CARE AND OPERATION

OF THE

CLAUSING LATHE

The purpose of this booklet is to acquaint the new owner with the Clausing Lathe, how to take care of it, how to operate it. No attempt will be made to give instructions on lathes in general.

HOOD
3 STEP COUNTER SHAFT PULLEY
SHAFT
GRAPHITE BRONZE BEARING COUNTERSHAFT ASSEMBLY
1 STEP COUNTER SHAFT PULLEY
SLEEVE BEARING HOUSINGS
BEARING HANGERS
THRUST COLLARS
GREASE SEALED BALL BEARING CLUTCH COUNTERSHAFT ASSEMBLY
CLUTCH LEVER
2 STEP ALUMINUM PULLEY
SHAFT
BALL BEARING
BEARING HOUSINGS
BEARING HANGERS
CLUTCH ASSEMBLY
OIL CAN
REVERSE PLATE
REVERSE GEARS
60-20 GEAR
100-25 GEAR
100 TOOTH GEAR
SMALL BACK GEAR
LARGE BACK GEAR
QUADRANT
VIEW OF GEAR TRAIN
COUNTERSHAFT PULLEY
HEADSTOCK PULLEY
HEADSTOCK PULLEY GEAR
SPACING COLLAR
BACK GEAR LEVER
BULL GEAR
BULL GEAR LOCK
TOOL POST ASSEMBLY
COMPOUND SLIDE
HEADSTOCK SPINDLE GEAR
TWIN REVERSE GEARS
REVERSE IDLER GEAR
STUD GEAR
HEADSTOCK
TAILSTOCK
CROSS SLIDE
CARRIAGE LOCK
CARRIAGE
QUADRANT
LONGITUDINAL LEAD SCREW
MANUAL LONGITUDINAL FEED
SPLIT NUT LEVER
APRON
POWER CROSS FEED CONTROL

OPERATION OF THE LATHE. After your new lathe has been accurately set us, checked and oiled, it is ready to be operated. Before attempting to do work on the lathe, familiarize yourself with the functioning of all the parts.

HEADSTOCK. The headstock of the lathe holds and drives the work at the different speeds selected. One group of Clausing Lathes have two sets of speeds and another group has three sets of speeds. Of the first group the two sets of speeds consist of the direct belt drive and the back-geared drive. Of the second group the three sets of speeds consist of the **high speed** direct belt drive, the regular speed belt drive and the back-geared drive. Both groups of lathes have three separate speeds in each set of speeds.

To change speeds in the first group of lathes, raise the hood. This automatically releases the belt between the counter shaft pulley and the headstock pulley and allows it to be shifted without straining. There are three steps on these pulleys allowing three speeds. This represents one set of speeds of the first group. The second set is the back geared speeds. To go into back gear raise the hood. Revolve the headstock pulley by hand until the knurled thumb wheel comes up. Turn this knurled thumb wheel counter clock-wise until the bull gear and headstock pulley are free of each other. Next pull the back gear lever toward you. It may be necessary to turn the headstock pulley to get the back gears to mesh. By shifting the belt you have three speeds while in back gear. When going from back gear to direct belt drive push back gear lever away from you and turn thumb wheel clockwise as tight as possible.

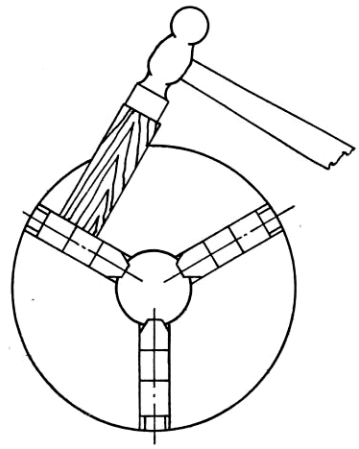
To change speeds in the second group of lathes you follow the same instructions as given for the first group. For the **high speeds** of this second group of lathes you change the belt from motor to counter shaft, revolving the counter shaft at motor speed. On this group of lathes the motor pulley is adjustable so that the same belt tension can be had at either step.

HEADSTOCK SPINDLE. Has a ⅝ in. hole through the center and a No. 3 Morse Taper reduced to a No. 2 Morse Taper with a reducing sleeve. Whenever you wish to use a tool with a No. 3 Morse Taper shank, knock out the reducing sleeve. This should be done with a rod ¾ in. in diameter, and preferably, made of brass or bronze so as not to damage the sleeve.

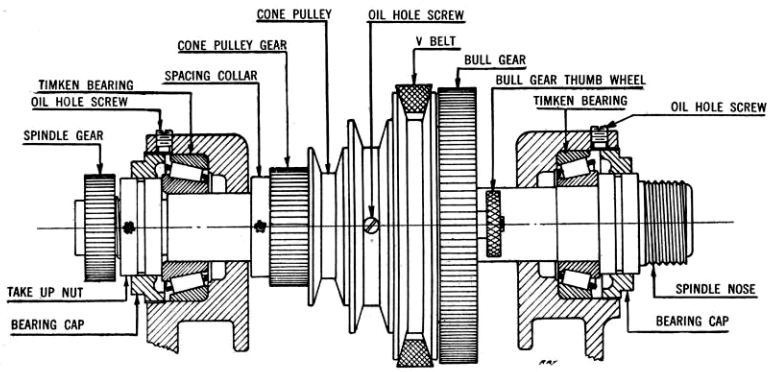
The headstock spindle nose is threaded to receive face plates, lathe chucks and the special Jacob Headstock Chuck.

When screwing the chuck or face plate on the spindle nose do not slam it on as that will make it stick and very difficult to remove. Always be sure that the threads on the spindle nose and in the chuck, face plate or Headstock Chuck are clean. Dirty threads can also make these units stick. Dirty threads or a dirty spindle shoulder will, also, make these units perform inaccurately.

If you are caught with one of these units stuck to the spindle, lock the headstock cone pulley and bull gear together and draw the back gears into mesh. This locks the spindle. Now use the method illustrated to remove the respective unit you have stuck on your lathe. A strap can be used for all three units but the tapping method is most effective. Do not pound, just tap until the gentle jolting dislodges the unit. Pounding can break a tooth in your gear or strain your chuck.



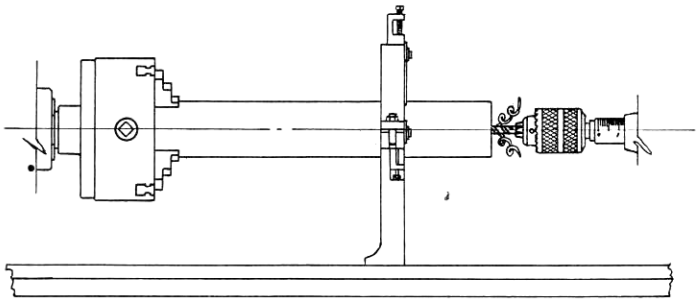
BEARING ADJUSTMENT. When the lathe chatters easily and the spindle seems to be too free, tighten the bearings. To do this remove the gear on the rear of headstock spindle. Then remove the bearing cap. Loosen the set screw that keeps the take-up collar from turning. With a spanner wrench or rod turn the take-up collar until the spindle has a slight drag. Then set your set screw, screw on the bearing cap and drive on the gear.



CHANGING HEADSTOCK BELT. To change the headstock belt the spindle must be removed. First remove the gear at rear of headstock spindle. Then remove both bearing caps. Now completely remove the take-up-nut. Loosen the set screw in the space collar. With a block of wood for pad drive the spindle forward. The rear bearing will slide off the spindle. Do not let it drop or get dirty. The bull gear is pressed on the spindle and can be driven off. Place a block between the bull gear hub and the headstock casting so all the pressure will be on the hub and none on the rim, which would break the gear. As you drive the spindle forward the spacing collar, pulley and bull gear are stripped off of it.

TOOL HOLDERS. Every lathe should have an assortment of tool holders so that every type of machine work can be reached quickly, conveniently. The tool holder is a drop forged piece of steel that is held in the tool post. The tool holder, in turn, holds a piece of high speed steel which cuts the metal that is to be machined. In addition to a set of tool holders there should be a wide variety of ground tool bits. If the lathe operator has only two or three ground tool bits he will soon find himself up against a job that requires a different shape tool bit than he has. He will be tempted to regrind one of his ground tool bits to fit the purpose. This would be the wrong thing to do as it will waste his time as well as his high speed steel. The right thing to do is to grind a new tool bit everytime a new shape is required. Soon the lathe operator will have a stock of shapes that will answer every requirement.

Using the Steady Rest on a job of drilling into the end of a shaft.

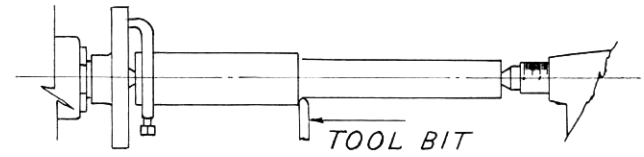


STEADY REST. The steady rest is used to give support to long round pieces, or bars of small diameter, rotating between centers. It provides a fixed support between the headstock and tailstock ends of the work while it is being machined. Without the steady rest, many long pieces of small diameter could not be turned. The work would spring away from the tool or climb upon the tool and bend. The steady rest is also used for holding long bars while drilling into the ends of them. The other end being held and turned by a chuck. This is the most accurate method of drilling a hole directly down the center of a rod.

The steady rest is clamped on the bed of the lathe and aligned by the V way.

FOLLOWER REST. The follower rest is also a work supporter, like the steady rest. Unlike the steady rest, it is bolted to the carriage and follows the tool bit. This accessory is used when making a long turning on a slim piece of stock.

Illustrating the use of face plate, lathe dogs and lathe centers. The work is first drilled at each end with the combination center drill and counter sink. The lathe centers then hold the work in the lathe. It is revolved with the lathe dog.



UNPACK CAREFULLY. If your lathe could have been picked up in our plant and set down in your shop, ready to use, we could eliminate the trouble that transportation sometimes causes. But the lathe has to be handed over to transportation companies and handled by men who do not always appreciate that they are transporting a precision tool and that it deserves a certain amount of respect. Therefore, in unpacking your lathe, note carefully if everything is in good order. If there is visible evidence of poor handling, file a claim with the transportation company that made final delivery. If you wish us to file the claim for you, send us your paid freight bill. If you purchased your lathe from a dealer and it was delivered in its original crate, report any abuse of the lathe to your dealer immediately. Poor delivery is the exception and not the rule. The customer is always protected, in the event of poor delivery, by the responsible dealer or transportation company and by the Clausing Mfg. Co.

In removing the crate and setting the lathe up always remember that it is a precision tool, built to perform to within .001 in. If it is abused it cannot be expected to retain this accuracy.

With some kerosene or furnace oil remove the rust preventive oil that was applied at the factory. After your new lathe is thoroughly cleaned, re-oil all unpainted surfaces with a light oil. The bed ways and slide rest ways should be cleaned and re-oiled each day. Keeping your lathe cleaned and well oiled is the first step toward keeping it accurate.

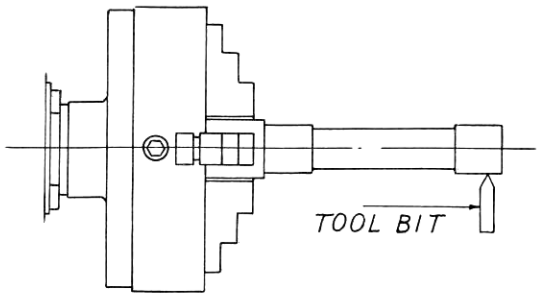
LOCATING LATHE. If your lathe is a bench lathe, see that the bench will not distort the lathe when the lathe is bolted to it. Clausing Bench Lathes are bolted to the bench with three bolts. Two at the headstock end and one at the tailstock end. This, in itself, guards against distorting the lathe but if the bench is very uneven it can still be strained. If necessary, place a washer under the bench feet at each point where the bolt is coming through.

If you have three points of contact the lathe bed cannot be strained by bolting to the bench.

If your lathe has floor legs the surest way to check it to determine that it hasn't been distorted by bolting it down is to use a precision level at the headstock end and tailstock end of the bed. If the bubble is in the same position at both ends, your lathe bed has not been twisted.

The lathe may be leveled by placing shims under the legs. See that all four legs are supported by the floor, see that the lathe is level. If you are locating the lathe on a cement floor fasten it down with anchor bolts. If on a wood floor, fasten it down with lag bolts. If you are locating the lathe temporarily and do not want to mar the floor just see that the lathe is level and supported under all four feet of the floor legs. If the lathe is moved even a few inches, it must again be leveled and supported.

The importance of fastening the lathe to the bench or floor without straining the bed cannot be appreciated except by the experienced mechanic. It appears that the heavy rugged lathe bed casting could not possibly be distorted. As far as the naked eye can see, it cannot be but sensitive indicators reveal that a deflection of .005 or .010 inch is easily possible through careless anchoring of the lathe.



TESTING LATHE. You will find a card attached to your lathe on which are recorded the accuracy tests of this particular lathe. Most shops do not have the equipment to make these same tests but any shop can make a test that will reveal whether the headstock is in alignment with the bed. Chuck a piece of steel, one inch or larger in diameter, projecting three or four inches away from the chuck. Make a roughing cut across this and then, with a newly sharpened tool bit ground to a point, make a light finishing cut. After making the first finishing cut, without touching the cross feed, let the tool bit float across again. Now measure both ends of your cut with a micrometer. If they are alike, your lathe is accurately set up. If you will cut a relief in the center of your test piece, about 2 inches long and 1-32 inch deep, your test will be more accurate. This will insure that your tool bit has not worn or that the work has not heated during the final test cut.

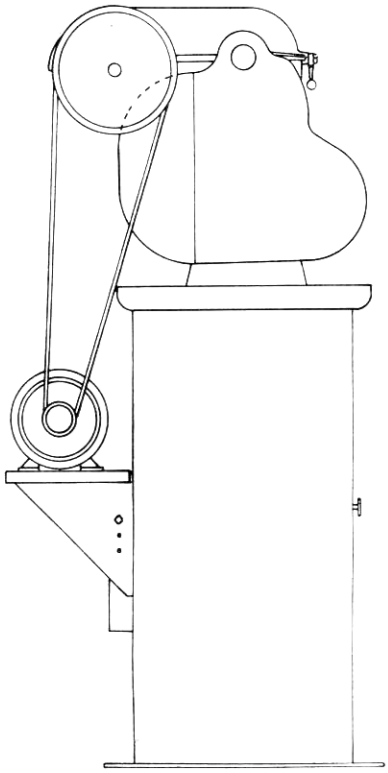
KEEP YOUR LATHE PROPERLY LUBRICATED

Follow the oiling chart that is enclosed with this booklet. Even before you use the lathe for the first time, oil all the places indicated on the chart.

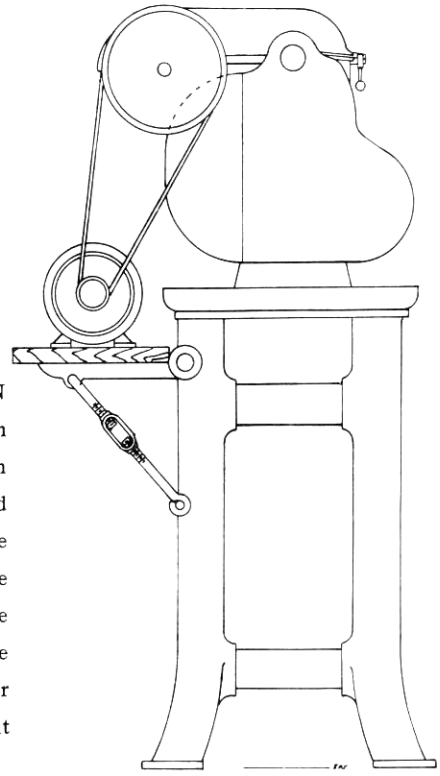
Clausing Lathes are designed so that oiling neglect will not immediately ruin the lathe. Timken bearings in the headstock, oil sealed ball bearings or graphite bronze sleeve bearings in the counter shaft protect fast moving parts. But neglect should not become a policy of the lathe owner for it is always possible to neglect too much and do damage to the lathe.

It is well to always oil in the same manner so that no oil holes will be missed. Do not use an excess of oil. It can do no good and will only flow out unused. In the Timken bearings an excess of oil can actually be harmful. The excess oil becomes an obstruction, causes friction and heats the bearing. If oil flows out of the bearings, after oiling, use less oil the next time.

LOCATING THE MOTOR. If you are mounting the lathe on your own bench, a logical place for the motor is on top of the bench, right below the counter shaft. It is also possible for you to build motor brackets of your own design so as to mount the motor to the side of the bench, below the top. The motor cannot be mounted under the bench, directly under the headstock. If you do so the belt will obstruct the gear cover.

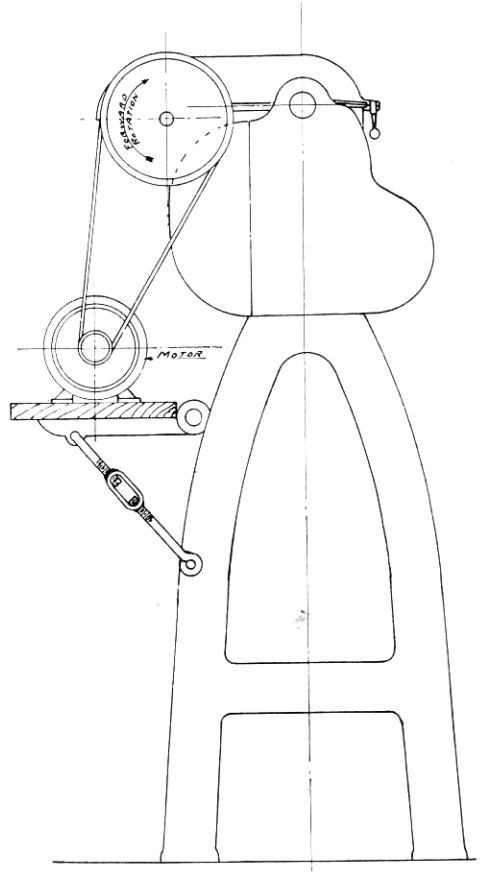


MOTOR MOUNTED ON METAL CABINET UNIT. A motor bracket is furnished with metal cabinets for this drive arrangement. Belt adjustment is by sliding bracket up or down and locking with pin.

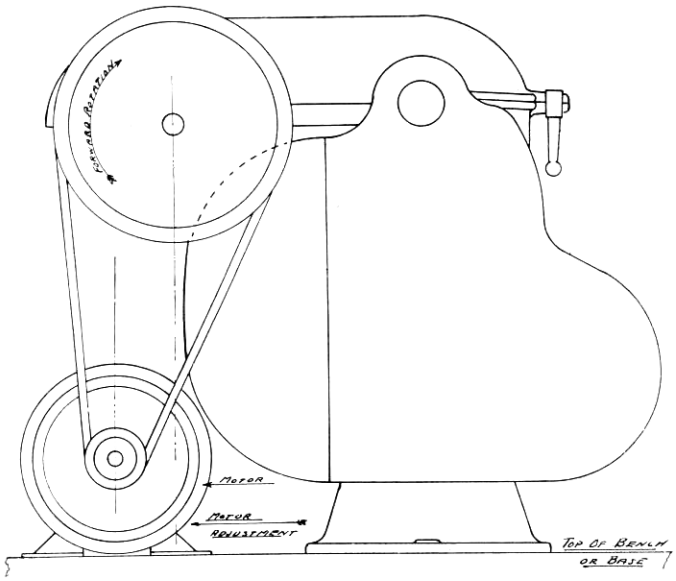


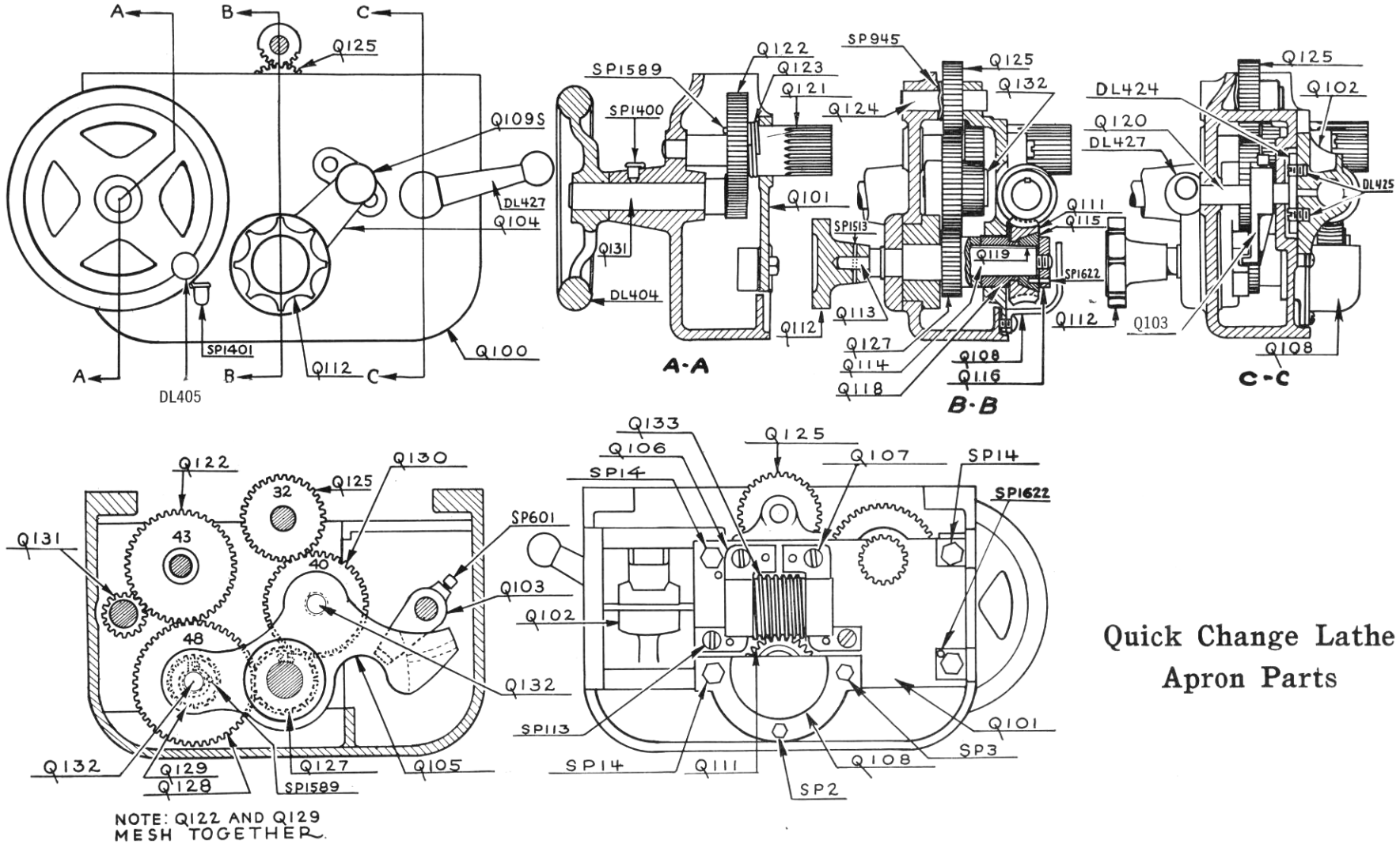
MOTOR MOUNT ON METAL BENCH with OIL PAN TOP. When an oil pan top is used on metal benches there is no place to mount the motor on top of the bench. By using the bracket used on floor legs an efficient mount is provided.

MOTOR MOUNT FOR LATHE WITH FLOOR LEGS. A motor mount is supplied with each set of floor legs. This motor bracket provides belt adjustment through a turn bucket.



MOTOR MOUNT FOR BENCH TOPS. On metal cabinets or metal benches with wooden tops or user made benches the motor can be mounted on top of the bench, underneath the counter shaft. By sliding the motor backward or forward, belt tension can be adjusted.





Quick Change Lathe Apron Parts

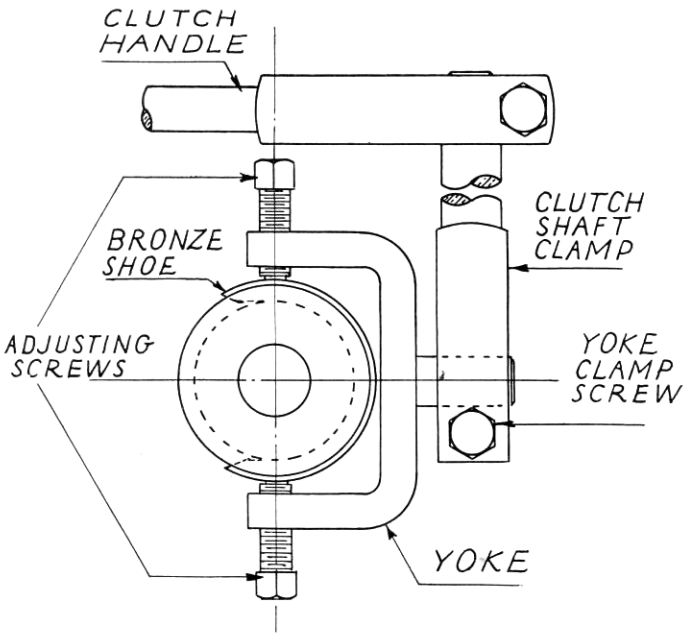
NUMBER	NAME	NO. USED
Q-100	Apron Casting	1
Q-101	Apron Wall	1
Q-102	Split Nut	1
Q-103	Safety Lock	1
Q-104	Feed Control Lever	1
Q-105	Feed Control Gear Bracket	1
Q-106	Left Worm Bracket	1
Q-107	Right Worm Bracket	1
Q-108	Oil Resevoir	1
Q-109S	Plunger Assembly	1
Q-111	Worm Gear	1
Q-112	Clutch Hand Wheel	1
Q-113	Clutch Bolt	1

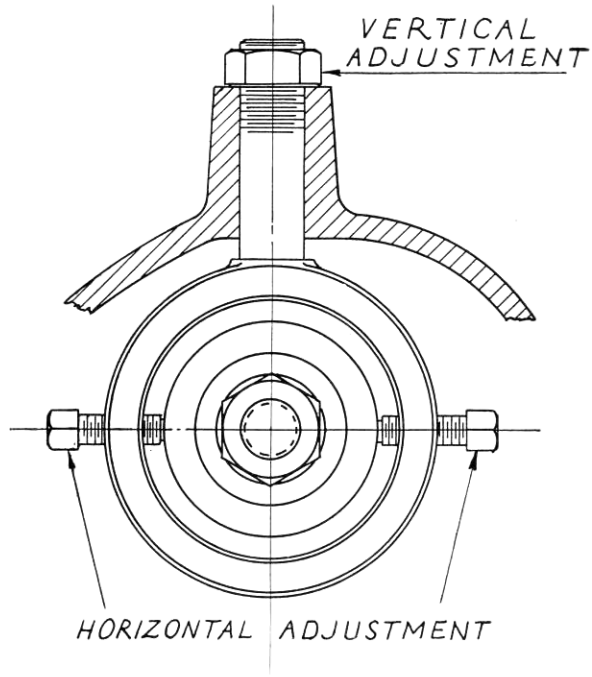
PART NO.	NAME	NO. USED
Q-114	Clutch Shaft	1
Q-115	Clutch Cone	1
Q-116	Clutch Nut	1
Q-118	Clutch Bushing	1
Q-119	Key	1
Q-120	Scroll Shaft	1
Q-121	Rack Pinion & Shaft	1
Q-122	43 Tooth Gear	1
Q-123	Pinion Shaft Spring	1
Q-124	Idler Gear Shaft	1
Q-125	32 Tooth Idler Gear	1
Q-127	25 Tooth Drive Gear	1

PART NO.	NAME	NO. USED
Q-128	48 Tooth Feed Gear	1
Q-129	19 Tooth Feed Gear	1
Q-130	40 Tooth Feed Gear	1
Q-132	Feed Gear Studs	2
Q-133	Worm	1
Q-131	Handwheel Shaft	1
DL-404	Handwheel	1
DL-405	Handwheel Handle	1
DL-424	Scroll	1
DL-427	Split Nut Lever	1
DL-425	Scroll Pins	2
SP-1400	Gits Oil Cup	1

PART NO.	NAME	NO. USED
SP-1401	Gits Oil Cup	1
SP-945	Spring Tension Washer	2
SP-1513	Type 5 3-32 x 1 Groov-pin	1
SP-1589	Type 3 5/8 x 3/4 Groov-pin	2
SP-1622	Type 4 5/8 x 1/2 Groov-pin	7
SP-113	5-16 x 3/4 Fil. Hd. CP screw	4
SP-14	5-16 x 3/4 Hex. Hd. CP screw	4
SP-2	1/4 x 3/8 Hex. Hd. Cp. Screw	1
SP-3	1/4 x 1/2 Hex. Hd. Cp. Screw	1
SP-601	1/4 x 1/2 Sq. Hd. St. Screw	1

COUNTER SHAFT SPINDLE. Keep the counter shaft spindle parallel with the headstock spindle. The counter shaft spindle can be adjusted in all directions.

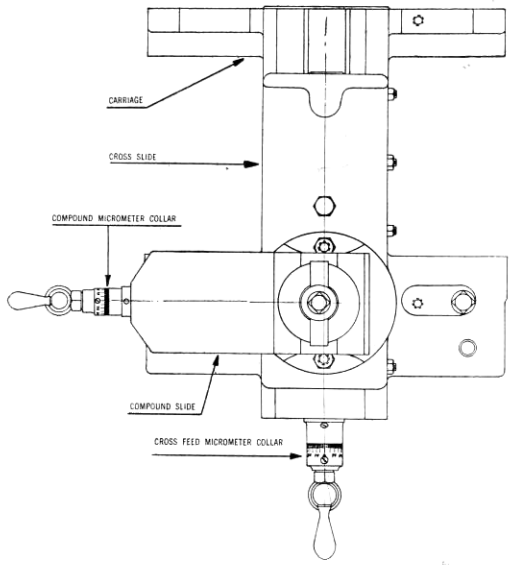


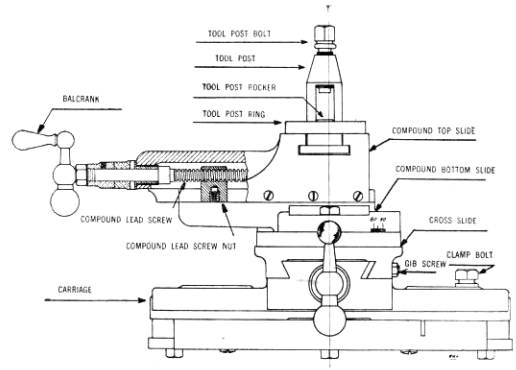


CLUTCH COUNTER SHAFT SPINDLE. Before adjusting the counter shaft spindle on which there is a clutch, release the clamp which holds the clutch yoke shank. If the adjustment is up and down, the hanger must also be adjusted up and down to correspond with it or the set screws in the yoke, which grip the bronze shoe, must be adjusted to correspond.

If your clutch engages itself or disengages itself look first to faulty adjustment. If the clutch is noisy or the clutch handle shakes excessively, check your adjustment. The clutch yoke should take a hole of the closer ring but should leave the counter shaft relaxed. If it pushes the counter shaft up or down or in or out, it should be corrected by adjustment.

ADJUSTING COUNTER SHAFT CLUTCH. When your clutch slips, fails to pull the load you wish to pull, it is ready to be taken-up. Release the set screw which keeps the take-up collar from turning. Turn the take-up collar until the clutch has the desired pull. Do not tighten your clutch too much as that exerts unnecessary strain on your closing mechanism. If the clutch is so tight that the belt will slip before it does, it is tight enough. Lock your take-up collar after adjustment is satisfactory.





CARRIAGE. The carriage is an important unit of the lathe. It travels along the bed, riding on the outer V way and the outer flat way. The movement along the bed is known as longitudinal travel or feed. The bed ways are protected from chips and dirt by felt wipers. These wipers should be replaced when they become packed and ineffective.

The carriage is gibbed to the bed in front and in back. This keeps the carriage from climbing up or twisting when making a heavy cut. When the lathe has a tendency to chatter, check the back gib. It may require tightening. In tightening do not create a drag on the carriage. The gib should be snug but it shouldn't bind.

The clamp bolt is used whenever a cross cut is made. The carriage is then locked in one spot so it cannot creep. When the lathe leaves the factory the carriage is locked with this clamp bolt. Before attempting to move the carriage, loosen this clamp bolt. Never engage the power longitudinal feed when the carriage is clamped to the bed.

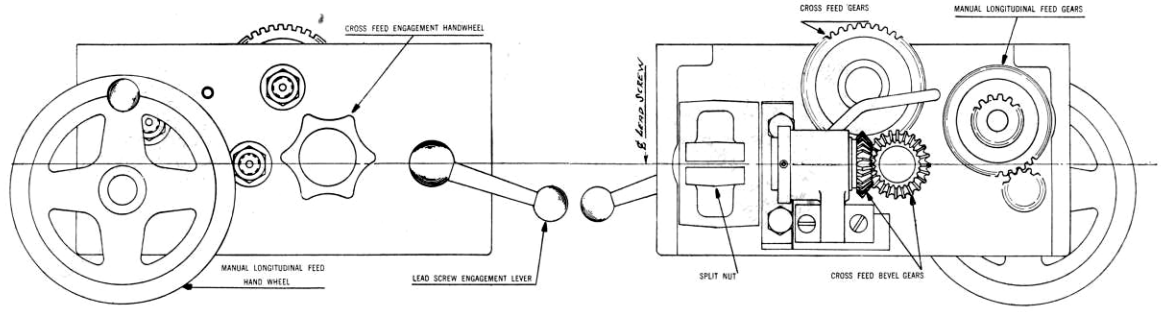
APRON. There are two types of aprons on Clausing Lathes, the standard and the friction. The standard apron is used on loose change gear lathes and the friction clutch apron is used on quick change lathes. The standard apron will be explained here and the quick change apron will be explained along with the quick change lathe.

With the standard apron the longitudinal power feed is through the split nut and lead screw, the same as when cutting threads. Your gear train, at rear of lathe, is arranged like section "D". (See Thread and Feed Chart). Always be sure that the split nut is fully closed when using it. If it is partially closed, riding on the edges of the threads, you can do damage to, both, split nut and lead screw. When using power longitudinal, be sure there are no obstructions in the path of the slide rest. Be on hand to stop it when it comes to the end of its range. Neglect in this matter will break something on your lathe.

The power cross feed on the standard apron, is engaged by turning a handwheel and engaging two bevel gears. Care must be taken to see that the bevel gears are fully meshed and not riding on the end of the gear teeth. The cross feed lead screw has a safety relief so that the cross feed stops when it comes to the end of its range and does not break anything.

The power cross feed and the power longitudinal feed can be engaged at the same time without damage to the lathe. Your tool bit will then travel at about a 45 degree angle.

The hand longitudinal feed is through a gear train and rack. This feed has a reduction, giving the operator greater leverage for smoother hand longitudinal feeds. For real smooth feeds always use the power feed, as the hand cannot be as steady as the machine.



STANDARD APRON

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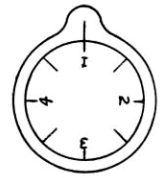
THREAD DIAL. The thread dial eliminates the necessity of reversing the lathe to return the carriage to the starting point when cutting threads. In this way it speeds up thread cutting.



The operator closes the split nut when the witness mark matches a mark on the dial. When he comes to the end of the cut he opens the split nut and returns the carriage by hand. Then when the witness mark again matches the mark he started with , he closes the split nut and starts another cut, knowing it will follow the first cut and not split the thread.

COMPOUND SLIDE. The compound slide, literally, means the cross slide and the swivel slide or the lower and upper slide of the slide rest. Among machinists the "compound slide" always means the upper slide alone. The lower slide is referred to as the "cross slide."

The lower slide rides on the dovetailed ways of the carriage. These ways should be cleaned and oiled frequently. The lower slide has a long grip on the carriage ways so that wear will be distributed the full length of the ways. This slide is equipped with flat gib to provide means of adjustment for wear The gib is held in place by gib screws which are locked by jam nuts.

The upper slide is fastened to the lower slide by two bolts held in T slots. When removing the upper slide, to fasten on some other unit such as a milling attachment or wood turning tool rest unit, loosen the two nuts that hold the upper slide down. Lift up on the upper slide and keep turning the nuts as you lift up until the unit comes off.

The upper slide is graduated in degrees. This slide can be swiveled to any predetermined angle.

Both slides of the compound have micrometer collars marked in .001 in. This permits advancing the tool bit a predetermined distance.

TOOL POST ASSEMBLY. The tool post fits in the T slot of the upper compound slide. This unit holds the tool holder. Always take as short a hold of the tool holder as possible. Keep tool post in center of T slot, if possible. These precautions will prevent chatter. Do not use a long handled wrench to tighten tool post bolt. Use only the wrench provided for the purpose.

BED. The bed of your lathe is the foundation. The accuracy of your lathe depends largely upon the bed. You have already been warned not to twist your bed when setting up the lathe. Do not drop wrenches or chuck on bed ways. Do not use the bed for an anvil. The slightest little nick can throw your lathe off. If you find you have no place to lay your tools, make a wooden tray that can be placed at the tailstock end of the bed. Keep the bed ways clean of chips. Oil the bed ways frequently with a light oil that will not gum.

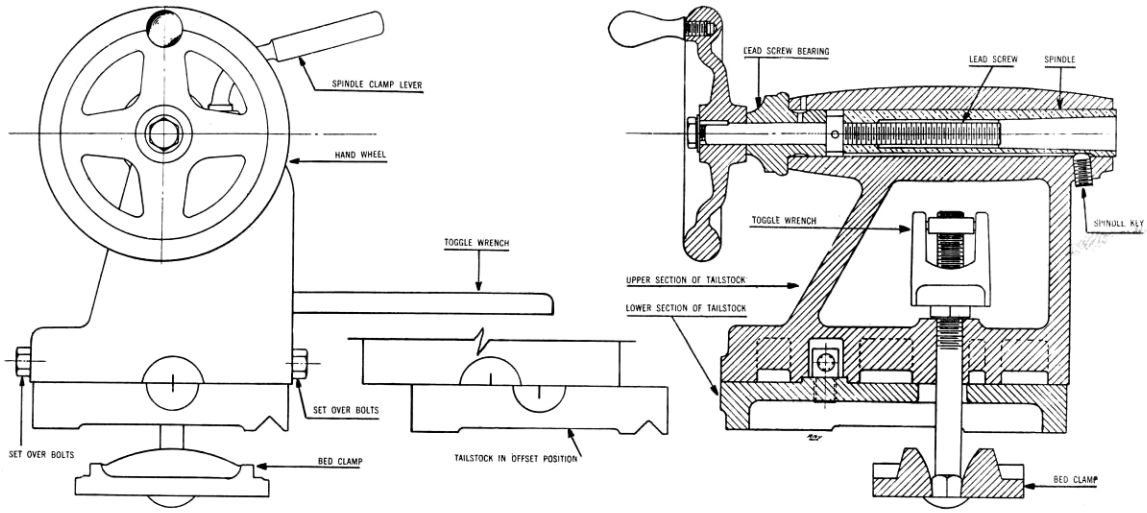
TAILSTOCK. The tailstock is used to hold "the other end" of the work, and to force drills and other tools into the work while the work is being revolved by the head stock.

The tailstock rests upon the bed, riding on one V way and one flat way. It is kept in alignment with the headstock by the V way. The tailstock is used at various points on the bed to accomodate various lengths of work. It is clamped to the bed by toggle wrench, bolt and clamp. When the wrench is lifted it is disconnected from the nut and can be shifted for another grip on the nut. After a little use the operator becomes so efficient he can quickly clamp or unclamp the tail stock without looking at it. The wrench is located at the rear of the tailstock so it will not tangle with the slide rest when machining short lengths of work.

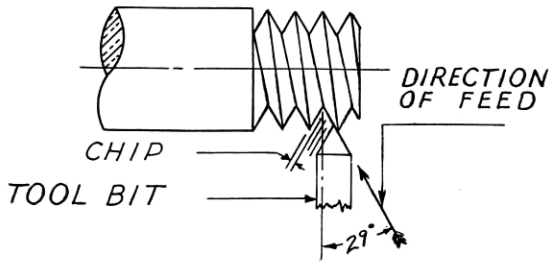
The tailstock spindle is graduated by $\frac{3}{8}$ inches for convenience in gauging depth drilling. The spindle can be locked at any point with the spindle clamp. When holding work between centers the spindle should always be locked.

The tailstock has a set-over for turning tapers. Do not have the tailstock clamped to the bed when shifting the set-over. If you are pulling the tailstock toward the front side of the lathe, first release the clamp that holds the tailstock to the bed. Second, turn the front set-over cap screw counter clock-wise, unscrewing it the amount you wish to set-over, or more. Third, turn the back set-over cap screw counter clockwise (viewed from the front of the lathe) the amount of the set-over. Fourth, turn the from set-over cap screw clock-wise until it tightens slightly. Your tailstock is set over and ready to use for turning tapers.

When setting your tailstock back to alignment without special tools for the purpose you will have to make trial cuts. You first set the tailstock back until the witness marks match. As far as the naked eye can see the tailstock is in alignment but you must remember that a few thousands of an inch is a measurement that is invisible. For ordinary work you do not need to bother about making the final precision alignment but if you wish to make a precision turning you must have precision alignment. Center up a piece of work and make test cuts at each end of the work, measure these test cuts with a micrometer. If the diameter is smaller at the headstock end than at the tailstock end, your tailstock has been set over too much and needs to be brought back to the front. By cutting and trying you will gradually secure precision alignment.

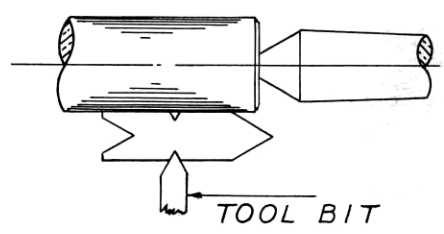


THREAD CUTTING. Threading on a lathe is a difficult task and skill has to be acquired before a smooth thread can be cut. The beginner's first attempt will be a rough and ragged thread. The points to watch are; 1—Have the work well supported. 2—Have your threading tool correctly ground or use a special threading tool. 3—Have the threading tool set square with the work and at the right level. 4—Do not take too large a bite. Your finishing cuts should not be more than .001 to .005 in. deep.



There are two methods of threading. One is to make plunge cuts. Go straight in with your tool bit until the proper pitch diameter has been secured. The second method is to make an angle feed with the compound. This method is usually used by experienced machinists. It produces a smoother thread and does not strain the work as much.

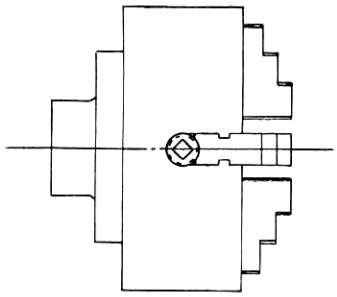
Set the compound slide at 29 degrees angle. After the work is mounted in the lathe and the threading tool is squared with the work, set the threading tool against the work. Just so it scratches it. Now set the micrometer collar, on the cross feed, to 0 or some specified number. When advancing the threading tool into the work always use the compound. When you come to the end of the cut, back your threading tool out of the work with the cross feed, set the slide rest over for the next cut and advance the tool bit to the point you started from. Advance the threading tool further into the work with the compound slide.



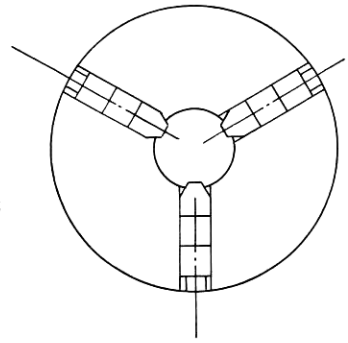
By this method all the cutting is done on the left side of tool bit. The main chip has a chance to curl up and roll off. The right side of the tool bit just shaves the work and keeps it smooth. The success of this method of threading depends largely upon having the threading tool correctly ground and correctly set in the tool post.

THREAD CHART. The Thread Chart clearly shows how to arrange the gear train so the lathe will cut any thread listed. This chart is self explanatory. A copy of this, etched on a metal disc, is attached to the gear cover of every standard lathe.

LATHE ACCESSORIES. The lathe cannot be operated until it is equipped with certain accessories. Only the basic accessories will be explained. These are lathe centers, lathe dogs, lathe chucks, drill chucks, steady rests, follower rests and lathe tools for the actual turning and boring operations.



INDEPENDENT FOUR-JAW LATHE CHUCK. Each jaw on this type of chuck can be moved independently. This chuck is used mostly in tool room and experimental work. where accuracy is more important than time. With the independent chuck a piece of work can be centered up more accurately than with the scroll chuck for the operator can keep moving the jaws until the work is on dead center. The independent chuck is also used for holding odd shaped work or setting work off center. The jaws on independent chucks are always reversible so the same set of jaws can be used for inside and outside chucking.



UNIVERSAL THREE JAW CHUCK. This is also known as a SCROLL chuck because most of them are built with a scroll to move the jaws simultaneously. This type of chuck is used in manufacturing as it will rapidly center up a piece of work. The jaws on the universal chuck cannot be reversed. These chucks are, therefore, supplied with two sets of jaws, one for inside chucking and one for outside chucking. Each set of jaws are numbered, No. 1, No. 2 and No. 3. No. 1 jaw goes in No. 1 T slot, etc. When inserting jaws, turn scroll until start of scroll approaches No. 1 T slot, then insert jaw No. 1. Next turn scroll until start of scroll approaches No. 2 slot, then insert jaw No. 2, etc.

The average new scroll chuck will center work to within .002 inch concentricity.

FITTING LATHE CHUCK. Chucks are fitted to the lathe by means of a chuck back or back plate, threaded to fit the spindle nose of the lathe. This back plate is machined to fit the recess in back of the chuck.

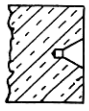
To machine the back plate, screw it on the spindle nose of the lathe and take a cut across the face and outer edge of it. Next screw the plate on backwards, and machine the back side. To machine the back side you should have a collar or washer between the plate and the spindle nose shoulder, as the threads are not relieved on the front of the plate.

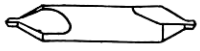
After the plate is machined all over, take another cut across the front side. When you machined the plate all over you relieved the surface strain of the casting, which may cause it to warp.

Now you come to the precision part of fitting the chuck back. Machine the outside edge or periphery of the plate until it fits into the recess in back of the chuck.

Do not machine the plate so large that you have to force it into the recess and do not machine it so small that it will rattle inside the recess. When you get close to the measurement required, cut only .001 inch per cut and try to fit the chuck over the plate between each cut.

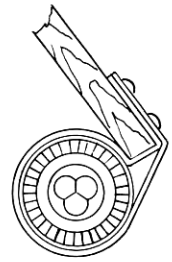
After the plate has been fitted to the recess, fasten it to the chuck with the screws provided.





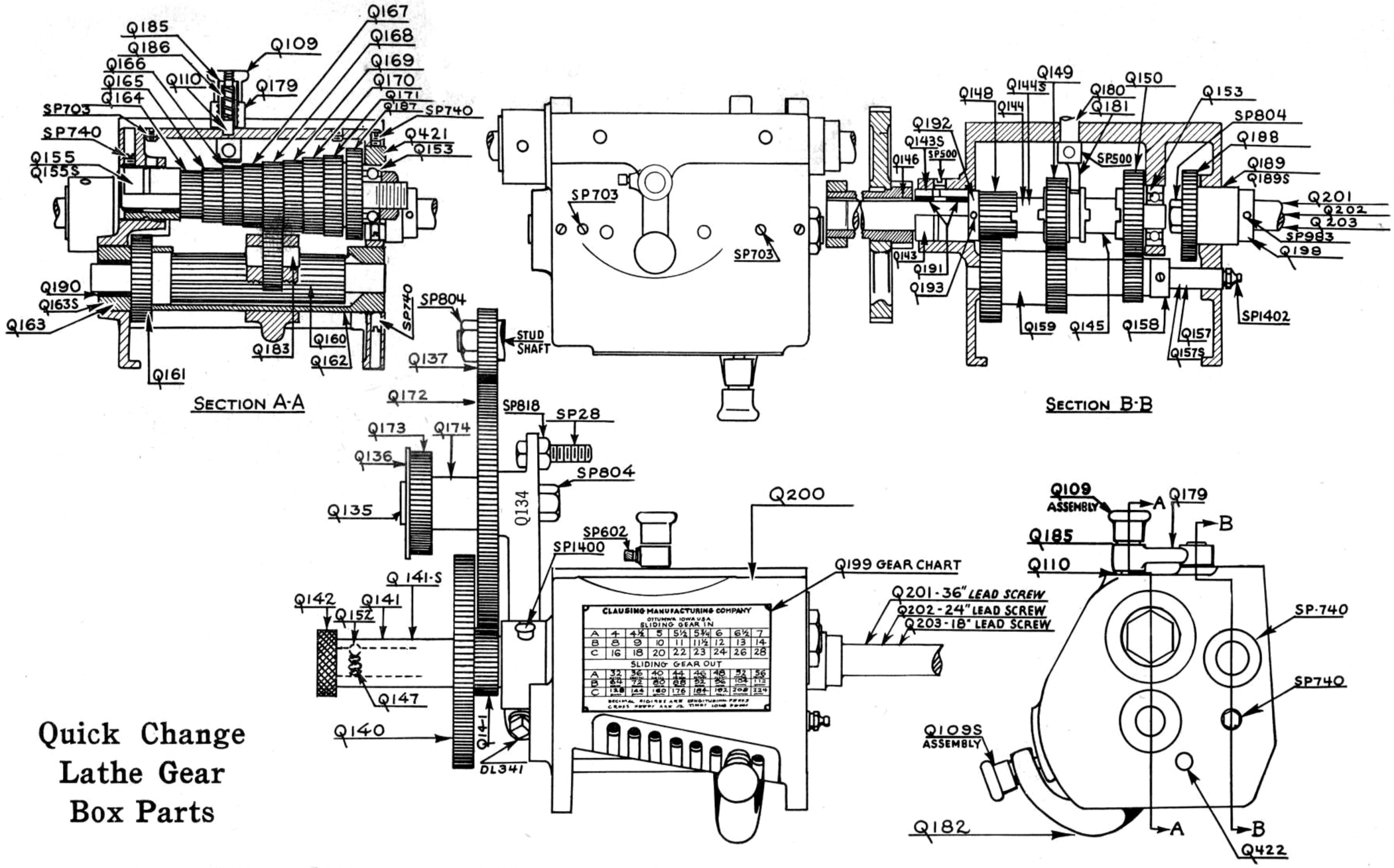
COMBINATION CENTER DRILL AND COUNTER SINK. Before work can be held between centers of a lathe it must have holes drilled at each end counter sunk 60. The quickest and most accurate way to perform this double operation is to use a combination drill. This drill when rigidly held is also efficient for starting holes.

DRILL CHUCKS. For holding center drills, and straight shank drills a drill chuck is one of the most used tools around a lathe. A drill chuck for a Clausing Lathe should have a No. 2 Morse taper shank. It will then fit in, both, the tailstock spindle and the headstock spindle.



USING A STRAP WRENCH FOR REMOVING A HEADSTOCK CHUCK. This type of wrench can also be used for removing other chucks or face plates. The principle of the wrench is that the harder you pull the tighter it grips.

JACOB HEADSTOCK CHUCK. This chuck has the appearance of a drill chuck and operates like a drill chuck but it screws on to the headstock spindle nose and is used mostly for turning armatures. It can be used for holding drills if the hole in the headstock spindle is plugged to give the drill something to push back against. The headstock chuck can also be used as a lathe chuck for turning small work.



Quick Change Lathe Gear Box Parts

PART NO.	NAME	NO. USED
Q-109	Plunger Knob	1
Q-110	Plunger	2
Q-134	Quick change quadrant	1
Q-135	Quadrant Bolt	1
Q-136	Retainer Washer	1
Q-137	24 Tooth Stud Gear	1
Q-140	80 Tooth Sliding Gear	1
Q-141	24 Tooth Sliding Gear	1
Q-141S	Assembly	1
Q-142	Sliding Gear Handle	1
Q-143	Bronze Lined Bushing in Quadrant Hub	1
Q-144	Sliding Gear Shaft	1
Q-144S	Assembly	
Q-145	Sliding Gear Key (Dog Clutch)	1
Q-146	24-80 Tooth Sliding Gear Key	1
Q-147	Sliding Gear Index Spring	1
Q-148	16 Tooth Dog Clutch Gear	1
Q-149	24 Tooth Gog Clutch Gear	1
Q-150	32 Tooth Dog Clutch Gear	1

PART NO.	NAME	NO. USED
Q-152	5-16 Steel Ball	1
Q-153	Nice Ball Bearing	1
Q-155	Bush. for Cone Shaft	1
Q-155S	Assembly	1
Q-157	Cluster Gear Shaft	1
Q-158	Thrust Collar for Q-157	1
Q-159	Cluster Gear	1
Q-160	16 T. Pinion	1
Q-161	32 T. Pinion Shaft Gear	1
Q-162	Tumbler Gear Sleeve	1
Q-163	Pinion Shaft Bronzed Lined Bushing	1
Q-163S	Assembly	1
Q-164	Cone Shaft & 16 T. Gear	1
Q-165	18 T. Cone Gear	1
Q-166	20 T. Cone Gear	1
Q-167	22 T. Cone Gear	1
Q-168	23 T. Cone Gear	1
Q-169	24 T. Cone Gear	1
Q-170	26 T. Cone Gear	1

PART NO.	NAME	NO. USED
Q-171	28 T. Cone Gear	1
Q-172	96 T. Quadrant Gear	1
Q-173	40 T. Quadrant Gear	1
Q-174	Quadrant Gears Hub	1
Q-179	A B C Lever	1
Q-180	A B C Lever Shaft	1
Q-181	Dog Clutch Throw	1
Q-182	Tumbler Lever	1
Q-183	Tumbler Gear Shaft	1
Q-184	24 T, Tumbler Gear	1
Q-185	Plunger Barrel	1
Q-186	Plunger Spring	
Q-187	33 T. Gear on Cone Shaft	1
Q-188	33 T. Gear on End of Lead Screw	1
Q-189	Lead Screw Thrust Bushing	1
Q-190	Bronze Inner Bushing for Q-163	1
Q-191	Bronze Inner Bushing for Q-143	1
Q-192	Sliding Gear Shaft Collar	1

PART NO.	NAME	NO. USED
Q-193	Sliding Gear Shaft Collar Pin	1
Q-194	Bronze Bush for Q-189	1
Q-198	Thrust Collar on Lead Screw	1
Q-199	Quick Change Name Plate	1
Q-200	Gear Box	
Q-201	36 in. Lead Screw	1
Q-202	24 in. Lead Screw	1
Q-203	18 in. Lead Screw	1
SP-28	7-16 x 1½ in. Hex. Hd. Cap Screw	1
SP-500	¼ x 20 x ¼ USS Socket Set Screw	2
SP-602	¼ x 20 x ⅝ SQ Hd. St. Screw	1
SP-703	¼ x 20 x ¼ Hdless Set Screw	3
SP-740	¼ x 20 x ½ Hdless Set Screws	5
SP-804	½ x 13 Hex. Nuts	3
SP-818	7-16 x 14 Hex. Jam Nut	1
SP-983	00 x 1¼ Taper Pin	1
SP-1400	¼ in. Gits Oil Cap	1
SP-1402	¼ in. Zerk Fitting	1

THE QUICK CHANGE LATHE. The quick change lathes are the same as the standard change lathes except the apron and gear train is different and instead of having a stack of loose change gears it has these gears arranged in a gear box with levers for easy shifting to select the thread or feed that is wanted.

A clear understanding of the correct way to shift gears will enable you to do it smoothly. Do not shift gears while the lathe is running, anymore than you would shift the gears in your car without slipping the clutch. To do so is to subject the gears to unnecessary shock. To shift gears, first, stop your lathe. If the lathe is stopped, set against a load, you will have to back the spindle up a little by hand. This will release the gears so they can be shifted. When shifting the gears and re-meshing them it is necessary to turn the spindle by hand, take a hold of the face plate or chuck, open the hood and turn the cone pulley or turn the counter shaft pulley.

Let us assume that your lathe is set to cut 10 threads per inch, and you want to change it to cut 32 threads per inch.

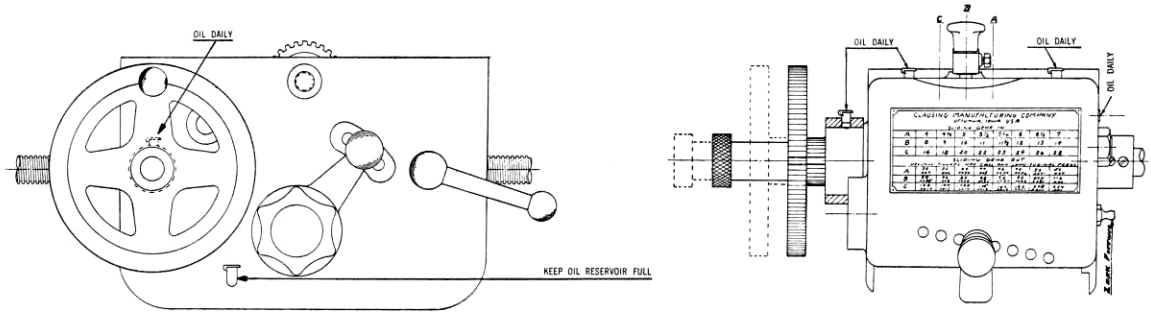
1—Stop the lathe.

2—Take a hold of the face plate, or other parts of lathe as mentioned before, and turn it back and forth, to release the gears, as you pull out the plunger of the tumbler lever and drop tumbler lever down. Slide the tumbler lever over so it is in line with the column in which you find 32. Raise the tumbler lever and insert the plunger in the hole, turning the spindle by hand so the gear will mesh.

3—Your A B C lever is in the B position. Raise the plunger and swivel it to the A position, inserting plunger in hole. While shifting this lever turn spindle to mesh dog clutch.

4—Your sliding gear is in. Pull it out. Turn spindle, if necessary, to mesh gears in new position.

After becoming accustomed to the quick change lathe, these steps can be taken in a fraction of a minute.



Special Oiling Instructions for Quick Change Lathes

The power cross and longitudinal feeds are engaged at the apron. .When the feed control lever is in the left or upper position, it is in position for cross feed. Center position is neutral. Lower, or right, position is for longitudinal feeds. When the plunger does not fall readily into the right or lower position, turn the longitudinal feed handwheel to mesh the gears. When it does not fall readily into the left or upper position, turn the cross feed balcrank. Placing the feed control lever in position does not engage the feed. This is done with a clutch. The clutch handwheel is turned clockwise for engaging the feed and counter clockwise for disengaging. Do not use the split nut for feeds. This is used only for cutting threads. To close the split nut, the feed control lever has to be in a neutral position. When the split nut is closed the feed control lever cannot be shifted from the neutral position.