Chapter 4

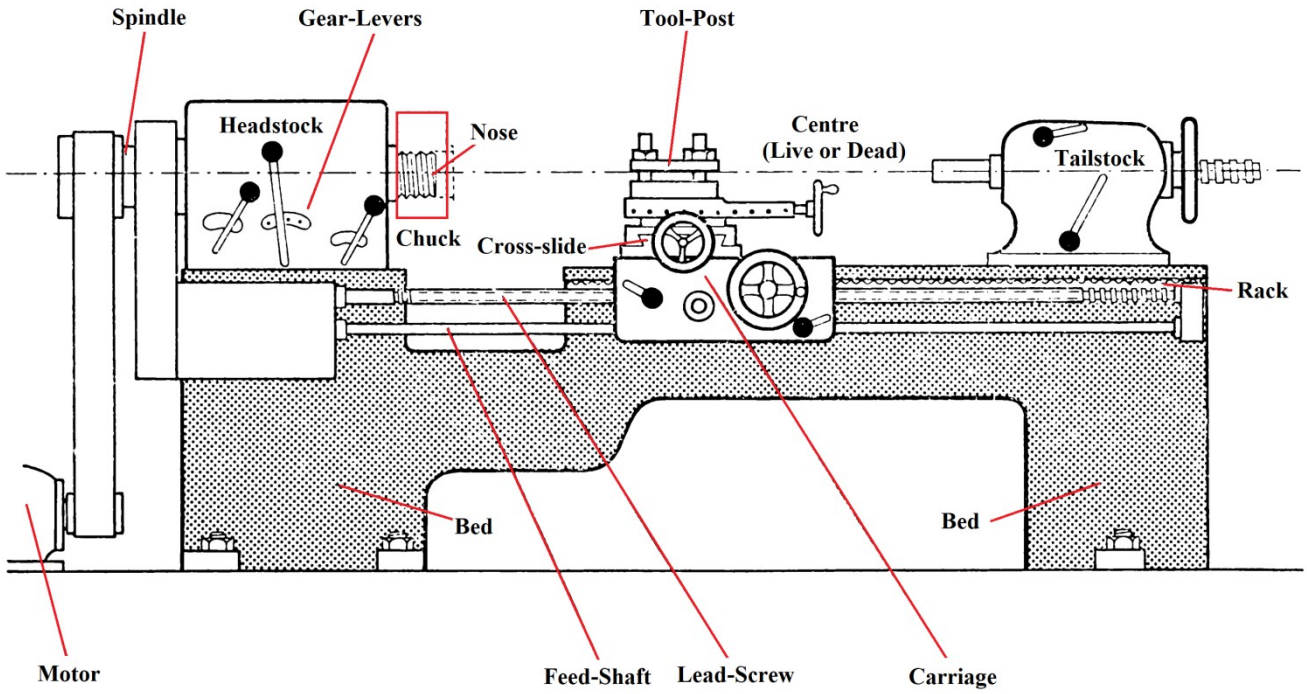
Reading: The Lathe

The lathe is one of the most useful and versatile machines in the workshop, and is capable of carrying out a wide variety of machining operations. The main components of the lathe are the headstock and tailstock at opposite ends of a bed, and a tool-post between them which holds the cutting tool. The tool-post stands on a cross-slide which enables it to move ***sideward*** across the saddle or carriage as well as well as along it, **depending on** the kind of job it is doing. The ordinary centre lathe can accommodate only one tool at a time on the tool-post, but a turret lathe is capable to holding five or more tools on the ***revolving*** turret. The lathe bed must be very solid or prevent the machine from bending or twisting under stress.

The headstock incorporates the driving and gear mechanism, and a spindle which holds the workpiece and causes it to ***rotate*** at a speed which **depends** largely **on** the diameter of the workpiece. A bar of large diameter should naturally ***rotate*** more slowly than a very thin bar; the cutting speed of the tool is what matters. Tapered centers in the hollow nose of the spindle and of the tailstock hold the work firmly between them. A fee-shaft from the headstock ***drives*** the tool-post along the saddle, either ***forwards*** or ***backwards***, at a fixed and uniform speed. This enables the operator to make accurate cuts and to give the work a good finish. Gears between the spindle and the fee-shaft control the speed of ***rotation*** of the shaft, and therefore the ***forwards*** or ***backwards*** movement of the tool-post. The gear which the operator will select **depends on** the type of metal which he is cutting and the amount of metal he has to cut off. For a deep or roughing cut the ***forward*** movement of the tool should be less than for a finishing cut.

Centres are not suitable for every job on the lathe. The operator can replace them by various types of chucks, which hold the work between jaws, or by a front-plate, **depending on** the shape of the work and the particular cutting operation. He will use a

chuck, for example, to hold a short piece of work, or work for drilling, boring or screw-cutting. A ***transverse*** movement f the tool-post across the saddle enables the tool to cut across the face of the workpiece and give it a flat surface. For srew-cutting, the operator engages the lead-screw, a long screwed shaft which runs along in front of the bed and which ***rotates*** with the spindle. The lead-screw ***drives*** the tool-post ***forwards*** along the carriage at the correct speed, and this ensures that he threads on the screw are of exactly the right pitch. The operator can select different gear speeds, and this will alter the ratio f spindle and lead-screw speeds and therefore alter the pitch of the threads. A ***revising*** lever on the headstock enables him to ***reverse*** the movement of the carriage and so bring the tool back to its original position.



Center Lathe

Word study

Machine, Motor, Work, Tool, etc.

An ***engine*** e.g. a steam engine, a turbine, an aero-engine, etc.

A ***motor*** e.g. a small (electric) motor

} These produce power.

A ***tool*** e.g. a hand-operated tool, a hammer, drill, chisel

A machine-***(tool)*** e.g. a lathe, power press, etc.

} These use power.

We ***roll*** metal in a rolling-mill.
We ***draw*** metal in a die.
We ***forge*** metal in a forge or drop-forge.
We ***hammer*** metal with a hammer, etc.

} We ***work*** or ***form*** the metal.

We ***turn*** metal on a lathe.
We ***grind*** metal on a grinding machine.
We ***polish*** metal.
We ***bore*** metal, etc.

} We ***machine*** the metal.

Gear, Teeth, etc.

We ***connect*** / We ***link*** the machine to the motor by a driving belt or chain.

We ***gear*** the crankshaft to the car engine by ***gears***, or toothed wheels.
(There may be four ***forward gears*** and one ***reverse gear***).

We engage the gear by ***letting*** (***putting***) in the clutch.
We disengage the gear by ***letting out*** the clutch.

Tolerance

Machined parts must have great dimensional ***accuracy***.
The ***dimensions*** (length, diameter, width, etc.) must be ***accurate*** to within certain limits.
The work must not be wider than the ***upper limit*** (1.0012).
The work must not be narrower than the ***lower limit*** (0.9988).
The difference between the upper and lower limits: 0.0024.
This is the ***tolerance*** permitted.

Incorporate

The pulley ***incorporates*** (has) a brake.
The headstock ***incorporates*** (contains) the gears and driving mechanism.
The solder ***incorporates*** (includes) a fluxing material.
The vessel incorporates (has) a number of new constructional features.

Patterns

1. Dependence

You should pay special attention to the contructions used with this word. Notice that the first meaning (1 *a*) is slightly different from the rest.

1. *a.* The aircraft is ***dependable*** (***reliable***). You can ***depend on*** (***rely on***) it. It will not break down.

   b. The aircraft ***depends on*** its wings and engines to provide lift.

   c. Sweden ***is dependent on*** her hydro-electric resources for power.

   d. Our customers ***rely on*** our completing their order by the agreed date.

2. *a.* The size of the motor
   b. The rise in pressure
   c. The hardness of the steel
   } ***depends on*** / ***It dependent on*** {
   the amount of power it has to produce.
   the speed of rotation of the pump.
   the proportion of carbon it contains.

3. *a.* The steel will be mild or hard
   b. The metal will expand or contract
   } ***depending on*** / ***according to*** {
   The proportion of carbon it contains.
   Whether the temperature rises or falls.

4. The climate remains the same, ***independent of*** (***irrespective of***) the season of the year.

2. Movements

1. *a.* A trip-lever ***acluates*** / ***operaes*** the valve. (= makes it move).

   b. A flexible belt ***drives*** the motor. (= makes it { move / turn / work }).

2. *a.* The piston ***moves*** forwards.
   travels backwards.
   slides up.
   runs down.

   = A(n) ***forward*** / ***backward*** / ***upward*** / ***downward*** movement of the piston

   The ***travel*** of the piston is the distance it travels.

   The piston ***reciprocates,*** or ***moves,*** etc.

   A ***reciprocating*** movement.
   engine.

   b. The pendulum ***oscillates,*** or ***swings.***

   An ***oscillating*** / ***oscillatory*** movement.

   c. The cross-slide ***traverses*** / ***croses*** the carriage.

   A ***slideward*** / ***transverse*** movement.

   d. The wheels ***rotate.*** / ***turn.*** / ***revolve.***

   A ***rotational*** / ***rotatory*** movement.

e.	The liquid The steam The air	***circulates***	though the pipes.	A	***circulating*** movement through a ***circuit***.
3.	The machine is	***at rest.*** ***stationary***			
	The machine is	***in motion.*** ***moving.***			

3. Velocity

The	***velocity*** ***speed***	of the	aircraft fluid gas, etc.	***increases.*** ***rises.*** ***decreases.*** ***falls.***

The aircraft	***increases speed.*** ***speeds up.*** ***accelerates.***	There is an	***increase***	in speed.
	decreases speed. ***reduces peed.*** ***slows down.*** ***decelerates.***		***decrease*** ***reduction***	

Opening the throttle of a car	makes it go faster. ***accelerates it.***
Applying the brake of a car	makes it go slower. ***retards it.***