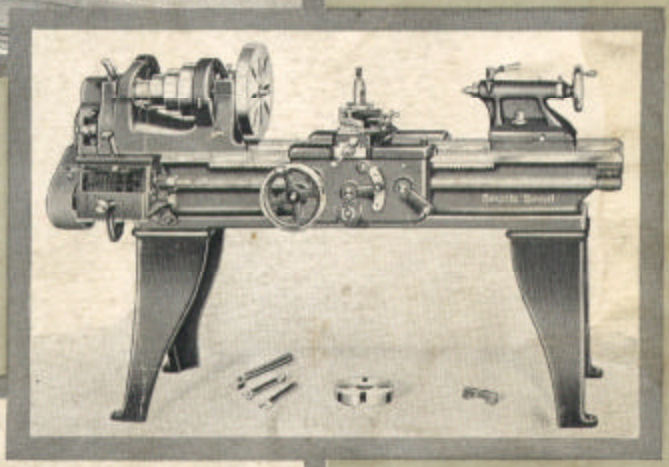
This book is used as a handy reference book by machinists and apprentices in industrial plants, railroad shops and machine shops, and is also used as a text book by students in educational institutions. It is considered the most popular text on lathe work in the world. More than a million and a half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



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

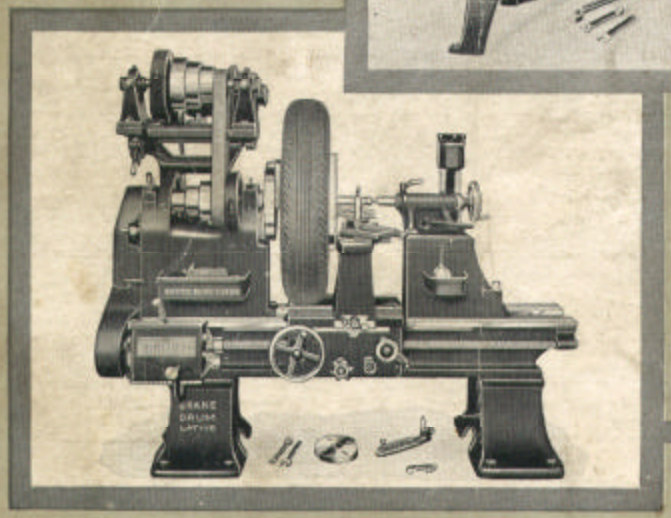
One of the finest small lathes we have ever built.

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



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

A popular type high quality precision lathe.



At Left—No. 304-C 36"x 6' South Bend Quick Change Gear Brake Drum and General Purpose Lathe. This is a popular size for shops specializing in brake and wheel service work.

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.