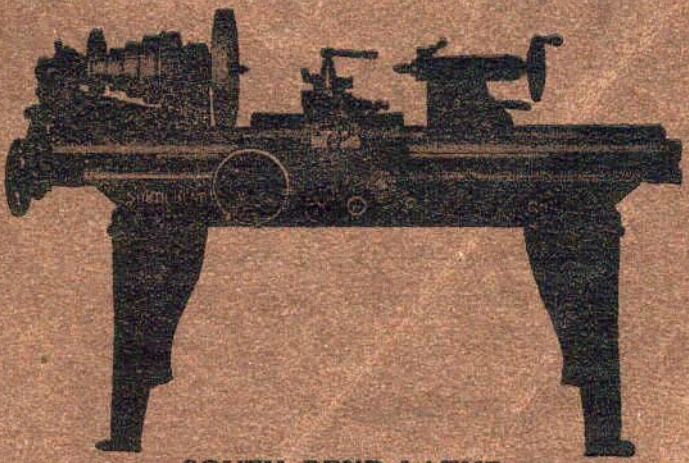
HOW TO RUN A LATHE

HOW TO ERECT, CARE FOR AND OPERATE
A SCREW CUTTING ENGINE LATHE

PRICE 50 CENTS



SOUTH BEND LATHE

Published by
SOUTH BEND MACHINE TOOL CO.
Manufacturers of South Bend Lathes
SOUTH BEND, INDIANA, U. S. A.

This Little Book

HOW TO RUN A LATHE

Is included, free, with each South Bend Lathe. It will be found packed with the regular equipment and will be of great assistance to the inexperienced operator in showing him how to set up, start and run a Screw Cutting Engine Lathe in a practical manner.

INSTRUCTIONS

BY A PRACTICAL MACHINIST

Who calls attention to the simple but necessary details that the beginner should be familiar with in operating a screw cutting engine lathe.

It has been said that if one, mechanically inclined, who knows how to run an engine lathe, will observe the four fundamental rules that he can become a first-class mechanic. The following are the rules:

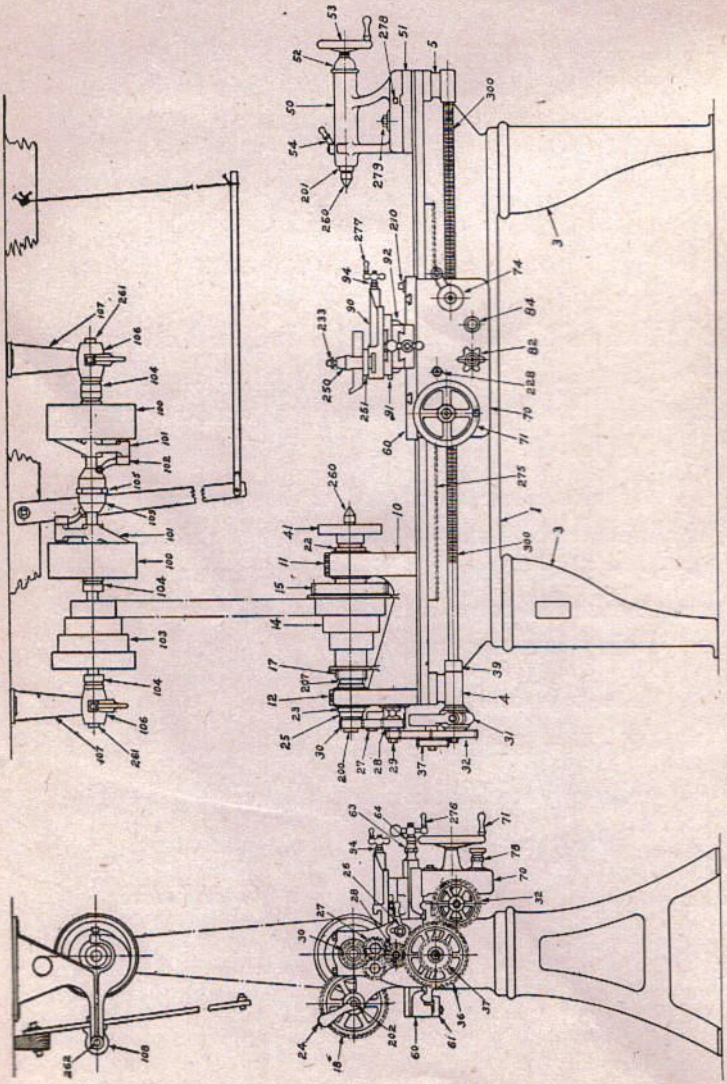
Keep your Lathe clean.

Keep your Lathe well oiled.

Keep your Tools sharp.

Take your Measurements Accurately.

Sam Perkins



Cut of Lathe showing principal parts numbered.

Number and Name of Parts of Drawing:

No.
1 Bed.
3. Power Legs.
4 Lead Screw Bracket F.
5 Lead Screw Bracket R.
10 Head Stock.
11 Head Stock Cap, Large.
12 Head Stock Cap, Small.
13 Head Stock Clamp Plate.
14 Spindle Cone.
15 Bull Gear.
16 Bull Gear Clamp.
17 Cone Pinion.
18 Quill Gear.
19 Quill Sleeve.
20 Quill Sleeve Pinion.
21 Ecc. Shaft Bushing.
22 Bronze Box, Large.
23 Bronze Box, Small.
24 Back Gear Lever.
25 Take up Nut.
26 Reverse Bracket.
27 Reverse Twin Gears (2).
28 Reverse Gear.
29 Stud Gear.
30 Spindle Reverse Gear.
31 Change Gear Bracket.
32 Change Gears and Turning Gear
33 Change Gear Idler.
34 Change Gear Idler Bushing.
35 Change Gear Collar on L. S.
36 Idler Gear 2 to 1 Large.
37 Idler Gear 2 to 1 Small.
38 Idler Gear Bushing 2 to 1.
39 Thrust Collar on Lead Screw.
40 Large Face Plate.
41 Small Face Plate.
50 Tail Stock Top.
51 Tail Stock Base.
52 Tail Stock Nut.
53 Tail Stock Hand Wheel.
54 Tail Stock Clamp Lever.
55 Tail Stock Wrench.
56 Tail Stock Clamp Plate.

No.
60 Carriage.
61 Carriage Gib.
62 Carriage Lock.
63 Cross Feed Bushing.
64 Cross Feed Gra. Collar.
65 Cross Feed Nut.
70 Apron.
71 Apron Hand Wheel.
72 Lead Screw Half Nut (2).
73 Lead Screw Half Nut Gib (2).
74 Nut Cam.
75 Nut Cam Washer.
76 Rack Pinion Gear.
77 Auto. Apron Worm Gear.
78 Auto. Apron Worm Gear Bushing
79 Auto. Apron Worm Gear Bracket
80 Auto. Apron Clutch Sleeve.
81 Auto. Apron Clutch.
82 Auto. Apron C. F. Star Knob.
83 Auto. Apron C. F. Lever.
84 Auto. Apron C. F. Lever Knob.
85 Auto. Apron C. F. Gear.
86 Auto. Apron Idler Gear.
87 Auto. Apron Idler Gear Pinion.
90 Compound Rest Top.
91 Compound Rest Swivel.
92 Compound Rest Bottom.
93 Compound Rest End Cap.
94 Compound Rest Bushing.
95 Compound Rest Swivel Nut.
96 Compound Rest Chip Guard.

Countershaft

100 C. S. Friction Pulleys (2)
101 C. S. Friction Spiders (2)
102 C. S. Friction Fingers (2)
103 C. S. Cone.
104 C. S. Collars (4)
105 C. S. Yoke Lever.
106 C. S. Boxes (2)
107 C. S. Hangers (2)
108 C. S. Shipper Nut.
109 C. S. Friction Cone.

No.

200 Head Stock Spindle.
201 Tail Stock Spindle.
202 Back Gear Eccentric Shaft.
203 Apron Worm.
204 Apron Rack Pinion.
205 Spindle Sleeve.
207 Spindle Thrust Collar.
208 Apron Worm Collar.
209 Tool Post Block.
210 Carriage Lock Collar Screw.
211 Compound Rest Swivel Bolts.
212 C. G. Bracket Collar Screw.
213 Reverse Collar Screw.
214 Bull Gear Clamp Collar Screw.
215 Apron Worm Clutch Sleeve Hexagon Nut.
216 Compound Rest Swivel Stud.
217 Steady Rest Lock Bolt.
218 Auto Cross Feed Lever Stud.
219 Reverse Steel Collar.
220 Apron Clutch Sleeve Pinion.
221 Compound Rest Gibs (2).
222 Plain Rest Gib.
223 Auto Apron Clutch Screw.
224 Cross Feed Screw.
225 Apron Hand Wheel Pinion.
226 Tail Stock Screw.
227 Reverse Shaft.
228 Apron Rack Pinion Stud.

No.

229 Reverse Shoulder Screws (2).
230 Compound Rest Screw.
231 Auto Cross Feed Stud.
232 Apron Half Nut Stud (2).
233 Tool Post Screw.
234 Apron Idler Gear Stud.
235 Cam Cap Screw.
238 Apron Worm Washer.
239 Comp. Rest Steel Wedge.
240 Gap Bridge Pins (2).
241 Reverse Stud Gear Washer.
242 Change Gear Spindle Knob.
250 Tool Post.
251 Tool Post Ring.
252 Tool Post Wedge.
253 Tool Post Wrench.
254 Compound Rest Wrench.
260 Centers (2).
261 C. S. Shaft.
262 C. S. Shipper Rod.
263 C. S. Expansion Wedges.
275 Rack.
276 Cross Feed Ball Crank.
277 Compound Rest Handle.
278 Tail Stock Set Over Screws (2).
279 Tail Stock Clamping Bolt, Nut and Washer.
300 Lead Screw.

REPAIR PARTS

In ordering repair parts for lathe, please order by number as this will avoid mistakes and delay.

SIZE OF LATHE

State the size of lathe that this part is intended for, as these numbers apply to lathes from 9″ to 18″ swing.

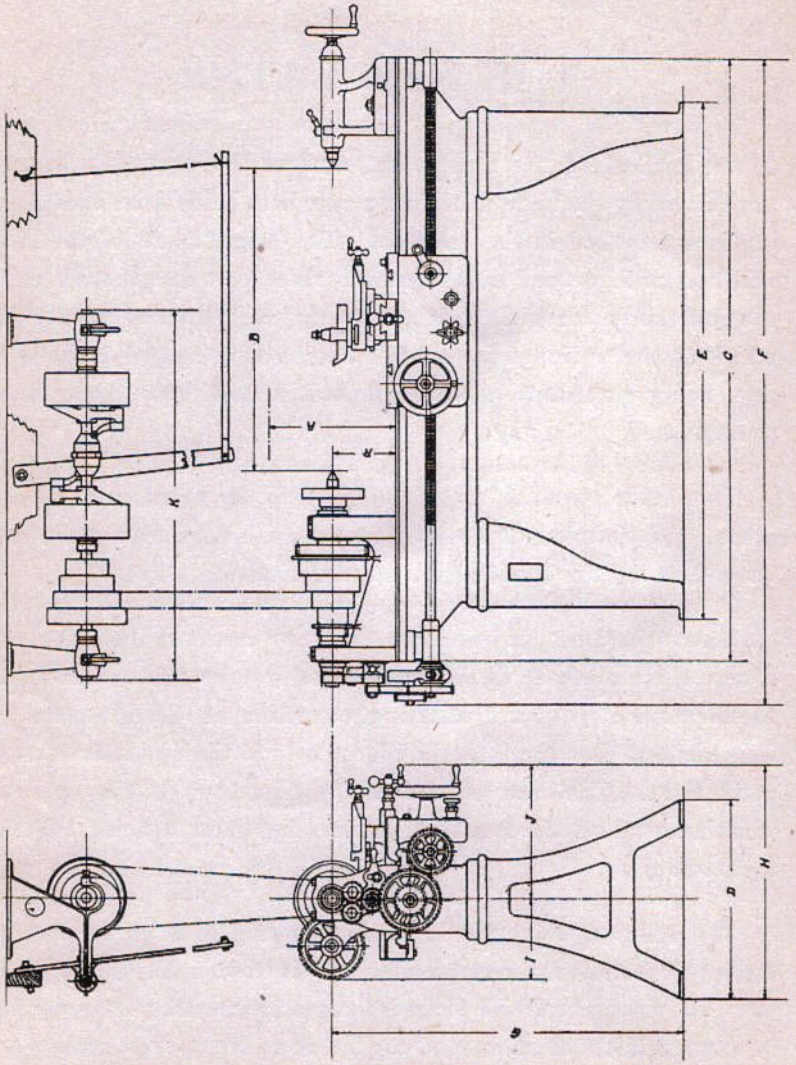
THE NEW LATHE

On arrival of the new lathe, remove the crating, carefully unpack every package containing supplies, being sure that nothing is overlooked in the excelsior. The bright parts of the lathe will be found covered with a grease, which prevents rusting while the lathe is in transit. This grease may be removed with a rag which has been dipped in coal oil or kerosene, then wipe the lathe dry, being careful to remove all dust and dirt that may have accumulated.

Particular attention should be given to the gears, such as back gears, and change gears, cleaning out each tooth, as there may have been dust or dirt lodged there during the trip.

Select the most desirable spot in your shop for the lathe. Of course there are several points that will govern this spot, such as the location of your line shafting, condition of the light, etc. It is important that the lathe be placed where the operator can get good light. The best results are obtained when the operator working at the lathe has the light coming from a point over his right shoulder.

The floor on which the lathe rests should be solid so that the lathe will stand on a firm foundation. If there is any shake whatever, the floor should be braced from underneath. There should be a space left free all around the lathe, as the operator may have an occasional job where he will be required to work from all sides.



Cut showing foundation plan of lathe.

GENERAL ERECTION PLAN.

From the erection plan on the opposite page may be seen the general arrangement of lathe and countershaft. The height of the countershaft is not important, except that the center of shaft should be, at least, 5′ distant from the center of spindle. A distance of 7′ is preferred.

The countershaft may be on either side of the line shaft, whichever is most convenient and should be, at least 5′ distant from the line shaft. The hangers of the countershaft should be set in a position so that the extension on hanger through which the shipper rod passes, will point toward the line shaft. The reason is that the hanger is designed to meet the pull of the belt in this direction with best results.

With the lathe in the approximate position, attach the countershaft to ceiling. The countershaft should be fastened to two pieces of 2 x 4's with lag screws or bolts and these 2 x 4's attached to the ceiling with several lag screws or bolts. The axis of the countershaft should be parallel to that of the line shaft. The hangers are slotted and will admit of adjustment. When countershaft is properly **leveled** and parallel with the line shaft, then fasten firmly to the ceiling.

The shipper rod should be placed so it is within easy reach of the operator.

SETTING THE LATHE

Countershaft being fastened in position, drop a plumb-bob from the countershaft cone to the spindle cone, adjust the lathe so that the belt will track between spindle cone and countershaft cone. It is necessary that axis of the lathe spindle is parallel to that of the countershaft. It is not necessary that the lathe spindle be directly underneath the countershaft as it may be from 6 to 12 inches either one side or the other as the belt will run on an angle from spindle cone to countershaft cone.

LEVELING LATHE

The accuracy of a lathe depends a great deal upon the manner in which it is erected and leveled up. Place level across the ways near the head stock and several places between that and the tail stock. Shim up the legs with shingles until the lathe is level in every direction, then when countershaft and spindle cones correspond, fasten lathe firmly to the floor using lag bolts.

BELTING

In belting from line shaft to countershaft two belts are used; one a straight belt, the other a cross belt. Which is to be the straight belt is determined by the direction in which the line shaft revolves, because the spindle of the lathe should revolve so that the top of the spindle cone runs towards the operator when he is in front of the lathe. Leather belt is recommended.

SIZE OF PULLEYS

The size of the pulleys to be used, depends upon the revolutions per minute of the line shaft. Crown face wood pulleys are recommended. See page 9 for speed of countershaft.

Rules for Finding the Speeds and Sizes of Pulleys

To find the diameter of driving pulley: Multiply the diameter of the driven by the number of revolutions it should make, and divide the product by the number of revolutions of the driver.

To find the diameter of the driven: Multiply the diameter of the driver by its number of revolutions, and divide the product by the number of revolutions of the driven.

To find the number of revolutions of the driven: Multiply the diameter of the driver by its number of revolutions, and divide by the diameter of the driven.

To find the horse-power of a pulley: Multiply the circumference of the pulley by the speed and the product thus obtained by the width of the belt, and divide the result by 600. The quotient will be the horse-power.

SPEED OF COUNTERSHAFT

The speed of the countershaft for 9 to 18" Lathes is as follows:

9" Lathe, Speed of Countershaft 250 Revolutions per minute.
10" Lathe, Speed of Countershaft 250 Revolutions per minute.
11" Lathe, Speed of Countershaft 225 Revolutions per minute.
12" Lathe, Speed of Countershaft 225 Revolutions per minute.
13" Lathe, Speed of Countershaft 225 Revolutions per minute.
16" Lathe, Speed of Countershaft 200 Revolutions per minute.
18" Lathe, Speed of Countershaft 190 Revolutions per minute.

SPEED OF THE LINE SHAFT

The line shaft in the machine shop gives the best results at a speed of about 250 revolutions per minute.

OILING

After lathe is fastened to floor, every oil hole should be located and a generous supply of machine oil should be used, practically flushing each revolving part, not only to give it the necessary oil, but also if any dirt or dust that may have located in the bearing during transportation may be washed out. The head stock, the apron, and the change gear brackets should receive special attention that all parts run free and easy. The same care and attention should be taken with the countershaft, both before it is placed on the ceiling and after it is set in position.

Oil Spindle Cone, two small headless set screws on large and small steps of spindle cone, oil, replace screws as these are to prevent dirt getting in.

Two small oil holes on Back Gear Quill should be oiled occasionally.

Oil for lathe or general machinery should be a good grade of machine oil.

STARTING LATHE

Lathe being belted, shipper rod adjusted, start the lathe up on open belt, slowest speed. If the spindle turns hard or if there is binding anywhere, stop the lathe, locate the source of trouble and use plenty of oil.

If the lathe runs all right on open belt, stop the spindle, loosen the bull gear screw, slip it down as far as it will go and throw in back gears.

Never throw in **back gears** while the lathe is running.

Never throw out **back gears** while the lathe is running.

If lathe runs smoothly with back gears in, stop the lathe, throw in the reverse, either direction, when reverse gear meshes with stud gear, fasten collar screw locking the reverse.

Never throw in the **reverse** while lathe is running.

Never throw out the **reverse** while lathe is running.

Start lathe up and if everything runs smoothly with reverse in, stop lathe and connect gears on change gear bracket with the small gear on reverse stud.

Never throw in change gear bracket to connect gears while lathe is running.

Never throw out gears on change gear bracket while lathe is running.

In connecting gears, the change gear bracket gears with small gear on reverse stud, there should be a slight play or shake between the teeth of the two connecting gears. This point is important in connecting **any two gears** as there should always be a little clearance between the top of the teeth and the bottom of the teeth of the opposite connected gear, in this way gears will turn with much less friction and give excellent results.

Now that lathe spindle runs smoothly with back gears connected, reverse the direction of the screw by shifting the reverse. With the change gears connected, we give attention to the carriage and apron.

CARRIAGE AND APRON

Oil thoroughly the way or V's on which the carriage or saddle runs. Move the carriage back and forth several times, mak-

ing sure tht it is properly oiled. Also oil the rear saddle gib by placing some oil on your finger and rubbing it under the rear way of lathe where this saddle gib operates.

FACE PLATE

In mounting a face plate on the spindle nose, care should be taken that all dirt is removed both from the thread of the spindle and the thread in the face plate. A little oil on the thread of the spindle nose, and the face plate will screw on much easier. If the face plate screws on tight, then there is dirt somewhere, take it off, remove the dirt and try again until face plate reaches the shoulder of spindle. The same caution should be used in attaching a lathe chuck to spindle.

LATHE CENTERS

It is very important that the lathe center be free from dirt before placing in the spindle. Use a rag on a stick and clean the spindle out carefully before putting in center.

Never put finger in spindle hole to remove the dirt.

Clean shank of center thoroughly and place center carefully in spindle hole. Push it home softly, then try it with finger and thumb, if it shakes, there is dirt there, clean out, try again and if center goes home snugly without shake, both center and spindle are clean. Pull it out and send it back with a quick thrust. Always remove center when using chuck.

The same procedure should be followed with the tail spindle center. This center is always hardened while the head spindle center is soft because the work revolves on the tail spindle center causing considerable wear, while the head spindle center revolves with the work, and should be trued occasionally using a tool in the tool post.

CENTERING

To turn or machine a shaft in the lathe, it is necessary that it be centered.

There are many ways of centering. The simplest way is to chalk the end of the shaft to be centered. Scratch two lines at right angles to each other, where they intersect will be the approximate center of the shaft. See Fig. 4.

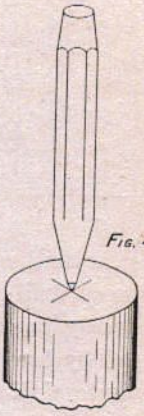
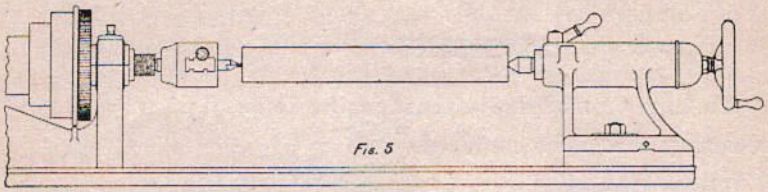


FIG. 4

Drive center punch on the intersection of lines on both ends of the shaft. Place the shaft thus marked on the centers of the lathe, revolve by hand; if it does not run true, hold a piece of chalk to the shaft while revolving and it will show the high spots. Place shaft in the vise once more and with the center punch and hammer, drive the center in the direction necessary to have the piece run true.

Long shafts may be centered with a breast drill or brace and bit, the regular countersinks may be used.

Drill and countersink each end of the shaft until a depth is reached sufficient to support the shaft thoroughly on the centers while it is being turned. A good method of countersinking is shown in Fig. 5.



A drill chuck in the head spindle of lathe holding a combined drill and countersink (see figure 5). The shaft has already been center punched. Place one end on tail center and feed by hand. Allow the countersink to enter the proper depth, countersink the other end in the same manner. The shaft is now ready to be turned.

PROPER DRILL AND COUNTERSINK

The depth of the countersink depends upon the diameter of the shaft to be machined and somewhat upon the depth of the cut to be taken. It is important that the countersink have the same taper as the lathe center.

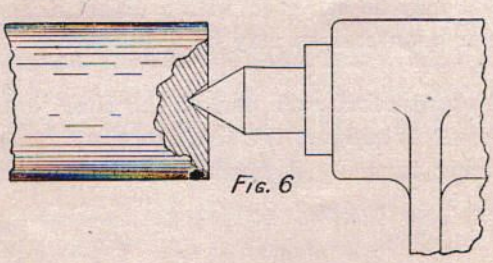


Fig. 6 shows a shaft countersunk in such a way that it does not fit on the lathe center, but rests on the point only. This very soon destroys the lathe center and will also ruin the shaft.

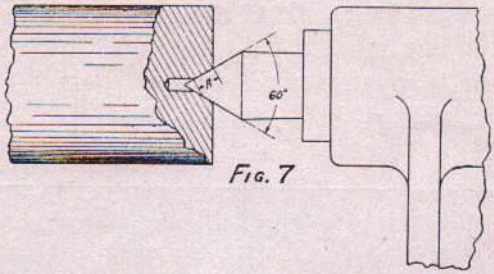


Fig. 7

Fig 7 shows the style of countersink which gives best results. The small hole is first drilled beyond the depth of the point of the lathe center; it is then countersunk on an angle of 60 degrees to fit the lathe center.

Fig. 5B is called a combined drill and countersink, which is both the center drill and countersink, but centering may also be done by a small twist drill for the center hole and a larger twist drill ground 60 degrees following as the countersink.

DRILL AND COUNTERSINK COMBINED

Fig. 5B

Fig. 8.

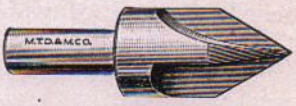
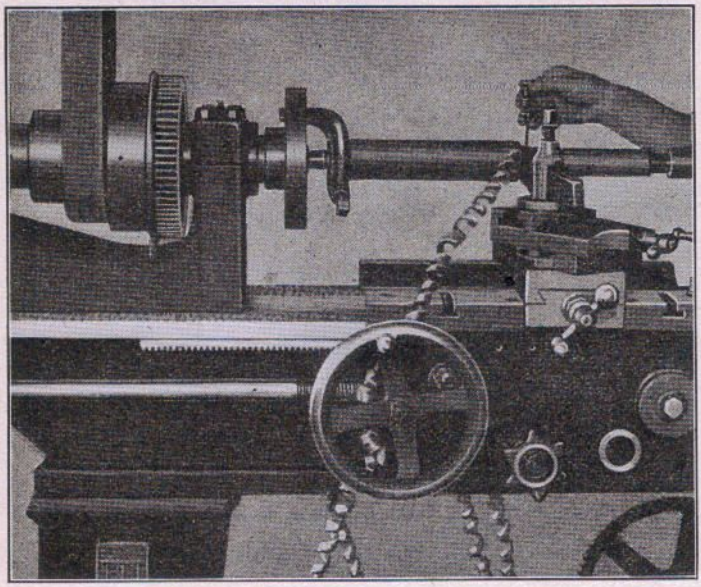


Fig. 9.

Figs. 8 and 9 show two style countersinks that are also used to follow the small center drill for countersinking.

DRIVING

After shaft is countersunk it is then ready for the lathe to be machined.



In Fig. 10 the shaft may be seen on centers with a lathe dog attached, the tail of which enters the slot in the face plate, which drives the work while it is being turned.

This is one means of driving a shaft. In addition to the common lathe dog there is a clamp lathe dog for holding rectangular pieces that are being driven in the lathe. (See page 16). Sometimes a shaft is held by one end in the lathe chuck, the other end being supported by a steady rest.

Clamp Lathe Dog

Common Lathe Dog

FACING END OF SHAFT

If accurate work is to be done, the end of the shaft must be faced so that it will ride on the centers evenly. A side tool is usually used to do the facing. See Fig. 11.

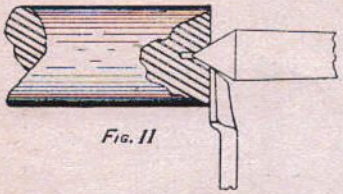


Fig. 11

In facing with a side tool, it may be necessary to face into the countersink. On reaching the edge of the countersink, tail center may be withdrawn slightly. This enables the side tool to face the end clean.

When shaft is faced it is ready for general machining. Place a drop of oil on the tail stock center, seeing that oil is also in countersunk hole. Adjust the tail stock center so that the shaft has the slightest play on the center or that it does not turn hard on the centers, then fasten the tail stock spindle by the binding clamp.

POSITION OF TOOL

The position of the tool is quite important in turning metal, but in most work we find that a little above the center is the proper height. See Fig. 12.

Care should be taken that the tool does not extend too far from the tool post, especially on heavy cuts.

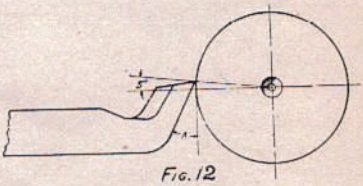


Fig. 12

ARRANGEMENT OF GEARS FOR THREAD CUTTING

For thread cutting see index plate on lathe, showing gears required to cut the desired thread. Arrange the gears as shown by index plate.

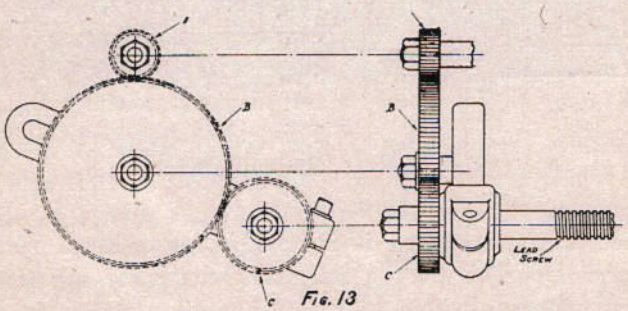


Fig. 13

Fig. 13 shows an arrangement of simple gearing for cutting a 16 thread on a 13" lathe equipped with a reverse and power feed.

A is the stud or spindle gear. B is the idler gear. C is the lead screw gear. The index plate shows that for 16 thread A gear should have 32 teeth. C gear 64 teeth. The B gear may be any size that will connect the two. To cut 16 thread left hand simply change the position of the reverse.

COMPOUND GEARING

In the arrangement of gears for thread cutting when the diameter of the gears become too large for convenience, we then compound.

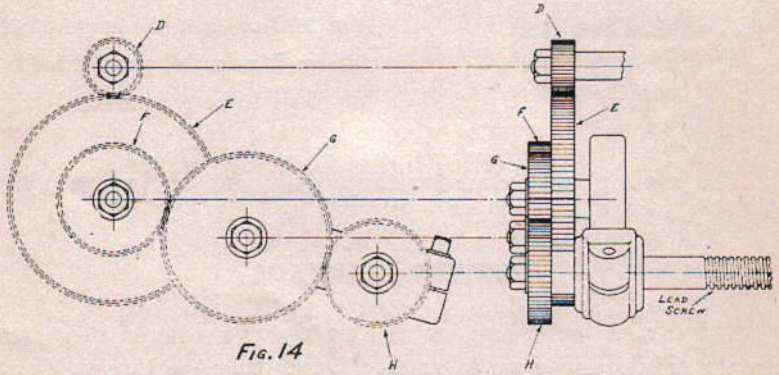


FIG. 14

In Fig. 14 is shown a two for one compound. This is arranged for cutting a 32 thread on a 16" lathe. The lathe is equipped with both reverse and automatic feed. D is the spindle or stud gear. H is the lead screw gear. E and F are the two for one compound. G is the idler which connects F and H. See index plate for cutting a 32 thread on 16" lathe. D is a 24 tooth gear. H is a 48 tooth gear. E is 104 tooth gear. F is a 52 tooth gear. G is the idler gear and may be any number of teeth that will connect F and H.

In cutting left hand thread on either of the above charts, simply change the position of the reverse. This changes the direction of the lead screw.

SETTING OF THREAD TOOL

The point of thread tool should be ground to an angle of 60 degrees and should be set about at the center of the work. The thread gauge is used for setting the tool. See Fig. 15.

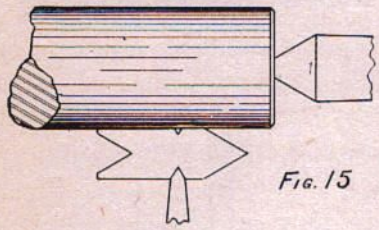


FIG. 15

This is also a gauge for grinding the tool. Then adjust the tool so that the edge of the guage is parallel with the shaft or piece to be threaded.

The same plan is used for the adjustment of threading tool for cutting internal thread. See Fig. 16.

CUTTING THREADS

The thread tool being set and the gears arranged to get the proper pitch desired we are ready for cutting the thread. When the material to be cut is soft machine steel, plenty of oil must be used on the tool The depth of each chip depends a great deal upon the diameter and the pitch of the thread to be cut. A beginner should take very light chips and a little experience will teach him the proper depth of cut, as there is no standard rule.

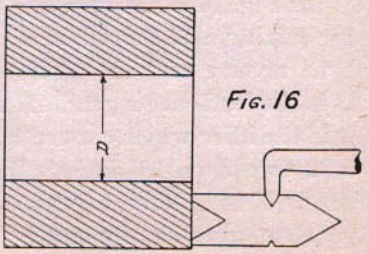


FIG. 16

Before starting to cut threads see that the automatic feeds of the lathe are not in contact, but are free and neutral. In thread cutting use the split nut on the lead screw. See that the split nut is oiled and that there is also plenty of oil on the lead screw. The depth of each chip may be governed by the graduated collar on the cross feed screw as this collar reads in one-thousands of an inch.

Being ready for the first chip, start the lathe up, enter the tool at the end of the shaft, five-thousands of an inch deep, when the point is reached where thread ends, draw the tool out, throw the shipper back. This reverses the direction of the lathe spindle and allows the carriage on the lathe to travel back automatically. Care should be taken that the point of the tool is withdrawn at a safe distance from the work so that the tool will not destroy the thread on its backward travel.

Usually two complete turns of the cross feed screw will withdraw the tool the required distance to clear the thread.

In thread cutting the part being threaded should revolve very slowly.

When the point of the tool has reached the beginning of the cut, proceed in the same manner to take another chip and continue this process until the thread is finished.

The same plan is used in cutting an acme or a square thread, as well as internal threads.

A nut may be used as a gauge in finishing and sizing the thread.

Never remove the dog on the screw you are cutting till the thread is finished. Always put the tail of dog in the same slot of face plate after trying screw.

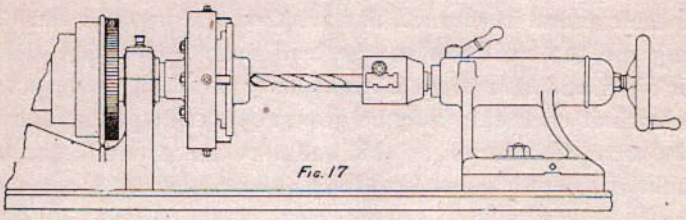


Fig. 17 shows a lathe chuck mounted in the head spindle and a drill chuck mounted in the tail spindle of the lathe. In a former illustration we showed the drill chuck attached to the head spindle. The taper in tail spindle is exactly the same as that in head spindle, so that a drill chuck fitted with a taper shank to fit the head spindle may be used in the tail spindle. This feature will be found very convenient for a great variety of work.

CENTER REST

The center rest is used to support a long slender shaft that is being machined. It may also be used for drilling, boring, etc.

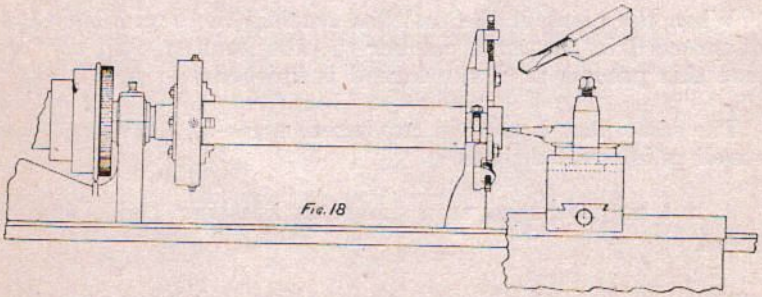


Fig. 18 shows a short shaft mounted on the center rest driven by the lathe chuck. This shaft is 2" in diameter and 12" long. It

is to have a ¾" hole drilled through the entire length. It is necessary to center shaft so that drill will start true. Cut shows the centering tool fastened in tool post. The point of this tool is exactly like an ordinary flat drill. Start the lathe up, adjust the tool so that it is approximately at the center of the shaft and move the carriage so the tool feeds in carefully. When the tool begins cutting it will show the exact center of shaft so that the tool may be adjusted if necessary.

When center of above shaft is about ⅛" deep, remove the centering tool, use the drill chuck in tail spindle, as in Fig. 17, fasten the drill in chuck and proceed with the drilling, using the hand wheel of tail stock for feeding.

TURING TAPER

To turn taper on a lathe the tail stock is set over off center a sufficient distance to get the desired taper.

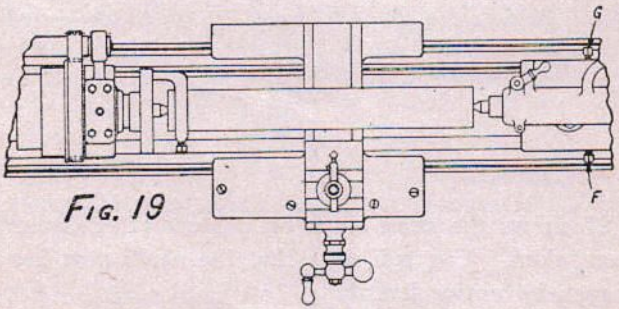


FIG. 19

Fig. 19 shows a sraight shaft in the lathe centers, with the lathe centers in perfect alignment.

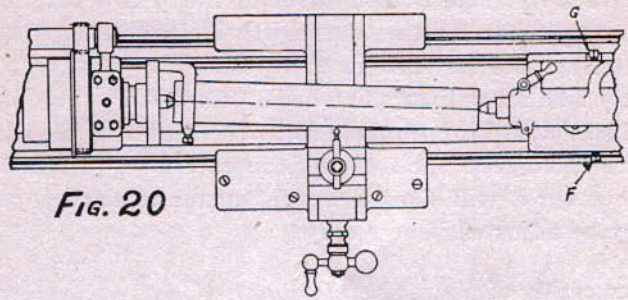


FIG. 20

Fig. 20 shows the same shaft in the lathe, but with the tail stock adjusted to the front about ¼".

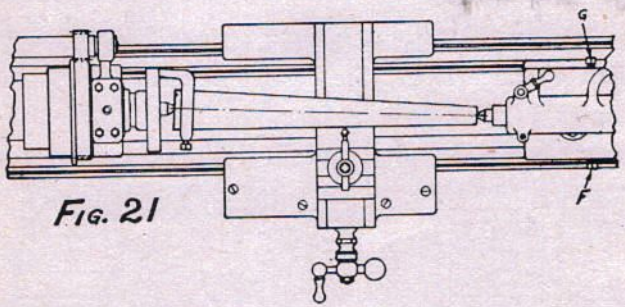


FIG. 21

Fig. 21 shows the same shaft on centers after several chips have been taken. You will note that the shaft now has considerable taper its entire length.

To set over the tail stock to turn taper, loosen up tail stock, then unscrew set screw F the proper distance, screwing in set screw G the same distance; this will set over the top of the tail stock; then clamp tail stock to bed once more and try for taper.

In testing the taper of a piece that has been machined: For example: a new center for another lathe, take several chips off the blank and when the end of the center being machined is small enough, insert it in the taper hole which it is to fit, carefully shaking to locate the bearing. This will show whether the taper is too great or not enough. Adjust the tail stock accordingly, make another test and continue until your taper is approximately fitted. For final test make two or three chalk marks the entire length of the taper and place in the spindle once more and turn carefully by hand, if there is a high spot or if it is a perfect fit it will be shown on the chalk marks.

When extreme tapers are to be turned or when a great deal of duplicate taper parts are to be machined, a taper attachment is recommended.

For taper boring the compound rest may be used, or the work to be bored may be clamped on to the carriage of the lathe and a boring bar may be used on centers. This boring bar carries a fly cutter. By setting over the tail stock, the taper hole may be bored in the same manner as described for turning a taper shaft.

FITTING A LATHE CHUCK TO THE SPINDLE

Fitting a lathe chuck to the spindle nose of a lathe is a rather difficult job, especially where one is not equipped with the necessary tools for doing this work. In a shop where there is only one lathe it is impossible for the operator to fit his first lathe chuck to that lathe, he will be obliged to use his neighbor's lathe for the job.

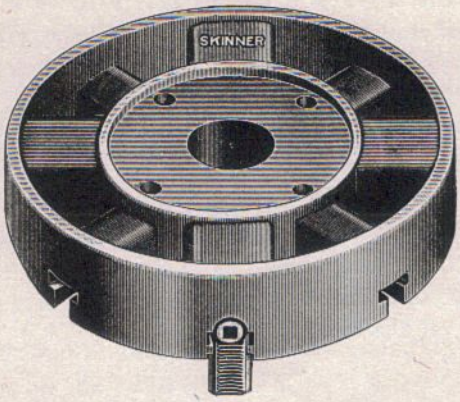


Fig. 30.

Fig. 30 shows the rear view of an Independent Lathe Chuck. Note the recess for the chuck plate. All lathe chucks are fitted with this recess.

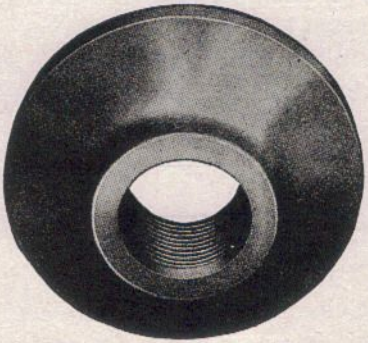


Fig. 31.

Fig. 31 shows a semi machined chuck plate that has been bored and threaded to fit the spindle nose of a lathe having a flange large enough to fit the recess of chuck desired for the lathe.

The lathe manufacturer has a special equipment and he usually carries a large stock of these semi-machined chuck plates on hand for the accommodation of the customers, making only a nominal charge, which is approximately the actual cost.

The semi-machined chuck plate is machined only where it fits on spindle nose of lathe; that is it is bored and threaded. Otherwise the casting is rough and should be machined all over in order to true it up before attempting to fit it to the chuck.

If you wish a chuck for your lathe, it will be economical to order a semi-machined chuck plate, specify the size lathe and the size of chuck. Screw semi-machined chuck plate on to the nose of the lathe spindle, turn the diameter of the flange so that it fits snugly into the recess of chuck. The fit should not be tight as the flange should be small enough so that the operator can press the chuck plate right to the bottom of recess by hand, still flange should be large enough so there is no shake.

To locate the screw holes on chuck plate, put a little red lead around the holes in chuck, place chuck plate in carefully and tap with hammer handle. Drill the holes in chuck plate about 1-16 inch larger than the size screw that will be found with chuck plate for attaching. These holes have nothing whatever to do with the true running of the chuck. Attach chuck plate to chuck with the proper screws and chuck is now ready for use.

Keep your chuck on a shelf or hang it on the wall. Do not keep it under lathe where chips and dirt will fall on it.

THE CUTTING SPEED FOR DIFFERENT METALS

There is no positive rule for cutting speed as a great deal depends upon the feeds of the lathe and on the job to be machined. The following speed is recommended where high speed cutting tools are used:

Soft Cast Iron	55	feet per minute
Hard Cast Iron	30	" " "
Hard Cast Steel	35	" " "
Soft Machine Steel	35	" " "
Hard Machine Steel	25	" " "
Wrought Iron	40	" " "
Tool Steel, Annealed	25	" " "
Tool Steel, Not Annealed	18	" " "
Soft Brass	120	" " "
Hard Brass	100	" " "
Bronze	70	" " "
Bronze, Gun Metal	50	" " "
Grey or Red Fiber	50	" " "

GEAR GUARDS.

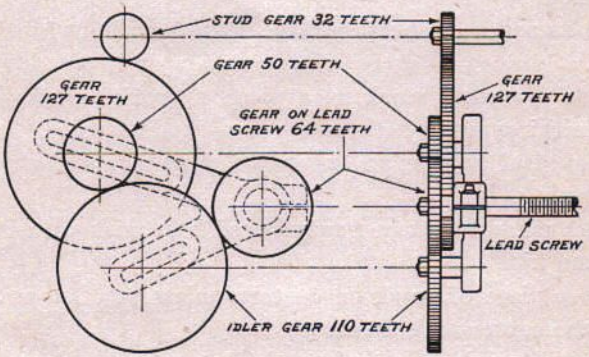
Gear guards may be furnished with all lathes from 9" to 18". These gear guards cover all back gears complete and also the change and reverse gears on the end of the lathe. If wanted these gear guards will be furnished at extra cost. Price depending upon the size of lathe they are intended for.

METRIC THREADS ON AN ENGLISH LEAD SCREW

To cut metric threads on our Lathe, use the compound idler or connecting gears 50 and 127: 50 gear to mesh with gear on screw through idler. 127 gear to mesh with gear on stud.

Read the chart as so many threads per centimeter instead of so many threads per inch.

Arrangement of gear for cutting 16 threads per centimeter.



HORSE POWER

The horse power required to drive a lathe depends a great deal upon the work that is being done on the lathe and the feeds that the operator is using. Below we show horse power that will drive a lathe up to its full capacity under a maximum load.

9	inch	Lathe	½	Horse	Power
10	"	"	½	"	"
11	"	"	½	"	"
12	"	"	¾	"	"
13	"	"	1	"	"
16	"	"	2	"	"
18	"	"	2½	"	"

We have seen a 13-inch Lathe driven by a ½ horse motor and the power seemed amply sufficient for a medium load.

DON'TS FOR MACHINISTS FROM "MACHINERY."

Don't run a Lathe with the belt too loose.

Don't run the point of your lathe tool into the mandrel.

Don't rap the chips out of your file on the lathe shears.

Don't set a lathe tool below the center for external work.

Don't start up a lathe without seeing that the tailstock spindle is locked.

Don't put an arbor or shaft on lathe centers without lubricant on them.

Don't leave too much stock on a piece of work to take off with the finishing cut.

Don't try a steel gage or an expensive caliper on a shaft while it is running.

Don't put a mandrel into a newly bored hole without a lubricant of some kind on it.

Don't put a piece of work on centers unless you know that the internal centers are clean.

Don't try to straighten a shaft on lathe centers, and expect that the centers will run true afterwards.

Don't put a piece of work on lathe centers unless you know that all your centers are at the same angles.

Don't set the cutting point of a lathe or planer tool any farther out from the toolrest than is absolutely necessary.

Don't take a lathe center out of its socket without having a witness mark on it, and put it back again according to the mark.

Don't start polishing a shaft on lathe centers without having it loose enough to allow for the expansion by heat from the polishing process.

Don't run your lathe tool into the faceplate.

Don't try to knurl a piece of work without oiling it.

Don't run a lathe an instant after the center begins to squeal.

Don't forget to oil your machine every morning; it works better.

Don't forget that a fairly good center-punch may be made from a piece of round file.

Don't forget that a surface, polished with oil will keep clean much longer than one polished dry.

Don't forget that the closer you can get your toolrest to the fork, the better it is.

Don't start to turn up a job on lathe centers unless you know that the centers are both in line with the ways.

Don't cross your belt laces on the side next to the pulley, for that makes them cut themselves in two.

Don't try to cut threads on steel or wrought iron dry; use lard oil or a cutting compound.

Don't run a chuck or faceplate up to the shoulder suddenly; it strains the spindle and threads and makes removal difficult.

Don't screw a tool post screw any tighter than is absolutely necessary; many mechanics have a false idea as to how tight a lathe tool should be to do its work.

Don't leave a wrench in a chuck; always remove it.

When using the automatic cross or longitudinal feed on a lathe be sure that the split nut is not closed on the lead screw.

To drive the center out of head spindle use a rod and drive through the hole in spindle.

When putting a lathe chuck on the head spindle, always remove the center, because many times in drilling a piece on the chuck the operator forgets that the center is in and drills right through the job and destroys the center.

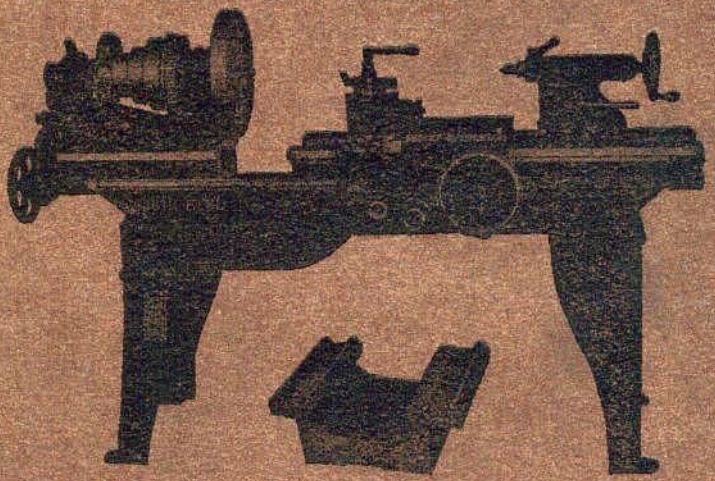
When the center is removed from the head spindle of the lathe, always put in a piece of rag to prevent any dirt from collecting in the spindle.

KEEP YOUR LATHE AND TOOLS CLEAN

HAVE A PLACE FOR EACH TOOL AND KEEP EVERYTHING IN ITS PLACE.

INDEX

SOUTH BEND GAP BED LATHE



BUILT IN THIRTY SIZES AS SHOWN BY X
STRAIGHT OR GAP BED

Swing of Lathe	Length of Bed									
	3'	4'	5'	6'	7'	8'	10'	12'	14'	16'
No. 24— 9"	x									
" 26—10"	x	x								
" 28—11"			x	x						
" 30—12"			x	x	x	x				
" 32—13"			x	x	x	x	x			
" 34—13"			x	x	x	x	x			
" 40—16"				x		x	x	x	x	
" 44—18"				x		x	x	x	x	x

Foot Power, Steam Power or Electric Motor Power

SOUTH BEND MACHINE TOOL CO.
SOUTH BEND, INDIANA, U. S. A.

PEERLESS PRESS SOUTH BEND IND.