GOVERNMENT POLYTECHNIC, BALANGIR

DEPARTMENT OF.....

INDEX PAPER

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AIM OF THE EXPERIMENT :

Checking Flatness and squareness using a try square and filling the same if not leveled.

APPARATOS REQUARD :

1. Try square.
2. Specimen (Different gemotrical shape)
3. Different type of File.

THEORY :

Parts of a File :

TIP or Point : The end opposite to tang

Face or Side : The broad part of the file with teeth cut on its surface.

Edge : The thin part of the file with a single row or parallel teeth

Heel : The portion of the broad part without teeth.

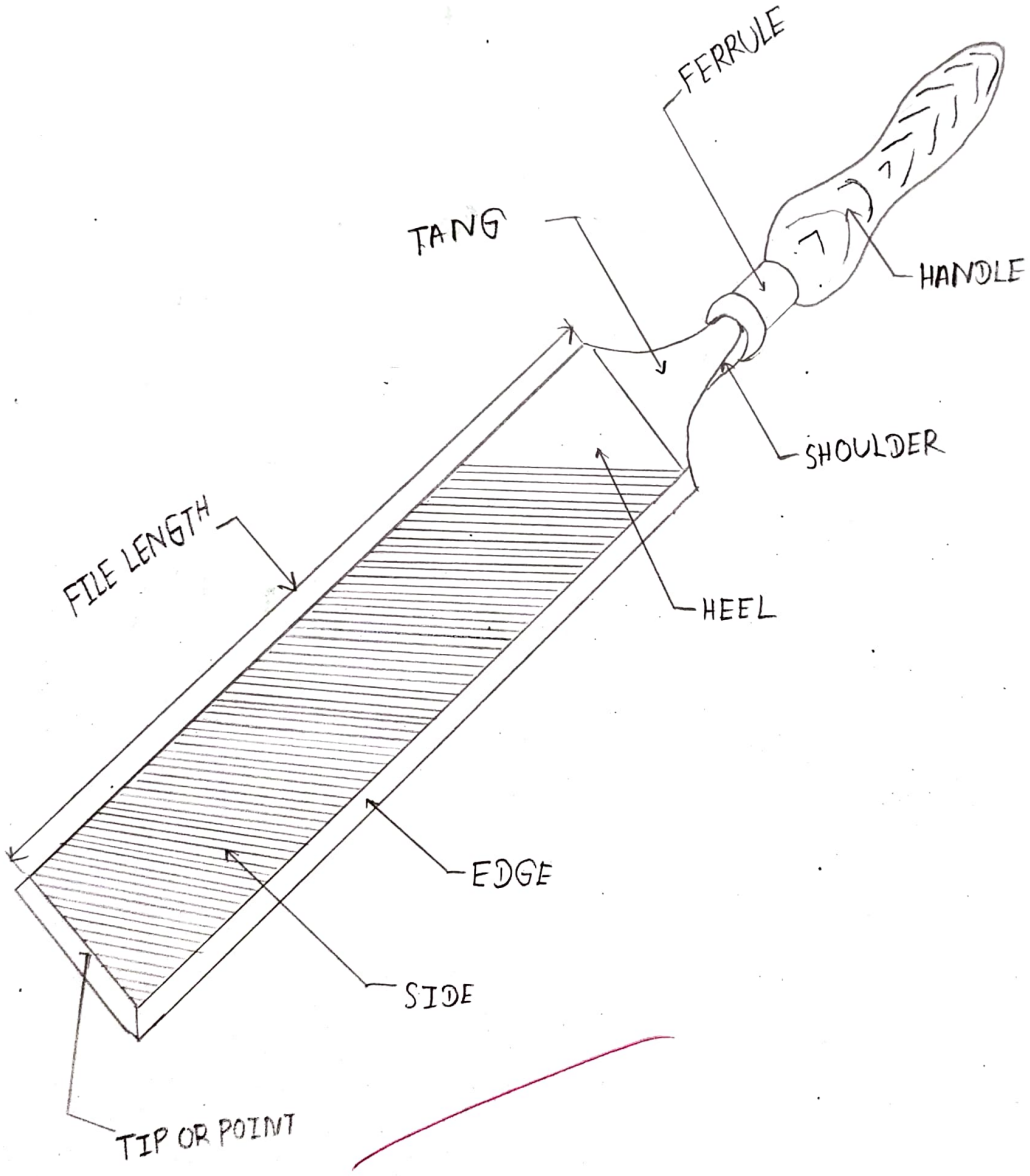
Shoulder : The curved part of the file separating tang from the body.

Tang : The narrow and thin part of a file which fits into the handle.

Handle : The part Fitted to the tang for holding the File.

Ferrul : A protective metal to prevent cracking of the handle.

Material : Generally Files are made of high carbon or high grade cast steel. The body portion is hardened and tempered. The Tang is, however, not hardened.


FERRULE
TANG
HANDLE
SHOULDER
FILE LENGTH
HEEL
EDGE
SIDE
TIP OR POINT

TYPES OF CUT : Basically there are four type single cut, Double cut, Rasp cut and curved cut.

Single cut FILE : A single cut file has rows of teeth cut in one direction across its face. The teeth are at an angle of 60° to the centre line. It can cut chips as wide as the cut of the file. Files with this cut are useful for filling soft metals like brass, aluminium, bronze and copper. Single cut files do not remove stock as fast as double cut files, but the surface finish obtained is much smoother.

Duble cut file : A duble cut file is two rows cut diagonal to each other. The first row of teeth is known as OVERCUT and they are cut at an angle of 70°. The other cut, made diagonal to this, is known as UPCUT, and is at an angle of 51°. This removes stock faster than the single cut file.

Rasp cut file :

The raps cut file has individual, sharp, pointed teeth in a line, and is useful for filling wood, leather and other soft material. These files are available only in half round shape.

curved cut file : These files have deeper cutting action and are useful for filling soft materials like - aluminium, tin, copper and plastic. The curved cut files are available only in a flat shape.

File specification and grades :

Files are manufactured in different type and grades to meet the various needs. Files are specified according to their length, grade, cut and shape length is the distance from the tip of a file to the heel. File grades are determined by the specing of the teeth.

A rough file : Is used for removing rapidly a larger quantity of metal. It is mostly used for trimming rough edges of soft metal casting.

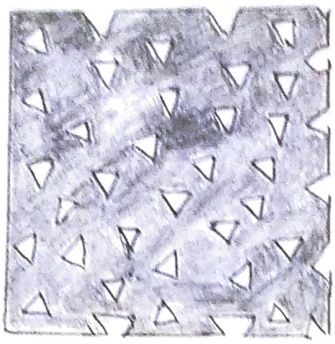
A bastard file : Is used in cases where there is a heavy reduction of material.

A second cut file : Is used to give a good finish on metals. It is excellent to file hard metals. It is useful for bringing the jobs close to the finishing size.

A smooth file : is used to remove small quantity of material and to give a good finish.

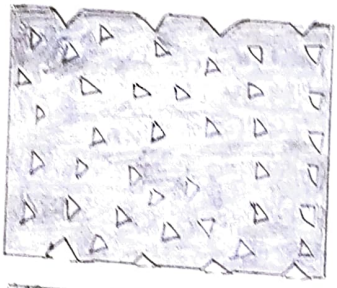
A dead smooth file : Is used to bring to accurate size with a high degree of finish.

The most used grade of filles are bastard, second cut, smooth and dead smooth. These are the grades recommended by the Bureau of Indian standards. (BIS).

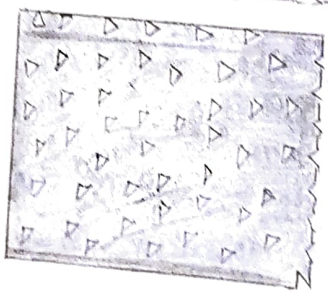


(Rough File)

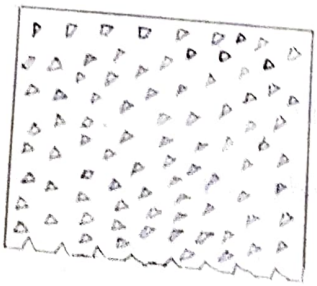
(bastard File)



(Second cut File)



(Smooth File)



(dead Smooth File)

FILE Shape :- Files are made in different shapes so as to be able to file and finish components to different shapes.

The shape of the files is usually specified by their cross section.

The files useful for this exercise are flat files and hand files.

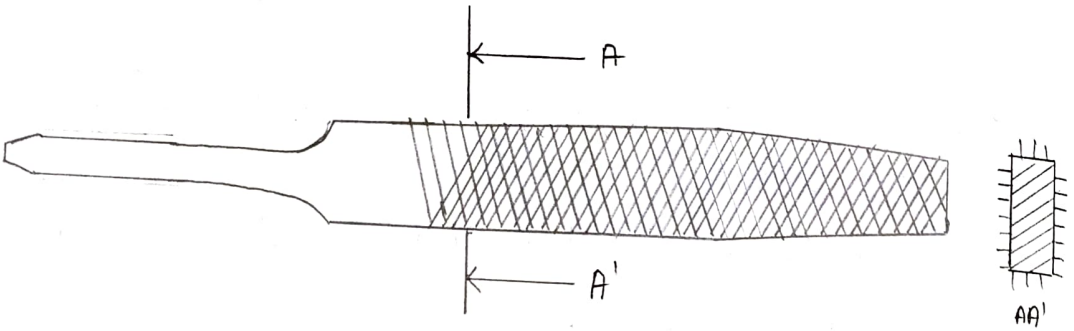
FLAT Files :-

These files are of a rectangular cross section. The edges along the width of these files are parallel up to two-thirds of the length, and then they taper towards the point. The faces are double cut, and the edges single cut. These files are used for general purpose work. They are useful for filling and finishing external and internal surface.

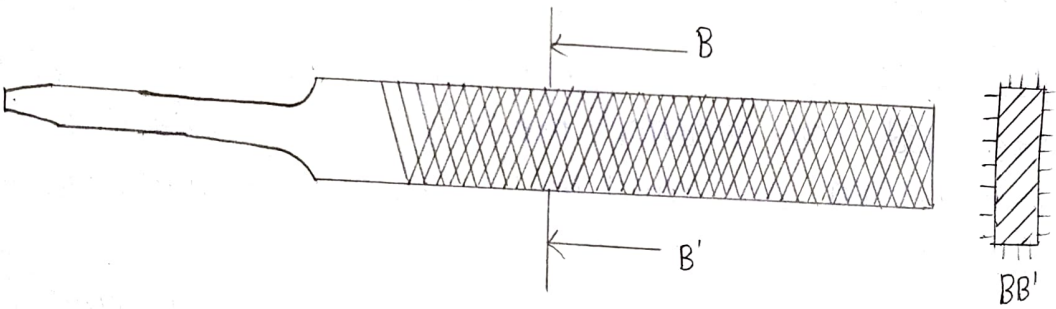
Hand File :-

These files are similar to the flat files in their cross section. The edges along the width are parallel throughout the length. The faces are double cut. one edge is single cut. whereas the other is safe edge. Because of the safe edge, they are useful for filing surfaces which are at right angle to surfaces already finished.

Flat Files are general files. They are available in all grades. Hand files are particularly useful for filling at right angle to a finished surfacess.



(FLAT FILES)



(HAND FILE)

LENGTH MEASUREMENT :-

STEEL Rules :- Steel rules are made of spring steel or stainless steel. The edges are accurately ground to form straight edges. The surface of the steel rule is stain-chrome finished to reduce glare, and to prevent rusting.

Size of steel Rules :-

Steel rules are available in different lengths, the common sizes being 150 mm, 300 mm and 600 mm.

The engineer's steel rule is graduated in 10 mm, 5 mm, 1 mm, and 0.5 mm. The reading accuracy of the steel rule is 0.5 mm.

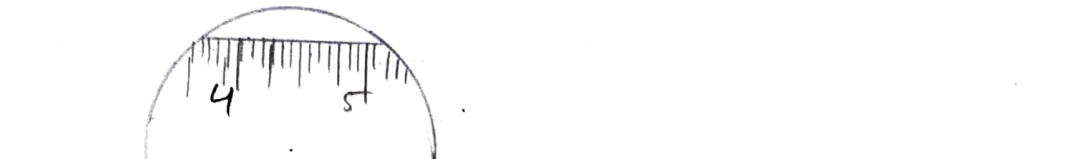
TRY SQUARE :- The try square is a precision instrument which is used to check squareness (angle of 90°) of a surface.

The accuracy of measurement by a try square is about 0.002 mm per 10 mm length, which is accurate enough for most workshop purposes. The try square has a blade with parallel surfaces. The blade is fixed to the stock at 90°

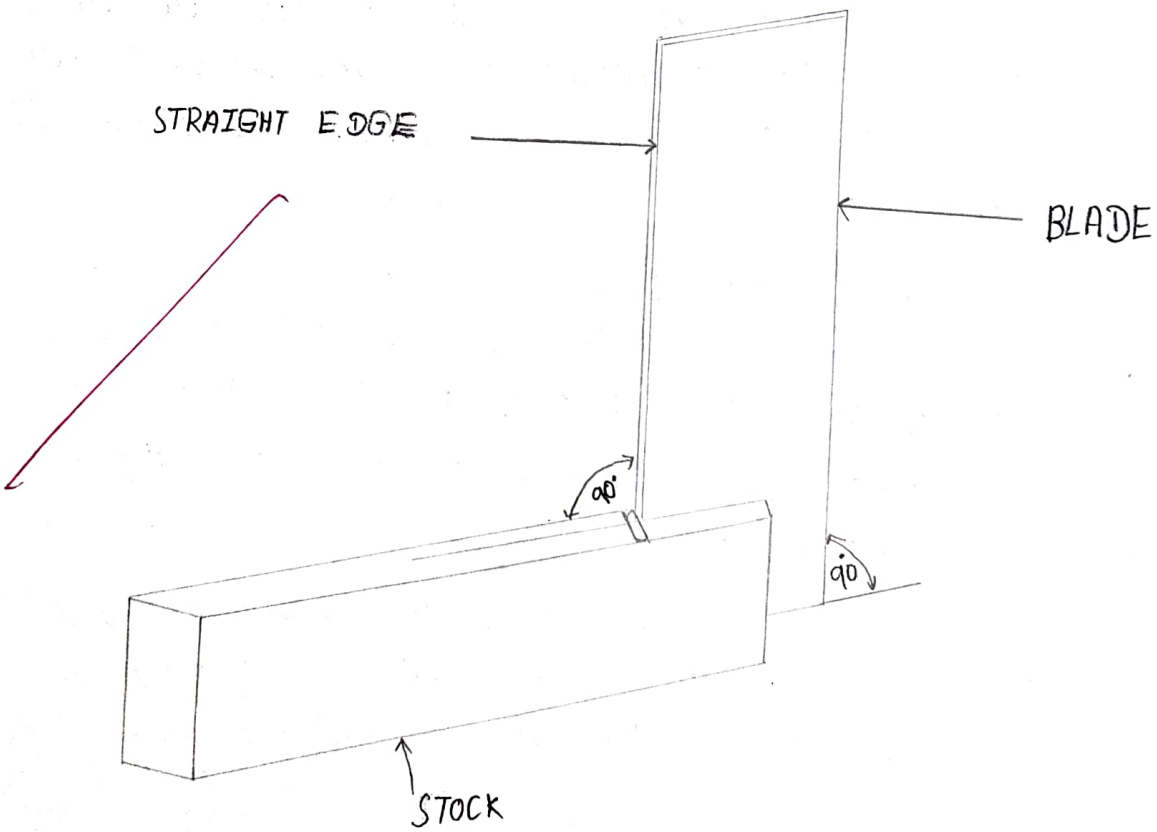
USES :- The try square is used to check the squareness of machined or fixed surfaces, check flatness of surfaces, mark lines at 90° to the edges of workpices, set workpices at right angles on work-holding devices.

Try squares are made of hardened steel.

Try squares are specified according to the length of the blade is 100 mm, 150 mm, 200 mm.



(steel rule)



Conclusion :

Hence we study in this instrument which is used in hour experiment.

Submited by

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BRANCH :- Automobile
REGd. NO :- 1611000 5005
SEMISTER :- 4th.

AIM OF THE EXPERIMENT -2

Sharpening of cutting tools like chisels, twist drill bit and punch through double ended grinder.

Apparatous Required :

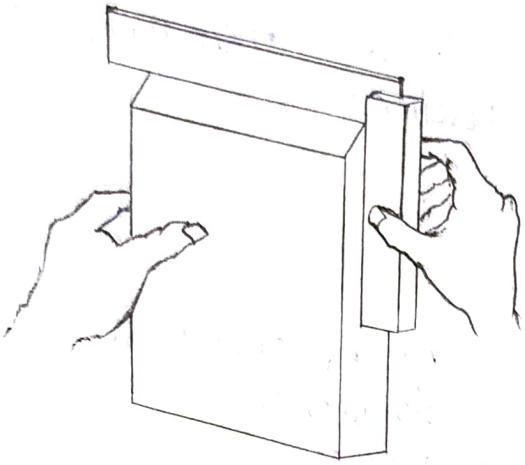
1. chisels
2. twist
3. drill bit
4. punch
5. duble ended grinder

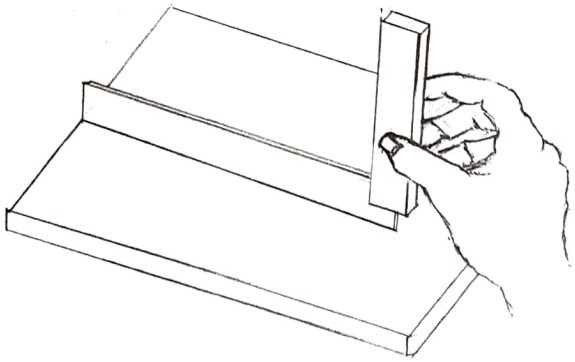
THEORY :

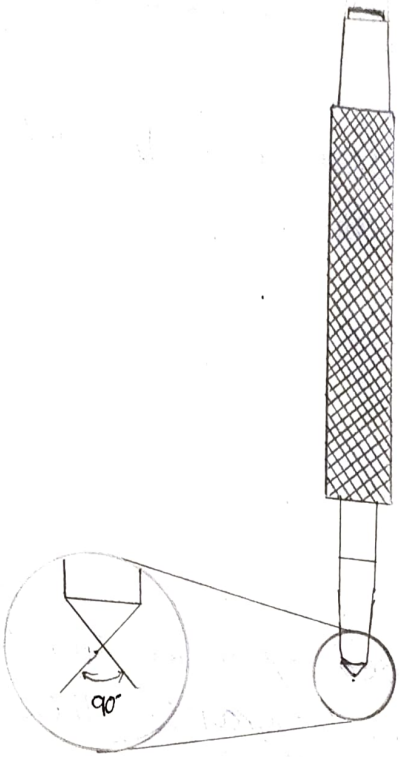
Punch : punches are used in order to make certain dimentional features of the layout permanet. There are two types of punches. They are centre punch and prick punch.

Centre punch : The angle of the points is 90° in a centre punch. The punch mark made by this is wide and not very deep. This punch is used for locating holes. The wide punch mark gives a good seating for starting the drill.

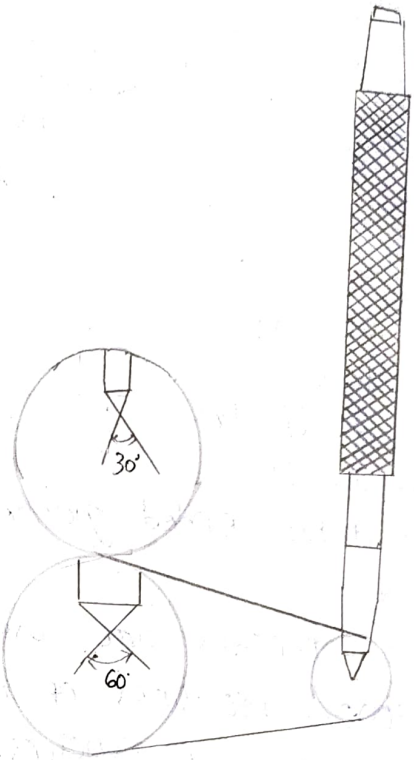
Prick Punch : The angle of the prick punch is 30° or 60°. The 30° point punch is used making light punch marks needed to position dividers. The divider leg will get a proper seating in the punch mark. The 60° prick punch is used for marking witness mark.



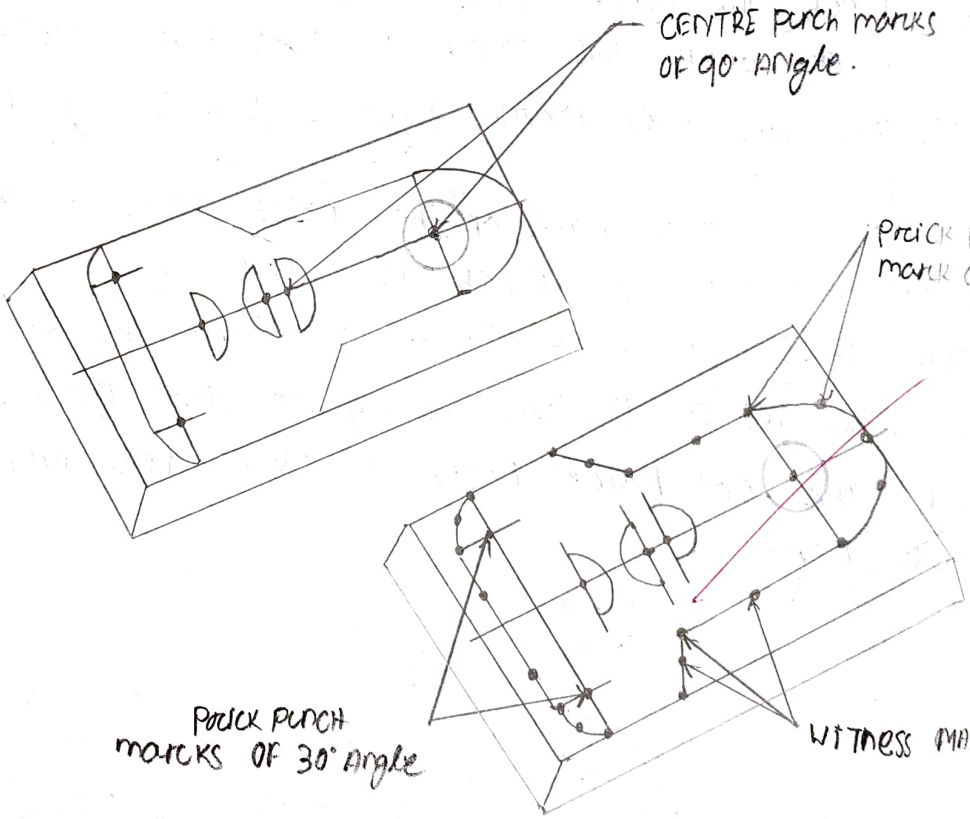




(Centre punch)



(Prick punch)



HACKSAW FRAME AND BLADE :

The hand hacksaw is used along with a blade to cut metals of different sections. It is also used to cut slots and contours.

Types of Hacksaw Frame : The two different types of hacksaw frames are solid frames and adjustable frames.

Solid Frames : Only a particular standard length of blade can be fitted to this frame.

Adjustable Frame (Flat type) :
Different standard lengths of blades can be fitted to this frame.

Adjustable Frame (Tubular type) :
This is the most commonly used type. it gives a better grip and control, while sawing.

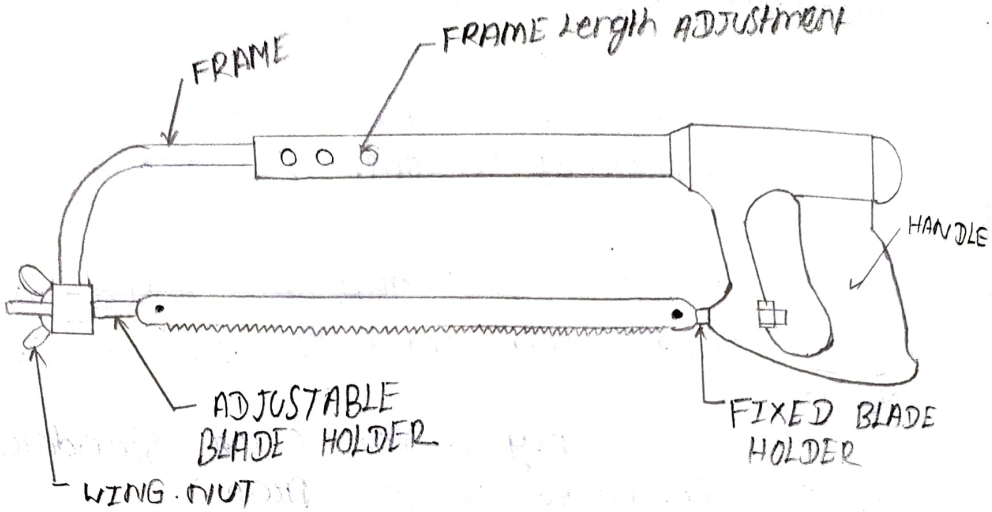
HACKSAW BLADE : A hacksaw blade is a thin narrow steel band with teeth. and two pin holes at the ends. It is used along with hacksaw frame. The blade is made of either low alloy steel (LA) or high speed steel (HS) and is available standard lengths of 250 mm and 300 mm.

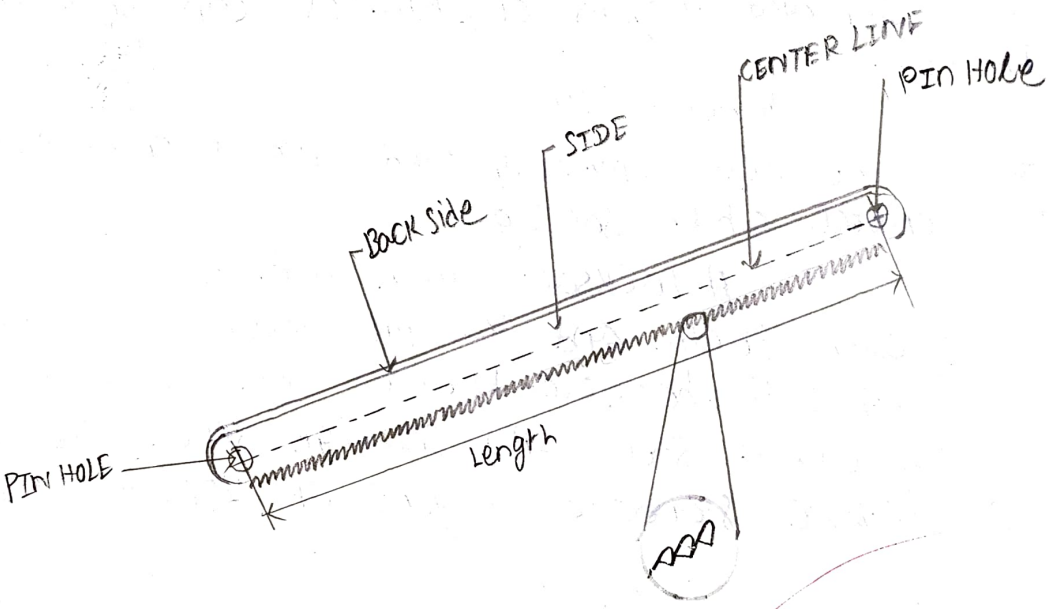
Types of Hacksaw Blades :
Two types of hacksaw blades are available - all hard blades and flexible blades.

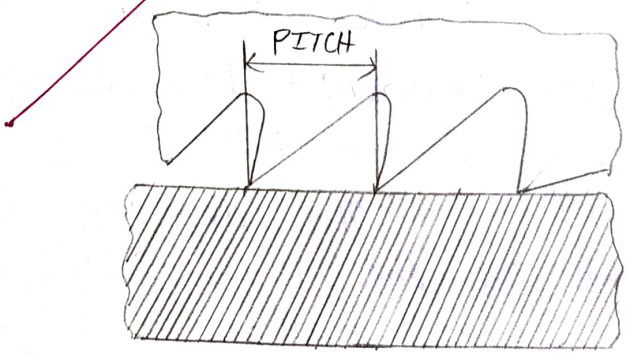
All Hard Blades : These are hardened to the full length between the pin holes.

Flexible blades : For these types of blades, only the teeth are hardened Because of their flexibility these blades are used for cutting along curved lines.

Pitch of the Blade : The distance between adjacent teeth is known as the 'pitch' of the blade.


FRAME
FRAME Length ADJUSTMENT
HANDLE
ADJUSTABLE BLADE HOLDER
FIXED BLADE HOLDER
WING NUT


CENTER LINE
PIN HOLE
SIDE
Back side
PIN HOLE
Length


PITCH

Classification	Pitch
coarse	1.8 mm
medium	1.4mm & 1.0 mm
Fine	0.8 mm

BENCH VICE :- Vice are used for holding workpices. They are available in different types. The vice used for bench work is the bench vice. (Engineer's vice)

A bench vice is made of cast iron or cast steel and it is used to hold work for filling, sawing, threading and other hand operation.

The size of the vice is stated by the width of the jaws.

Parts of Bench vice

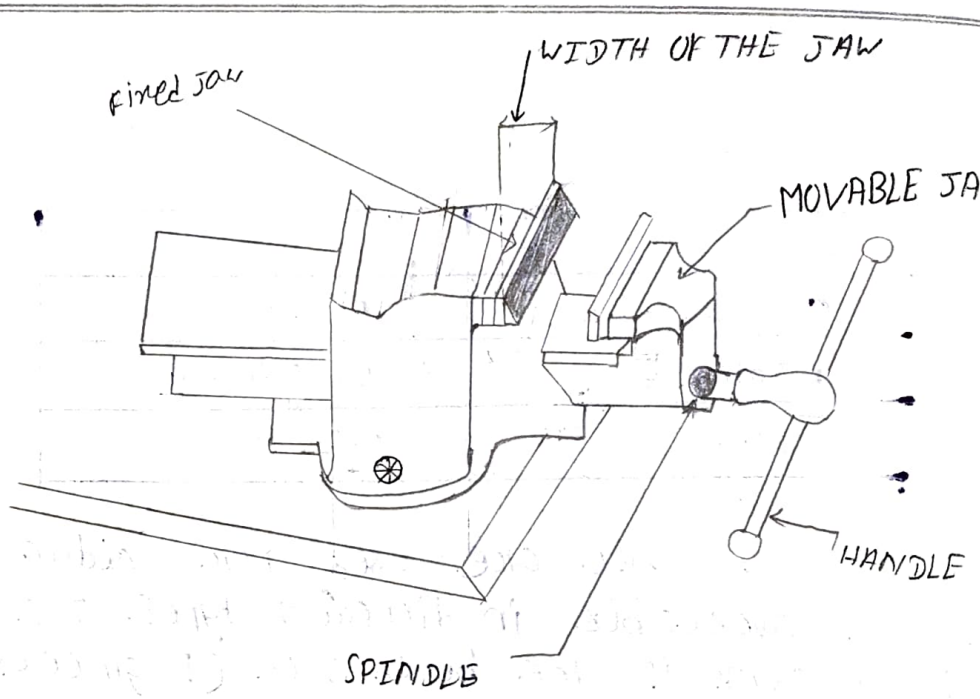
The following are the part of a vice : Fixed jaw, movable jaw, Hared jaw, Spindle, Handle, Box nut and spring

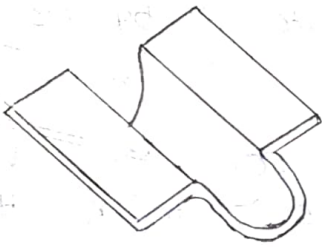
The box nut and the spring are the internal parts.

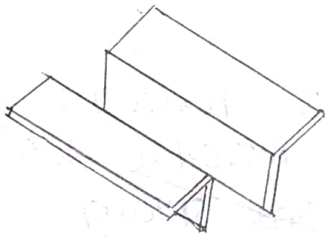
Vice Clamps or soft jaw :-

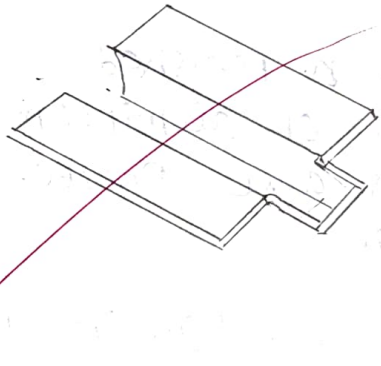
To hold a finished work use soft jaws (vice clamps) made of aluminium over the regular hard jaw. This will protect the work surface from damage.

Do not over-tighten the vice, otherwise, the spindle may be damaged.


WIDTH OF THE JAW
fixed jaw
MOVABLE JAW
HANDLE
SPINDLE







CHISEL :- The cold chisel is a hand cutting tool used by fitters for chipping and cutting of operation.

Chipping is an operation of removing excess metal with the help of a chisel and hammer. Chipped surfaces being rough, they should be finished by filing.

Parts of a chisel :- A chisel has the following parts.

Head, Body Point or cutting edge.

Chisels are made from high carbon steel or chrome vanadium steel. The cross-section of chisels is usually hexagonal or octagonal. The cutting edge is hardened and tempered.

Common type of chisels :-

There are four common type of chisels.

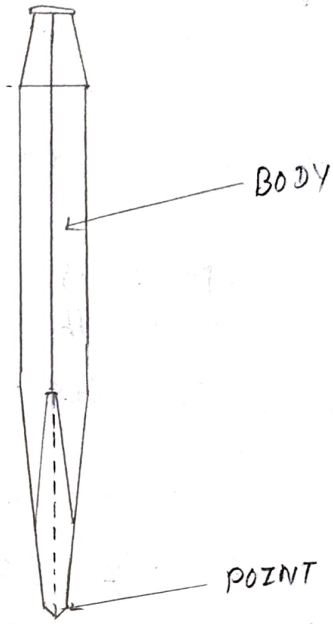
Flat chisel.
Cross-cut chisel.
Half-round nose chisel.
Diamond point chisel.

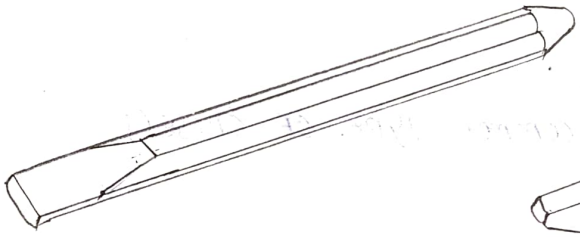
Flat Chisels :- They are used to remove metal from large flat surfaces and chip excess metal off weld joints and castings.

Cross-cut or cape chisels :- These are used for cutting keyways, grooves and slots.

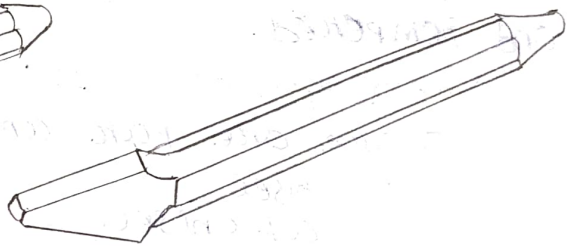
Half-round nose chisels :- They are used for cutting curved grooves (oil grooves)

Diamond point chisels :- These are used for squaring materials at the corners.

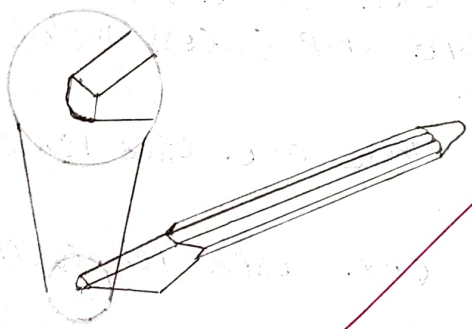




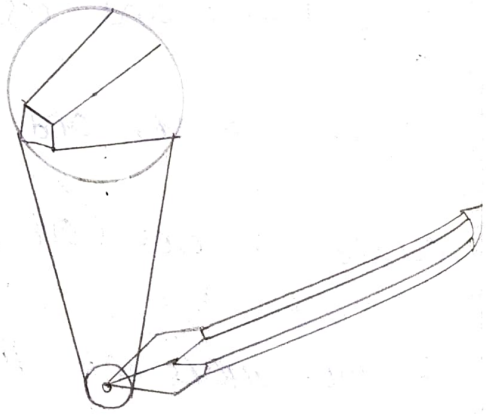
(FLAT CHISEL)



(CROSS CUT CHISEL)



(HALF ROUND CHISEL)



DIAMOND CHISEL.

ANGLE OF CHISELS :- The correct point/cutting angle (b) of the chisel depend on the material to be chipped. sharper angles are given for soft materials, and wide angles for hard material.

The correct point angle and angle of inclination generate the correct rake and clearance angles.

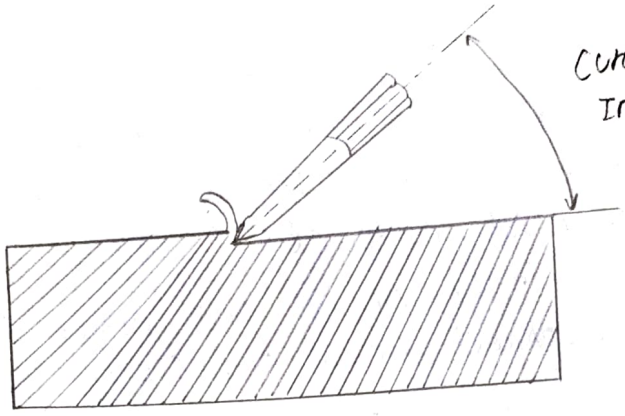
RAKE angle :- Rake angle (g) is the angle between the top face of the cutting point, and normal to the work surface at the cutting edge

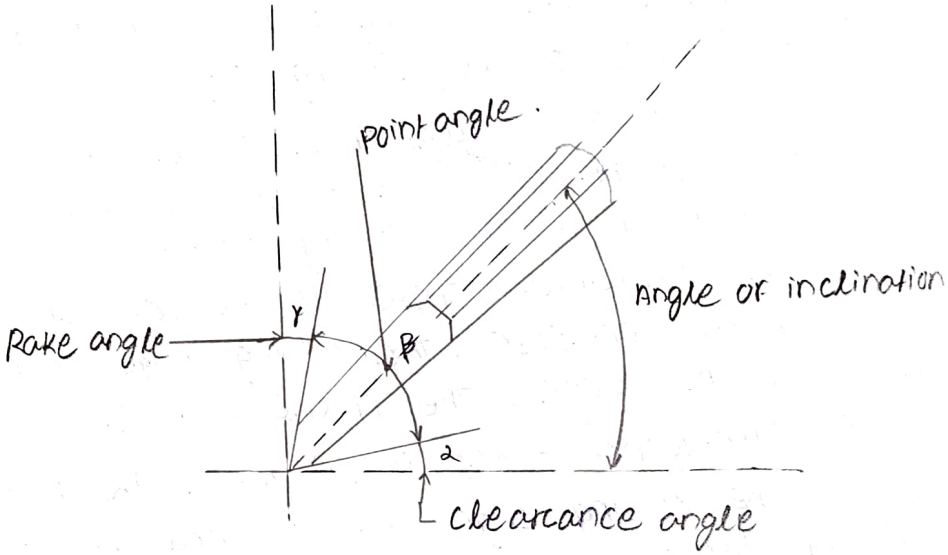
clearance angle :- clearance angle between the bottom face of the point and tangent to the work surface originating at the cutting edge.

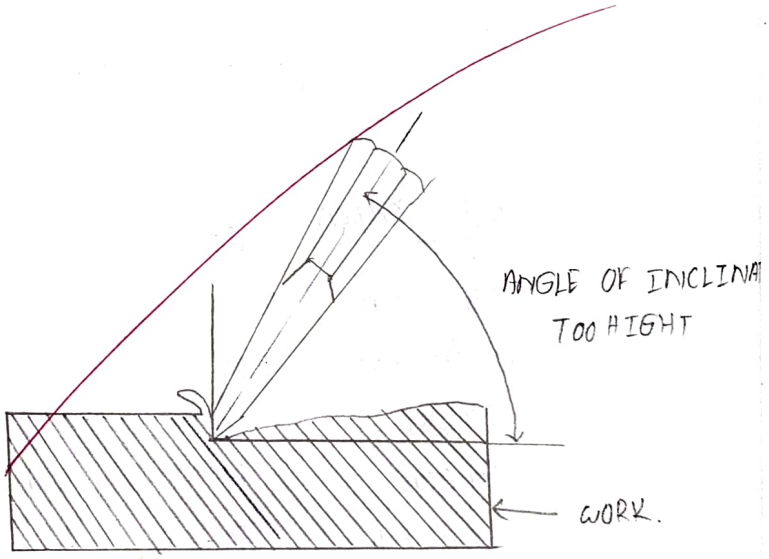
If the clearance angle is too low or zero, the rake angle increases. The cutting edge cannot penetrate into the work, The chisel will slip.

If the clearance angle is too grate, the rake angle reduces the cutting edge digs in, and the cut progressively increases.

Material to be cut	Point angle	Angle of inclination
High carbon steel	65°	39.5°
Cast iron	60°	37°
mild steel	55°	34.5°
Brass	50°	32°
copper	45°	29.5°
Aluminium	30°	22°


Correct
Inclination


Point angle.
Angle of inclination
Rake angle
γ
β
α
clearance angle


ANGLE OF INCLINA
TOO HIGHT
WORK.

DRILL PARTS (AND FUNCTION)

Drilling is a process of making holes on workpieces. The tool used is a drill. For drilling, the drill is rotated with a downward pressure causing the tool to penetrate into the material. The various parts of a drill can be identified from Fig

POINT : The cone shaped end which does the cutting is called the point. It consists of a dead centre, lips or cutting edges, and a heel.

Shank : This is the driving end of the drill which is fitted on to the machine. Shanks are of two types. Taper shank, used for larger diameter drills, and straight shank used for smaller diameter drills.

Tang : This is a part of the taper shank drill which fits into the slot of the drilling machine spindle.

Body : The portion between the point and the shank is called the body of drill. The part of the body are flute, land / margin, body clearance and web.

Flutes : Flutes are the spiral grooves which run to the length of the drill. The flutes help.

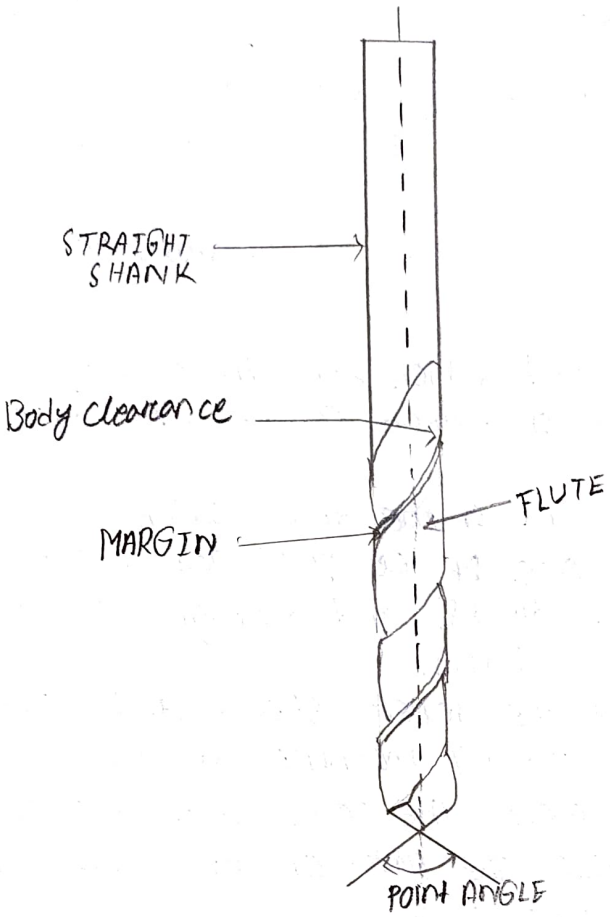
- to form the cutting edges.
- to curl the chips and allow these to come out
- the coolant to flow to the cutting edge.

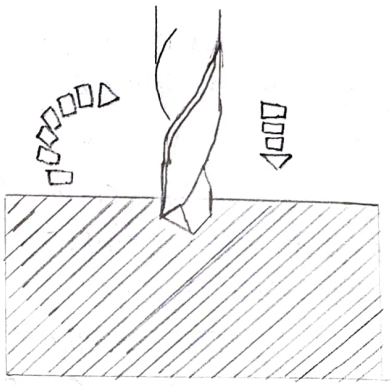
Margin : The margine is the narrow strip which extends to the entire length of the flutes.

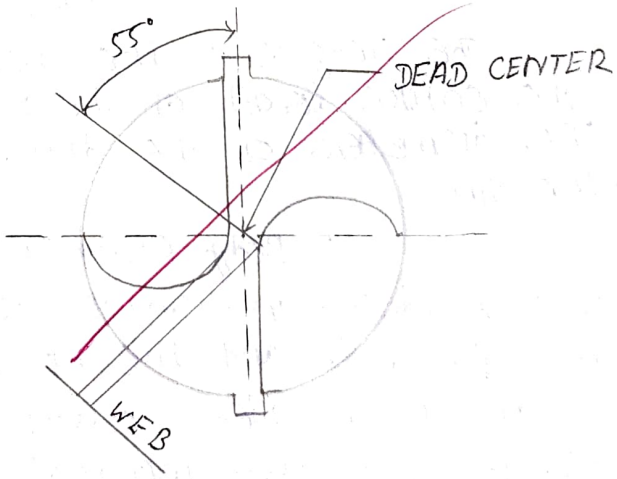
The diameter of the drill is measured across the land / margin.

Body clearance : Body clearance is the part of the body which is reduced in diameter to cut down the friction between the drill and the hole being drilled.

Web : web is the metal column which separates the flutes. It gradually increases in thickness towards the shank.


STRAIGHT SHANK
Body clearance
MARGIN
FLUTE
POINT ANGLE




55°
DEAD CENTER
WEB

DRILL HOLDING DEVICE :

For drilling holes on materials, the drills are to be held accurately and rigidly on the machine.

The common drill-holding devices are drill chucks and sleeves and sockets.

DRILL Chuck : Starting shank drills are held in drill chucks. For fixing and moving drills, the chucks are provided either with a pinion and key or a knurled ring.

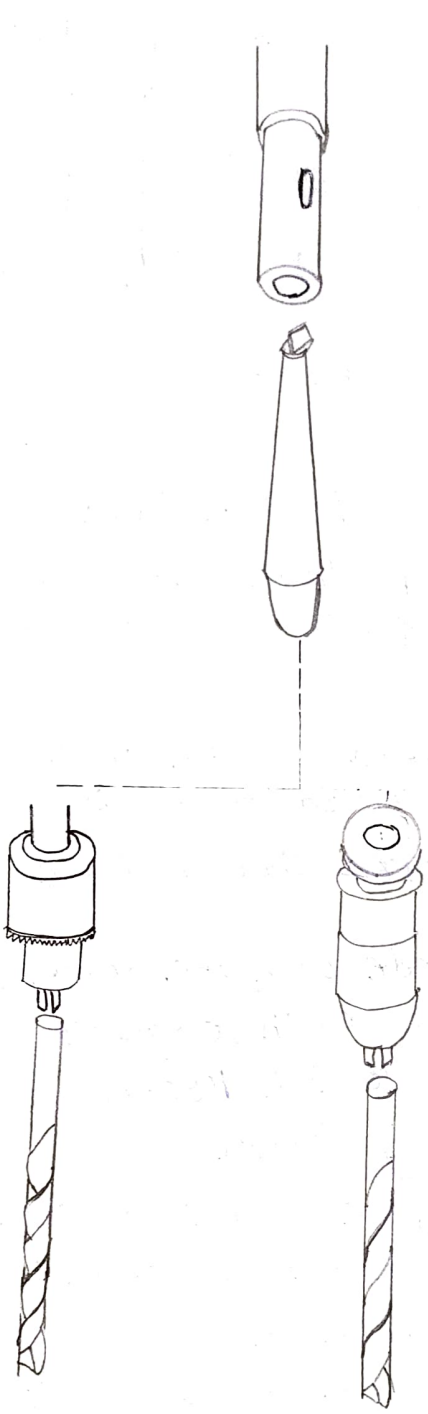
The drill chucks are held on the machine spindle by means of an arbor fitted on the drill chuck

Taper sleeve and sockets : Taper shanks have a morse taper.

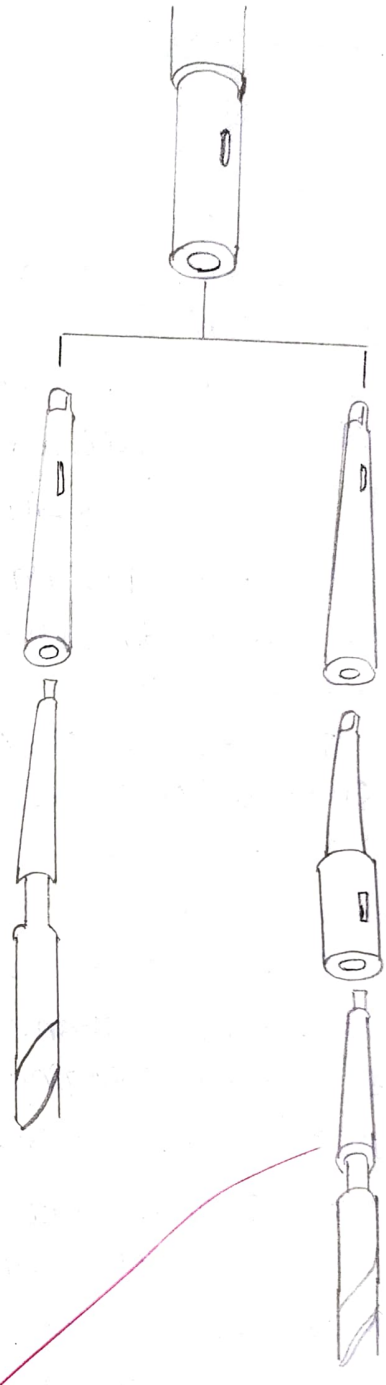
Sleeves and sockets are made with the same taper so that taper shank of the drill, when engaged, will give a good wedging action, Due to this reason morese tapers are called self-holding tapers.

Drills are provided with five different sizes of morse tapers, and are numbered from MT1 to MT5.

In order to makes up the difference in size between the shanks of the drills and the type of machine spindles. Sleeves of different sizes are used. When the drill taper shank is bigger than the machine spindle, taper sockets are used.



(CHUCKS)



(SLEEVES & SOCKETS)

GRINDER :-

Off-hand grinding is the operation of removing material which does not require great accuracy in size or shape. This is carried out by pressing the work piece by hand against a grinding wheel.

Off-hand grinding is performed for rough grinding of job and resharpening of

- Scribers
- Punches
- Chisels
- Twist drills, single point cutting tool.

Bench grinder :- Bench grinders are fitted to a bench or table, and are useful for light duty work.

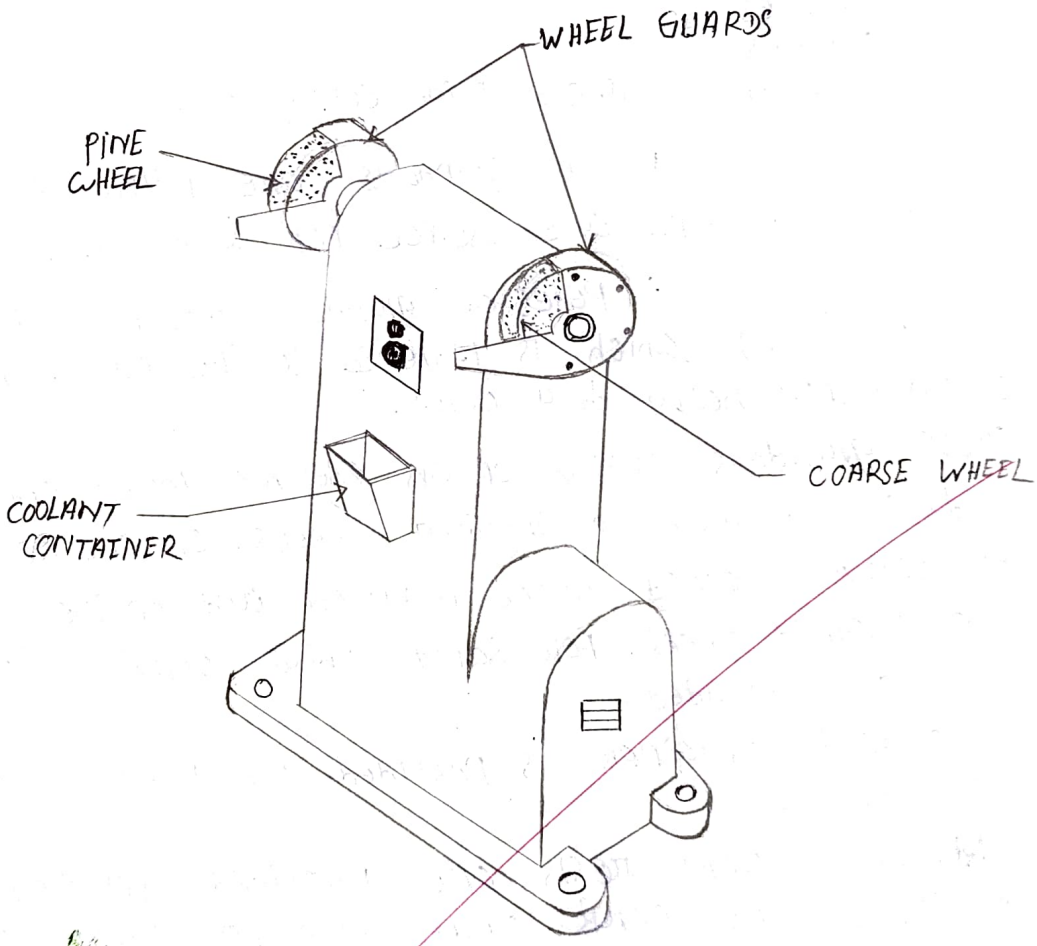
Pedestal grinders :- Pedestal grinders are mounted on a base (Pedestal), which is fastened to the floor. They are used for heavy duty work.

These grinders consist of an electric motor and two spindles for mounting grinding wheels. On one spindle a coarse-grained wheel is fitted and on the other, a fine grained wheel. For safty, while working, wheel guards are provided.

A coolant container is provided for frequent cooling of the work.

Adjustable work-rests are provided for both wheels to support the work while grinding. These work-rests must be set very close to the wheels.

Extra eye-shields are also provided for the protection of the eyes.



(GRINDING MACHINE)

Conclusion :-

Hence we study in this instrument which is used in hour experiment

Submited by

NAME :- Ayash Kanta Dash

BRANCH :- Automobile

REGD. NO :- F16110005005

SEMESTER :- 4th

AIM OF THE EXPERIMENT :-

Drilling through hole by drilling machine both pillar and hand drill.

APPARATUS REQUIRED >>

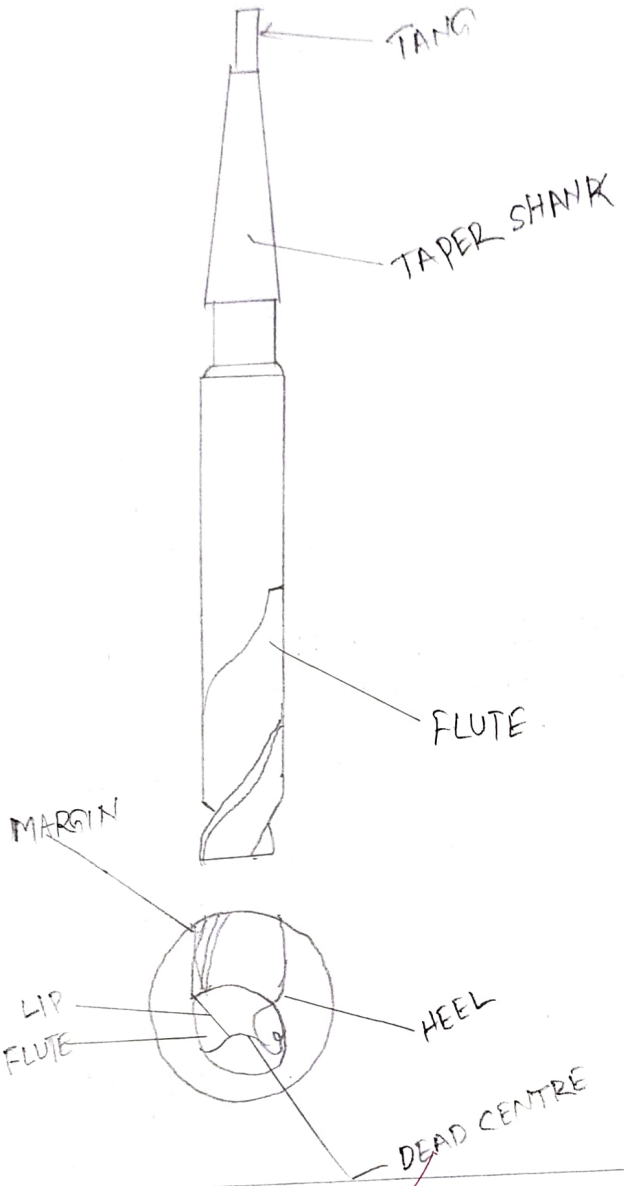
Drillbit
Drill Machines
Reamers

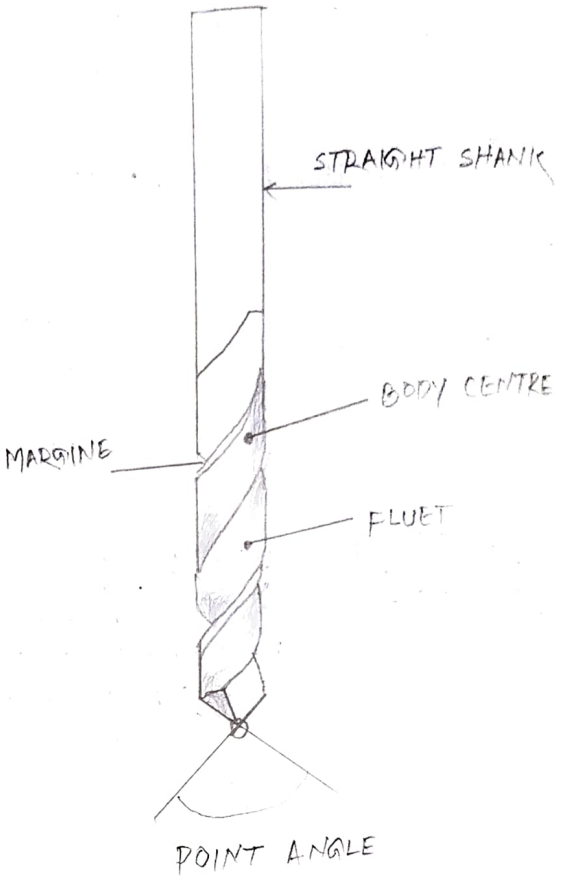
THEORY >>

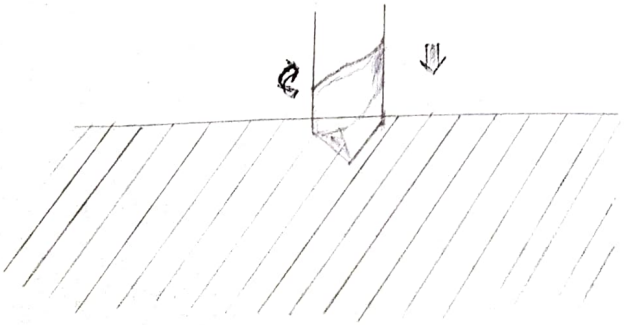
Drilling is a process of making holes on workpieces The tool used is a drill. For drilling, the drill is rotate with a downward pressure causing the tool to penetrate into the material.

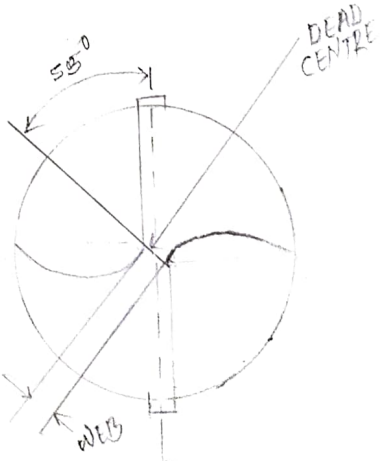
PARTS OF A DRILLBIT :-

1. POINT → The cone shaped end which does the cutting is called the point. It consists of a dead centre lips or cutting edges, and a wheel.
2. Shank → This is the driving end of the drill which is fitted on to the machine shanks are of two type. Taper shank, used for larger diameter drills. and straight shank, used for smaller diameter drills.
3. Tang → This is a part of the taper shank drill which fits into the slot the drilling machine spindle
4. Body → The portion between the point and the shank is called the body of a drill. The parts of the body are flute, land / margin, body clearance and web
5. Flute → Flutes are the spiral grooves which run to the length of the drill. The flutes help to form the cutting edges, to clirl the chips and allow them to come out, the coolant to flow to the cutting edge.
6. Land / margin → The land / margin is the narrow strip which extends to the entire length of the flute. The diameter of the drill is measured across the land / margin.
7. Body clearance → Body clearance is the part of the body which is reduced in diameter to cut down the friction, between the drill and the hole being drilled.
8. Web → web is the metal column which separates the flutes. It gradually increases in thickness towards the shank.


TANG
TAPER SHANK
FLUTE
MARGIN
LIP
FLUTE
HEEL
DEAD CENTRE


STRAIGHT SHANK
BODY CENTRE
MARGINE
FLUET
POINT ANGLE




DEAD CENTRE
WEB

DRILING MACHINES >>

The principle types of drilling machines are
(a) The sensitive bench drilling machines
(b) The pillar drilling machine.
(c) The column drilling machine.
(d) The radial arm drilling machine.

The pillar Drilling Machine >>

This is an enlarged version of the Sensitive bench drill machine. These drilling machines are mounted on floor and driven by more powerful electric motors. They are used for heavy duty work pilar drilling machines available in different size.

The sensitive Bench Drilling machine >>

The simplest type of sensitive drilling machine is shown in the figure with its various parts marked. This is used for light duty work This machine is capable of drilling holes up to 12-5mm diameter. The drills are fitted in the chuck or directly in the tapered hole of the machine spindle for normal drilling the work - surface is kept horizontal If the holes are to be drilled cut an angle, the table can be tilted. Different spindle speeds are achived by changing the belt position in the stepped pulley.

DRILL HOLDING DEVICES >>

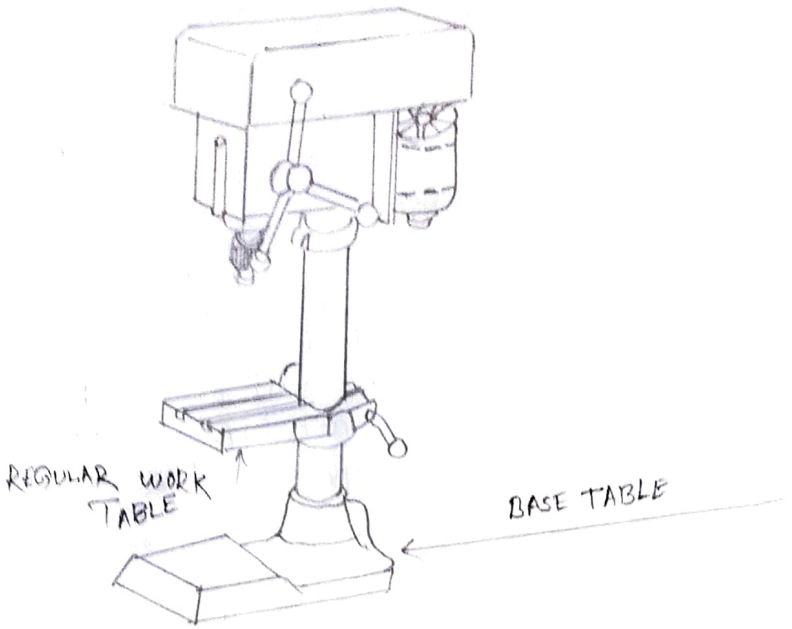
For drilling holes on materials, the drills, are to be held accurately and rigidly on the machines. The common drill - holding devices are drill chucks and sleeves and socket.

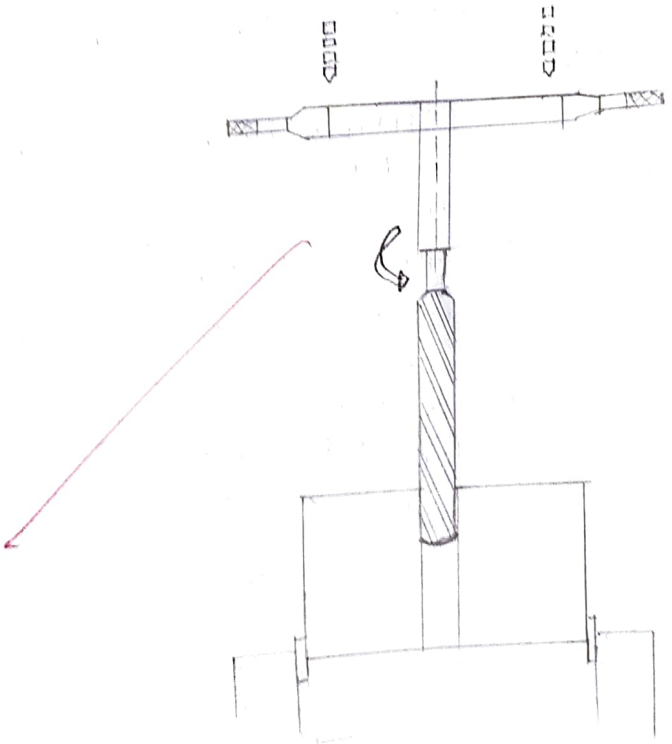
Drill chuck >>

straight shank drills are held in drill chucks For fixing and removing drills the chucks are provided either with a pinion and key or a knurled ring. The drill chucks are held in the machine spindle by an arbor fitted on the drill chuck.

Taper sleeves and sockets >>

Taper shank drills have a morse taper. sleeves and sockets are made with the same taper so that the taper shank of the drill, when engaged will give a good seeding action.


REGULAR WORK TABLE
BASE TABLE



Due to this reason morse taper's are called self holding tapers drills are provided with five different sizes of morse tapers. and are numbered from MT1 to MT5

In order to make up the different is sizes between the shanks of the drills and the type of machine spindles, sleeves of different size are used. when the drill taper shank is bigger than that the machine spindle. taper sockets are used.

REAMERS>>

A reamer is a multipoint cutting tool used for enlarging by finishing previously drilled holes to accurate sizes Reaming produces
- high quality surface finish
- dimensional accuracy to close limits
- Also small hole which can not be finished by other process can be finished.

Reamers are classified as hand reamers and machine remers Reaming by using hand reamers is done manually for which great skill is needed machine reamers are fitted on spindles of machine and rotated for reaming machine reamers are provided with morse taper shanks for holding on machine spindles Hand reamers have straight shank with 'square' at the end, for holding with tap wrenches.

PARTS OF A HAND REAMERS>>

1. AXis → The longitudional centre line of the reamer.
2. Body → The partion of the reamer exteding from the entering end of the remer to the commencement of the shank.
3. Recess → The pontion of the body which is reduced in drameter below the cutting edges, pilot or guide diameters.
4. Shank → The portion of the reamer which is held and driven. it can be parallel or taper.
5. circular Land → The cylindrically ground surface adjacent to the cutting edge on the leading edge of the land.

⑥ Bevel Lead → The bevel lead cutting portion at the entering end of the reamer cutting its way in to the hole. It is not provided with a circular land.

⑦ Taper Lead → The tapered cutting portion at the entering end to facilitate cutting and finishing of the hole. It is not provided with a circular land.

⑧ Bevel Lead Angle → The angle formed by the cutting edges of the bevel lead and the reamer axis

Materials of Hand Reamer:- When the reamers are made as a one-piece construction high speed steel is used When they are made as two piece construction then the cutting portion is made of high speed steel while the shank portion is made of carbon steel. They are butt welded together before manufacturing.

Specification of a Reamer- To specify a reamer the following data is to be given.

Type
Flute
Shank end
Size

Examples. Hand reamer, straight flute, parallel shank of Ø20mm.

Drill size for Reaming → For reaming with a hand or a machine reamer, the hole drilled should be smaller than the reamer size. The drilled hole should have sufficient metal for finishing with the reamer Excessive metal will impose a strain on the cutting edge of the reamer and damage it. A method generally practised in workshop is by applying the following formula.

Drill size = Reamed size - (undersize + oversize)

Finished size → Finished size is the diameter of reamed

under size → undersize is the recommended reduction in size for different ranges of drill diameter.

Undersizes for Reaming

Diameter of ready reamed hole (mm)	undersize of rough bored hole (mm)
Under 5	0.1 --- 0.2
5 --- 20	0.2 --- 0.3
21 --- 50	0.3 --- 0.5
Over 50	0.5 --- 1

over size → It is generally considered that a twist drill will make a hole large than its diameter the Oversize for calculation purposes is taken as 0.05mm - for all diameters of drills

For obtaining good surface finish use a coolant while reaming, Remove metal chips from the reamer frequently, Advance the reamer slowly into the work

Drills

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EXPERIMENT NO. -4

AIM OF The experiment : Internal threading of through hole/ blind holes using hand taps.

APPARATOS REquared :

① Types of taps
② Double ended Adjustable Tap wrench

THEORY : Hand taps are used for internal threading of componet.

Features : They are made from high carbon steel or high speed steel, hardened and ground.

Threads are cut on the surface, and are accurately finished To from the cutting edges, the flutes are cut across the thread. For holding and turning the taps while cutting threads, the ends of the shanks are squared

Thend of the taps are chamfered (taper lead) for assisting, aliganing and starting of the thread.

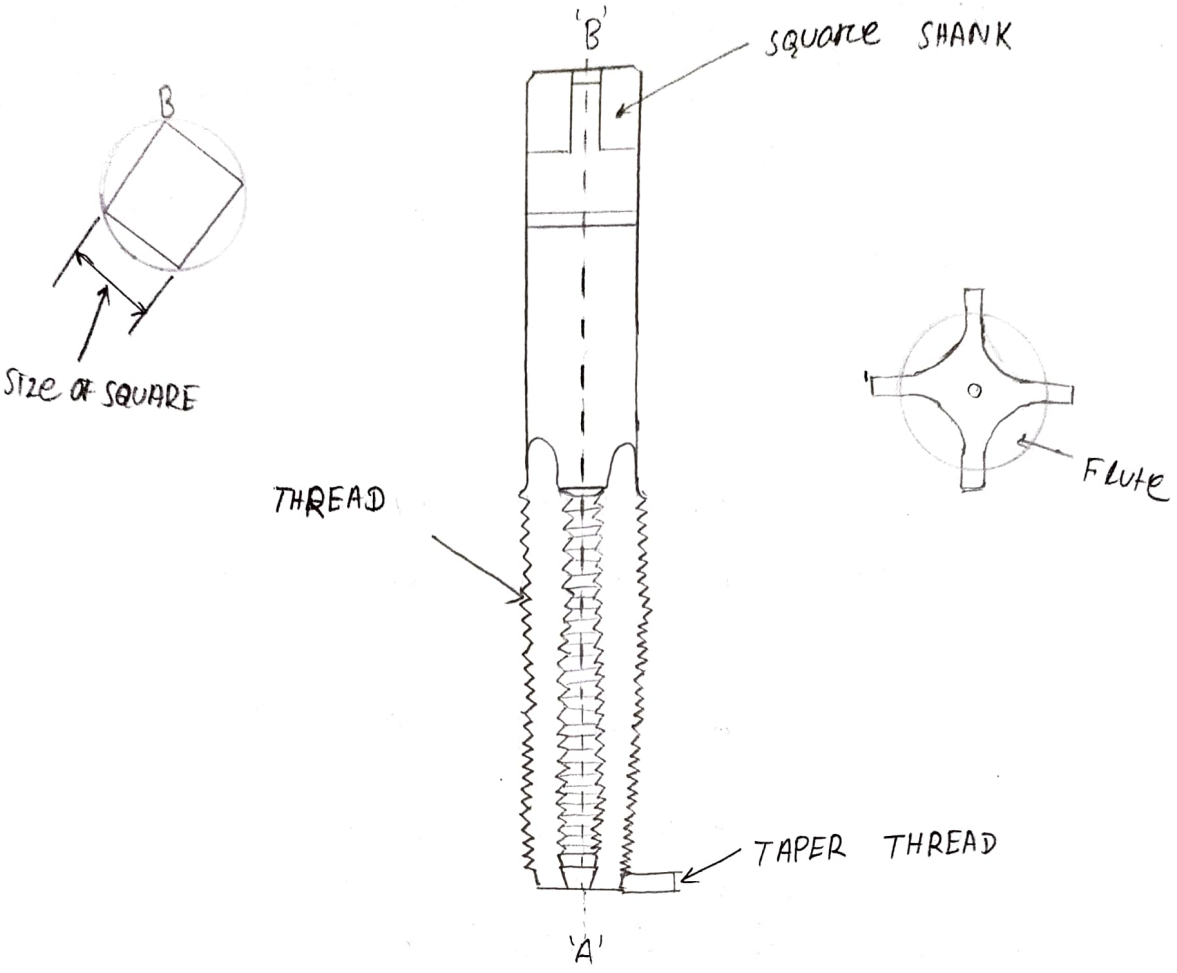
The size of the taps ~~are~~ and the type of the thread are usually conked on the shank.

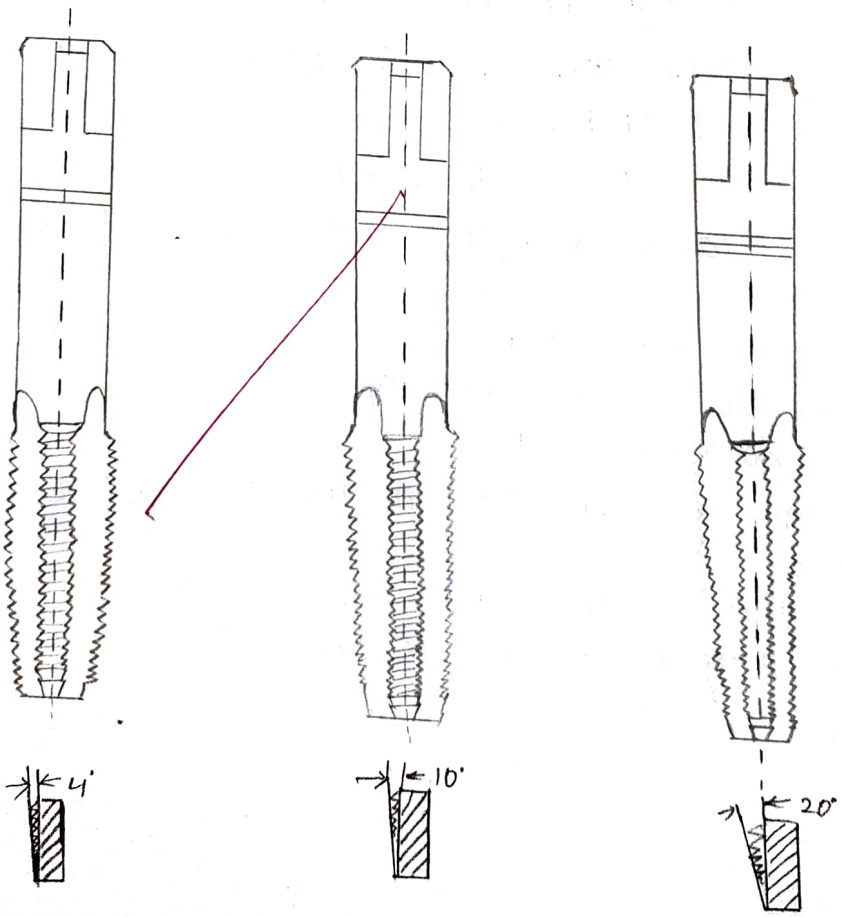
Types of taps in a set : Hand taps for a particular thread are available as a set consisting of three pices. These are

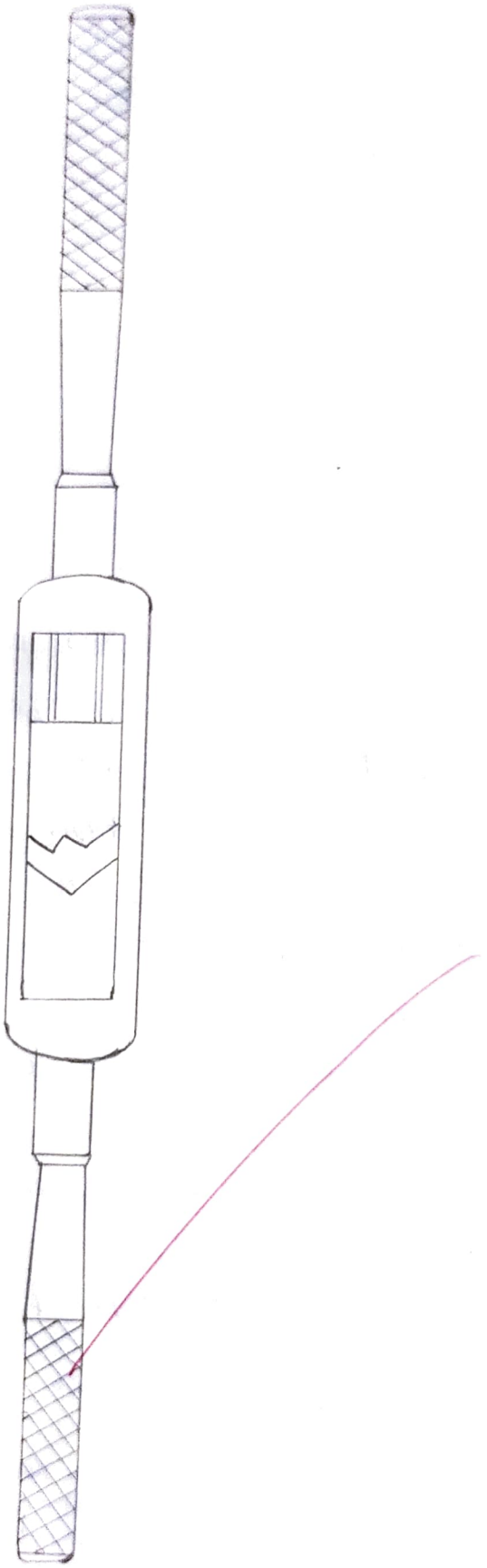
first tap or taper tap
second tap or intermediate tap
plug or bottoming tap.

These tapes are identical in all features except in the taper lead.

The taper tap is to start the thread. It is possible to form full threads by the taper tap in through holes which are not deep.


'B'
SQUARE SHANK
B
SIZE OF SQUARE
FLUTE
THREAD
TAPER THREAD
'A'


4'
10'
20'



EXPERIMENT NO. 5 :

AIM OF THE EXPERIMENT : External threading using dies.

APPARATOS Required :

1) Die
2) Adjustable screw plate.

THEORY :

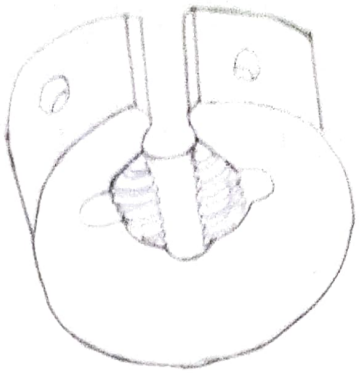
Uses of Die : Threading dies are used to cut external threads on cylindrical workpieces.

Types of Dies : The following are the different type of dies. Circular split die (Button die)
Half Die.
Adjustable screw plate die

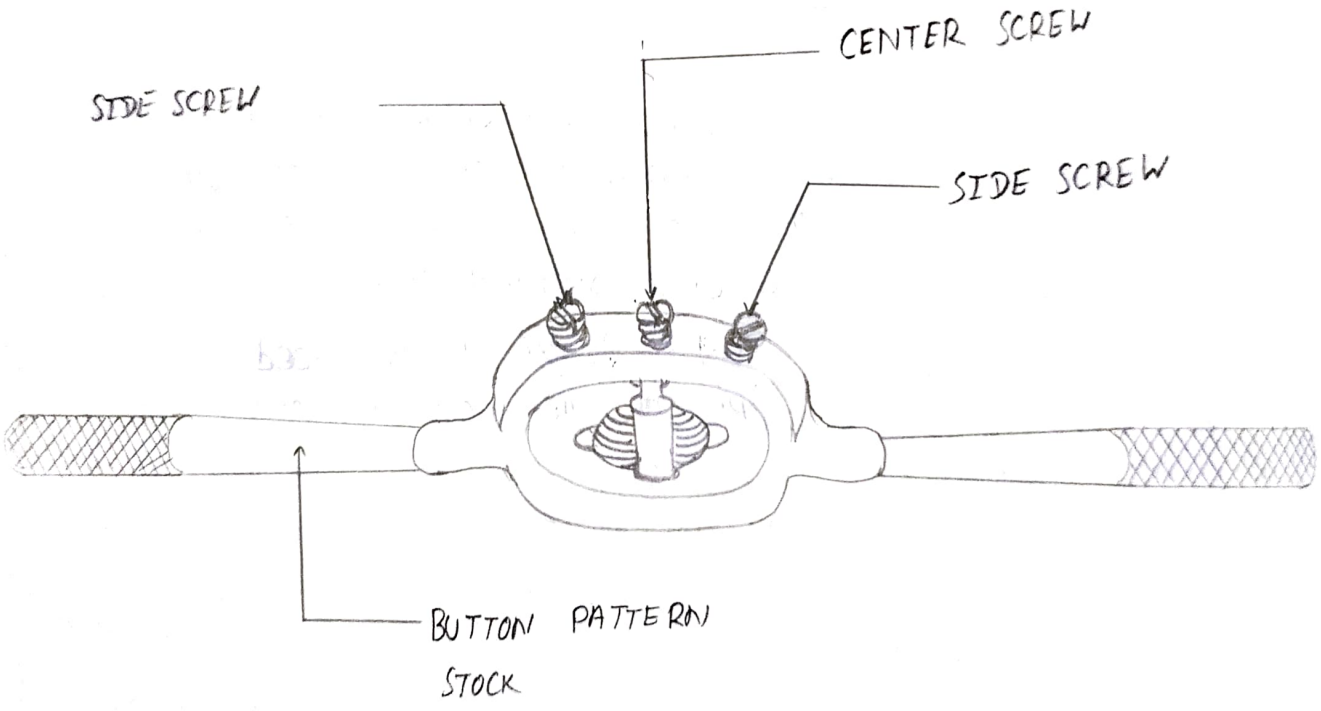
Circular split Die / Button Die : This has a slot cut to permit sligh variation in size.
When held in the diestock, variation in the size can made by using the adjusting screws. This permits creasing or decreasing of the depth of cut. When the screws are tightened the die will close slightly. For adjusting the depth of the cut, the centre screw is advanced and locked in the groove. This type of die stock is called button pattern stock.

Adjustable screw plate Die : This is another type of a two piece die similar to the half die. This provides greater adjustment than the split die.

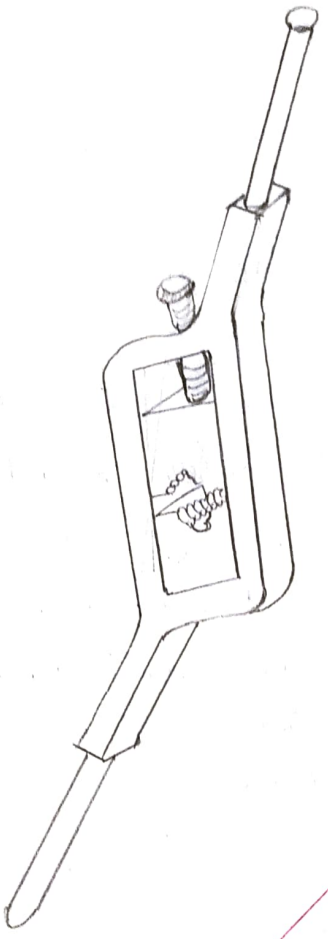
The two die halves are held seccurely in a collar by means of a threaded plate (guide plate) which also acts as a guide while threading.



(Circular split Die)



(Adjustable screw plate Die)



(HALF DIE)

when the guide plate is tightened after placing the die pieces in the collar, the die pieces are correctly located and rigidly held.

Half Die :-

Half dies are stronger in construction.

Adjustments can be made easily to increase or decrease the depth of cut.

These dies are available in matching pairs and should be used together.

By adjusting the screw of the diestock, the die pieces can be brought closer together or can be moved apart.

They need a special die holder.

The die pieces can be adjusted, using the adjusting screws on the collar. This type of die stock used is called quick cut diestock.

Conclusion :- Hence we study in this instrument which is used in hour experiment.

Submitted by

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Semester → 4th

EXPERIMENT NO. - 6 :

AIM OF THE EXPERIMENT :- Study of micrometer, dial gauge, vernier caliper, Filler gauge, inside and outside micrometer, vernier height gauge etc.

APPARATUS Required :-

(1) micrometer
(2) dial gauge.
(3) vernier caliper
(4) Filler gauge
(5) inside and outside micrometer,
(6) vernier height gauge.

THEORY :-

micrometer :- micrometer is a measuring instrument used for measuring external, internal and depth dimensions accurately. They are available in different ranges. It is made on the basis of nut and screw bolt. The different part of the micrometer are given figure. There are Three type of micrometer such as: outside inside and depth micrometer.

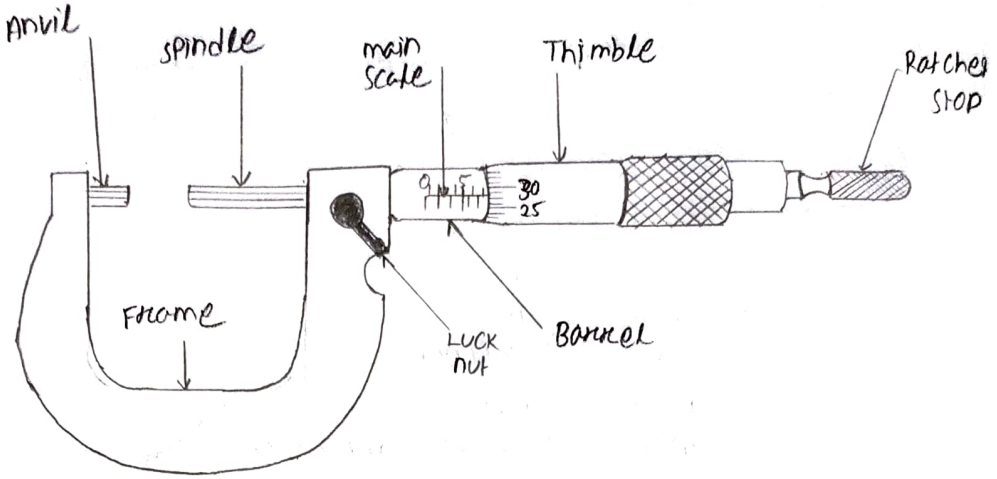
outside micrometer :- An outside micrometer is a precision measuring instrument used to measure the thickness of sheets, plates and the outside diameters of round objects to an accuracy of ± 0.01m on the barrel, a 25 mm long datum line is marked. This line is graduated to read millimeters and half millimeters.

Since the pitch of the spindle screw is 0.5 mm, with the thimble rotating once the spindle ~~screw 0.5 mm~~ advances by 0.5 mm.

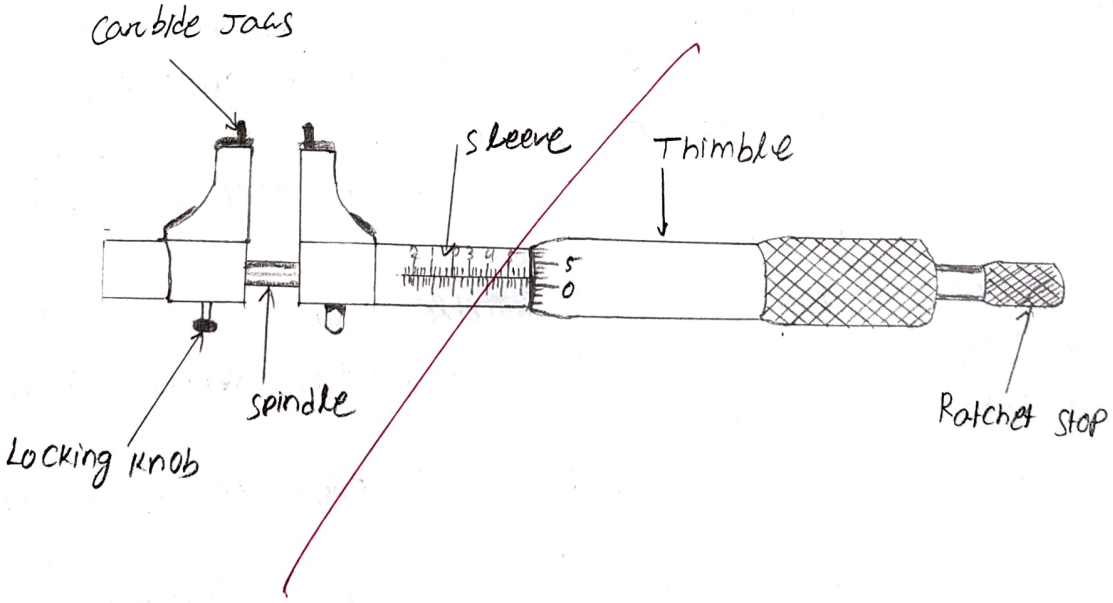
The circumference of the bevelled edge of the thimble is graduated into 50 divisions.

movement of one division of the barrel = 0.5 mm

movement of one division of the thimble = $\frac{0.5 \times 1}{50} = 0.01$



(Out side micrometer)



Inside micrometer : The inside micrometer, as the nam implies is used for measuring inside dimensions, such as pump casing ceasing ring, cylinders, bearings, and bush ings. inside micrometer usually come in a set that includes a micrometer head, and a spacing collar that is 0.500 inch in length. The spin-dles usually graduate in 1-inch increments or range, for example, 1 to 2 inches, 2 to 3 inches.

The 0.500 spacing piece is used between the spindle and the micrometer head so the range of the micrometer can be extended.

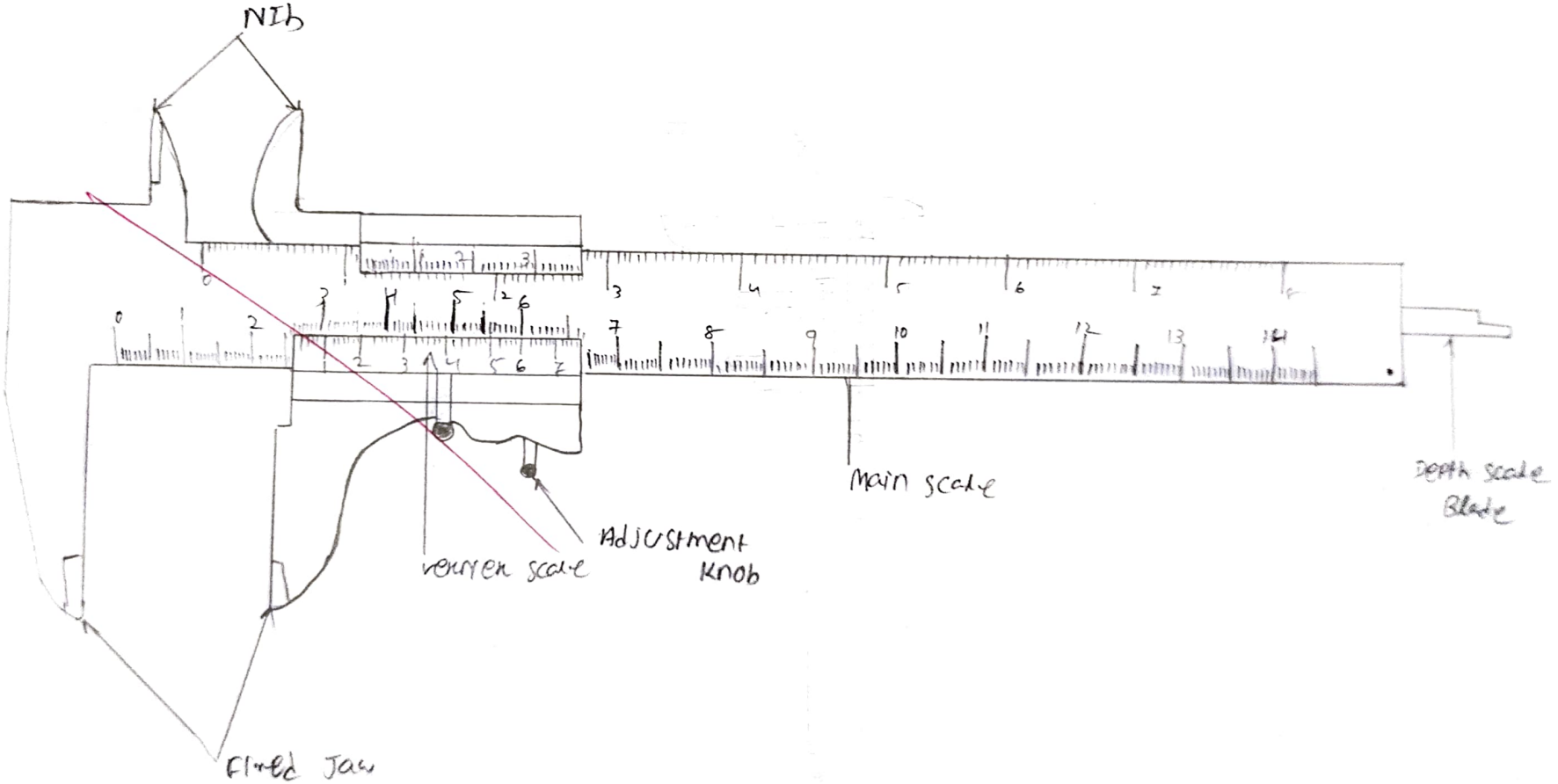
To read the inside micrometer, read the micrometer head exactly as you would an outside micrometer then add the micrometer reading to the rod length to obtain the total measurement.

When the 1-to 2 inch spindle is used, and the sleeve and thimble scales are set to 0.00 inch the distance between the face of the anvil and the face of the spindle is exactly 1.00 inch.

the 0.011 mark on the thimble scale has been advanced and additional 0.0002 beyond the horizontal sleeve line. when you add this to the other readings, the reading is 0.200 + 0.075 + 0.011 + 0.0002 or 0.2862

VERNIER CALIPER :

vernier caliper is a precision measuring instrument used for measurement of outside diameter, inside diameter and depth, The least count of vernier caliper is 0.001 inch and 0.02 mm. vernier caliper is made by assembling several different parts as shown in the given figure.



(vernier scale)

METHOD OF TAKING READING :-

a) → Locate that part of the scale which contains inch signs and which is on the left hand side of 0 on the vernier scale.

b → Look at the divisions or central distance. How many of them are on the left hand side of 0 of the vernier? Their value is 0.1 and 0.2 inch respectively.

c → Locate the small parts of the main scale. Their value is 0.025.

d → The sum of all the four items written above is reading of the vernier caliper.

PRECAUTIONS :-

a → It is necessary that there is no play in its beam and movable jaw and it could be easily.

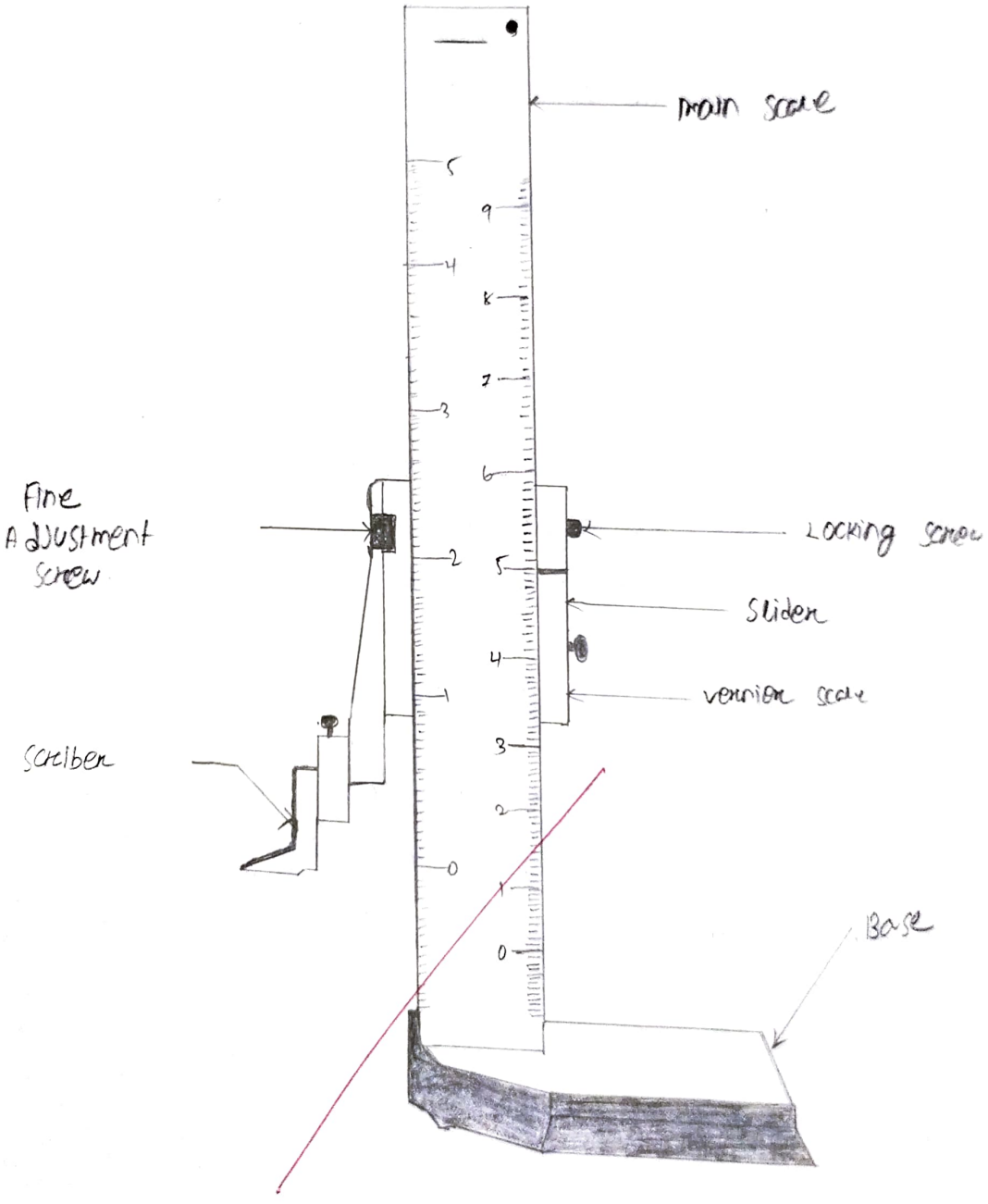
b → After long use, the jaw-edges wear out. In such cases, it should be regrinded.

c → A job fixed on a machine in operation should not be measured with it.

d → It should always be kept away from the cutting tools.

e → It is difficult to see the part of scale. Therefore, it is advisable to use a magnifying glass.

f → After using it, we should clean it with thinner and keep it in the case.



(vernier height Gauge)

Vernier Height Gauge :- Is similar to vernier calipers and used for marking purpose by the help of surface plate and angle plate. It consists of scriber by which lines are scribed on the job. In vernier height gauge, slide base remains joint with the beam permanently as shown in the figure.

Dial gauge :-

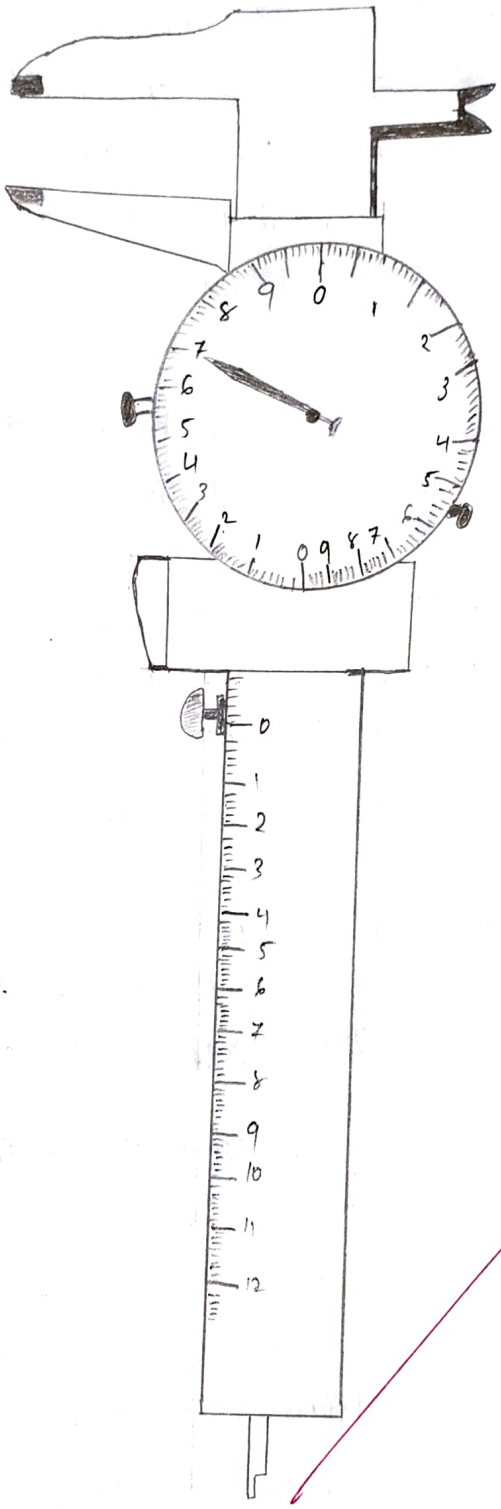
A dial caliper (gauge) is a handy and versatile measuring tool. It can measure I. D, O. D, step and depth.

Clean the measuring faces before and after measurement close the jaw and check that the indicator points to 0' on the dial face. If caliper does not zero, loosen the bezel clam screw and rotate the bezel to the 0' position.

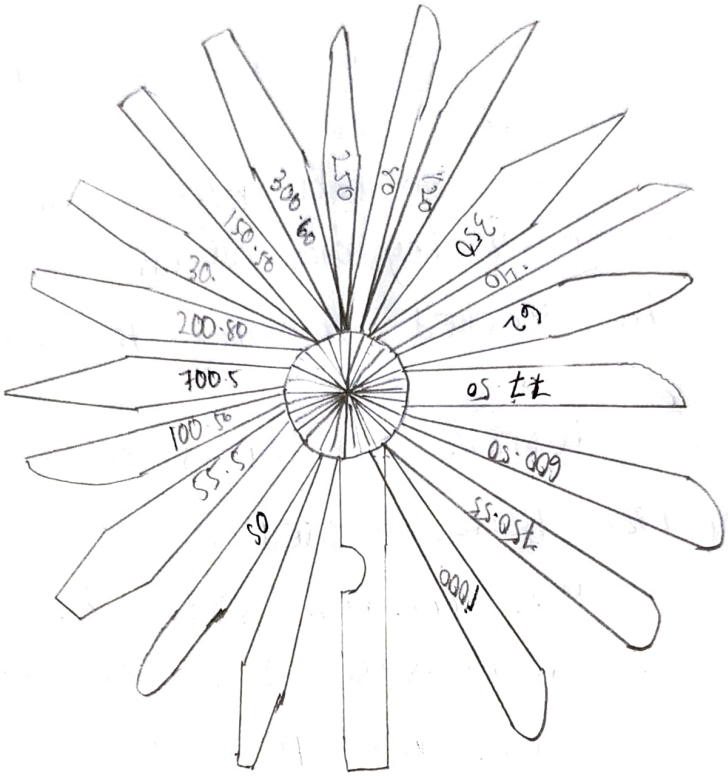
The main scale on the caliper with the inch system is marked every .100" and represents one revolution. Each graduation on the dial represents .001".

Material Dial Caliper are read in a similar fashion. The main scale on the caliper has graduations every 1 mm and represents one half of a revolution of the dial. Every 10th mark is numbered in cm. Each full revolution is 2mm. (It take 5 revolutions to make 1cm or 10 mm) Each graduation on the dial represents .02mm

Thus a measurement of 12.02 mm could be obtained by reading 1 (1cm = 10mm) on the main scale.



(DIAL GAUGE)



(Feeler gauge)

Tapered (upper) and parallel lower feeler gauge

Feeler gauge :- Is a tool used to measure gap widths. Feeler gauge are mostly used in engineering to measure the clearance between two parts.

They consist of a number of small length of steel of different thicknesses with measurements marked on each piece. They are flexible enough that, even if they are all on the same hinge, several can be stacked together to gauge intermidiate values.

A similar device with wires of specific diameter instead of flat blades is used to set the gap in spark plugs to the correct size, this is done by increasing or decreasing the gap until the gauge of the correct size just fits inside the gap.

The length of steel are sometimes called levers or blads, although they have no sharp edge.

Conclusion :- Hence we have study in this experiment and used our experiment.

Submitted by

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EXPERIMENT - 07 :

AIM OF THE EXPERIMENT: operating various workshop equipment such as: Drilling machine, Grinding machine, valve refacing machine, cylinder Honing machine, Twin head machine, Horizontal Boring bar, surface grinding machine, crank shaft and cam shaft grinding machine, mechanical press, hydrolic press etc.

APPARATUS Required :

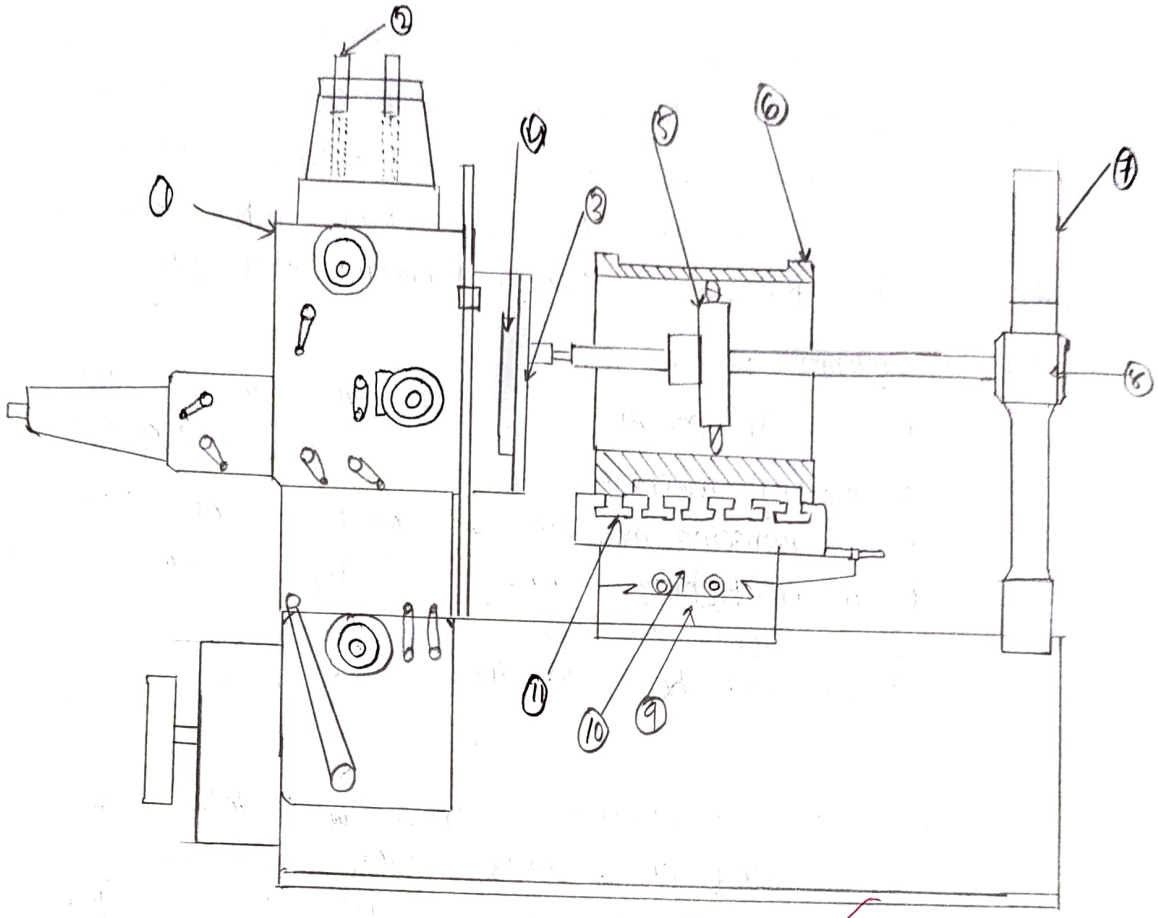
1. Drilling machine
2. Grinding machine
3. Valve refacing machine
4. cylinder honing machine
5. Twin head machine
6. Horizontal boring machine
7. Crank Shaft, Camshaft Grinding machine
8. mechanical press hydrolic press machine

THEORY :

HORIZONTAL BORING machine : In a horizontal boring machine the work is supported on a table which is stationary and the tool revolves in a horizontal axis. A horizontal boring machine can perform boring, reaming, tooling, threading, facing, milling, groving, recessing and many other operation with suitable tools. workpice which are heavy, irregular, UN symmetrical or bulky can be conveniently held and machined Different types of horizontal boring machines have been designed to suit different purposes, Illustrates a horizontal machine

Type of Horizontal machine :

1. Table type horizontal boring machine
2. Floor type horizontal boring machine
3. Planer type horizontal boring machine.
4. multiple head type horizontal boring machine.



(Horizontal boring machine)

1→ Headstock

2→ Pully Fan counter balancing weight of head stock

3→ Headstock elevating screw

4→ Boring head

5→ Boring cutter on boring bar

6→ work

7→ End supporting column

8→ Bearing block

9→ Saddle

10→ cross-slide

11→ Table.

HONING MACHINE :

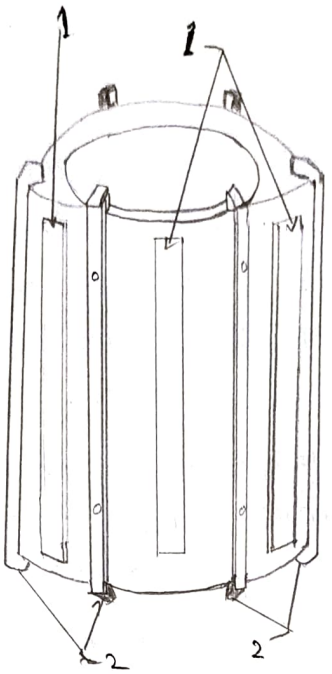
Honing is grinding or a abrading process mostly for finishing round holes by means of bonded abrasive stones, called hones. Honing is therefore a cutting operation and has been used to remove as much as 3 mm of stock but is normally confined to amount less than 0.25 mm. so honing is primarily used to correct some out of roundness, taper, tool marks, and axial distortion. Honing stones are made from common abrasive an bonding materials often impregnated with sulphur, resin, or wax to improve cutting action and lengthen tool life. materials honed range from plastics, silver, aluminium, brass, and cast iron to hard steel and cemented carbides. This method is mostly used for finishing automobile crankshaft journals.

SURFACE GRINDER :

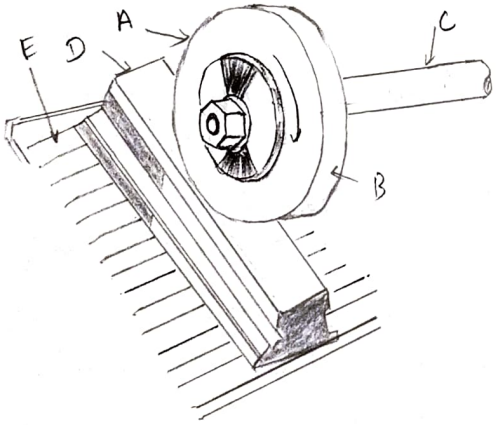
Surface grinding machine are employed to finish plane or flat surfaces. They are also capable of grinding irregular, curved, convex, and concave surfaces.

Conventional surface grinders may be divided into two classes. one class has Reciprocating tables for work ground along straight lines, while the other covers the mechines with rotating work tables for continuos rapid grinding. Surface grinders may also be classified according to whether they have horizontal or vertical grinding wheel spindles. so there may be four different types of surface grinders:

1. Horizontal spindle reciprocating table
2. Horizontal pindle rotating table
3. vertical spindle reciprocating table
4. vertical spindle rotary table.

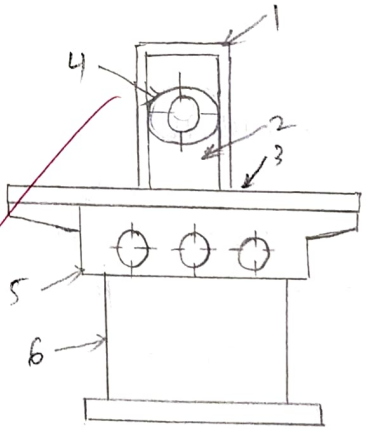


(Honing)



(Surface grinders)

A → Grinding wheel
B → Grinding face
C → wheel spindle
D → work piece
E → work Table



(Horizontal spindle surface Grinder)

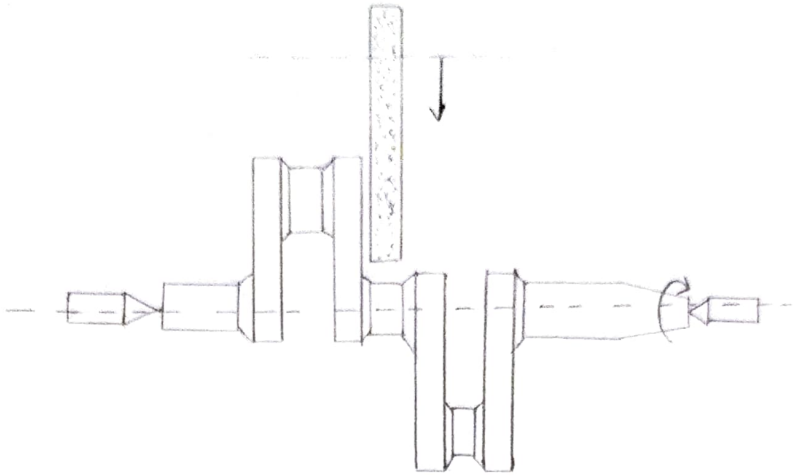
1 → column
2 → wheel head
3 → Table
4 → wheel
5 → Saddle
6 → Base

Crank shaft and cam shaft grinding machine : The cylindrical grinders are intended primarily for grinding plain cylindrical part, although they can also be used for grinding contoured cylinders, fillets and even cams and crankshafts.

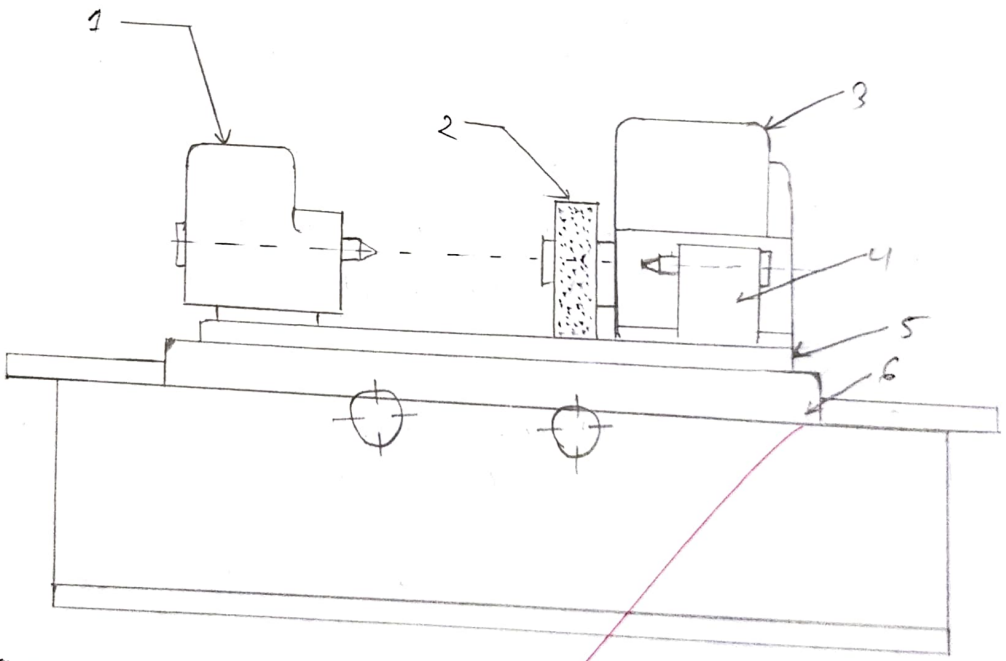
Main features : The workpice is usually held between ded centers and rotated by a dog and driver on the face plate. The work may also be rotated about its own axis in a chuck. There are four movements involved in a cylindrical center-type grinding (1) the work must revolve, (2) the wheel must revolve, (3) the work must pass the wheel, and (4) the wheel must pass the work. Hand feed is employed only in adjusting the wheel or starting the cut. A provision is also made for varying the logitudinal movement of the work on the wheel, and the rotating speed of the work to suit different conditions. The traverse of the work past the wheel or vice versa, is controlled by dogs which cause the table or wheel to reverse at the end of each stroke.

In machines of the cylindrical type, two ~~distance~~ distinct types of grinding operations are done. In the first, called traverse grinding, the work is reciprocated as the wheel feeds to produce cylinders longer than the width of the wheel face.

This machine essentially a lathe on which a grinding wheel has been substitute for the single point tool. It consist of the following ~~part~~ parts : Base, Table, Headstock, tailstock, wheel head, cross feed, wheel.



(Plunge grinding)



1⇒ Headstock
2-> Grinding wheel
3-> wheelhead
4->Tailstock
5-> upper table
6-> Lower table
7> BASE

(Crank shaft and cam shaft Grinding machine)

Twin Head machine :- Twin head connecting rod boring machine is suitable for reboring of connecting rods of all types of diesel and petrol engine. Heavy Duty Twin head Connecting Rod Boring machine is also suitable for reboring of forged connecting Rod as well as filled with white metal.

Casting and other steel plants :- All the casting of the machine is seasoned to achieve persistent accuracy, carbon steel is used for spindles and other parts of the machine and alloy steel is used for gears.

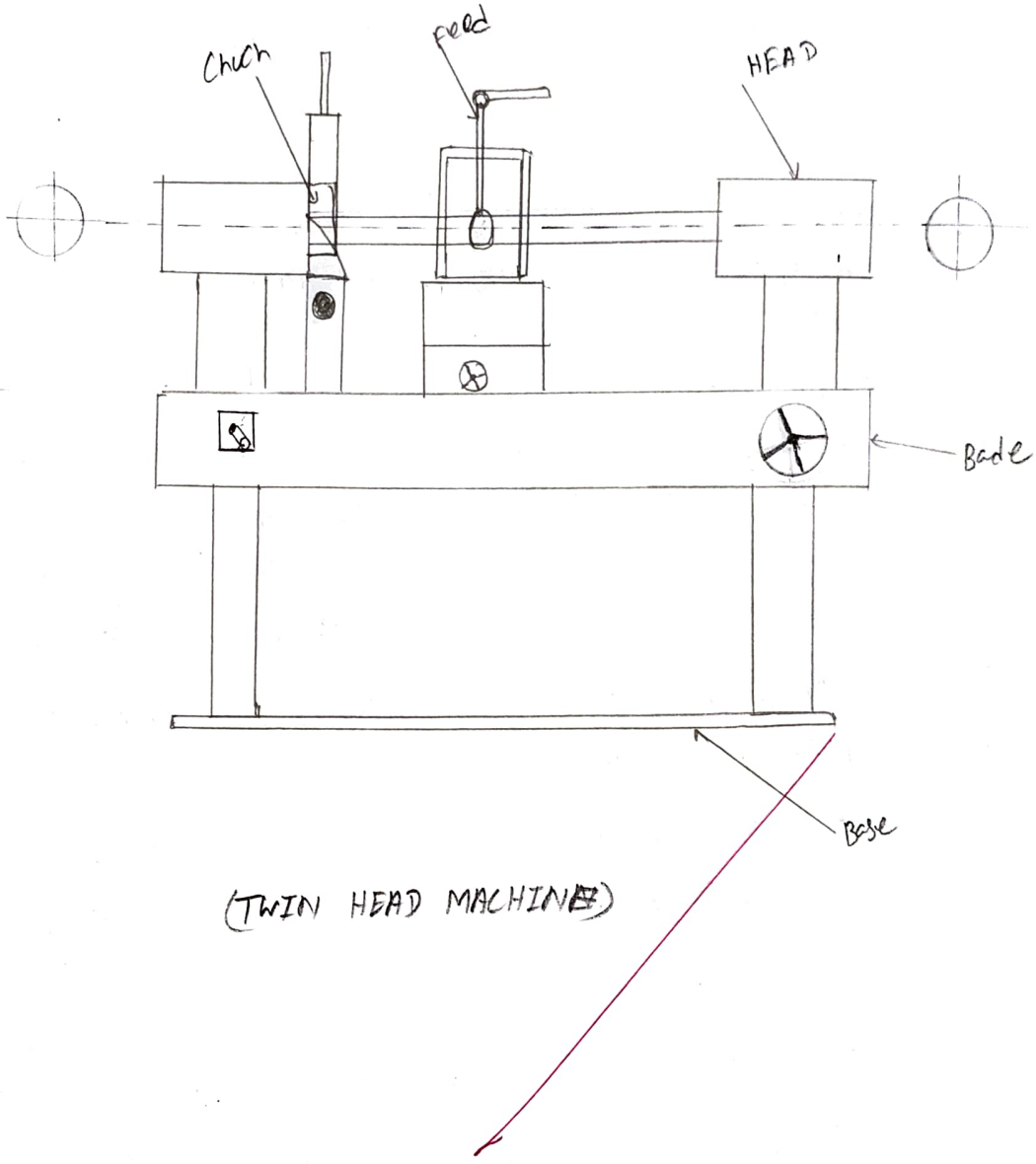
Bed :- It is of latest design with strong ribbing provided. The guide ways are carefully hand scrapped to highest accuracy and checked with precision instruments

Heads :- Both head are fitted with Tapper Roller Bearing with Hardened & ground spindles. Self lubrication provided

Setting :- only few minutes required to centre and set, bore & face the rod complete.

Chuck :- Two jaw chuch & anvil pin Finiture centres rod accurately and hold it securely for boring Automatic perfect job.

Feed :- Both end main slide feed provided with Automatic control with one lever and hand operated also.

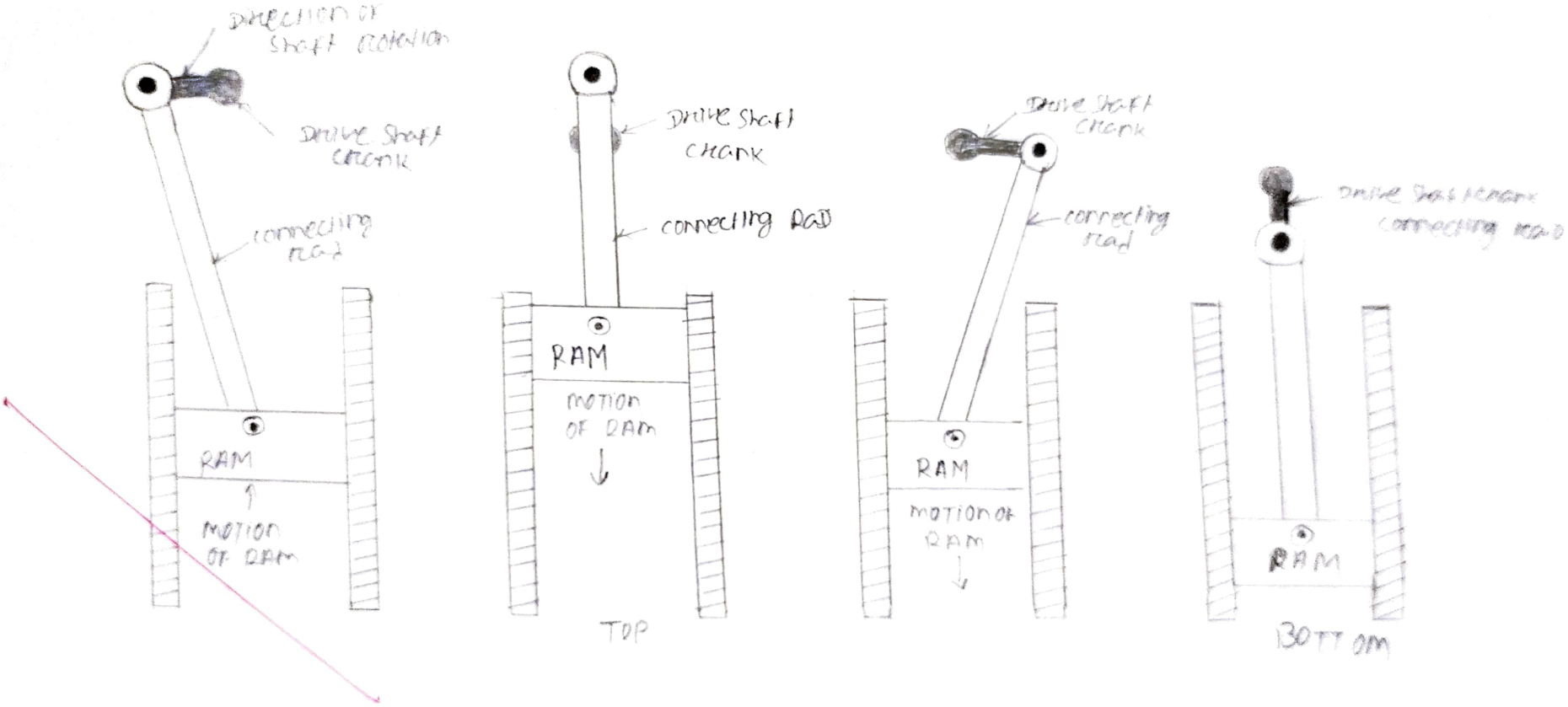


(TWIN HEAD MACHINE)

Mechanical Press :-

Mechanical Press belong to a class of machine tools that encompass a wide range of different machine type. Primarily, the mechanical press transforms the rotational force of a motor into translational force. Vectors that performs the pressing action. Therefore, the energy in a mechanical press comes from the motor. These type of press are generally faster than hydraulic or screw press. (Actually the screw press may also be classified as a mechanical press). When performing a manufacturing operation using a mechanical press, the correct range of the stroke is essential.

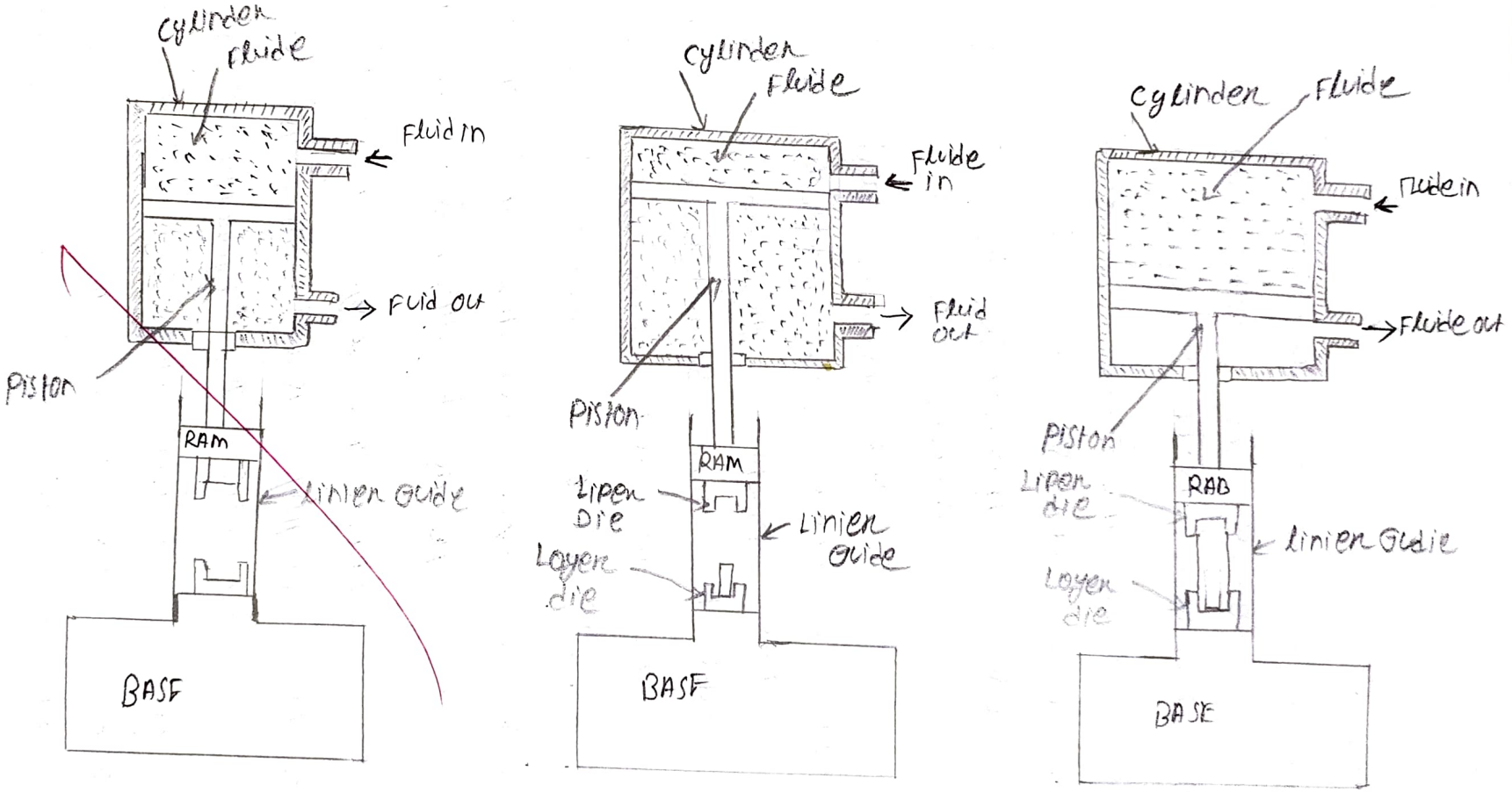
Mechanical Press machine tool are commonly used in metal forging manufacture, and sheet metal working. The desired application of force will dictate the type of machine required. Extrusion will often necessitate a more consistent force over a longer distance. However, a mechanical press may often be a good choice for impact extrusion, since a fast, quickly repeatable application of force over a limited distance is what is needed for that type of manufacturing process. The most powerful mechanical press in modern manufacturing Industry will have a press capacity of about 12000 tons. (24,000,000 lbs)



(MECHANICAL PRESS)

Hydraulic Press :-

Hydraulic Press are a powerful class of machine tools, they derive the energy they deliver through hydraulic pressure. Fluid pressure, in a particular chamber, can be increased or decreased by the use of pumps, and valves. Sometimes devices and system may be used to increase the capacity of the pumps. In more powerful presses. These presses can operates over a long distance and at a constant speed. Hydraulic presses are generally slower relative to other press machine types. This involves longer contact with the work, therefore the cooling of the work can be an issue when hot forming a part with hydraulic force. Hydraulic Press are capable of being the most powerful class of presses. Some may be as large as building, and can deliver awesome pressure. The largest hydraulic pressure are capable of applying 75,000 tons. (150,000,000 lbs) of force. The hydraulic. The hydraulic press shown is being used to manufacture a metal forging. Extrusion is also very common use for such a press, although extrusion is often performed horizontally.



(Hydrolic Press)

VALVE REFACING MACHINE :- Place them on a piece of board with holes drill and numbered to correspond with the cylinder each valve come from.

The next step is to re surface the valve face. This is done by using a valve grinder or refacing machine. valve refacing is done by machining a fresh, smooth surface on the face and stem tips. valve faces suffer from burning, pitting, and wear caused by opening and closing millions of times during the service life of the engine. valve steam tips wear because of friction from the rocker arms.

Although there are some variations in design, most valve grinding machines are basically the same. They use a grinding stone and precision chuck to remove a thin layer of metal from the valve and steam tip. The following steps are used in preparing to reface a valve.

~~SET~~ SET THE CHUCK ANGLE :- By rotating the valve grinding machine chuck assembly. An Interference angle normally 1 degree difference in valve face angle and valve set angle) is set on the machine. If the valve set is by using diamond cutter to ~~face~~ stone surface. Do this before grinding the valve.

Conclusion :- Hence we have study above this instrument and used in our experiment.

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