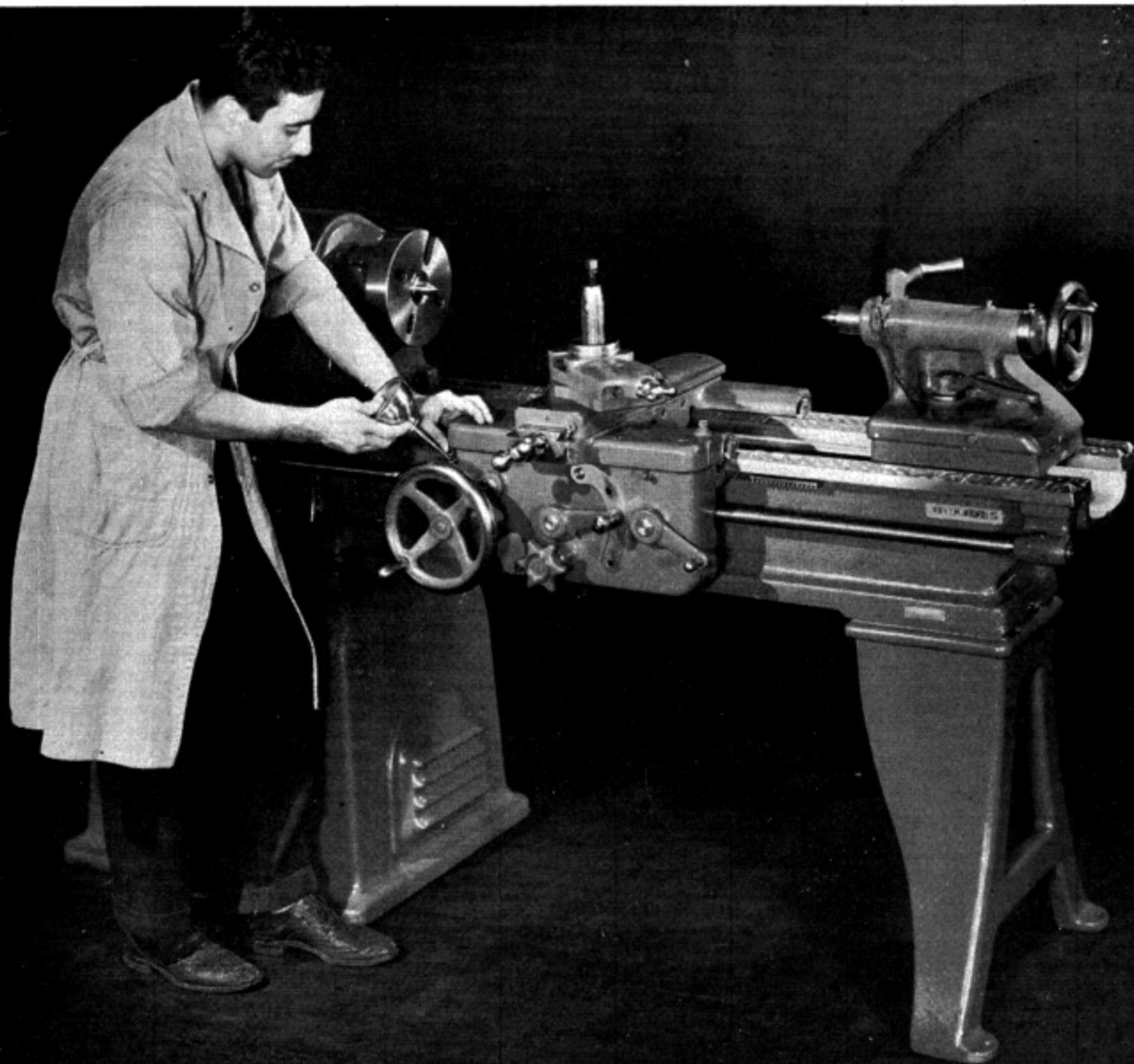


# Oiling The Lathe

*The Importance of Adequate Lubrication*



**SOUTH BEND LATHE WORKS**

425 EAST MADISON STREET

SOUTH BEND 22, INDIANA, U. S. A.

# HOW TO GET THE MOST OUT OF YOUR LATHES

## *A Series of Bulletins on the Care and Operation of Metal Working Lathes*

These bulletins are supplied in any reasonable quantity without charge to shop instructors and others who are interested in the care and operation of the lathe.

**Bulletin H-1**—"Keep Your Lathe Clean". Shows how protecting the lathe from abrasive dirt will increase production, reduce scrap, and lengthen the life of the lathe.

**Bulletin H-2**—"Oiling the Lathe". Explains the importance of adequate lubrication.

**Bulletin H-3**—"The Installation and Leveling of the Lathe". Gives detailed information on the correct installation and leveling of the lathe for precision work.

**Bulletin H-4**—"Keep Your Lathe in Trim". Tells how to make all necessary adjustments, check power supply, protect lathe from abuse, and keep lathe in best operating condition.

## LUBRICATING OIL

Machine oil and spindle oil especially prepared for the lubrication of South Bend Lathes and other fine machinery can be supplied by authorized distributors of South Bend Lathes or can be ordered direct from the factory. Write for Catalog.

# Oiling the Lathe

The Importance  
Of Adequate Lubrication

*Prepared by*

Technical Service Department  
South Bend Lathe Works

Bulletin No. H-2

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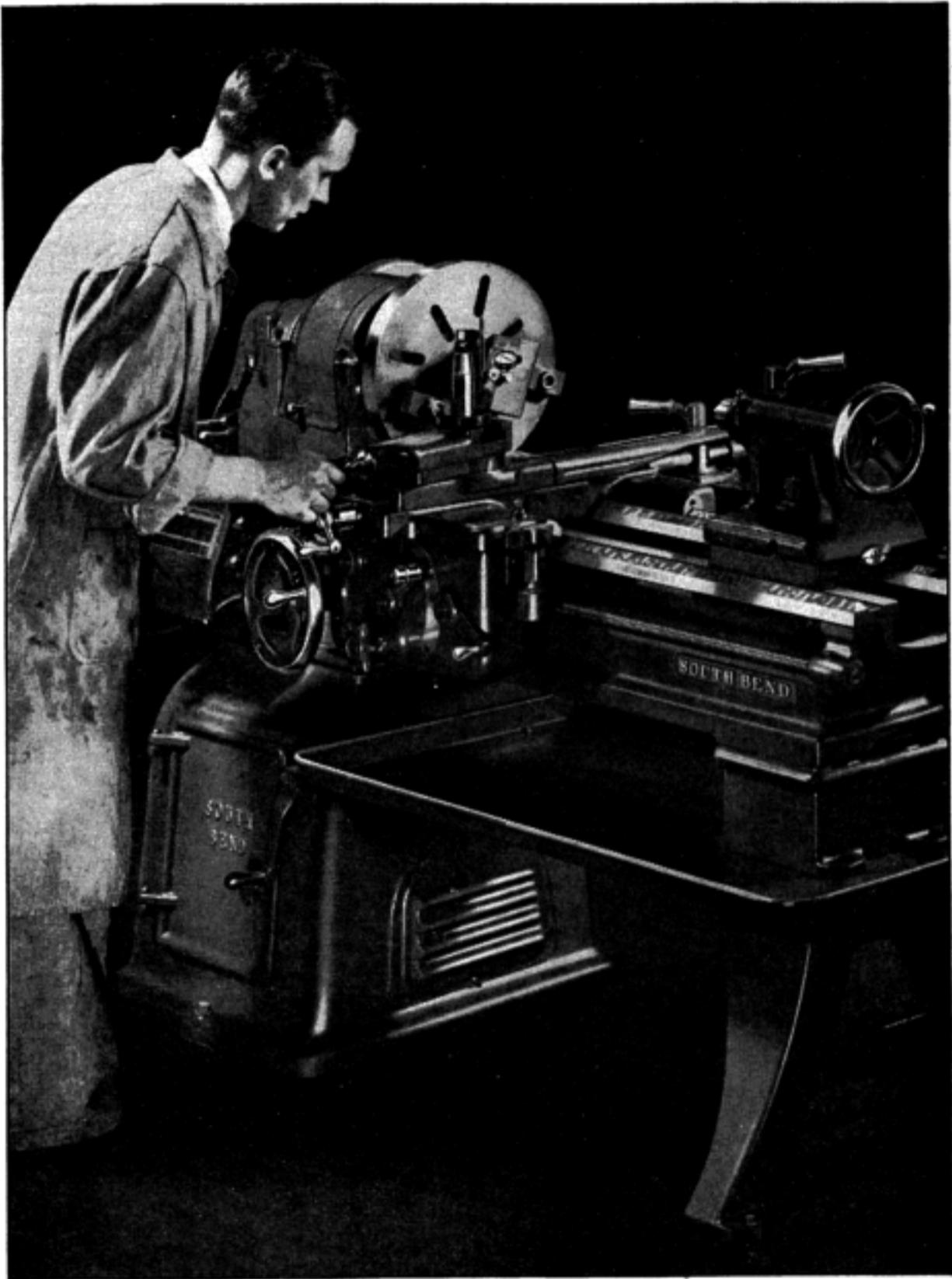


Fig. 1. The experienced toolmaker oils his lathe regularly.

# OILING THE LATHE

## The Importance of Adequate Lubrication

*"For lack of oil the bearing was lost,  
For lack of a bearing the tank was lost,  
For lack of a tank the battle was lost . . .  
And all for the lack of a film of oil."*

### Importance of Lubrication

Cleverly paraphrasing the ancient rhyme about the horse-shoe nail, a young army officer is said to have used the above verse to emphasize the importance of lubrication in modern mechanized warfare.

Lubrication is just as important to shop machinery as it is to tanks. The length of time a lathe will retain its accuracy and give satisfactory service depends on the lubrication and care it receives from the operator. Given the right kind of care, a good lathe will retain its accuracy through years of service. But if lubrication is neglected the bearing surfaces may be damaged, impairing the accuracy and shortening the serviceable life of the lathe.

South Bend Lathes, like other fine machine tools, have large oil reservoirs, felt wicks, and oil retainers to guard against lack of oil due to temporary neglect or oversight. But for best results the lathe should be oiled at regular intervals.

### Functions of Lubricants

The most important functions of lubricants are to eliminate friction and prevent bearing surfaces from wearing. To do this, the lubricant must form a protective film which will practically eliminate metal to metal contact between the bearing surfaces.

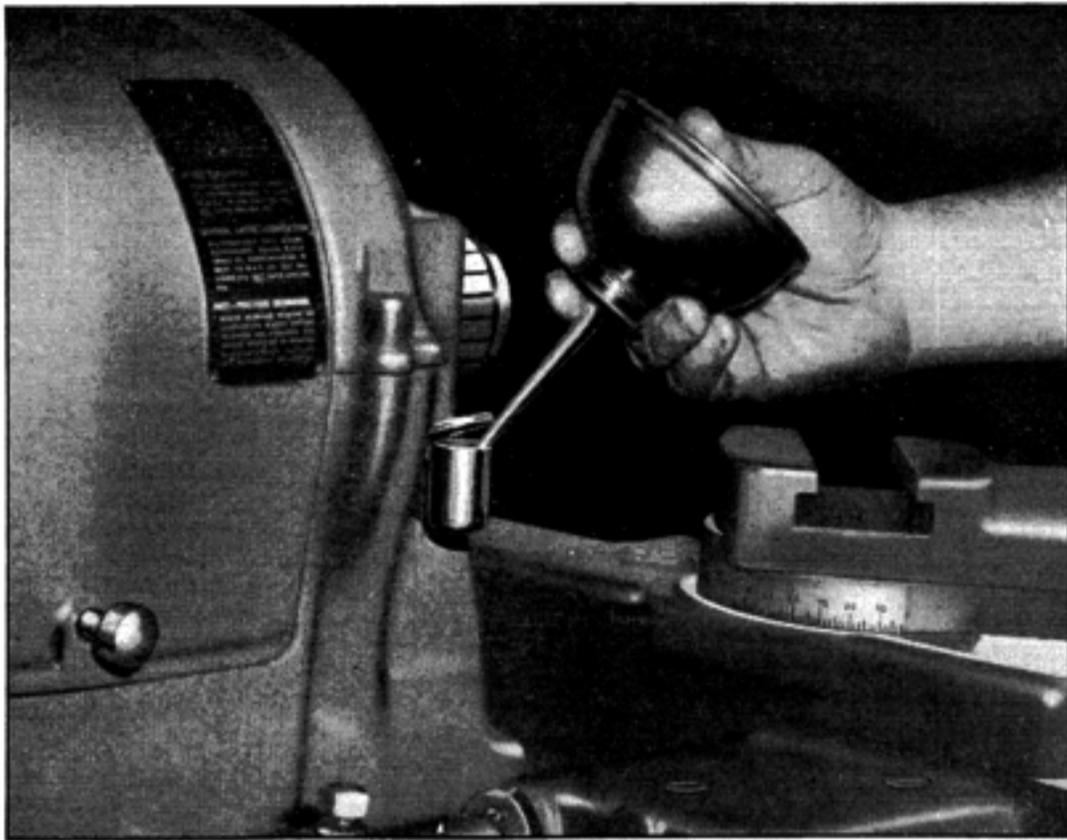


Fig. 2. Oil reservoirs for the headstock spindle bearings should be inspected daily and the correct oil level maintained.

The more completely the lubricating film separates the bearing surfaces, the less friction and the less wear will result. Under ideal conditions there is no metal to metal contact, no wear, and no friction other than the fluid friction of the lubricant. Ideal conditions of lubrication are seldom attained, but they can be closely approached.

Obviously if the bearing runs dry or the oil film breaks down there will be nothing to prevent metal to metal contact and the bearing surfaces may be badly scored and damaged in a short time. For this reason it is imperative that all bearings receive an adequate supply of a highly efficient lubricant.

### **Use Correct Grade of Oil**

Instructions are packed with each new South Bend Lathe specifying the grade of oil to be used in the spindle bearings, motor bearings, apron oil reservoir, and other important bearings. When oiling the lathe, always use the correct grade of oil as specified.

A good quality medium body machine oil is recommended for the general lubrication of the lathe. The viscosity of this oil should be approximately 250 seconds Saybolt Universal at 100° F. Automobile engine oil is not suitable for lubricating the lathe because it is designed for bearings which operate at high temperatures, and at room temperature does not have the lubricating qualities of good machine oil.

### Make Oiling A Habit

All oil holes and oil cups on the lathe should be filled or inspected at least once a day—oftener when the lathe operates day and night, or when top speeds and feeds are employed. When the lathe is in service on two or more shifts, oiling the lathe should be the first daily task of each operator.

The best practice is to fill each oil hole in a regular sequence so that oiling will become a habit and no oil holes will be overlooked.

The lathe should always be stopped before it is lubricated.

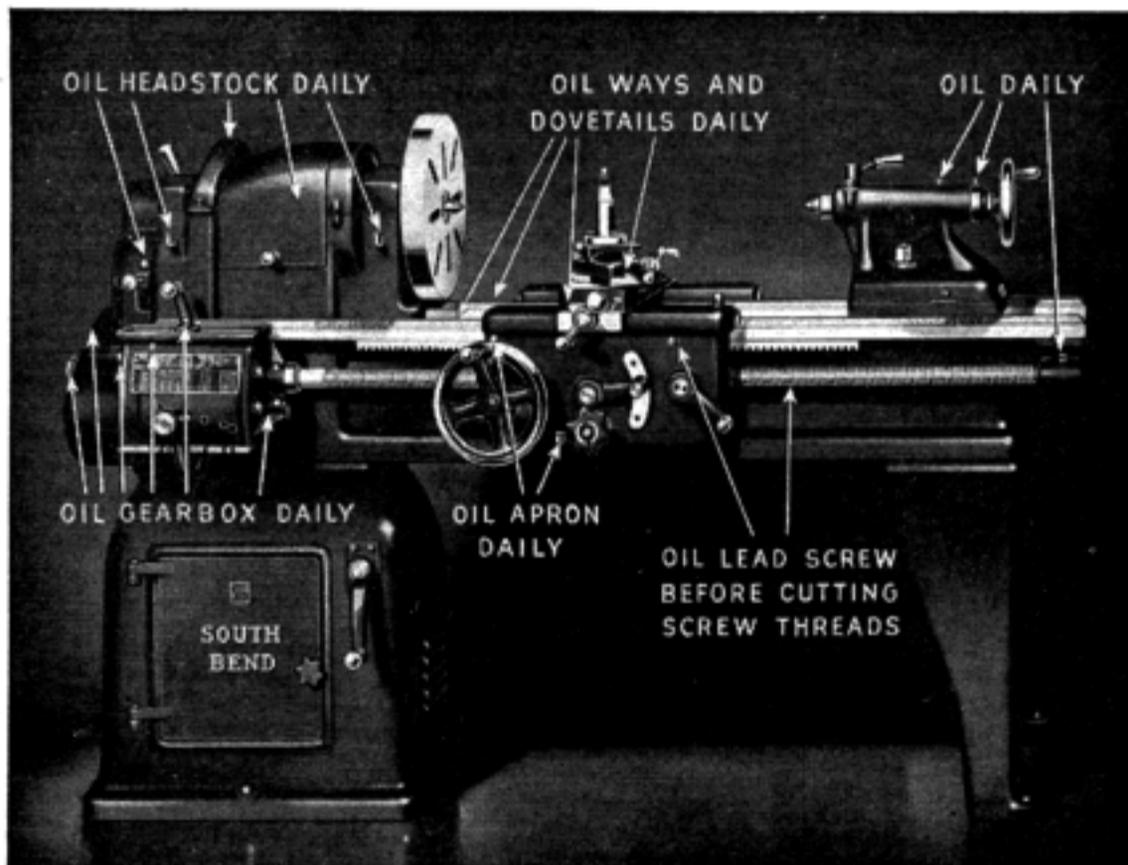


Fig. 3. All oil holes and oil cups on the lathe should be filled or inspected at least once a day.

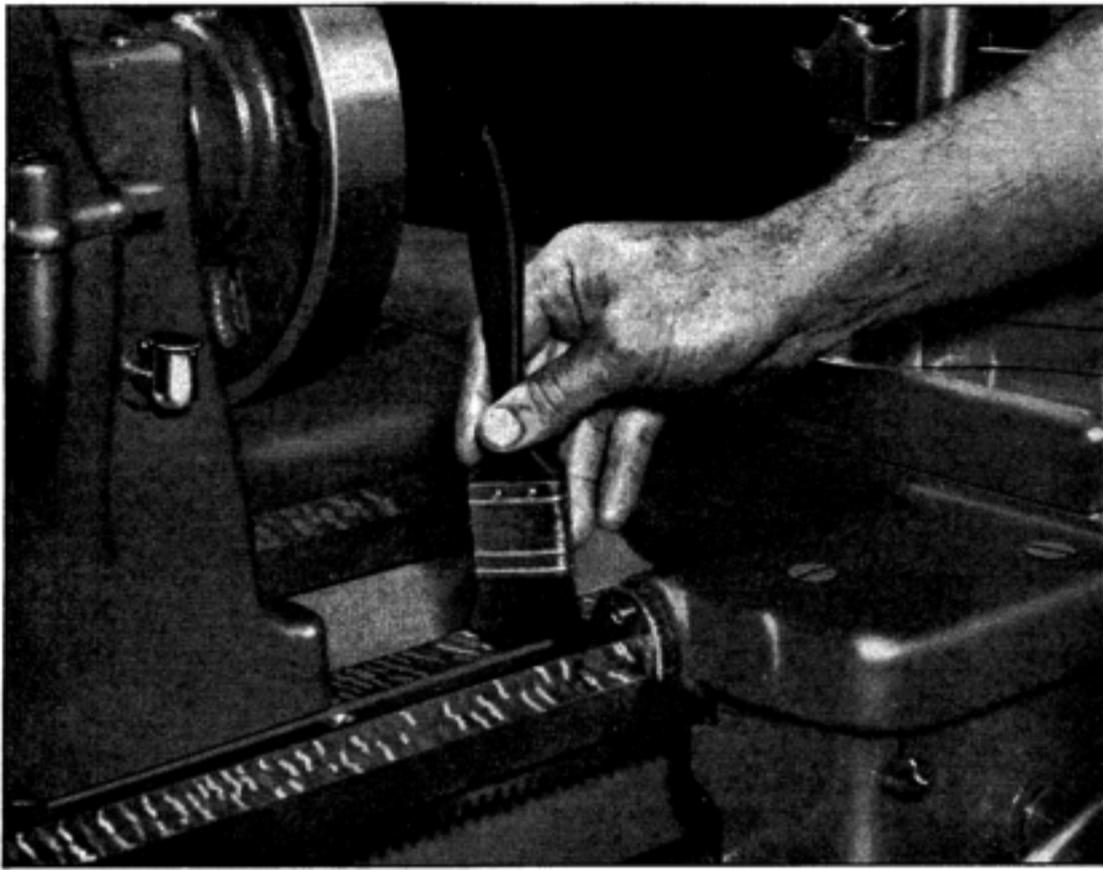


Fig. 4. Dirt and chips should be brushed away before oiling the lathe.

Dirt and chips should be brushed away before oiling to prevent them from working into the oil holes. To help the inexperienced operator find the oil holes a circle of brightly colored paint may



Fig. 5. To help the inexperienced operator find the oil holes a circle of brightly colored paint may be applied around each oil cup.

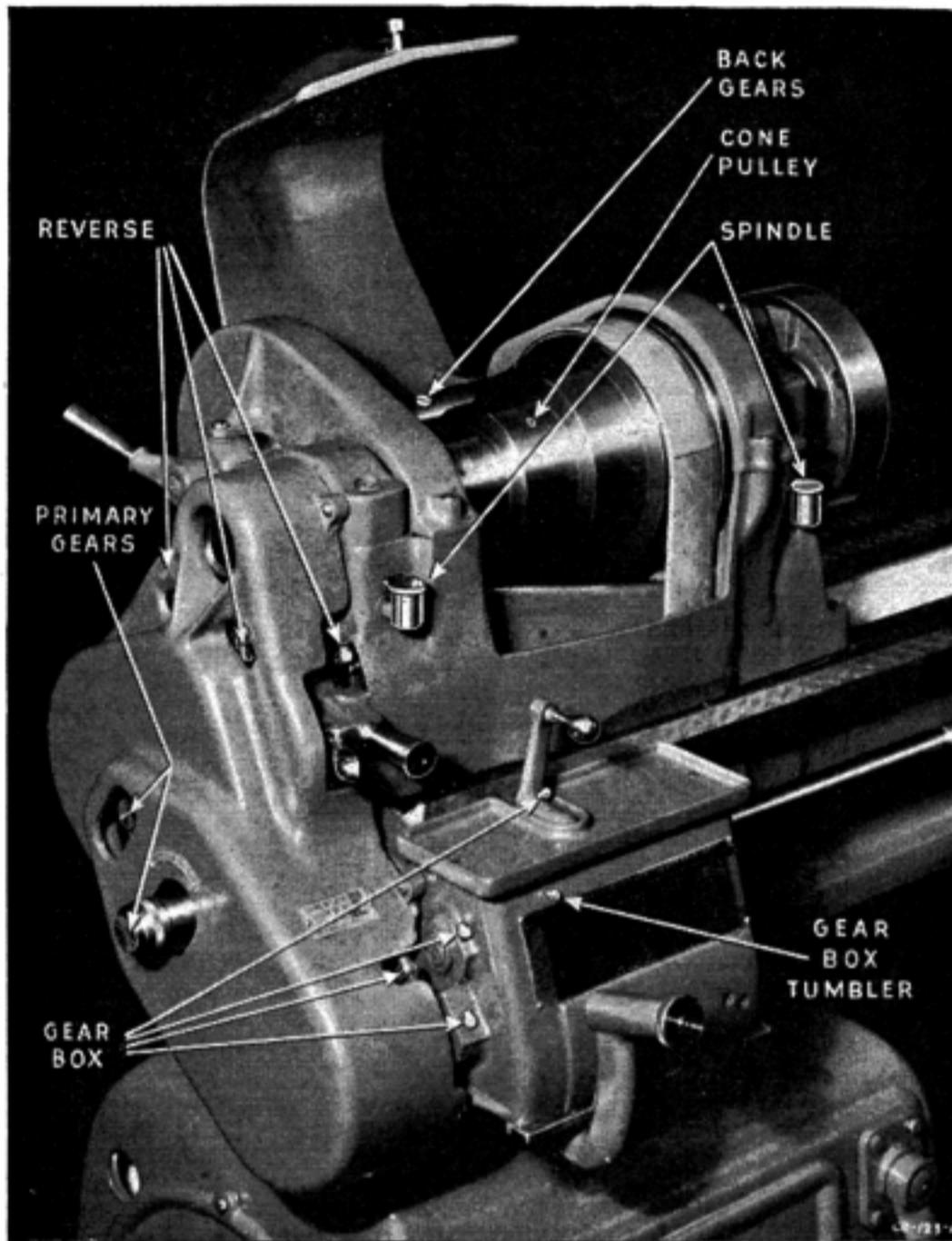


Fig. 6. Oil holes on headstock and quick change gear mechanism of lathe should be filled daily. See also Fig. 12, page 13.

be applied around each oil cup. Different colors of paint can be used to indicate different grades of oil.

### Headstock

The locations of the oil holes for lubricating the various bearings on the lathe headstock are shown in Fig. 6.

There is an oil reservoir in the headstock beneath each of the two spindle bearings. The oil flows through capillary wicks from the oil reservoirs up to the spindle bearings. These reservoirs

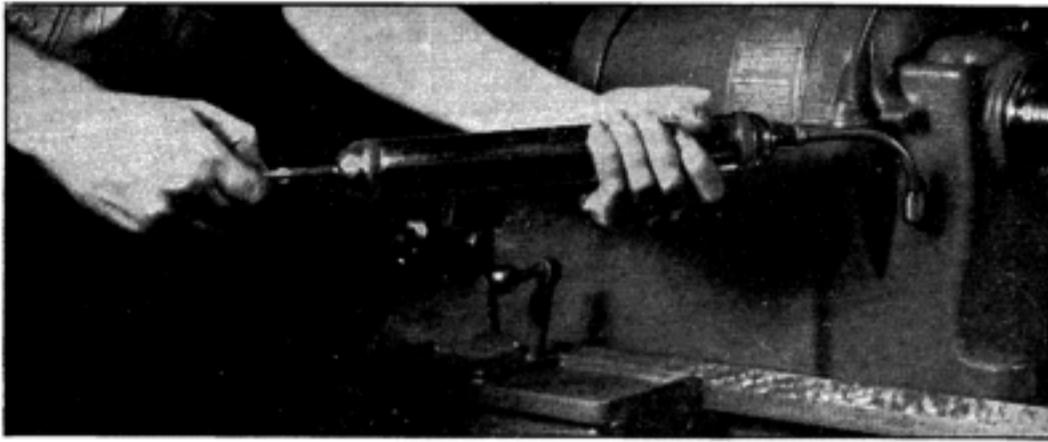


Fig. 7. Draining and flushing the headstock spindle bearing oil wells with suction pump.

should be filled daily and the oil level maintained within  $\frac{1}{8}$  inch of the top of the oil filler cup. See Fig. 2, page 6.

### Lubrication of Superfinished Spindles \*

South Bend Lathes have superfinished headstock spindles to which the bearings are fitted with extreme precision. The clearance for the oil film is very small, necessitating the use of a light machine oil having a viscosity of 120 to 150 seconds S.U.V. at 100° F. Some lathes have bearings so closely fitted that they require a very light machine oil having a viscosity of approximately 70 seconds S.U.V. at 100°F. A metal plate specifying the lubricant to be used is attached to each headstock that is equipped with a superfinished spindle. See Figs. 9a and 9b.

The spindle bearing oil wells should be drained and flushed about once a month to prevent the oil from becoming dirty. The oil should be removed with a small suction pump, as shown in Fig. 7, or by removing the drain plug underneath the oil cup. See Fig. 7a. Flush the bearings with kerosene, running the lathe spindle a short time at a moderate speed. Remove the kerosene and refill the oil wells with fresh, clean oil.

\*Note: This does not apply to older models of lathes with oil cups on top of headstock bearing caps. Use medium body machine oil for lubricating spindle bearings of all lathes that do not have a metal plate specifying grade of oil to be used.

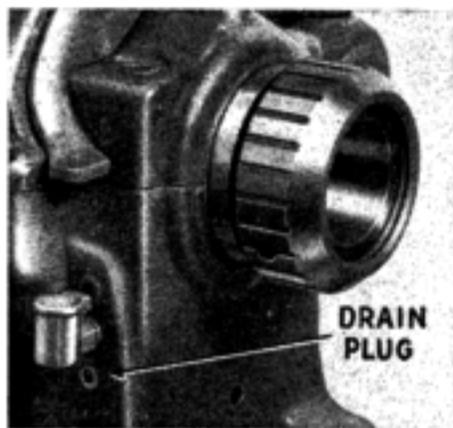


Fig. 7a. Headstock with drain plug for spindle bearing oil reservoir.

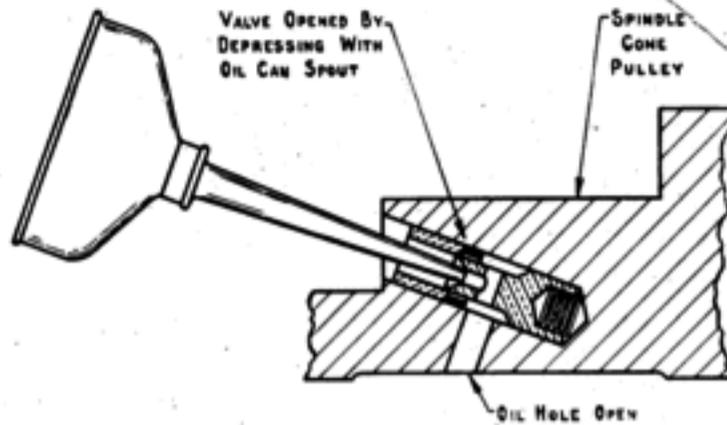


Fig. 8. When oiling cone pulley with automatic oil retaining valve the oil can spout must be pressed into oil hole to open valve.

If the spindle bearings heat above 120° Fahrenheit (uncomfortably hot to the hand), it is an indication that the oil has become dirty, or is too heavy to lubricate the bearings properly. The lathe should be stopped immediately, the spindle bearings

**LUBRICATION CHART**

**HEADSTOCK BEARINGS**

KEEP OIL CUPS FILLED WITH GOOD GRADE OIL CORRESPONDING IN BODY TO S. A. E. 10. USE MACHINE OIL. NOT AUTO ENGINE OIL. FLUSH CLEAN EVERY 6 MONTHS.

**APRON RESERVOIR**

KEEP FILLED WITH GOOD GRADE OIL CORRESPONDING IN BODY TO S. A. E. 10. USE MACHINE OIL. NOT AUTO ENGINE OIL. FLUSH CLEAN EVERY 6 MONTHS.

**GENERAL LATHE LUBRICATION**

OIL REGULARLY, DAILY WHERE NECESSARY, USING GOOD GRADE OIL CORRESPONDING IN BODY TO S. A. E. 20. USE MACHINE OIL. NOT AUTO ENGINE OIL.

**ANTI-FRICTION BEARINGS**

SEALED BEARINGS REQUIRE NO LUBRICATION. WHERE GREASE OPENINGS ARE PROVIDED, USE GREASE SPECIFIED IN BEARING MANUFACTURER'S CATALOG FOR PARTICULAR APPLICATION.

Fig. 9a. 9-inch lathes with superfinished spindles require lubricants specified on metal chart shown above.

**LUBRICATION CHART**

**HEADSTOCK BEARINGS**

KEEP OIL CUPS FILLED WITH HIGH GRADE OIL TESTING 70 SECONDS AT 100° F. DO NOT USE AUTO ENGINE OIL. FLUSH CLEAN EVERY 6 MONTHS.

**APRON RESERVOIR**

KEEP FILLED WITH HIGH GRADE OIL CORRESPONDING IN BODY TO S. A. E. 10. USE MACHINE OIL. NOT AUTO ENGINE OIL. FLUSH CLEAN EVERY 6 MONTHS.

**GENERAL LATHE LUBRICATION**

OIL REGULARLY, DAILY WHERE NECESSARY, USING HIGH GRADE OIL CORRESPONDING IN BODY TO S. A. E. 20. USE MACHINE OIL. NOT AUTO ENGINE OIL.

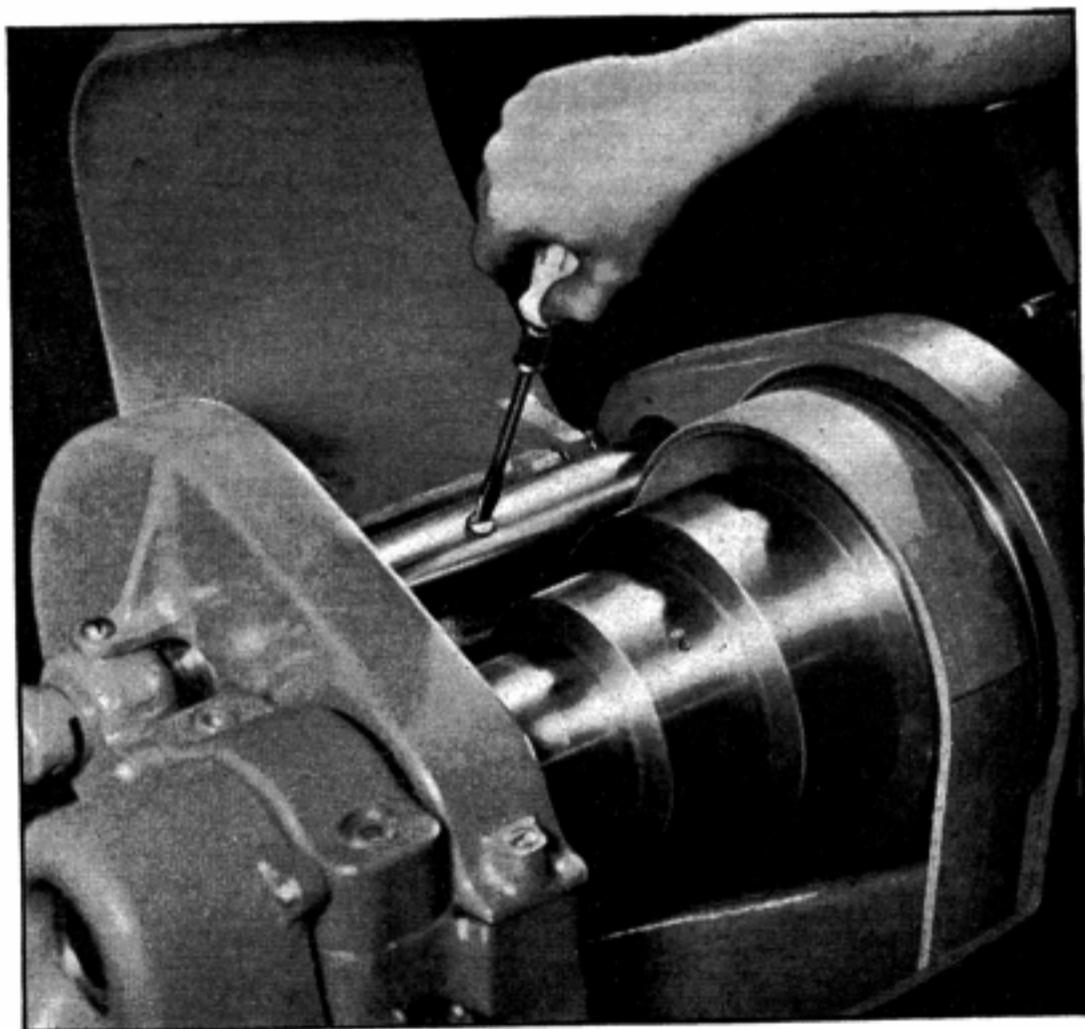
**ANTI-FRICTION BEARINGS**

SEALED BEARINGS REQUIRE NO LUBRICATION. WHERE GREASE OPENINGS ARE PROVIDED, USE GREASE SPECIFIED IN BEARING MANUFACTURER'S CATALOG FOR PARTICULAR APPLICATION.

Fig. 9b. 10-inch and larger lathes with superfinished spindles require lubricants specified on metal chart shown above.



**Fig. 10.** Oiling the threads of the headstock spindle nose preparatory to mounting chuck or face plate on spindle.



**Fig. 11.** Oiling the back gear quill bearing necessitates removing the oil hole plug with a screwdriver.

flushed with kerosene, and the oil wells filled with a fresh, clean lubricant of the correct grade.

The cone pulley bearing should be oiled at least once a day, using machine oil. The oil holes in the cone pulley have screw plugs as shown in Fig. 6, or may be equipped with an automatic oil retaining valve as shown in Figs. 8 and 9. When oiling through the automatic valve be sure to push the valve in as far as it will go; otherwise no oil will reach the bearing.

The reverse gear bearings and the reverse shaft bearing should be oiled at least once each eight hour shift. Use machine oil for these bearings. See Fig. 6, page 9.

The threads of the headstock spindle nose should always be cleaned and oiled before screwing a chuck or a face plate onto the spindle. See Fig. 10, page 12.

The back gear quill bearing has a screw oil plug which must be removed for oiling. A few drops of machine oil daily is sufficient for this bearing. See Fig. 11, page 12.

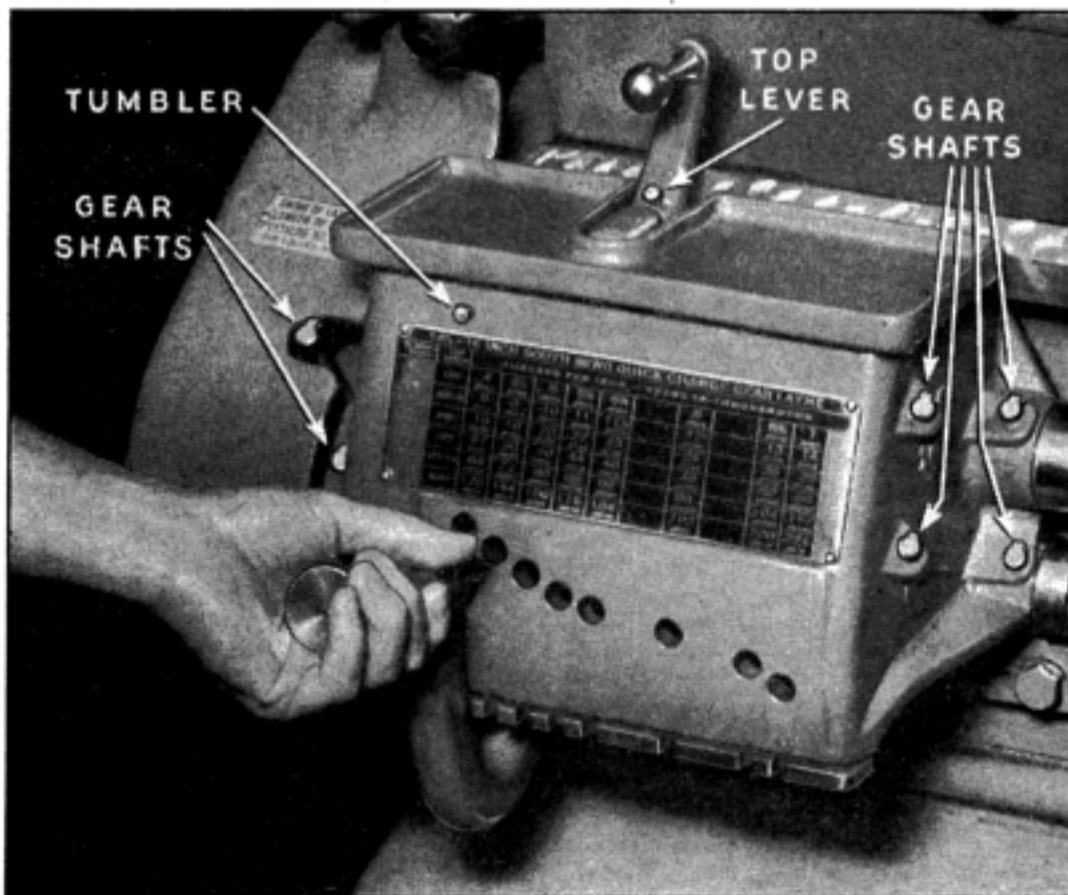


Fig. 12. Before oiling this type of gear box place the tumbler lever plunger in the first hole on the left.

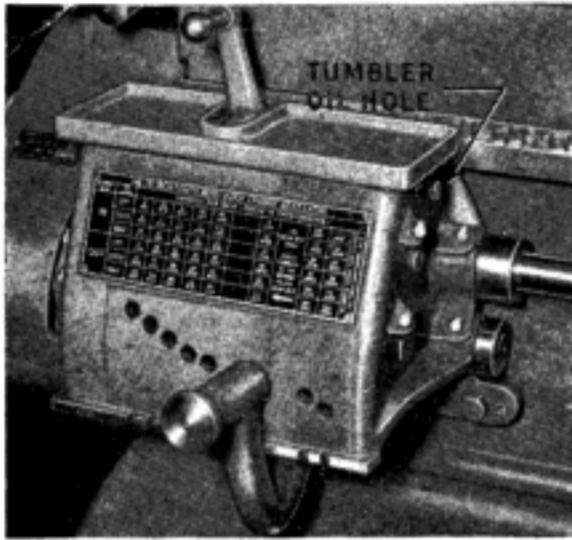


Fig. 12a. Gear box with single oil hole on right end.



Fig. 12b. Gear box with single oil hole on top.

### Quick Change Gear Mechanism

Three different types of gear boxes are used on South Bend Lathes. Two of them have an individual oil hole for each bearing. The third has a single oil hole, with oil tubes and wicks to distribute the oil to all bearings.

If the gear box has individual oil holes with the tumbler oil hole on the front as shown in Fig. 12, place the tumbler lever plunger in the first hole on the left before oiling. In this position the tumbler is in line with the oil tube which lubricates the tumbler idler gear bearing. In any other position the tumbler idler gear bearing will not be oiled.

If the gear box is designed as shown in Fig. 12a, with individual oil holes, but with the tumbler oil hole on the right end, place the tumbler lever plunger in the third hole from the right before oiling.

If the gear box has only one oil cup located on top as shown in Fig. 12b, the position of the tumbler lever when oiling is not important.

Fill all oil cups and oil holes in the gear box and primary gear assembly with machine oil at least once each eight hour shift. Make sure all oil hole plugs are replaced and all oil hole covers are closed after oiling. See Fig. 6, page 9, and Fig. 12, page 13.

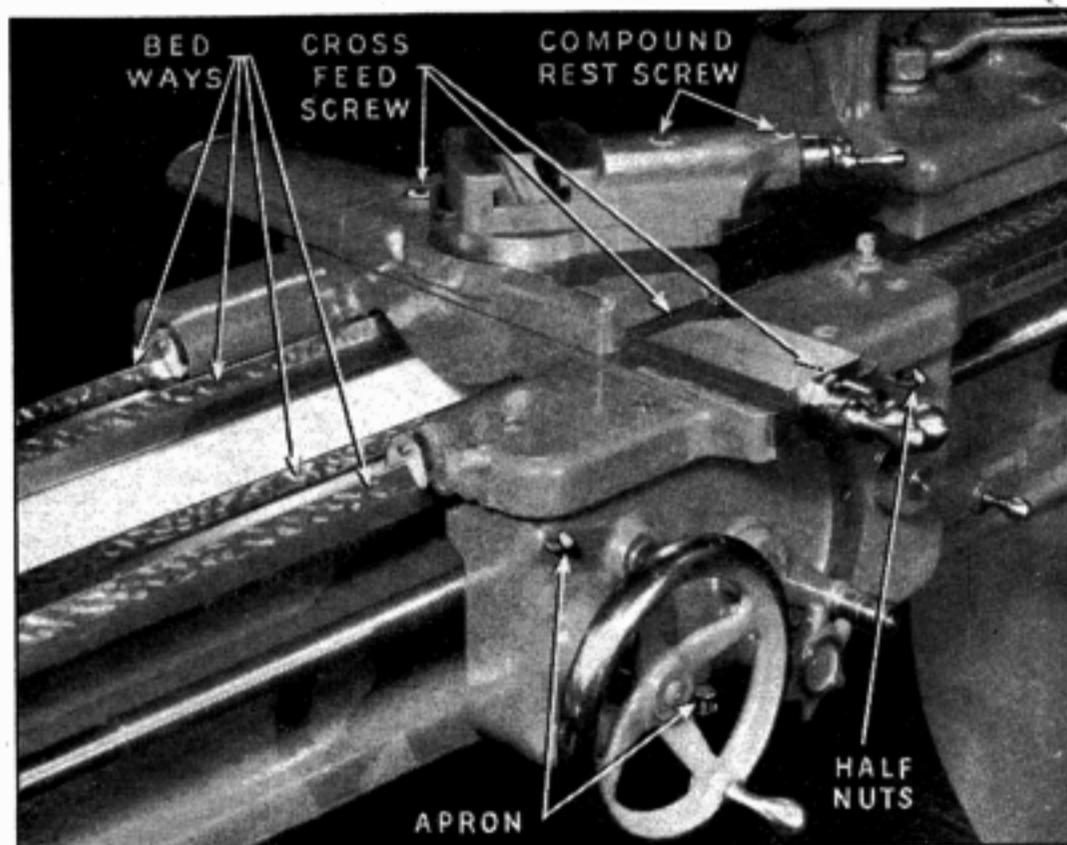


Fig. 13. Oil holes on lathe carriage should be filled daily. Bed ways and dovetails must also be lubricated.

### Carriage and Lathe Bed

Fig. 13, above, shows the locations of the oil holes for lubricating the various bearings on the lathe carriage.

The carriage dovetails and the bed ways should be lubricated with machine oil at least once each eight hour shift. When machining some classes of work it may be necessary to clean and oil the bed ways more frequently. It is important that a film of oil be maintained at all times. Touching the bed way with the finger tip will indicate whether or not there is an adequate oil film. The felt oil distributing pads on the saddle should be removed and cleaned in kerosene about once a month.

The cross-feed and compound rest screw bearings should be oiled once a day. The oil holes for these bearings have screw plugs which must be removed for oiling. See Fig. 13.

The apron oil holes should be filled with machine oil once a day. A large oil reservoir at the bottom of the apron supplies lubrication for the apron clutch and gearing. This reservoir is filled with machine oil through the lower oil cup. The oil level

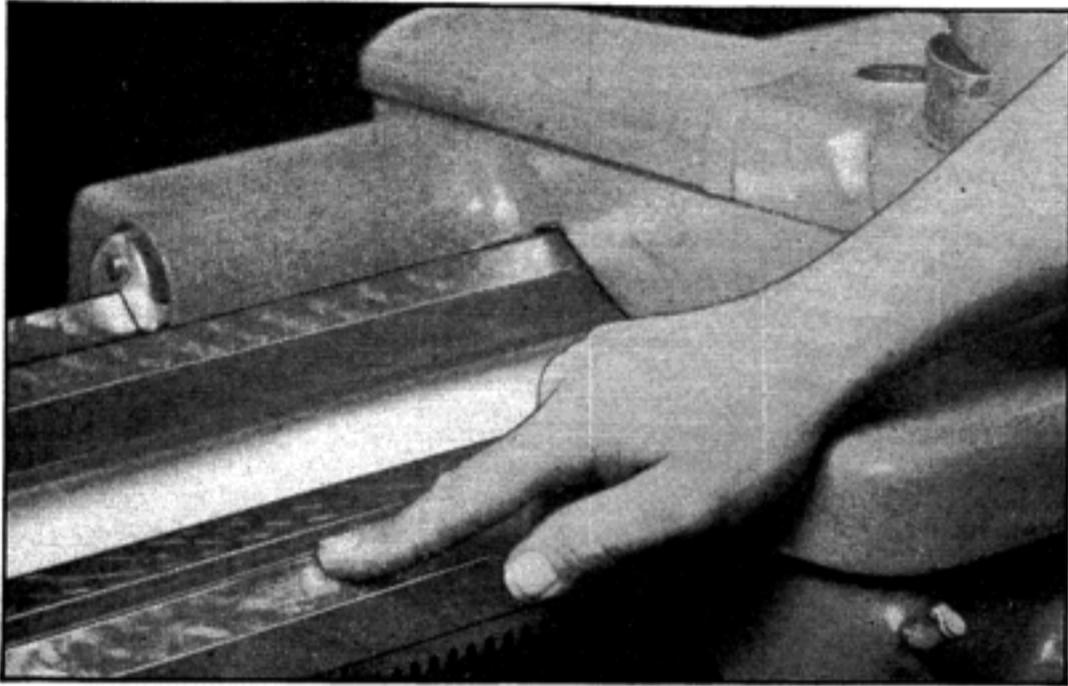


Fig. 14. Touching the bed way with the finger tip will indicate whether or not there is an adequate oil film.

should be inspected daily and should be kept within  $\frac{1}{8}$ -inch of the top of the oil cup. Felt wicks carry the oil from the reservoir to important bearings in the apron.



Fig. 15. The apron oil reservoir should be drained, flushed, and refilled every three months.

The apron oil reservoir should be drained, flushed with kerosene, and refilled with fresh, clean oil at least once each three months.

If the oil used in the apron oil reservoir is too heavy, the apron clutch may not release properly. To remedy this, drain the apron oil reservoir and refill with a mixture of equal parts of kerosene and machine oil.

The threads of the lead screw should be oiled frequently when cutting screw threads. The oil hole for the lead screw bearing at the right end of the lathe bed should be filled with machine oil every eight hour shift.

### Tailstock

All oil cups on the tailstock should be filled with machine oil at least once a day. The tailstock spindle and binding lever mechanism should also be lubricated. The bed ways on which the tailstock slides should be cleaned and oiled frequently.

Dry red lead mixed with machine oil to the consistency of

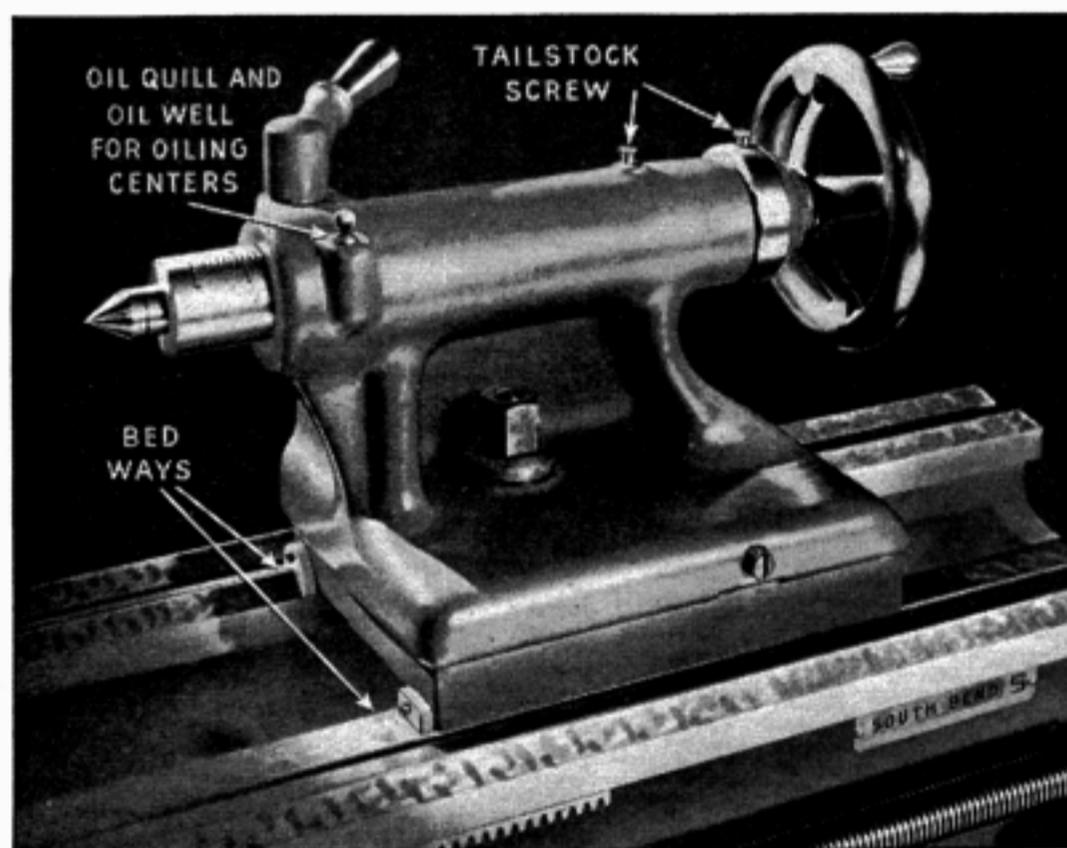


Fig. 16. Oil holes for bearings on tailstock of lathe.

thick cream is an excellent lubricant for the tailstock center point when machining work between centers. This mixture should be kept in the small reservoir provided on the tailstock and applied to the center hole in the work with the oil quill as required.

### Motor and Drive Mechanism

Specific lubrication instructions prepared by the motor manufacturer are usually attached to each motor. When specific instructions for motor lubrication are not available the bearing construction may be taken as a guide to lubrication.

Motors having plain bearings are equipped with wick or ring

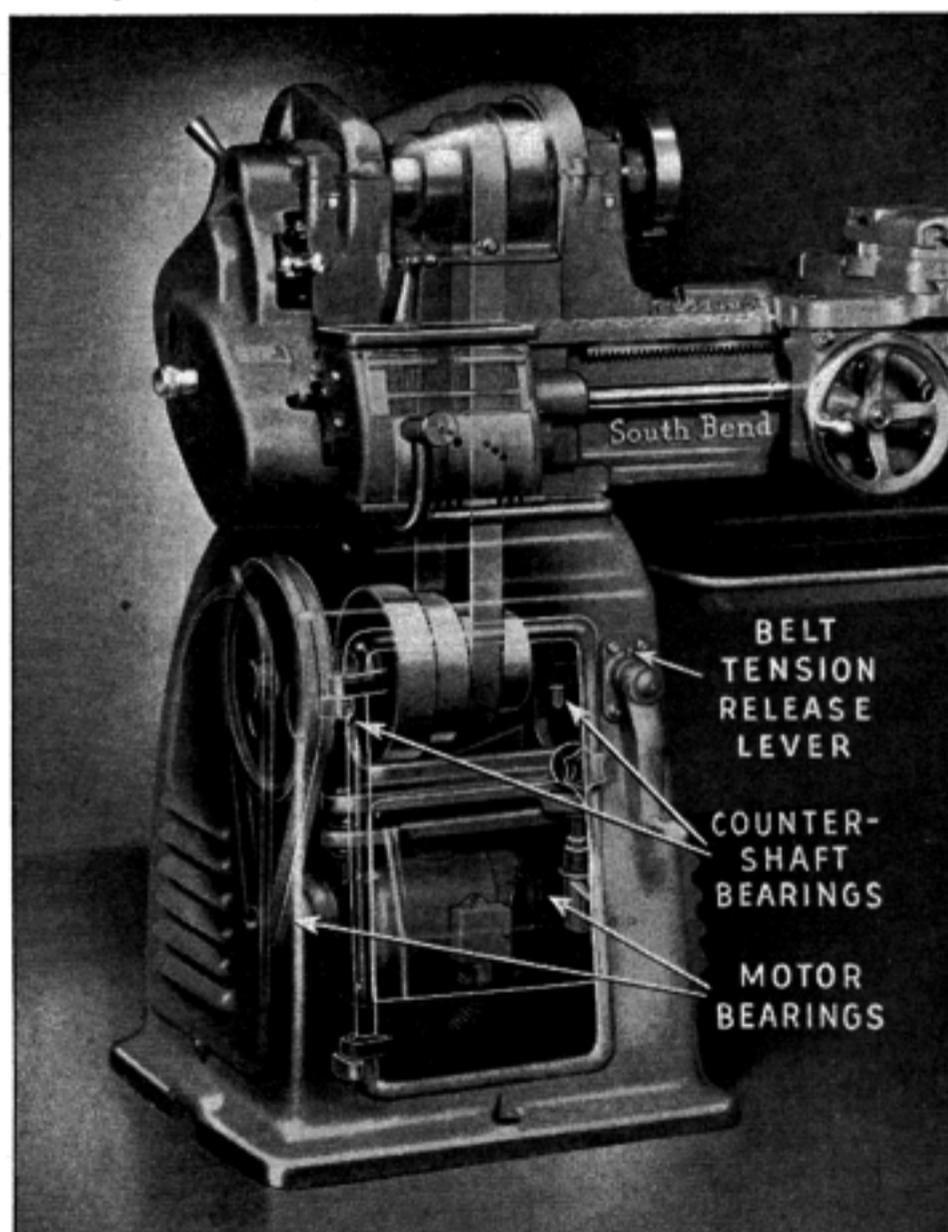


Fig. 17. The construction of the bearings for the motor and drive mechanism determines the type of lubrication required.

oiling system. Ring oiling bearings should be checked every thirty days and machine oil added when needed. The oil wells should be drained and flushed once a year. Wick oiling bearings will require a few drops of oil about once a month.

Too much lubrication of motor bearings may seriously damage the motor. Excess oil is harmful to the commutator, brushes, and windings. It also causes dust to collect in the motor which may interfere with ventilation, causing the motor to overheat and burn out.

Ball bearing motors\* usually have a plug or fitting for grease lubrication, also a relief plug. The relief plug should first be taken out and any hardened grease removed with a clean screwdriver. Clean the grease gun and grease fitting carefully with a cloth to avoid the possibility of dirt or grit working into the

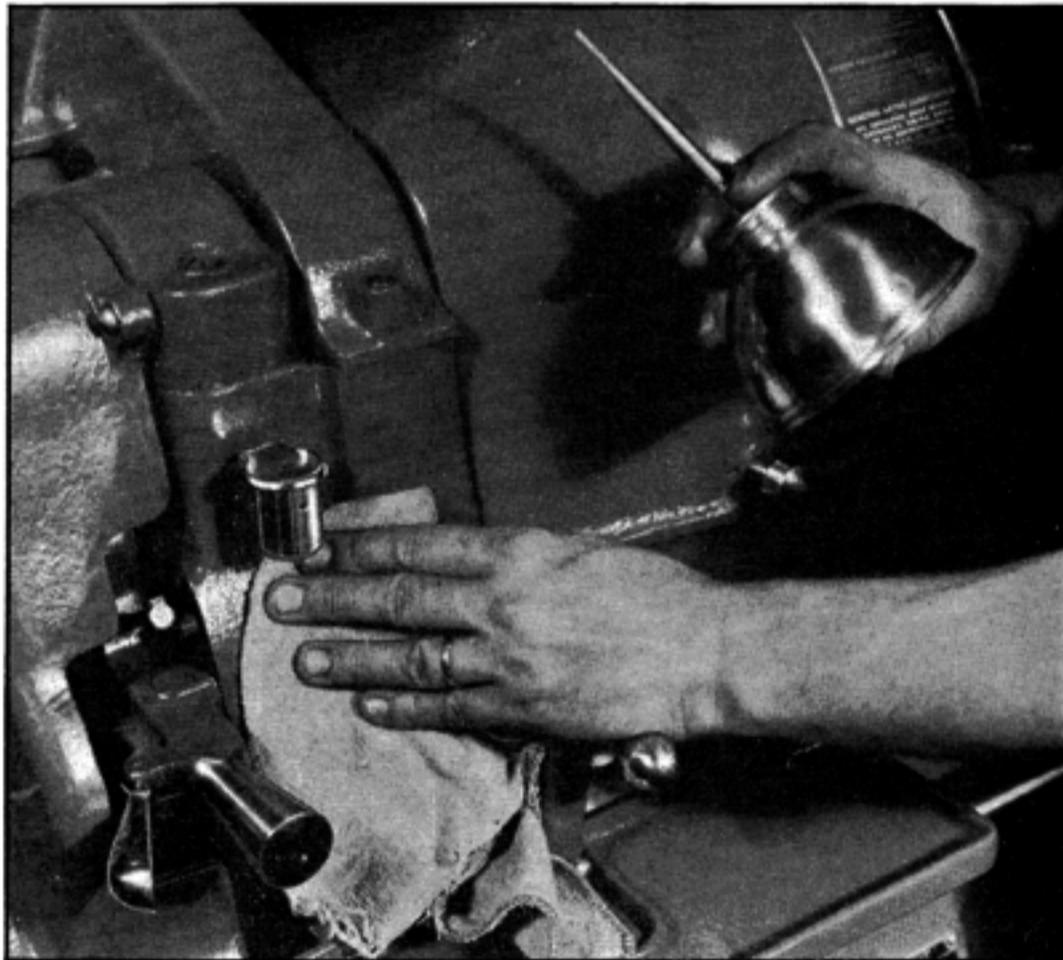


Fig. 18. After oiling the lathe the excess oil should be wiped off with a clean cloth.

\*Note: Some ball bearing motors have sealed bearings which are packed with grease and require no additional lubrication. Others have oil holes for lubrication with machine oil.

bearing with the grease. With the motor running, fill the bearing with fresh grease until an excess works out through the relief hole. Allow the motor to run until all excess grease has worked out. Then stop the motor and replace the relief plug.

The lower cone pulley shaft on recent models of South Bend Lathes has sealed anti-friction bearings which are packed with lubricant at the factory and require no further attention. Older models of lathes have ring oiling bearings which should be inspected daily and oil added as required. The belt tension release lever and belt tension adjusting mechanism should be lubricated with machine oil daily.

### Clean Lathe After Oiling

After the oiling of the lathe has been completed the excess of oil should be wiped off with a clean cloth. The lathe should be kept clean. Dirt, chips, or rust should not be allowed to collect.

All oil hole plugs should be replaced and all oil hole covers closed to prevent dirt and chips from working into the bearings through the oil holes. If an oil hole plug is lost, or an oil hole cover broken off it should be replaced without delay.

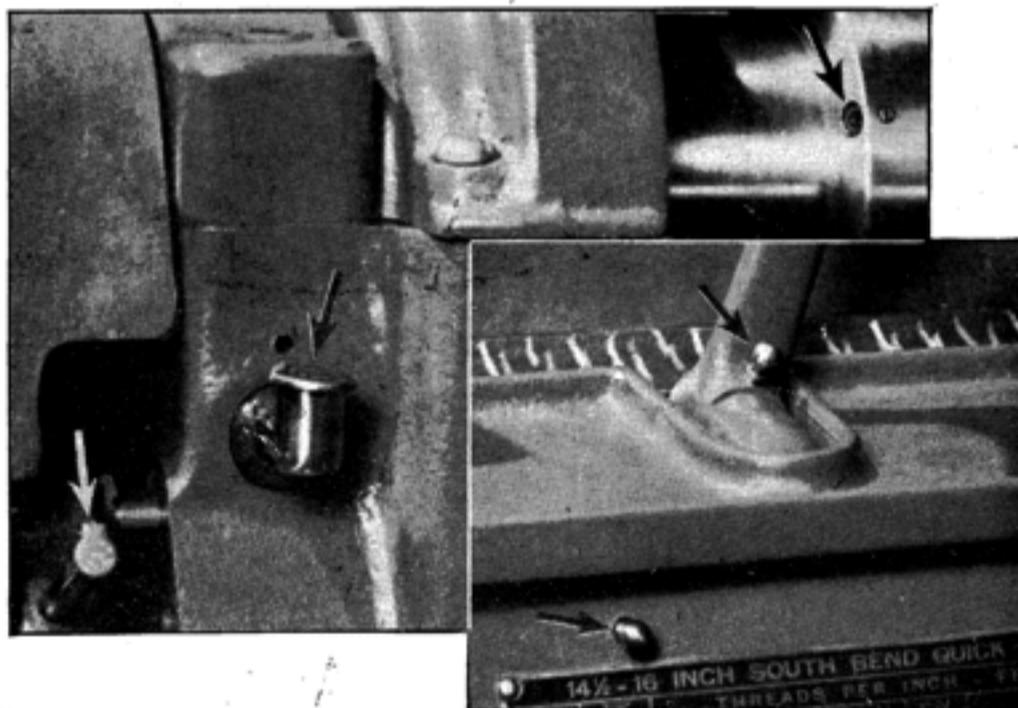


Fig. 19. All oil hole plugs should be replaced and all oil hole covers closed after oiling.