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DEPARTMENT OF MECHANICAL ENGINEERING

Machine Drawing

(B.Tech II Year I Semester)

MACHINE DRAWING

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Sheet No. 1 : Conventional Representation

Certain draughting conventions are used to represent materials in section and machine elements in engineering drawings.

1. **Materials**

As a variety of materials are used for machine components in engineering applications, it is preferable to have different conventions of section lining to differentiate between various materials. The recommended conventions in use are shown in Fig.2.26.

2. **Machine Components**

When the drawing of a component in its true projection involves a lot of time, its convention may be used to represent the actual component. Figure 2.27 shows typical examples of conventional representation of various machine components used in engineering drawing.

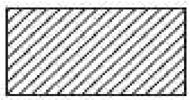
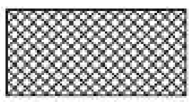
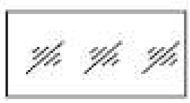
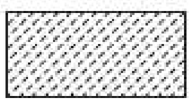
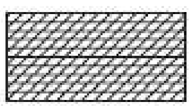
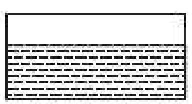
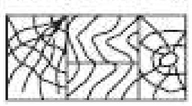
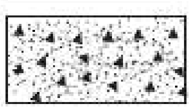
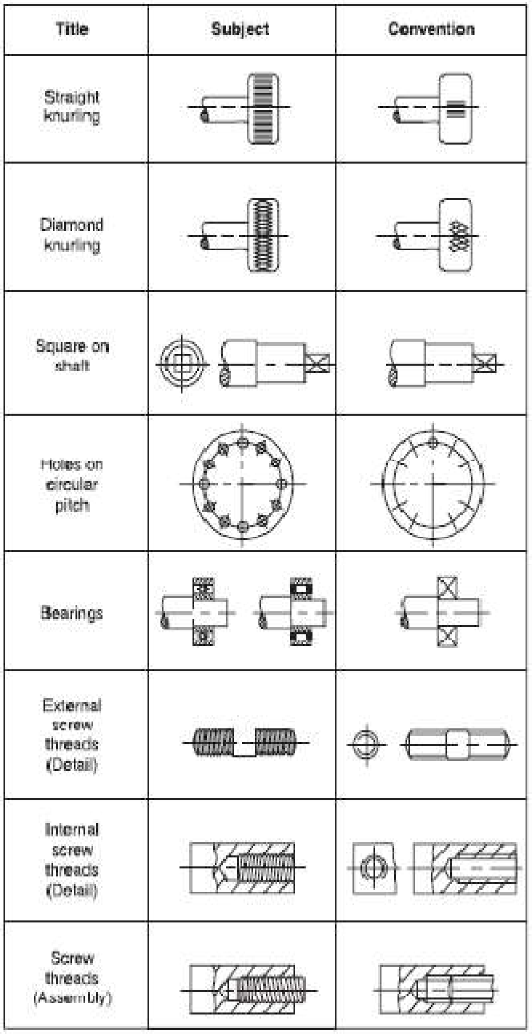
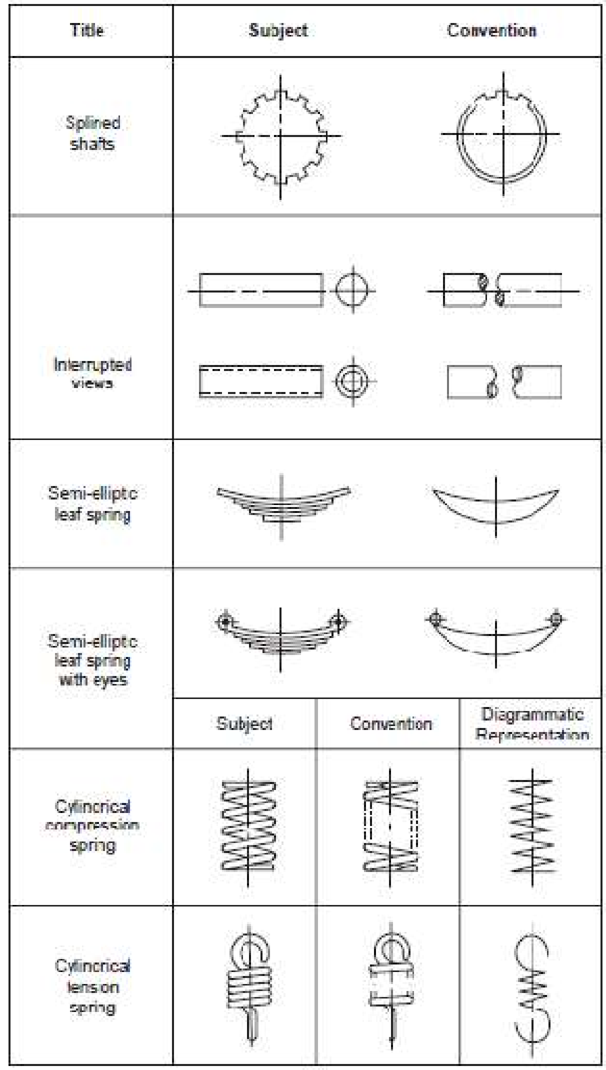
Type	Convention	Material
Metals		Steel, Cast Iron, Copper and its Alloys, Aluminium and its Alloys, etc.
		Lead, Zinc, Tin, White-metal, etc.
Glass		Glass
Packing and Insulating material		Porcelain, Stoneware, Marble, Slate, etc.
		Asbestos, Fibre, Felt, Synthetic resin products, Paper, Cork, Linoleum, Rubber, Leather, Wax, Insulating and Filling materials, etc.
Liquids		Water, Oil, Petrol, Kerosene, etc.
Wood		Wood, Plywood, etc.
Concrete		A mixture of Cement, Sand and Gravel

Fig. 2.26 Conventional representation of materials



(a)

Fig. 2.27 Conventional representation of machine components (*Contd.*)



(b)

Fig. 2.27 Conventional representation of machine components (*Contd.*)

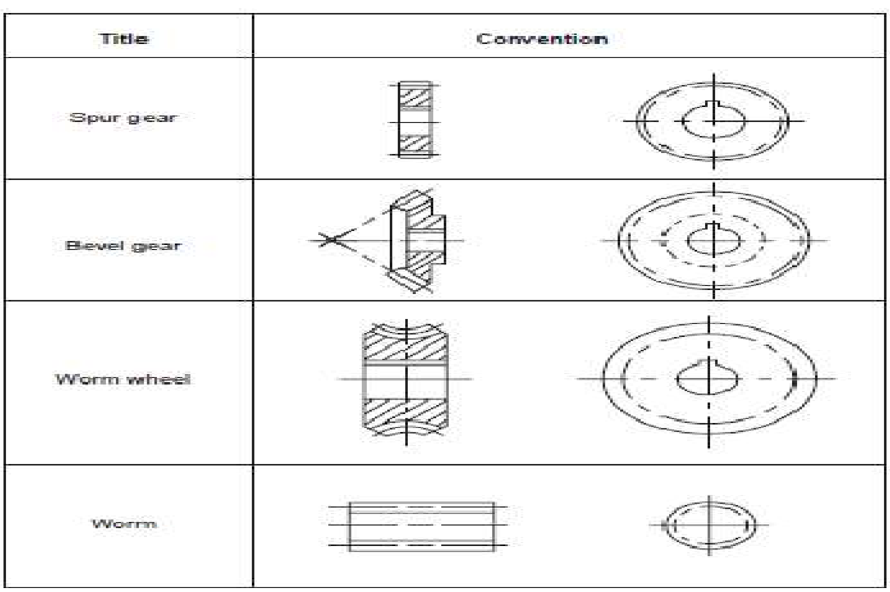


Fig. 2.27 Conventional representation of machine components

Sheet No. 2 : # Screwed Fasteners

Introduction

A machine element used for holding or joining two or more parts of a machine or structure is known as a fastener. The process of joining the parts is called fastening. The fasteners are of two types: permanent and removable (temporary). Riveting and welding processes are used for fastening permanently. Screwed fasteners such as bolts, studs and nuts in combination, machine screws, set screws, etc., and keys, cotters, couplings, etc., are used for fastening components that require frequent assembly and dissemble.

Screwed fasteners occupy the most prominent place among the removable fasteners. In general, screwed fasteners are used : (*i*) to hold parts together, (*ii*) to adjust parts with reference to each other and (*iii*) to transmit power.

Screw Thread Nomenclature

A screw thread is obtained by cutting a continuous helical groove on a cylindrical surface (external thread). The threaded portion engages with a corresponding threaded hole (internal thread); forming a screwed fastener. Following are the terms that are associated with screw

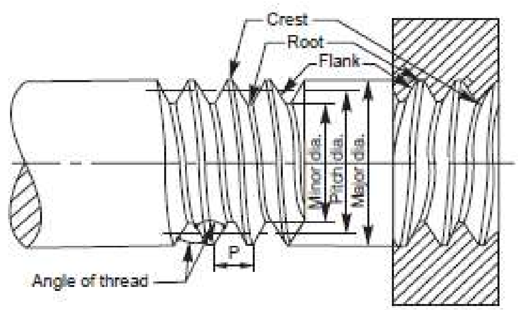


Fig. 5.1 Screw thread nomenclature

1. Major (nominal) diameter

This is the largest diameter of a screw thread, touching the crests on an external thread or the roots of an internal thread.

2. Minor (core) diameter

This is the smallest diameter of a screw thread, touching the roots or core of an external thread (root or core diameter) or the crests of an internal thread.

3. Pitch diameter

This is the diameter of an imaginary cylinder, passing through the threads at the points where the thread width is equal to the space between the threads.

4. Pitch

It is the distance measured parallel to the axis, between corresponding points on adjacent screw threads.

5. Lead

It is the distance a screw advances axially in one turn.

6. Flank

Flank is the straight portion of the surface, on either side of the screw thread.

7. Crest

It is the peak edge of a screw thread, that connects the adjacent flanks at the top.

8. Root

It is the bottom edge of the thread that connects the adjacent flanks at the bottom.

9. Thread angle

This is the angle included between the flanks of the thread, measured in an axial plane.

Form of Thread

Bureau of Indian Standards (BIS) adapts ISO (International Organization for Standards) metric threads which are adapted by a number of countries apart from India.

OTHER PROFILES

Apart from ISO metric screw thread profile, there are other profiles in use to meet various applications. These profiles are shown in Fig. 5.3, the characteristics and applications of which are discussed below:

Sharp V Thread

This thread profile has a larger contact area, providing more frictional resistance to motion. Hence, it is used where effective positioning is required. It is also used in brass pipe work.

British Standard With Worth Thread

This thread form is adopted in Britain in inch units. The profile has rounded ends, making it less liable to damage than sharp V-thread.

Buttress Thread

This thread is a combination of V-and square threads. It exhibits the advantages of square thread, like the ability to transmit power and low frictional resistance, with the strength of the V-thread. It is used where power transmission takes place in one direction only such as screw press, quick acting carpenter's vice, etc.

Square thread

Square thread is an ideal thread form for power transmission. In this, as the thread flank is at right angle to the axis, the normal force between the threads, acts parallel to the axis, with zero radial component. This enables the nut to transmit very high pressures, as in the case of a screw jack and other similar applications.

ACME thread

It is a modified form of square thread. It is much stronger than square thread because of the wider base and it is easy to cut. The inclined sides of the thread facilitate quick and easy engagement and disengagement as for example, the split nut with the lead screw of a lathe.

Worm thread

Worm thread is similar to the ACME thread, but is deeper. It is used on shafts to carry power to worm wheels.

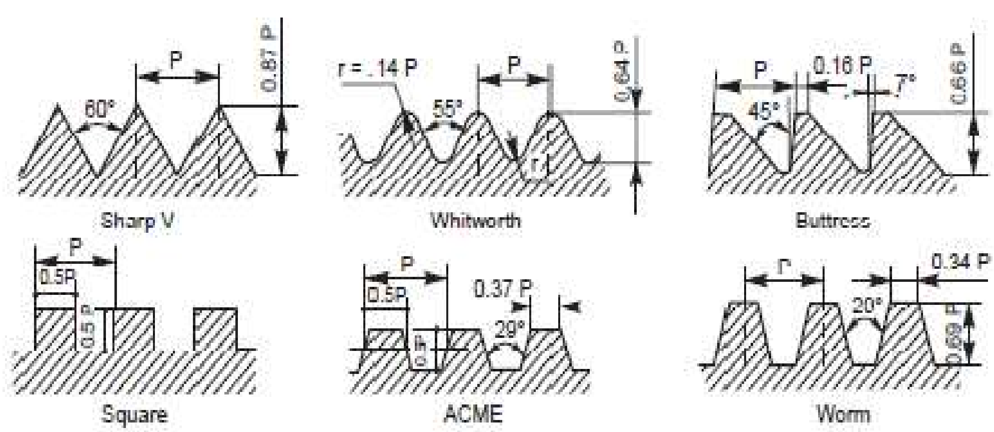


Fig. 5.3 Types of thread profiles

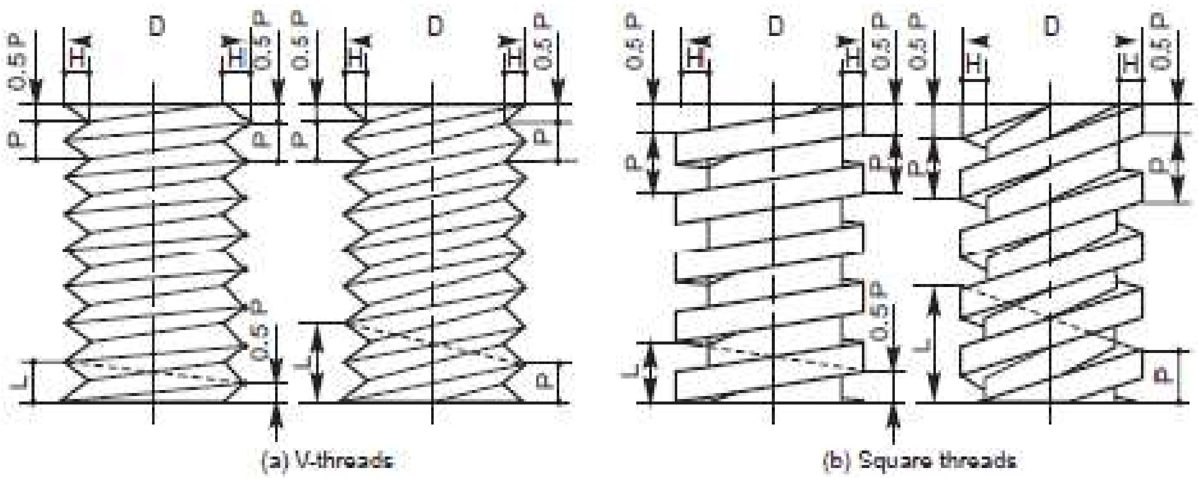


Fig. 5.4 Single and mult-start threads

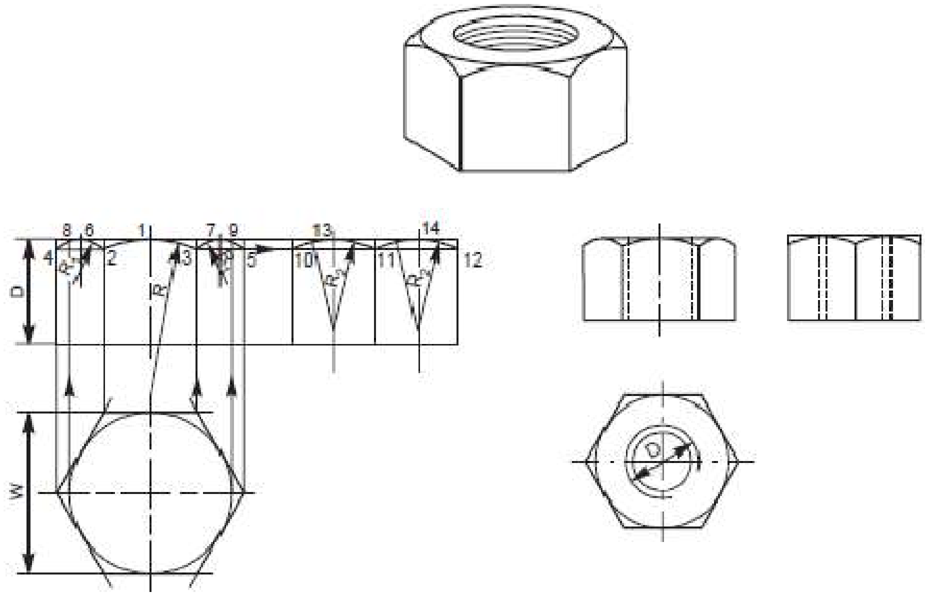
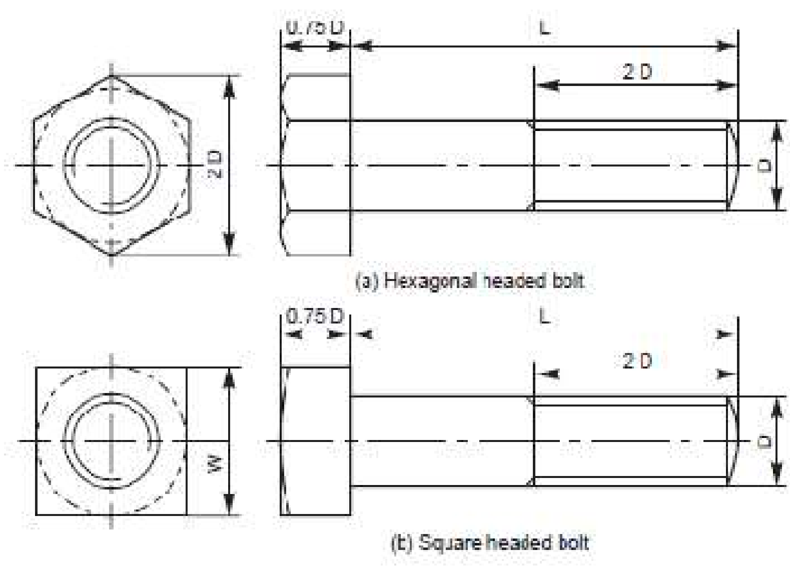


Fig. 5.12 Method of drawing views of a hexagonal nut (Method I)



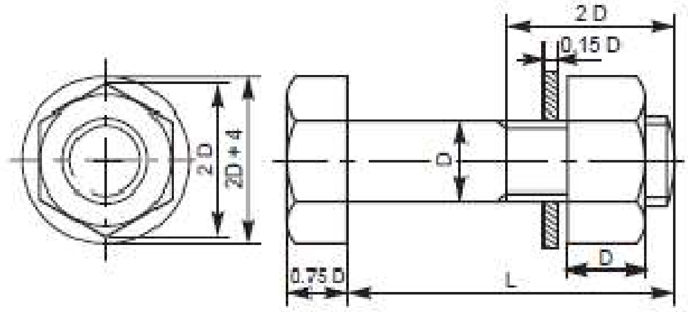


Fig. 5.17 A hexagonal headed bolt with a nut and a washer in position

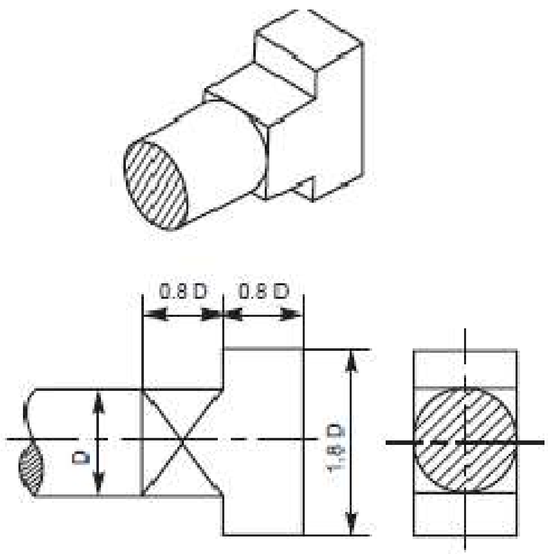


Fig. 5.19 T-headed bolt

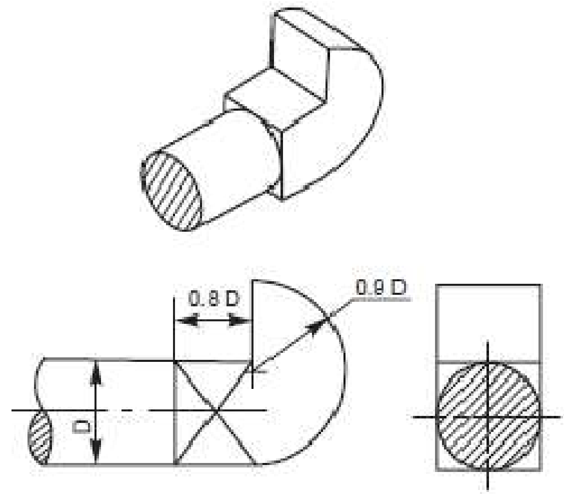


Fig. 5.20 Hook bolt

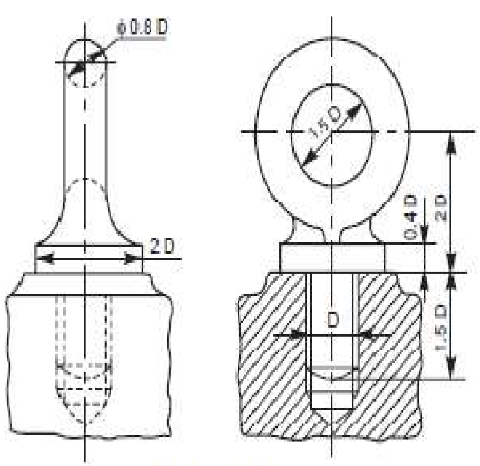


Fig 5.21 Eye-bolt

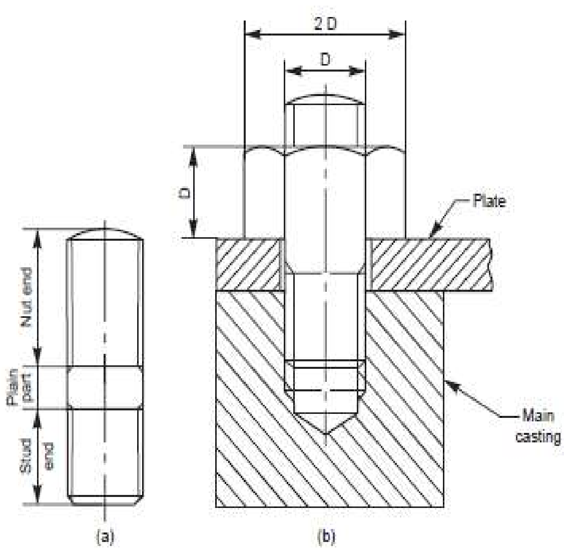


Fig. 5.22 (*a*)–Stud, (*b*)–Stud joint

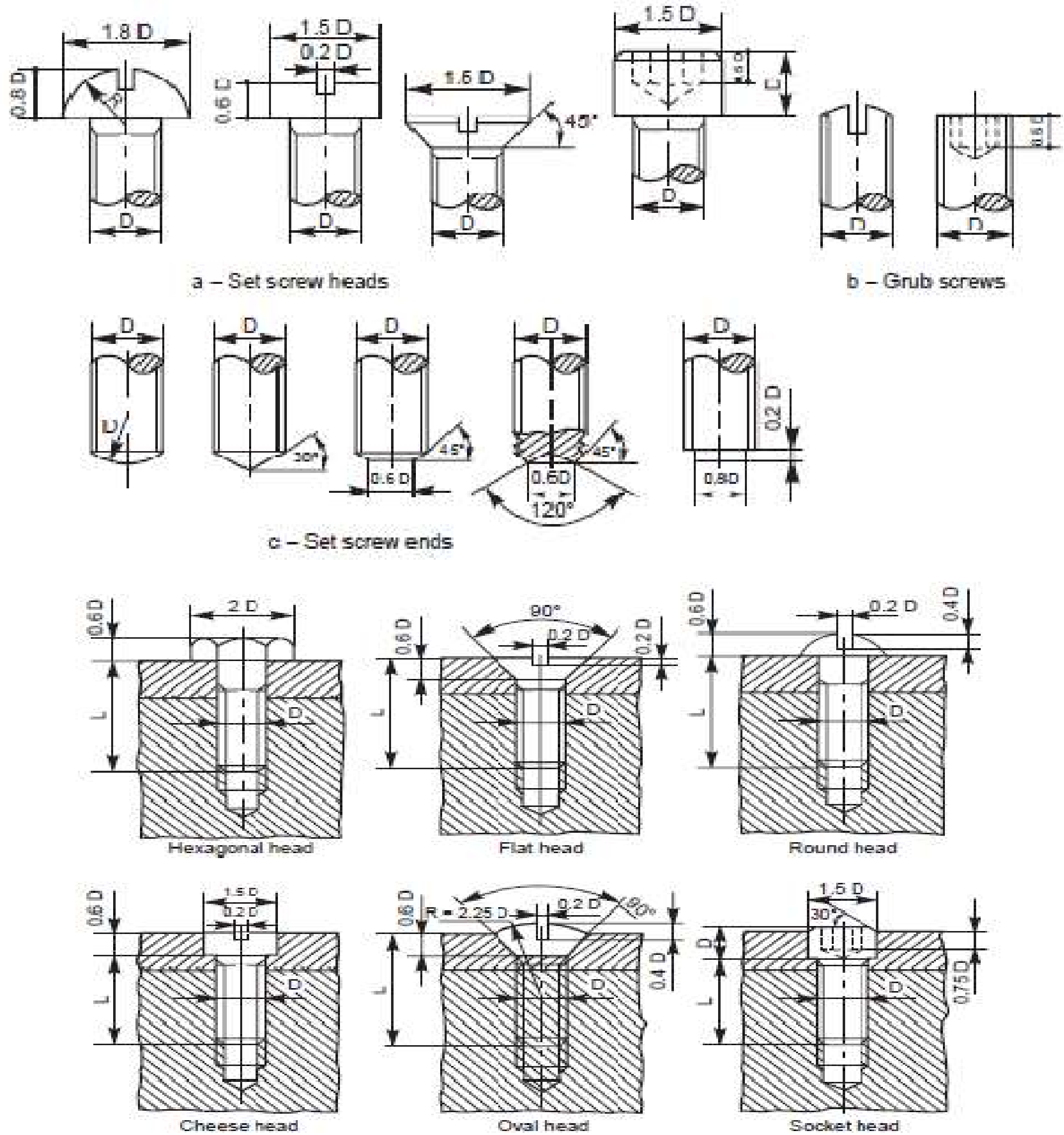


Fig. 5.24 Types of machine and cap screws

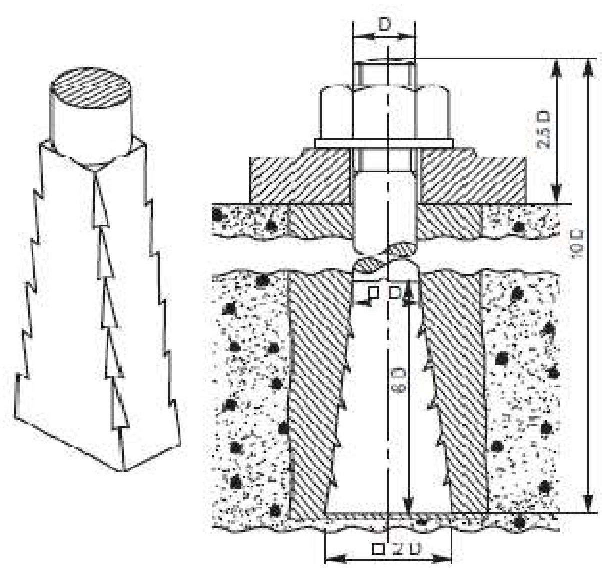


Fig. 5.38 Rag foundation bolt

Sheet No. 3 : **Keys, Cotter Joints and Knuckle Joint**

Keys

Keys are machine elements used to prevent relative rotational movement between a shaft and the parts mounted on it, such as pulleys, gears, wheels, couplings, etc. Figure 6.1 shows the parts of a keyed joint and its assembly. For making the joint, grooves or keyways are cut on the surface of the shaft and in the hub of the part to be mounted. After positioning the part on the shaft such that, both the keyways are properly aligned, the key is driven from the end, resulting in a firm joint. For mounting a part at any intermediate location on the shaft, first the key is firmly placed in the keyway of the shaft and then the part to be mounted is slid from one end of the shaft, till it is fully engaged with the key. Keys are classified into three types, viz., saddle keys, sunk keys and round keys.

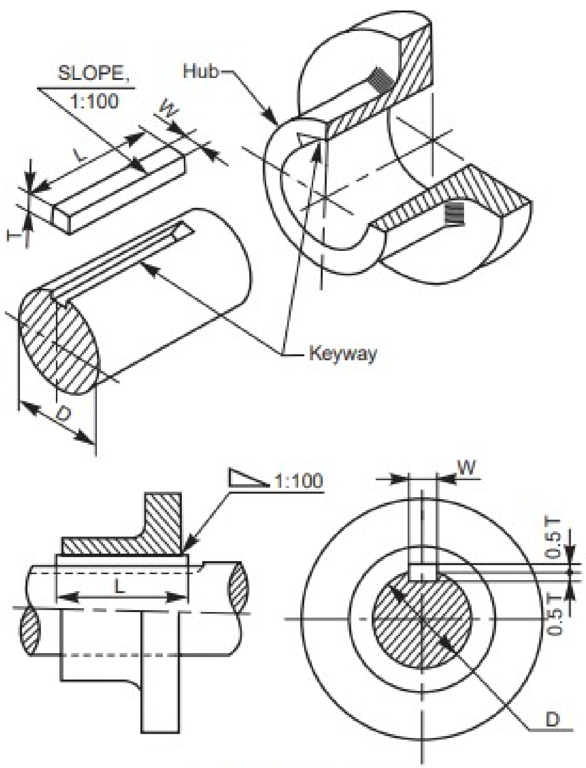


Fig. 6.1 Keyed joint

Cotter Joint

A cotter is a flat wedge shaped piece, made of steel. It is uniform in thickness but tapering in width, generally on one side; the usual taper being 1:30. The lateral (bearing) edges of the cotter and the bearing slots are generally made semi-circular instead of straight (Fig. 6.10).

This increases the bearing area and permits drilling while making the slots. The cotter is locked in position by means of a screw as shown in Fig. 6.11. Cotter joints are used to connect two rods, subjected to tensile or compressive forces along their axes. These joints are not suitable where the members are under rotation. The following are some of the commonly used cotter joints:

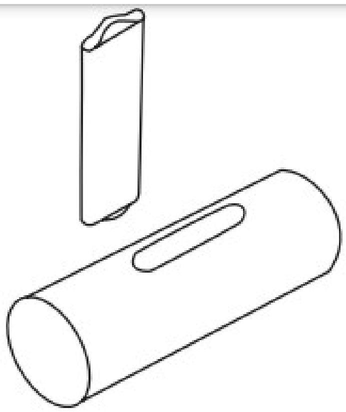


Fig. 6.10 Cotter and the bearing slot

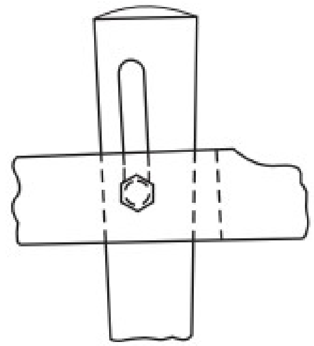


Fig. 6.11 Locking arrangement of cotter

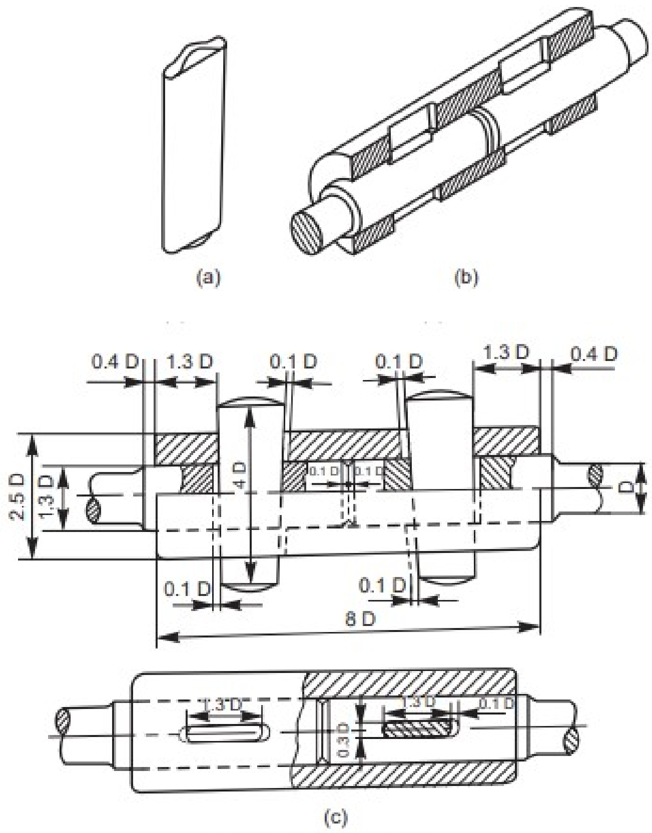


Fig. 6.12 Cotter joint with sleeve

Cotter Joint with Sleeve

This is the simplest of all cotter joints, used for fastening two circular rods. To make the joint, the rods are enlarged at their ends and slots are cut. After keeping the rods butt against each other, a sleeve with slots is placed over them. After aligning the slots properly, two cotters are driven-in through the slots, resulting in the joint (Fig. 6.12). The rod ends are enlarged to take care of the weakening effect caused by the slots. The slots in the rods and sleeve are made slightly wider than the width of cotter. The relative positions of the slots are such, that when a cotter is driven into its position, it permits wedging action and pulls the rod into the sleeve.

Cotter Joint with socket and spigot

This joint is also used to fasten two circular rods. In this, the rod ends are modified instead of using a sleeve. One end of the rod is formed into a socket and the other into a spigot (Fig. 6.13) and slots are cut. After aligning the socket and spigot ends, a cotter is driven-in through the slots, forming the joint.

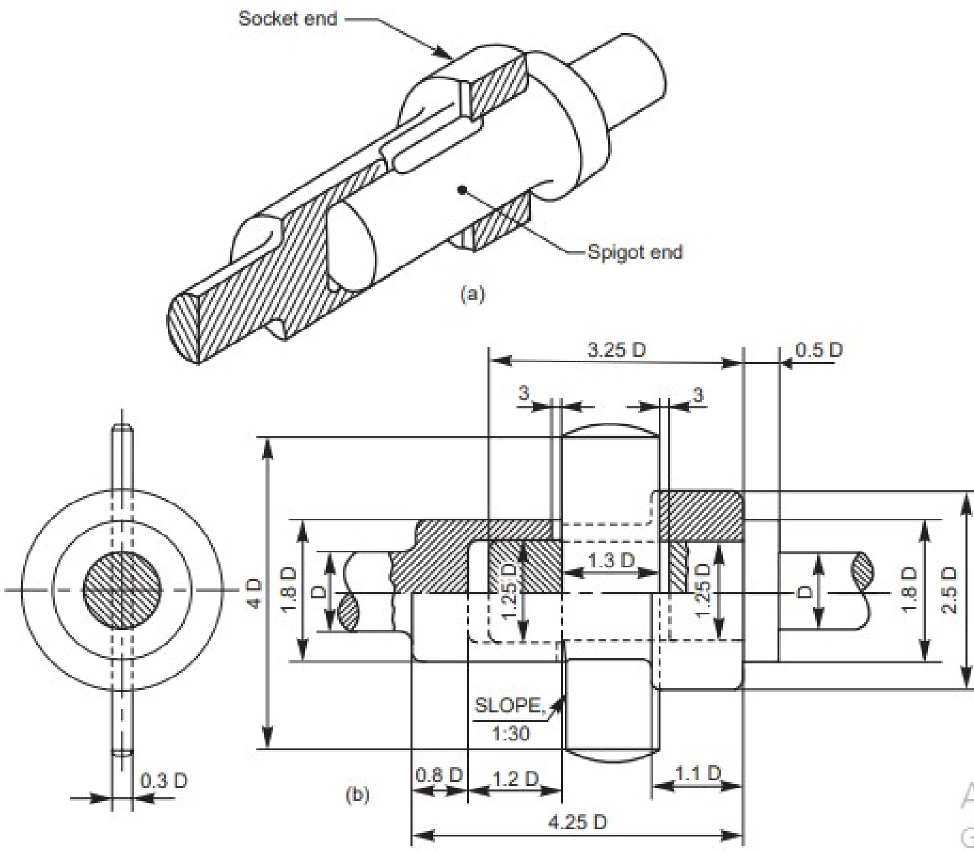


Fig. 6.13 Cotter joint with socket and spigot ends

Cotter Joint with Gib

This joint is generally used to connect two rods of square or rectangular cross-section. To make the joint, one end of the rod is formed into a U-fork, into which, the end of the other rod fits in. When a cotter is driven-in, the friction between the cotter and straps of the U-fork, causes the straps to open. This is prevented by the use of a gib. A gib is also a wedge shaped piece of retangular cross-section with two rectangular projections called lugs. One side of the gib is tapered and the other straight. The tapered side of the gib bears against the tapered side of the cotter such that, the outer edges of the cotter and gib as a unit are parallel. This facilitates making of slots with parallel edges, unlike the tapered edges in case of ordinary cotter joint. Further, the lugs bearing against the outer surfaces of the fork, prevents the opening tendency of the straps. Figure 6.14 shows a cotter joint with a gib. For making the joint, first the gib is placed in position and then the cotter is driven-in.

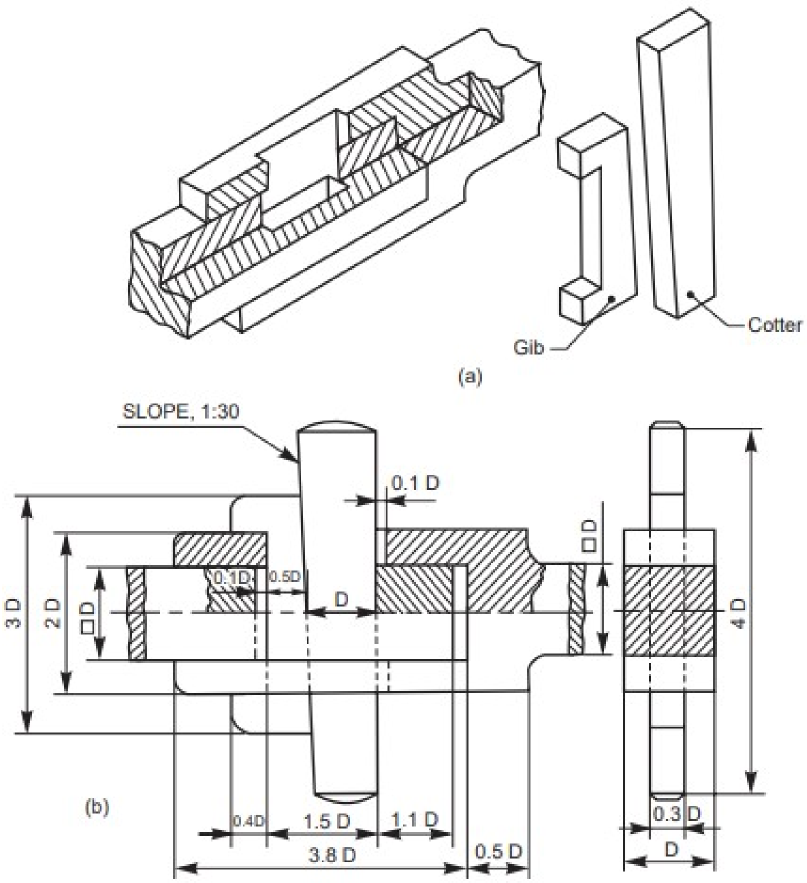


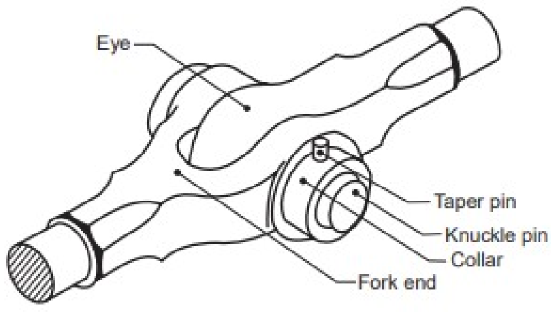
Fig. 6.14 Cotter joint with a gib

Pin Joint

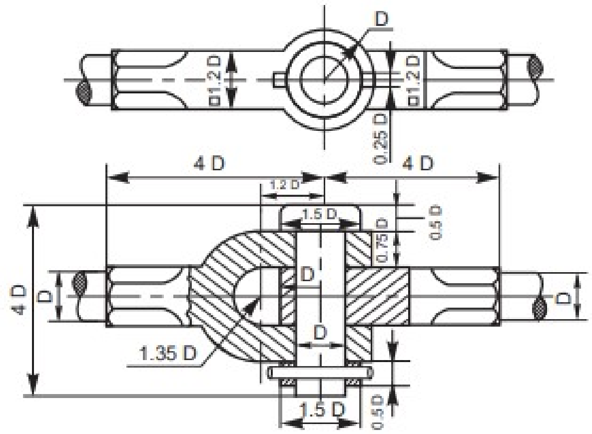
In a pin joint, a pin is used to fasten two rods that are under the action of a tensile force; although the rods may support a compressive force if the joint is guided. Some pin joints such as universal joints, use two pins and are used to transmit power from one rotating shaft to another (the universal joint is discussed under Chapter 7). A pin joint permits a small amount of flexibility or one rod may be positioned at an angle (in the plane containing the rods) with respect to the other rod, after providing suitable guides. Unlike in cotter joints, the pin in a pin joint is not driven-in with a force fit, but is inserted in the holes with a clearance fit. The pin is held in position, by means of a taper pin or a split pin provided at its end.

Knuckle Joint

A knuckle joint is a pin joint used to fasten two circular rods. In this joint, one end of the rod is formed into an eye and the other into a fork (double eye). For making the joint, the eye end of the rod is aligned into the fork end of the other and then the pin is inserted through the holes and held in position by means of a collar and a taper pin (Fig. 6.15). Once the joint is made, the rods are free to swivel about the cylindrical pin. Knuckle joints are used in suspension links, air brake arrangement of locomotives, etc.


Eye
Taper pin
Knuckle pin
Collar
Fork end

(a)


D
□1.2 D
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0.5 D
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D
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1.5 D
0.5 D

(b)

Sheet No. 4 : Rivetted Joints for Plates

Riveted joints are permanent fastenings and riveting is one of the commonly used method of producing rigid and permanent joints. Manufacture of boilers, storage tanks, etc., involve joining of steel sheets, by means of riveted joints. These joints are also used to fasten rolled steel sections in structural works, such as bridge and roof trusses.

Rivet

A rivet is a round rod of circular cross-section. It consists of two parts, viz., head and shank (Fig. 10.1 (a)). Mild steel, wrought iron, copper and aluminium alloys are some of the metals commonly use.

Riveting

Riveting is the process of forming a riveted joint. For this, a rivet is first placed in the hole drilled through the two parts to be joined. Then the shank end is made into a rivet head by applying pressure, when it is either in cold or hot condition.

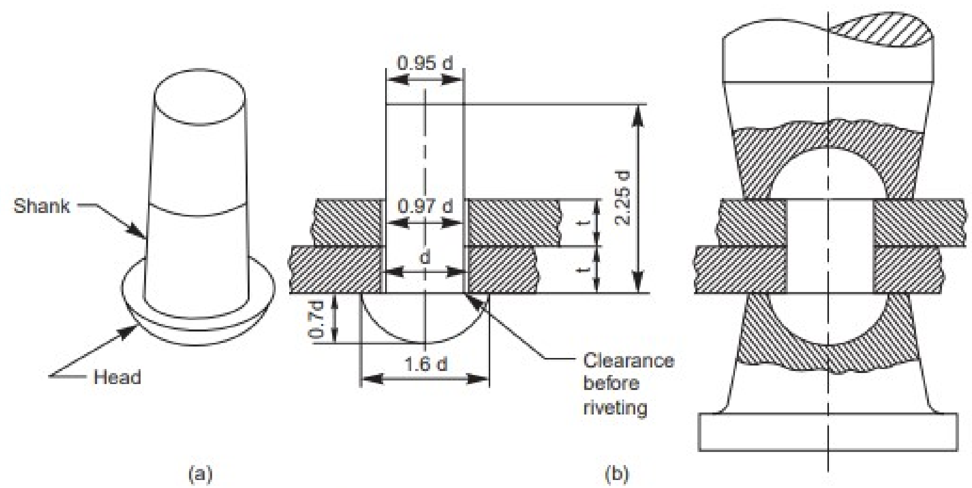


Fig. 10.1 (*a*) Rivet (*b*) Riveting

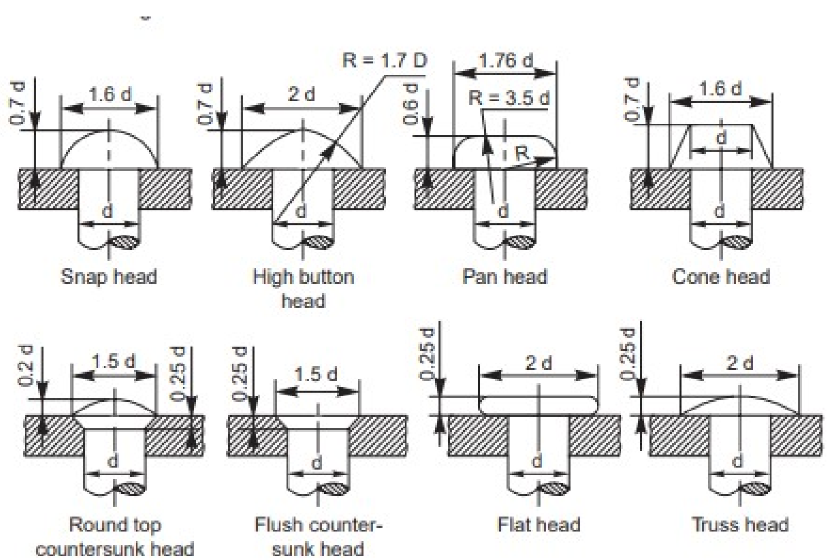


Fig. 10.3 Types of rivet heads

Lap Joint

In a lap joint, the plates to be riveted, overlap each other. The plates to be joined are first bevelled at the edges, to an angle of about 80° (Fig. 10.9). Depending upon the number of rows of rivets used in the joint, lap joints are further classified as single riveted lap joint, double riveted lap joint and so on.

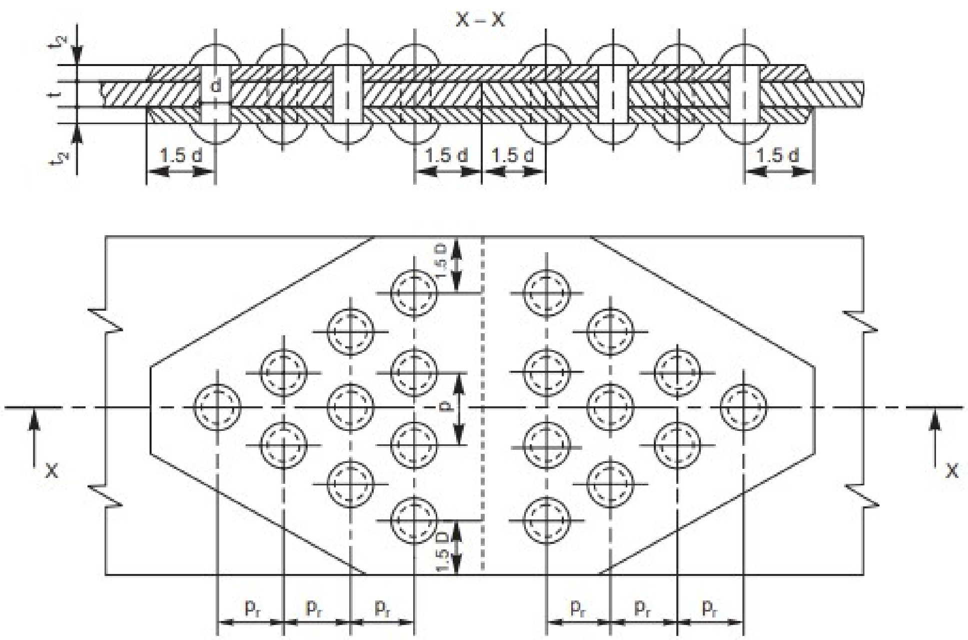


Fig. 10.8 Double strap diamond butt joint

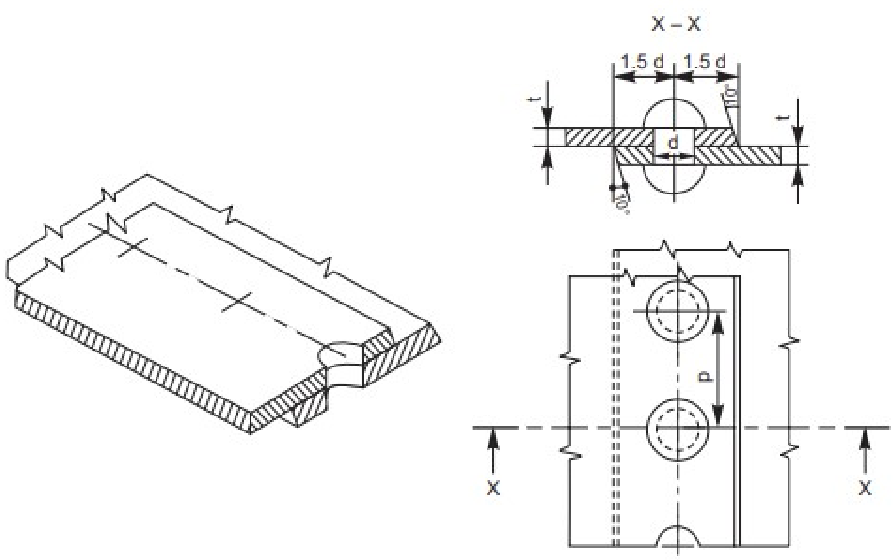


Fig. 10.9 Single riveted lap joint

In multi-row riveted joints, rows may be arranged either in chain or zig-zag fashion (refer articles 10.4.3 and 10.4.4 for explanation), as shown in Figs. 10.10 and 10.11. Figure 10.9 shows a single riveted lap joint. The size of the rivet, d is taken as, d = 6 t mm where‘t’ is the thickness of the plates to be joined in millimetres. Figures 10.10 and 10.11 show double riveted chain, lap joint and double riveted zig-zag lap joint respectively.

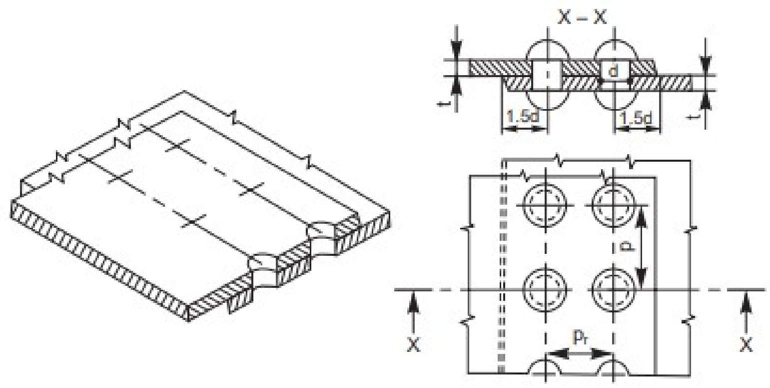


Fig. 10.10 Double riveted chain lap joint

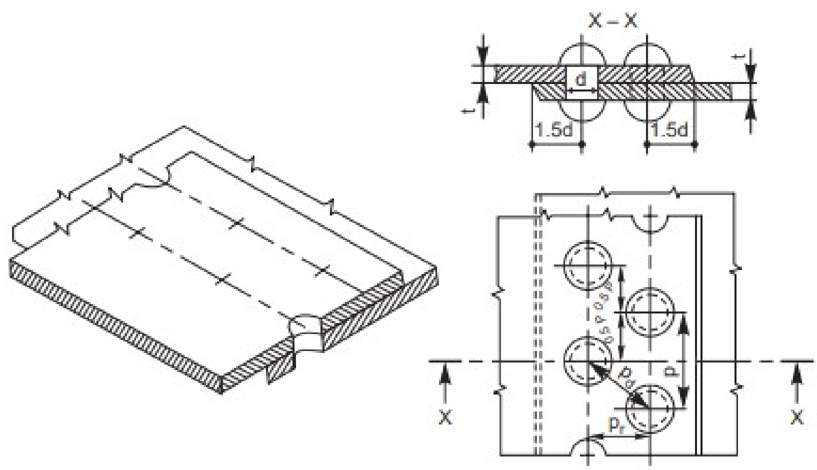


Fig. 10.11 Double riveted zig-zag lap joint

Butt Joint

In a butt joint, the plates to be joined, butt against each other, with a cover plate or strap, either on one or both sides of the plates; the latter one being preferred. In this joint, the butting edges of the plates to be joined are square and the outer edges of the cover plate(s) is(are) bevelled. These joints are generally used for joining thick plates, and are much stronger than lap joints. Figures 10.12 and 10.13 show single riveted single strap and a single riveted double strap, butt joints respectively.

In a single strap butt joint, the thickness of the strap (cover plate) is given by, t 1 = 1.125t If two straps are used, the thickness of each cover plate is given by, t2 = 0.75t

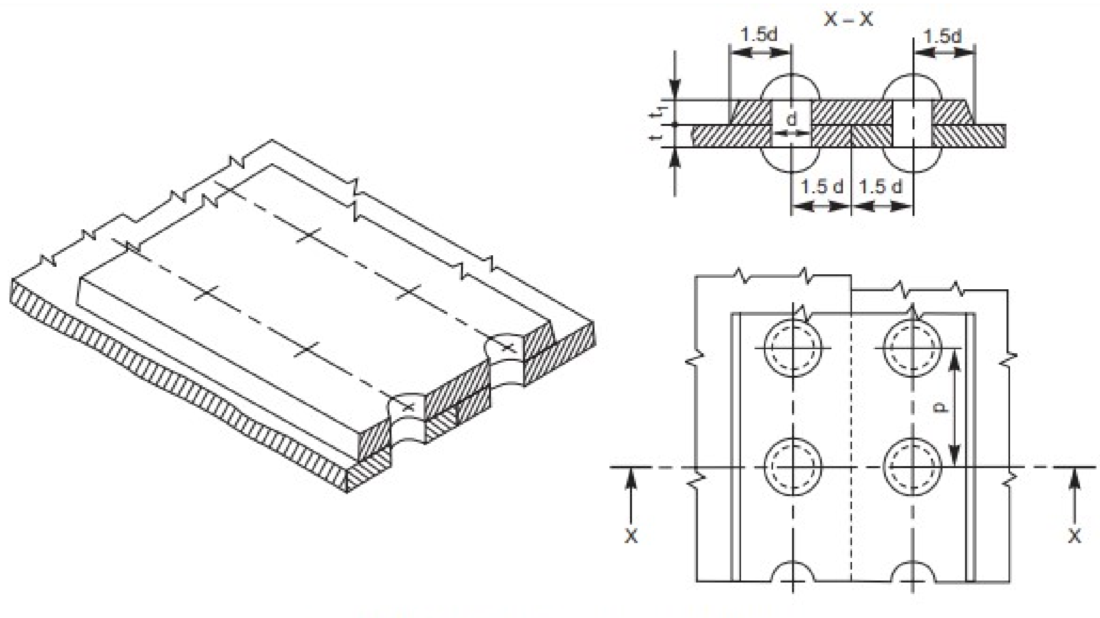


Fig. 10.12 Single riveted, single strap butt joint

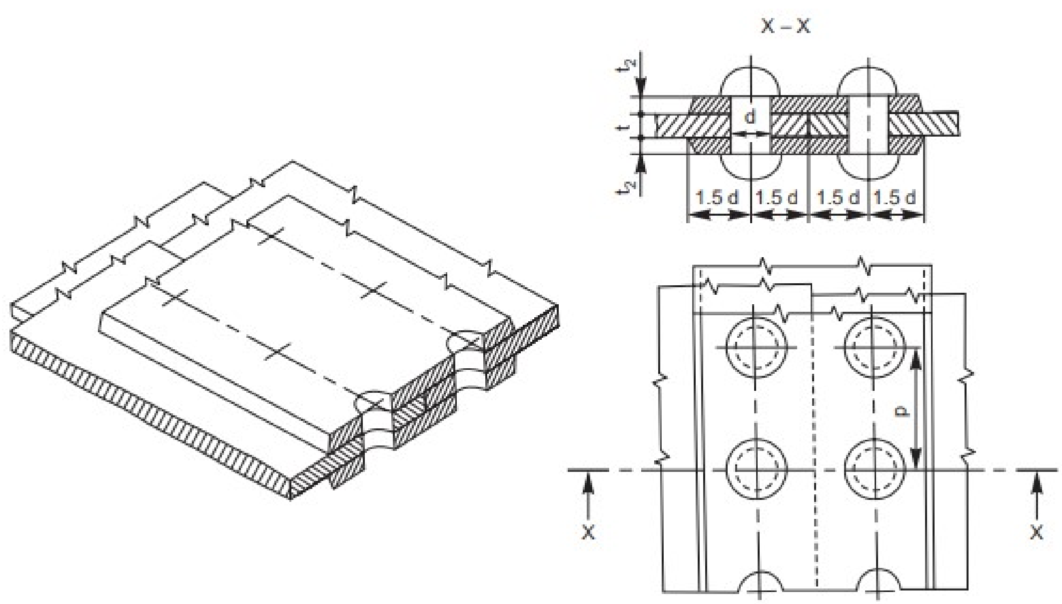


Fig. 10.13 Single riveted, double strap butt joint

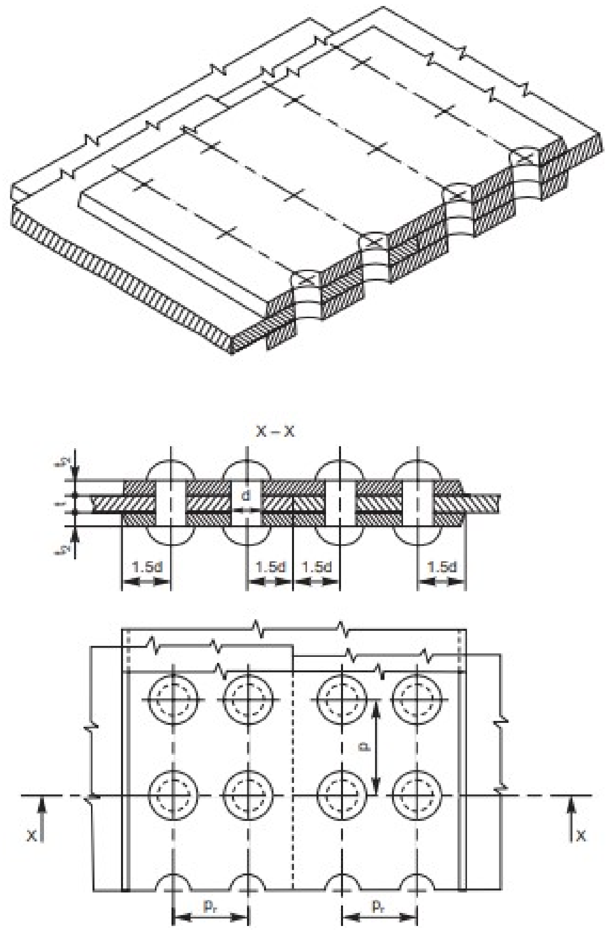


Fig. 10.14 Double riveted, double strap chain butt joint

Figures 10.14 and 10.15 show double riveted, double strap chain, butt joint and double riveted, double strap zig-zag butt joint.

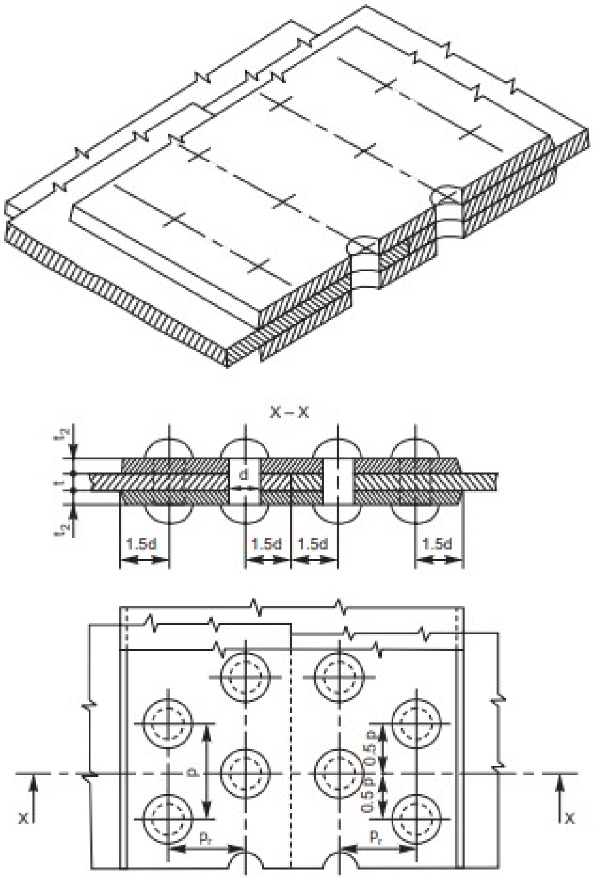


Fig. 10.15 Double riveted, double strap zig-zag butt joint

Sheet No. 5 : Shaft Coupling, Flange Coupling and Universal Coupling

Shaft Coupling

Shaft couplings are used to join or connect two shafts in such a way that when both the shafts rotate, they act as one unit and transmit power from one shaft to the other. Shafts to be connected or coupled may have collinear axes, intersecting axes or parallel axes at a small distance. Based on the requirements, the shaft couplings are classified as: (i) rigid couplings, (ii) flexible couplings, (iii) loose or dis-engaging couplings and (iv) non-aligned couplings.

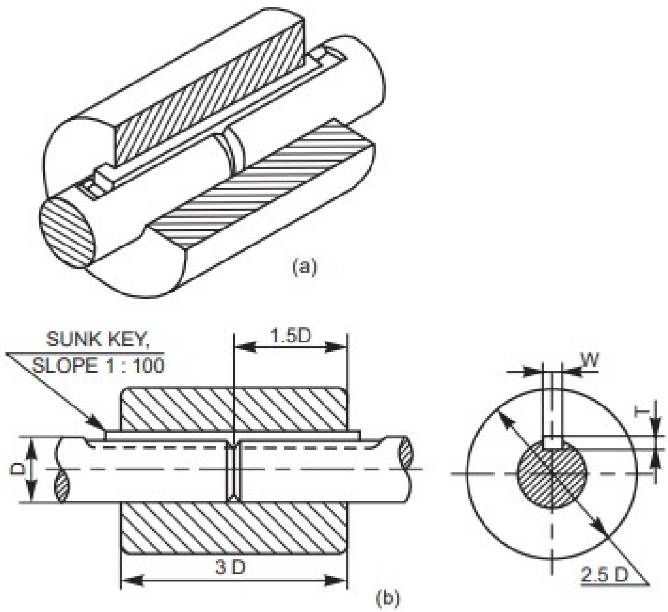


Fig. 7.1 Butt-muff coupling

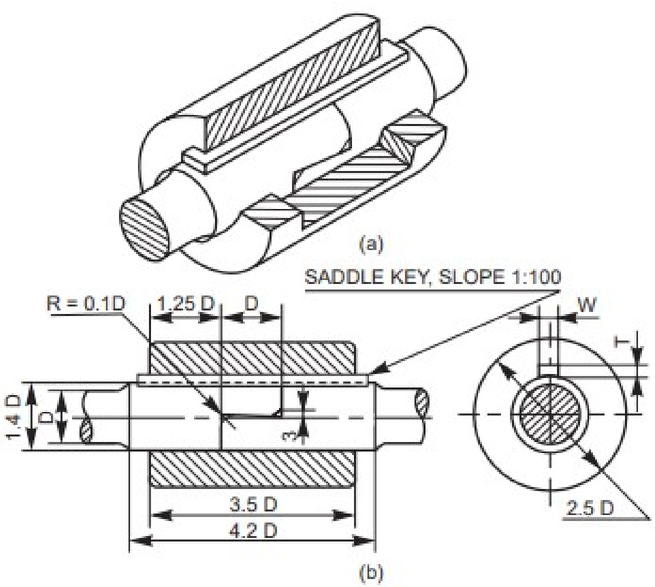
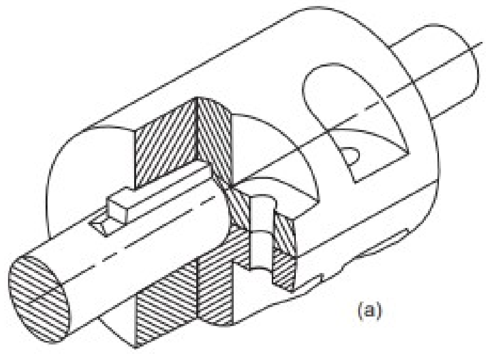


Fig. 7.2 Half-lap muff coupling



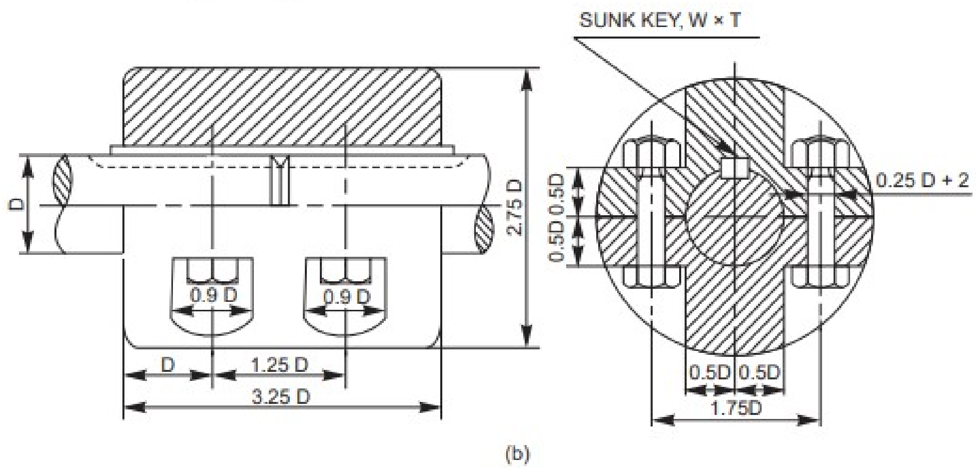


Fig. 7.3 Split-muff coupling

Flanged Coupling

These are the standard forms of couplings, most extensively used. In a flanged coupling, flanges are either fitted or provided at the ends of shafts. The flanges are fastened together by means of a number of bolts and nuts. The number and size of the bolts depend upon the power to be transmitted and hence, the shaft diameter.

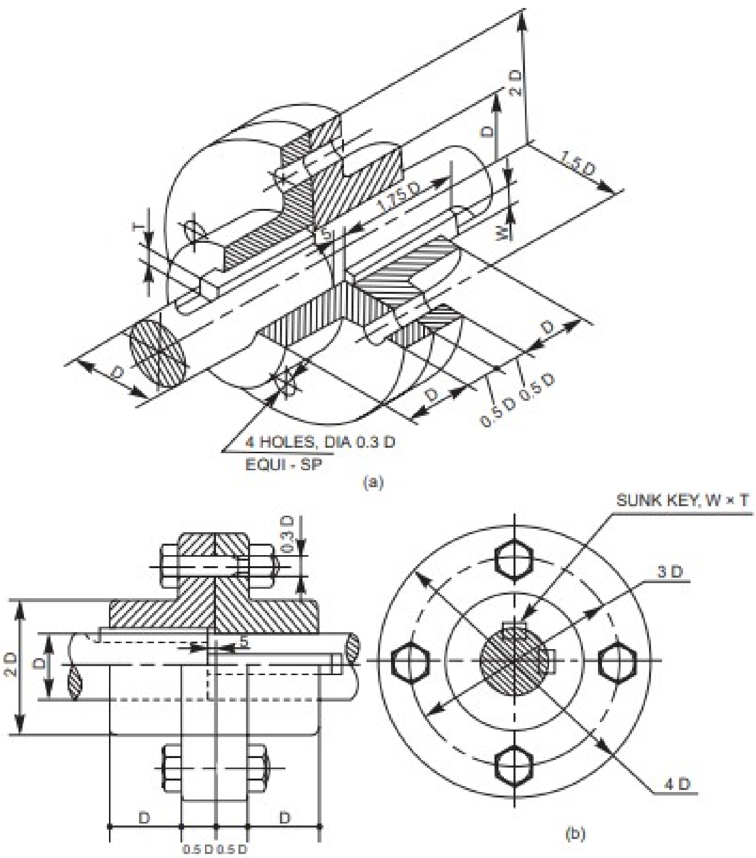


Fig. 7.4 Flanged coupling

Universal Coupling

It is a rigid coupling that connects two shafts, whose axes intersect if extended. It consists of two forks which are keyed to the shafts. The two forks are pin joined to a central block, which has two arms at right angle to each other in the form of a cross (Fig. 7.11). The angle between the shafts may be varied even while the shafts are rotating.

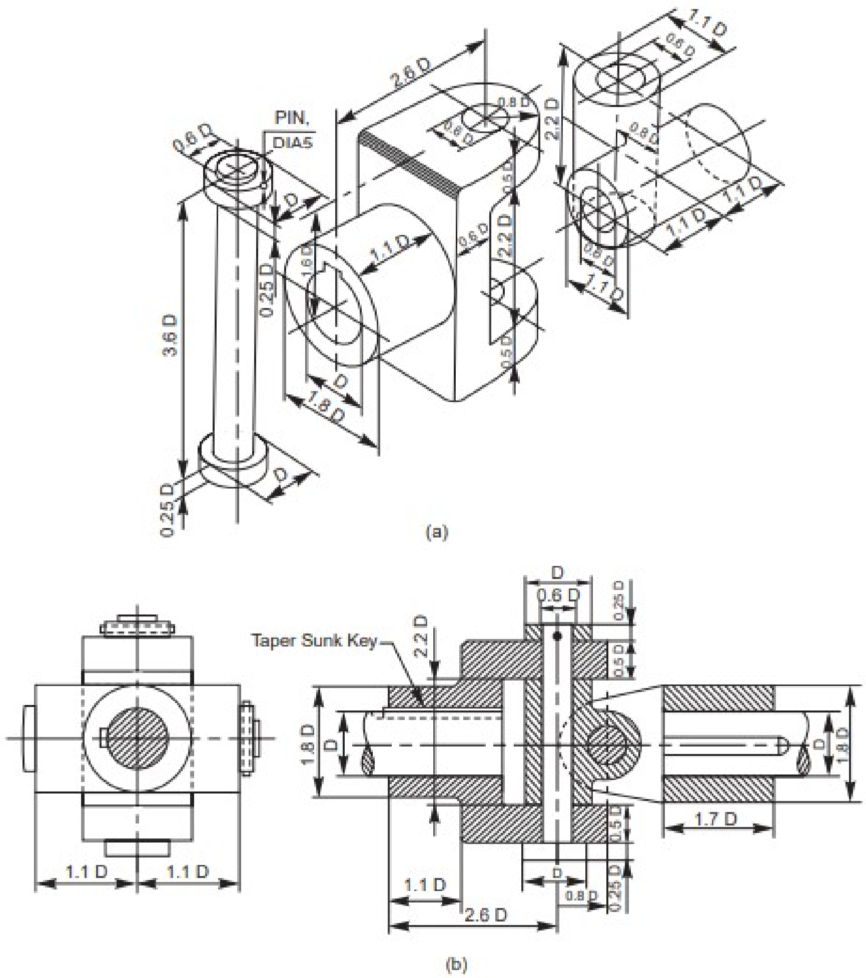


Fig. 7.11 Universal coupling

Oldham Coupling

It is used to connect two parallel shafts whose axes are at a small distance apart. Two flanges, each having a rectangular slot, are keyed, one on each shaft. The two flanges are positioned such that, the slot in one is at right angle to the slot in the other. To make the coupling, a circular disc with two rectangular projections on either side and at right angle to each other, is placed between the two flanges. During motion, the central disc, while turning, slides in the slots of the flanges. Power transmission takes place between the shafts, because of the positive connection between the flanges and the central disc (Fig. 7.12).

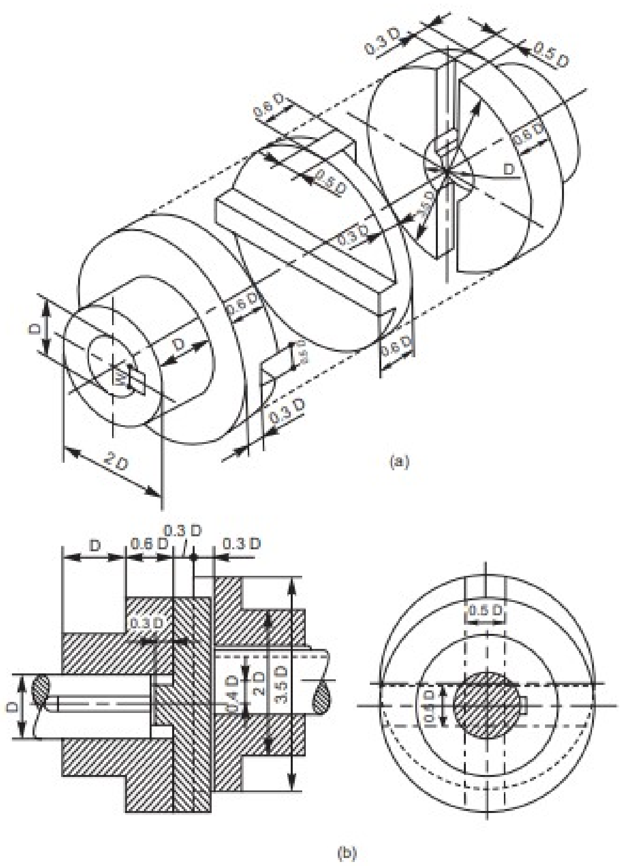


Fig. 7.12 Oldham coupling

Sheet No. 6 : Spigot and Socket Joint

This type of joint is used for underground pipelines of large diameters. In this, one end of a pipe is made into a socket and the other end into a spigot. After placing the spigot end into the socket, the space between them is filled-in, partly by rope (jute or coir) and the remaining by molten lead (Fig. 8.6). Because of the flexible nature of the joint, it adapts itself to small changes in level due to settlement of earth.

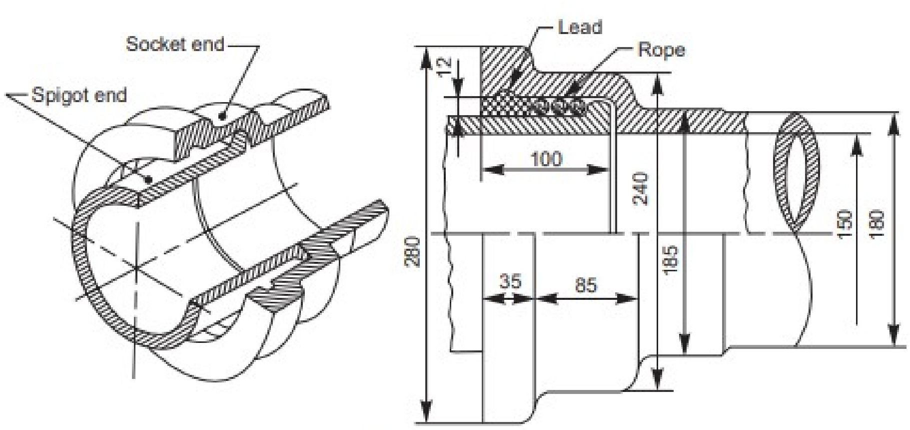


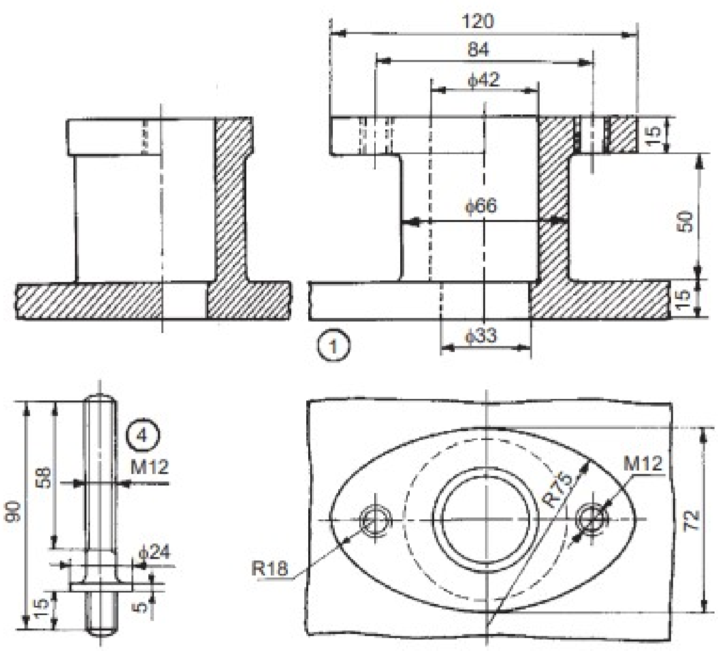
Fig. 8.6 Socket and spigot joint

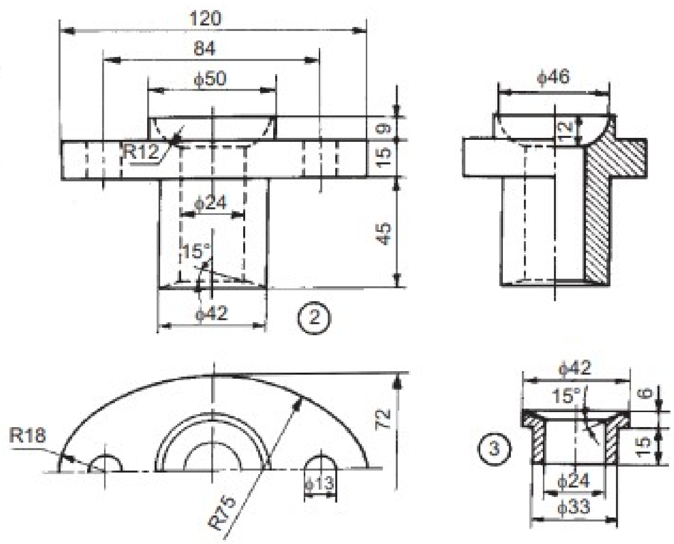
Sheet No. 7 : Engine parts – stuffing boxes, cross heads, Eccentrics, Petrol Engine connecting rod, Piston assembly

Stuffing Box

It is used to prevent loss of fluid such as steam, between sliding or turning parts of machine elements. In a steam engine, when the piston rod reciprocates through the cylinder cover; stuffing box provided in the cylinder cover, prevents leakage of steam from the cylinder. Figure 18.1 shows the various parts of a stuffing box. At the base of stuffing box body 1, a bush 3 is placed such that the bevelled edge of the bush is at the inner side of the body. Gland 2 is placed at the other end of the body and is connected to the main body by means of studs 4 and nuts 5. The space between the reciprocating rod and the bush and the gland is packed with a packing material such as mineral fibres, leather, rubber or cork.

Exercise: Assemble all parts of the stuffing box for a vertical steam engine, shown in Fig. 18.1 and draw, (i) half sectional view from the front, with left half in section, (ii) half sectional view from the right and (iii) view from above.





Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Gland	Brass	1
3	Bush	Brass	1
4	Stud	MS	2
5	Nut, M12	MS	2

Fig. 18.1 Stuffing box

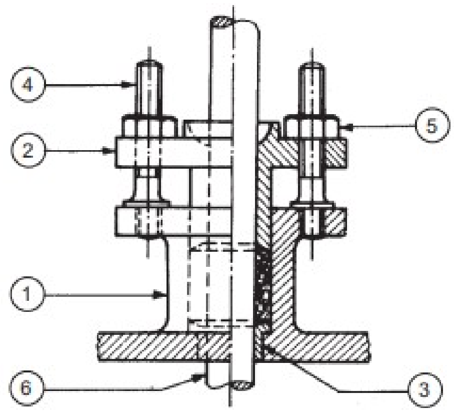
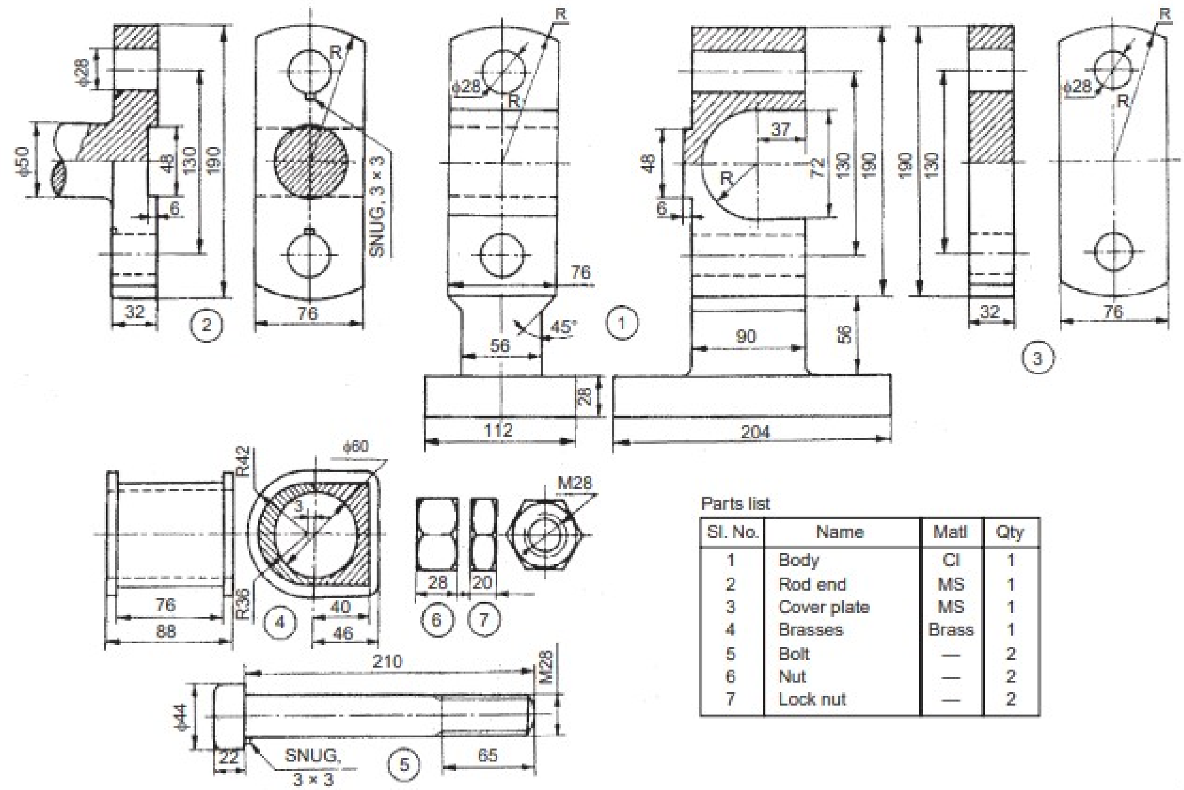


Fig. 18.1A Stuffing box

Cross Head

Figure 18.3 shows the details of another type of steam engine crosshead. It consists of a body or slide block 1, which slides in-between parallel guides in the frame of the engine. The piston rod end 2 is fitted to the crosshead with the help of bolts 5 and nuts 6 and 7 after placing the brasses 4, and cover plate 3 in position.

Exercise: The details of a crosshead of a steam engine are shown in Fig. 18.3. Assemble the parts and draw, (i) half sectional view from the front, showing top half in section and (ii) the view from the left.



Sl. No.	Name	Matl	Qty
1	Body	CI	1
2	Rod end	MS	1
3	Cover plate	MS	1
4	Brasses	Brass	1
5	Bolt	—	2
6	Nut	—	2
7	Lock nut	—	2

Fig. 18.3 Crosshead

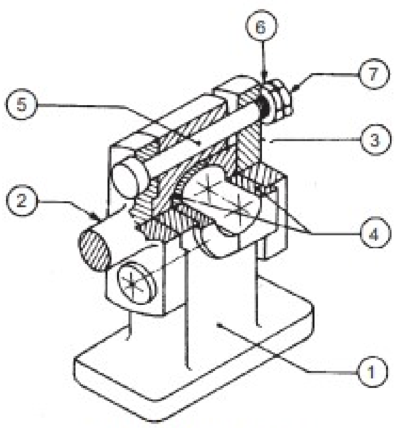


Fig. 18.3A Crosshead

Eccentric

It is used to provide a short reciprocating motion, actuated by the rotation of a shaft. Eccentrics are used for operating steam valves, small pump plungers, shaking screens, etc. The components of an eccentric are shown in isometric views (Fig. 18.8a) for easy understanding of their shapes. Rotary motion can be converted into a reciprocating motion with an eccentric, but the reverse conversion is not possible due to excessive friction between the sheave and the strap. The crank arrangement, in a slider crank mechanism however, allows conversion in either direction.

Figure 18.8b shows the various parts of an eccentric. The sheave 2 which is in the form of a circular disc with a stepped rim is keyed on the shaft. When the shaft rotates, the sheave rotates eccentrically because of the eccentrically placed hole in it and imparts reciprocating motion to eccentric rod 6. The straps 1 are semi-circular elements with an annular recess to accommodate the stepped rim of the sheave. These are held together on the sheave by means of strap bolts 4, with packing strips 3 placed between them. The eccentric rod is fixed to the eccentric strap by means of the studs and nuts 5.

Exercise: The details of an eccentric are shown in Fig. 18.8b. Assemble the parts and draw, (i) half sectional view from the front, with top half in section, (ii) view from the right and (iii) view from above.

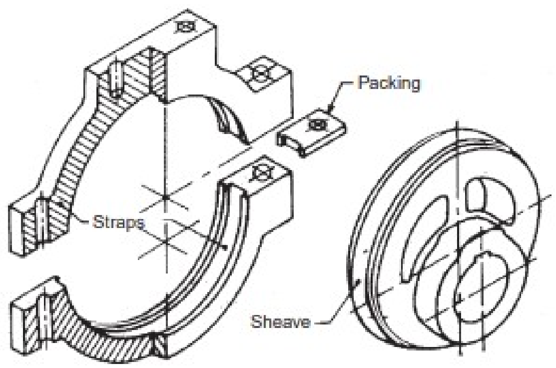


Fig. 18.8a Components of an eccentric in isometric view

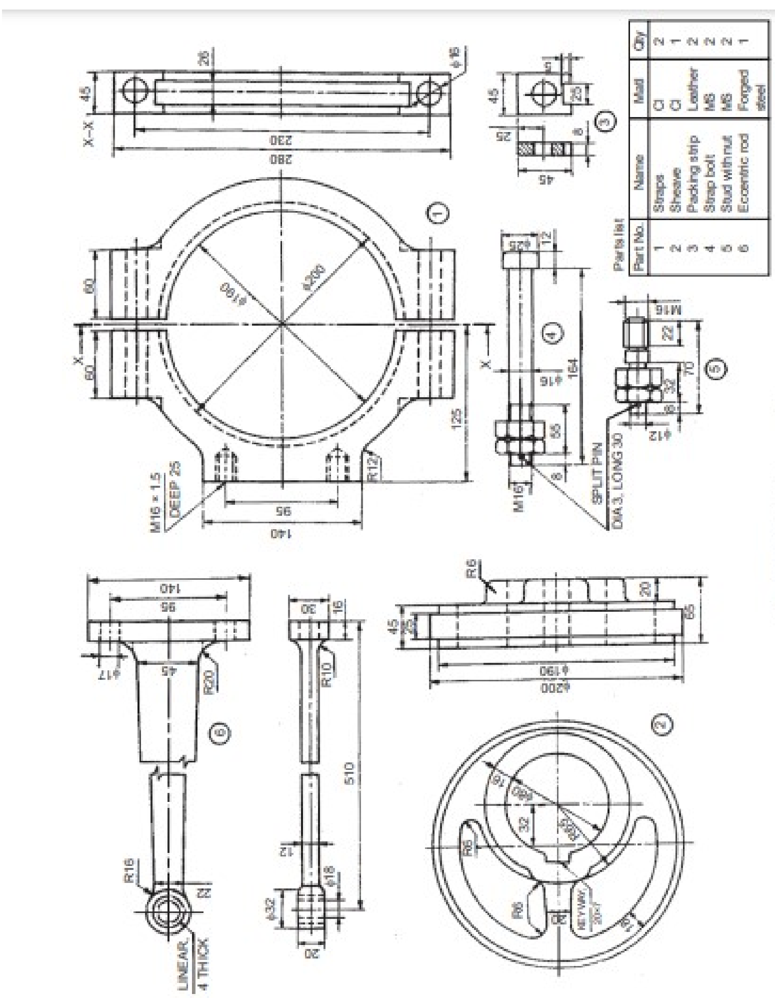
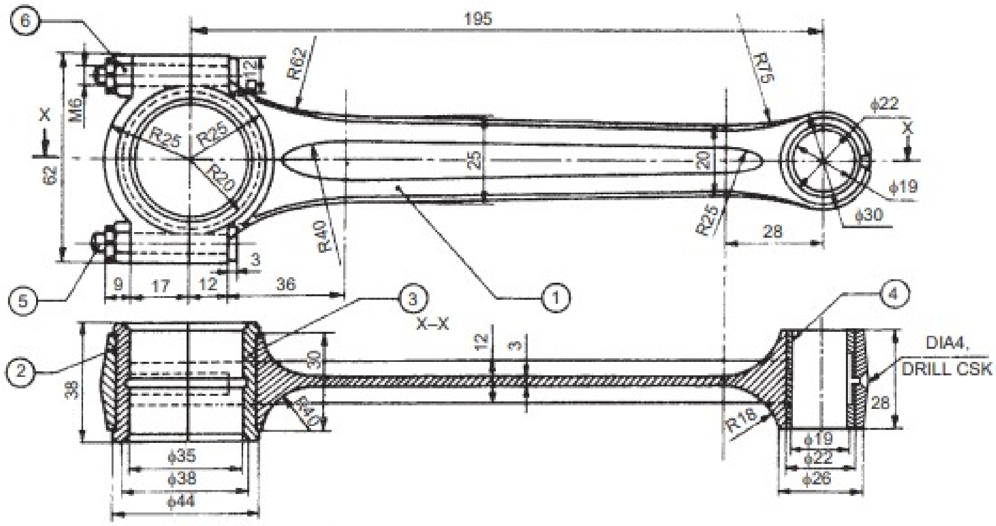


Fig. 18.8b Details of an eccentric

Petrol Engine Connecting Rod

Figure 19.1 shows the assembly drawing of a petrol engine connecting rod, the big end of which is split into two halves. It is used in center crank engines. The bearing bush 4 which is in one piece, is fitted at the small end of the connecting rod 1. The small end of the rod is connected to the piston. The main bearing bush, which is split into two halves, is placed at the big end of the connecting rod. The big end of the rod is connected to the crank pin of the center crank. First, the split bearing brasses 3 are placed on the crank pin, then the big end of the connecting rod and the cap 2 are clamped onto these, by means of two bolts 5 and nuts 6. The bearing brasses are made of gun-metal, because it has good resistance to corrosion. Oil groove is provided at the centre of the bearing. The bearing bush is made of phosphor bronze to provide low coefficient of friction. Oil groove is provided in this bush for lubrication between the pin and bearing.



Parts list

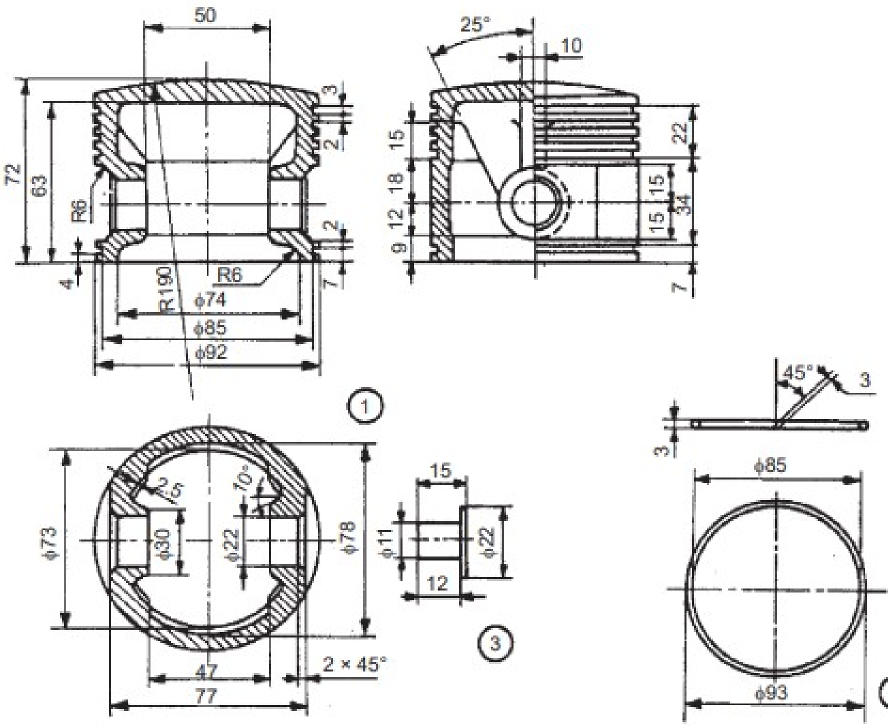
Part No.	Name	Matl.	Qty.
1	Rod	FS	1
2	Cap	FS	1
3	Bearing brass	GM	2
4	Bearing bush	P Bronze	1
5	Bolt	MCS	2
6	Nut	MCS	2

Fig. 19.1 Petrol engine connecting rod

Piston Assembly

A piston is cylindrical in form and reciprocates in a cylinder. The petrol engine piston is generally die cast in aluminium alloy. It is connected to the small end of the connecting rod by means of a gudgeon pin. Figure 18.6 shows the details of the petrol engine piston assembly. Five piston rings 4 are positioned in the piston 1; four at the top and one at the bottom. The top piston rings, known as compression rings, prevent leakage of gases from combustion chamber into the crank case. The bottom one; oil or scraper ring, prevents the lubricating oil from entering the combustion chamber. The piston is connected to the small end of the connecting rod, by means of the gudgeon or piston pin 2; the axial movement of which is prevented by piston plugs 3.

Exercise: Assemble the parts of the piston, shown in Fig. 18.6 and draw the following views: (i) Sectional view from the front, (ii) Half sectional view from the left, and (iii) Sectional view from above.



Parts list

No.	Name	Matl	Qty
1	Piston	Al-alloy	1
2	Piston pin	HCS	1
3	Piston pin plug	HCS	2
4	Piston ring	CI	5

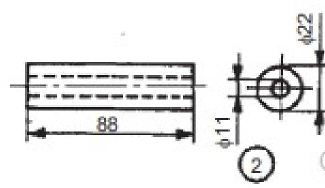


Fig. 18.6 Piston of a petrol engine

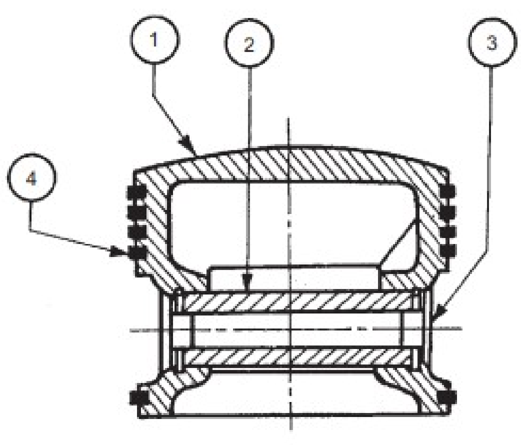
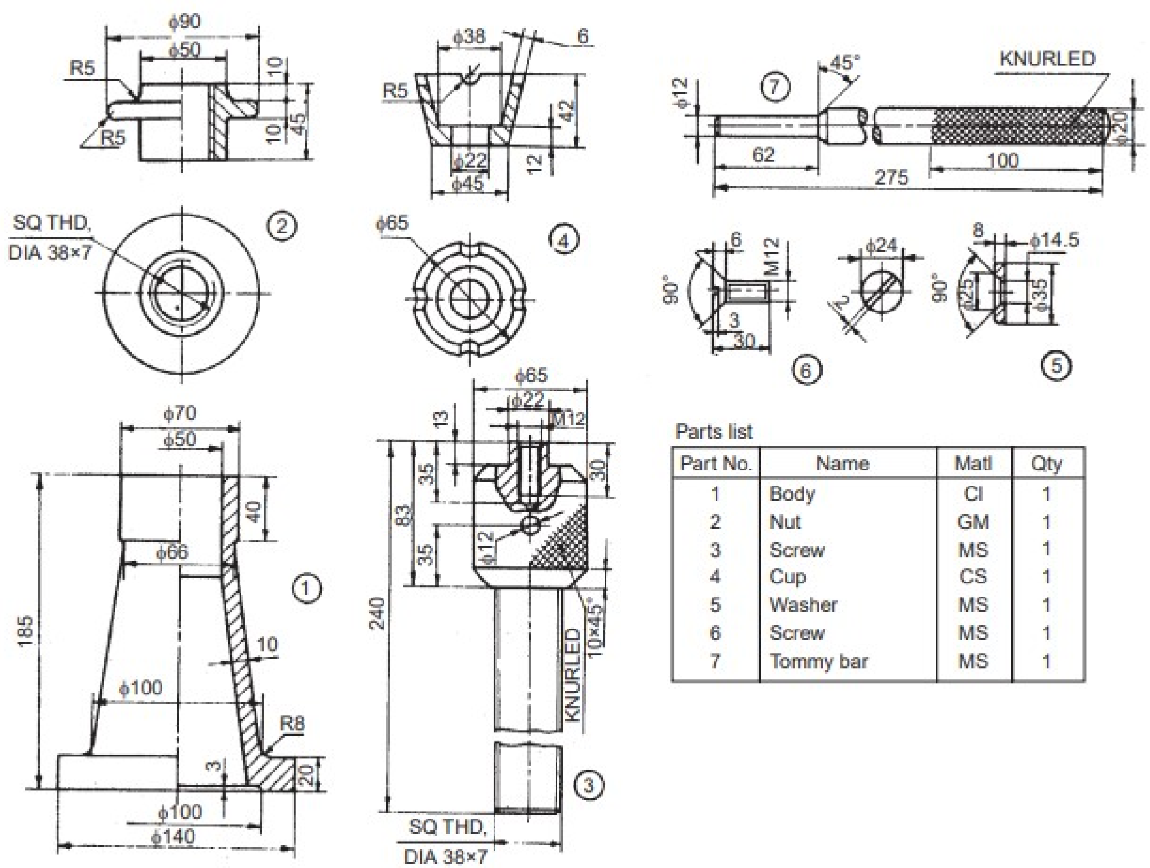


Fig. 18.6A Petrol engine piston

Sheet No. 8 : Other machine parts - Screws jack, Milling machine tail stock, Plummer block, single tool post, Clapper block

Screw Jack: Screw jacks are used for raising heavy loads through very small heights. Figure 18.51 shows the details of one type of screw jack. In this, the screw 3 works in the nut 2 which is press fitted into the main body 1. The tommy bar 7 is inserted into a hole through the enlarged head of the screw and when this is turned, the screw will move up or down, thereby raising or lowering the load.

Exercise: Assemble all parts of the screw jack, shown in Fig. 18.51 and draw the following views: (i) Half sectional view from the front, and (ii) View from above.



Parts list

Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1

Fig. 18.51 Screw jack

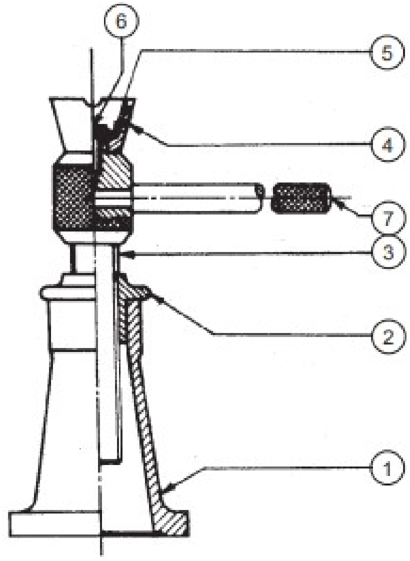
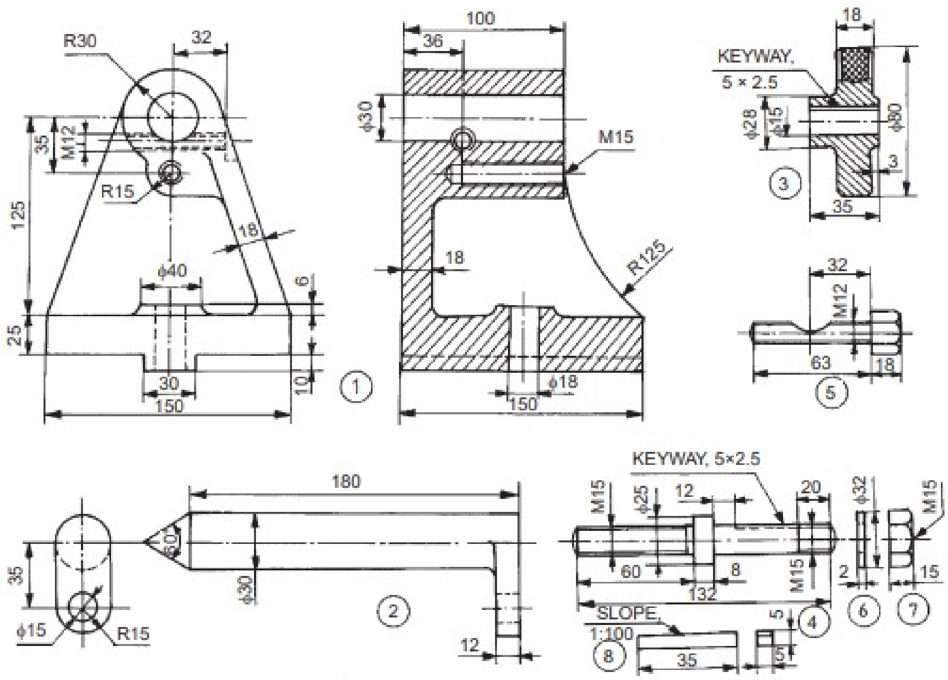


Fig. 18.51A Screw jack

Milling Machine Tail Stock:

Certain jobs requiring milling operations, in relation to their axes of rotation, are usually supported between centers. An assembly drawing of a milling machine tail-stock is shown in Fig. 19.11. The job is held between the centre in the dividing head and adjustable center provided in the tailstock. This is similar to the lathe tail-stock. To fix the work between centers, the dividing head spindle is first brought to a horizontal position. Then, one end of the work is supported in the work center of the dividing head spindle, with the help of a mill-dog. The tail-stock position is then adjusted to suit the length of the work and it is then clamped to the table of the machine, in that position. After clamping of the tailstock, fine adjustment can be made by rotating the knurled hand wheel 3. The knurled hand wheel is attached to the center by the screw 4, washer 6 and nut 7. This will allow tail-stock center 2 to slide horizontally in its guide. After setting correctly, the center is clamped by means of screw 5. Unlike the lathe tail-stock, there is no relative motion between the center and the work piece in the milling machine tail-stock; hence the center may be made of mild steel.



Parts list

Sl. No.	Name	Matl.	Qty.
1	Body	CI	1
2	Centre	Case hardened alloy steel	1
3	Hand wheel	Cast steel	1
4	Screw	MS	1
5	Screw	MS	1
6	Washer	MS	1
7	Nut	MS	1
8	Key	MS	

Fig. 18.19 Milling machine tail-stock

Plummer Block:

This bearing is used for long shafts, requiring intermediate support, especially when the shaft cannot be introduced in the bearing end-wise. It consists of a pedastal or base, a cap and a bush, split into two halves, called 'bearing brasses'. The split parts used in the assembly, facilitate easy assembly and periodical replacement of the worn-out brasses. After placing the journal on the lower half of the bush, kept in the base, the upper half of the bush is placed and the cap is then fixed to the pedastal, by means of two bolts (Fig. 12.4). Flanges are provided at either end of the bush, to prevent its axial motion. The rotary motion of the bush is prevented by a snug provided at the bottom of the lower brass, fitting into a corresponding hole in the base.

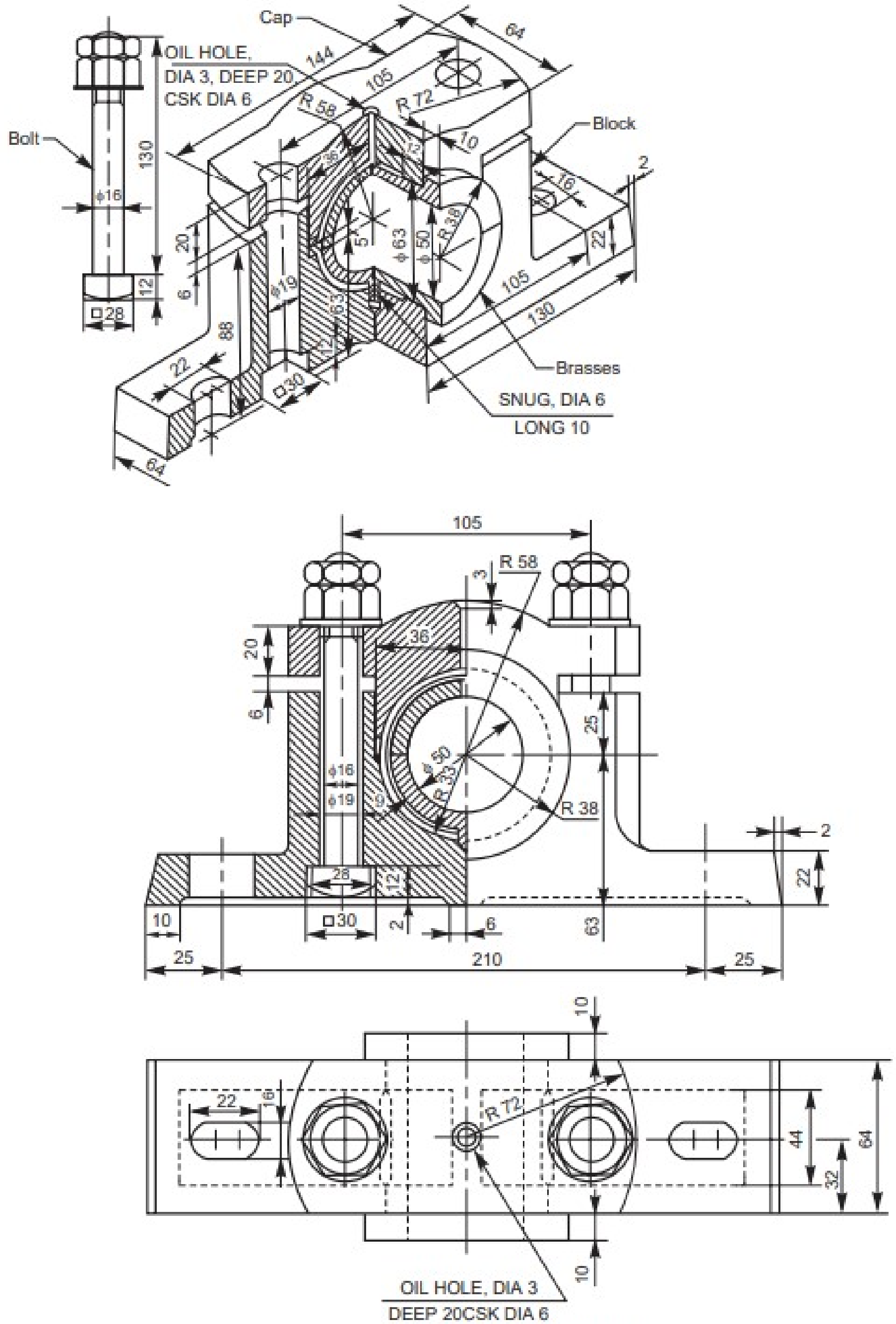
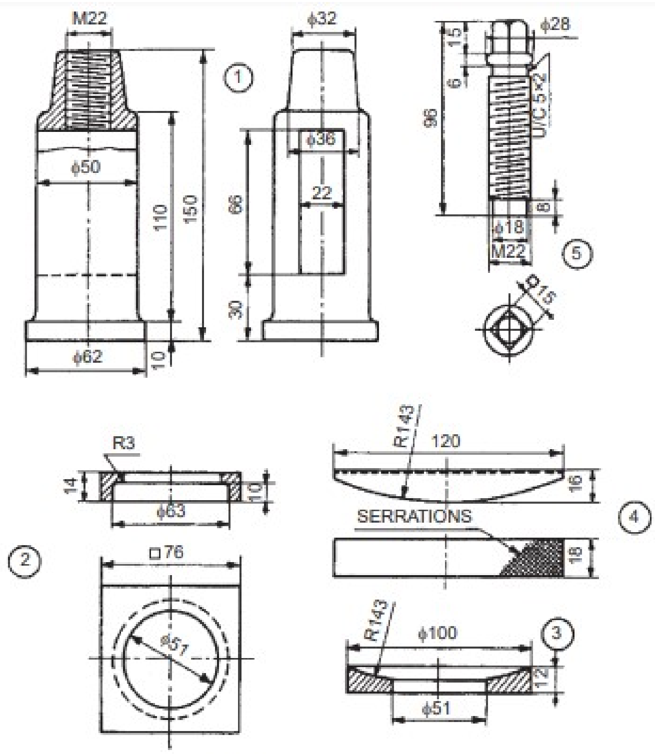


Fig. 12.4 Plummer block

Single Tool Post

Tool posts of several designs are available to support and hold the cutting tools in lathe machines. Figure 18.14 shows the part drawings of a single tool post, which supports one cutting tool at a time and is used on small sized lathes. This unit is fixed on the compound rest of the lathe carriage. The single tool post consists of a circular body 1 with a collar at one end and a threaded hole at the other. A vertical slot is provided in the body to accommodate the tool/tool holder. The body is slid through the square block 5, which is finally located in the T-slot, provided in the compound rest. The design permits rotation of the body about the vertical axis. A circular ring 4 having spherical top surface is slid over the body and the wedge 3 is located in the vertical slot. The tool / tool holder is placed over the wedge. By sliding the wedge on the ring, the tool tip level can be adjusted. The tool is clamped in position by means of the square headed clamping screw 2, passing through the head of the body. Figure 19.8 shows the assembly drawing of a single tool post.

Exercise: Assemble the parts of a lathe single tool post, shown in Fig. 18.14 and draw, (i) half sectional view from the front and (ii) view from the right.



Parts list

No.	Name	Matl	Qty
1	Piller	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

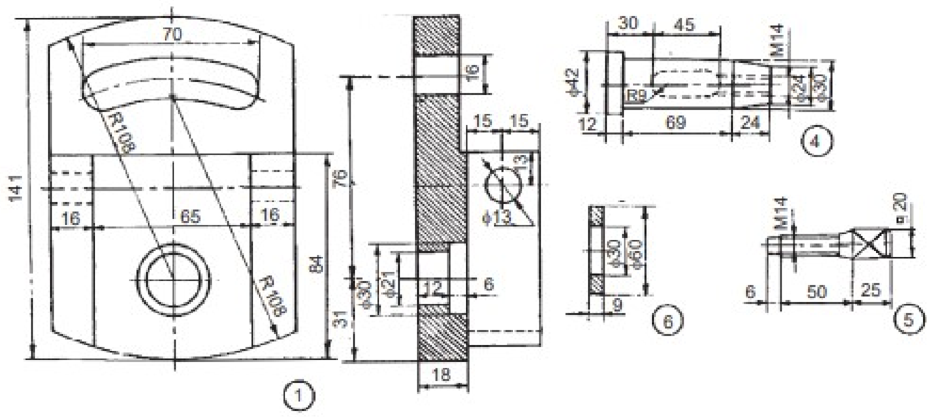
Fig. 18.14 Single tool post

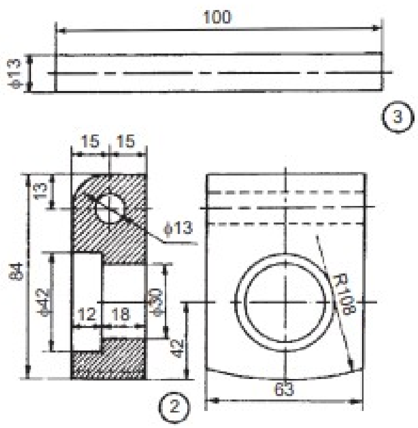
Clapper Block:

It is a sub-assembly of the tool head of a shaping machine. It is used for holding the shaper cutting tool. The design of the clapper block is such that it relieves the tool during the return stroke.

Figure 18.16 shows the details of a clapper block. This consists of a swivel plate 1, attached to the vertical slide of the tool head (Fig. 18.17) of the shaping machine. The drag release plate 2 relieves the tool during the return stroke. The drag release plate carries the tool holder 4 and the tool is fixed in it by means of the tool clamping screw 5. The washer 6 is used over the drag release plate for providing even bearing surface to the tool.

Exercise: Figure 18.16 shows the details of a shaper clapper block. Assemble the parts and draw, (i) the view from the front and (ii) sectional view from the left.





Parts list

Part No.	Name	Matl	Qty
1	Swivel plate	CI	1
2	Drag release plate	CI	1
3	Pin	MS	1
4	Tool holder	MCS	1
5	Tool clamping screw	MS	1
6	Washer	MS	1

Fig. 18.16 Clapper block

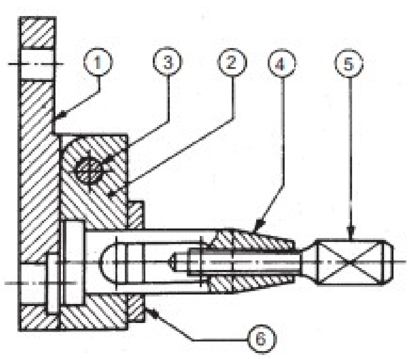


Fig. 18.16A Clapper block