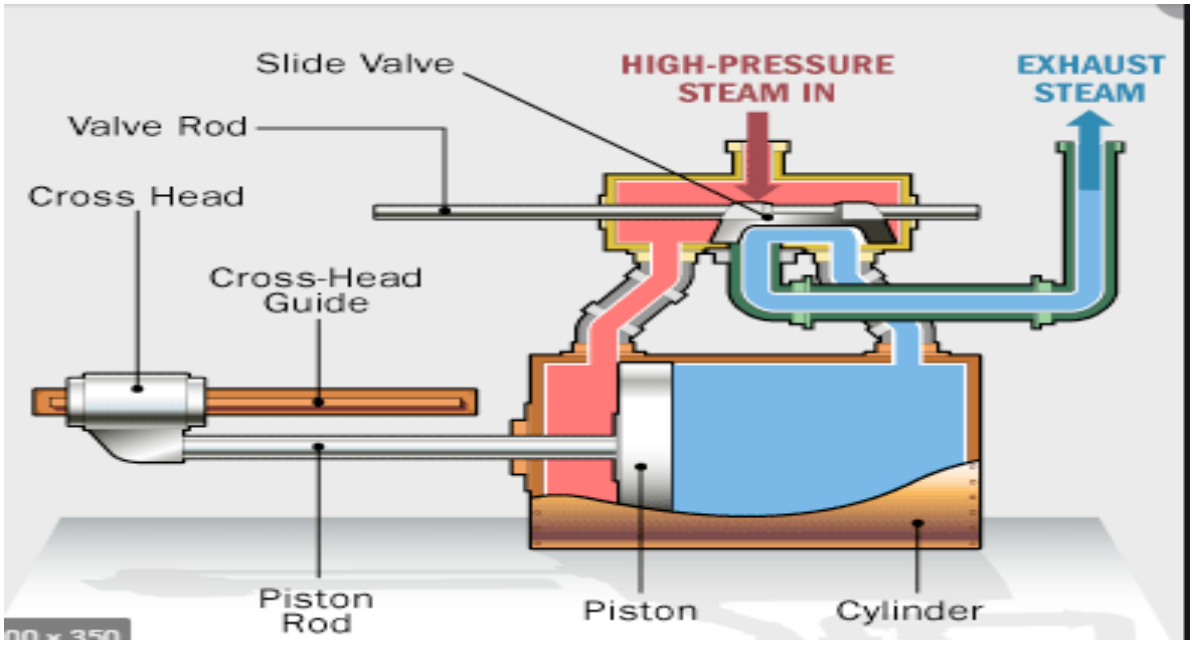
SEMESTER:FOURTH(IV)

BRANCH:MECHANICAL

SUBJECT:MACHINE DRAWING

TOPIC:CHAPTER 9:ENGINEERING PARTS



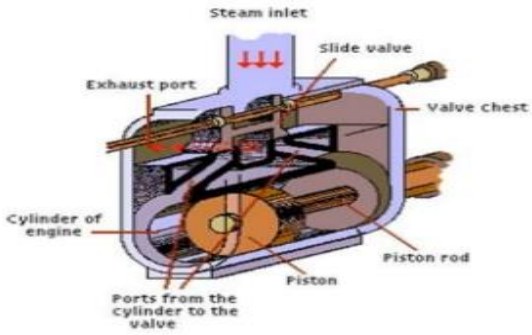
STEAM ENGINE :

A steam engine is a machine that burns coal to release the heat energy it contains—so it's an example of what we call a heat engine. It's a bit like a giant kettle sitting on top of a coal fire. The heat from the fire boils the water in the kettle and turns it into steam. But instead of blowing off uselessly into the air, like the steam from a kettle, the steam is captured and used to power a machine.

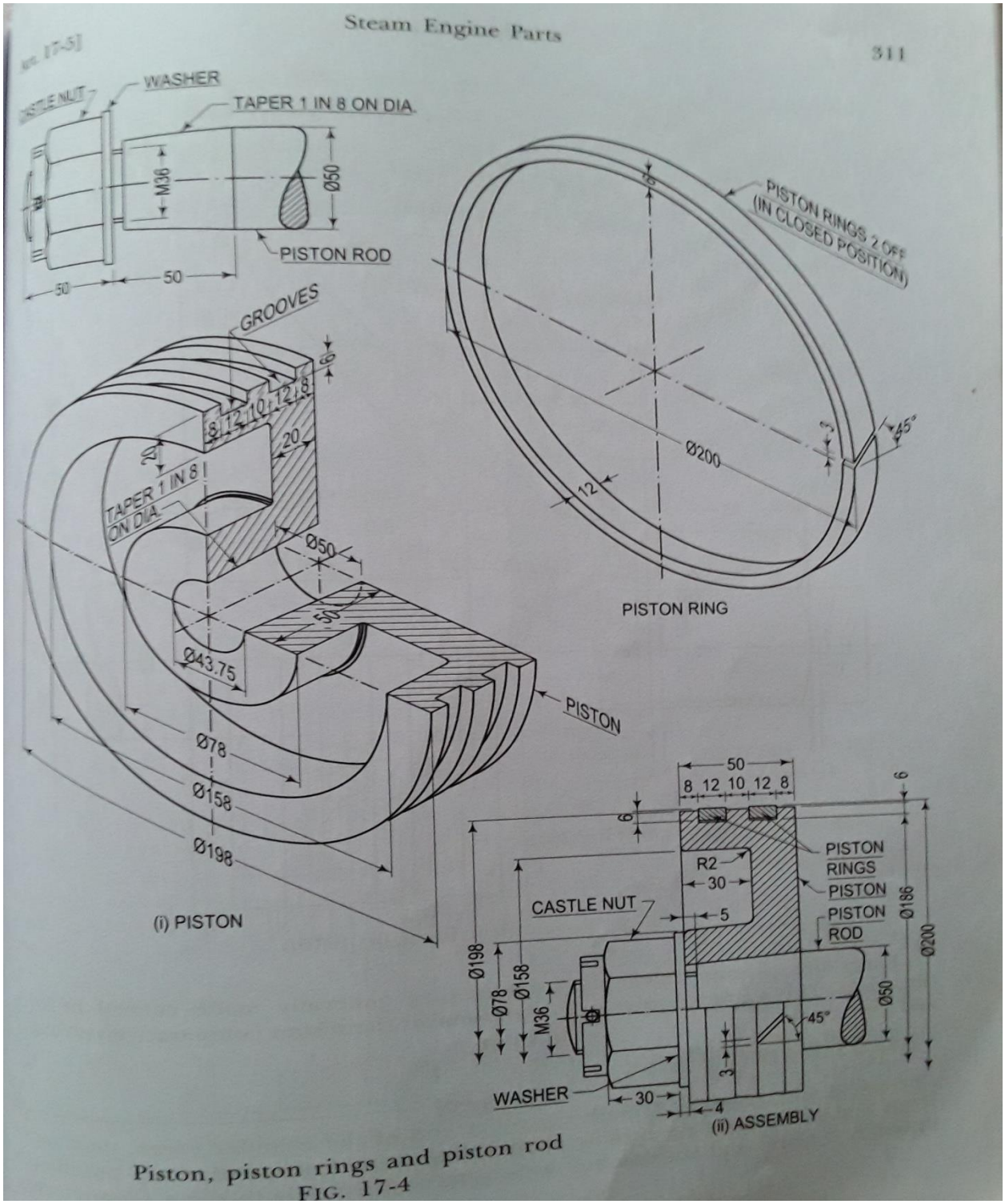
PARTS OF A STEAM ENGINE:

Components of Steam Engine

1. Piston and Piston rod
2. Piston rings
3. Connecting rod
4. Crank and crank shaft
5. Stuffing box
6. Crosshead and guide ways
8. Eccentric
9. Slide valve



STEAM ENGINE PISTON:

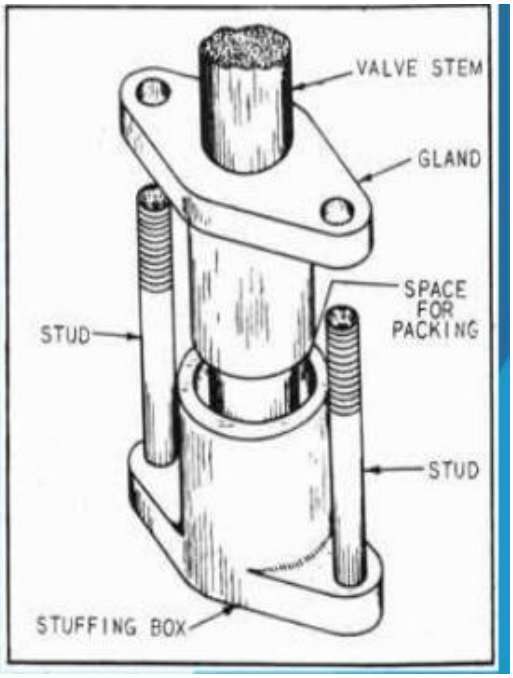


Piston, piston rings and piston rod
FIG. 17-4

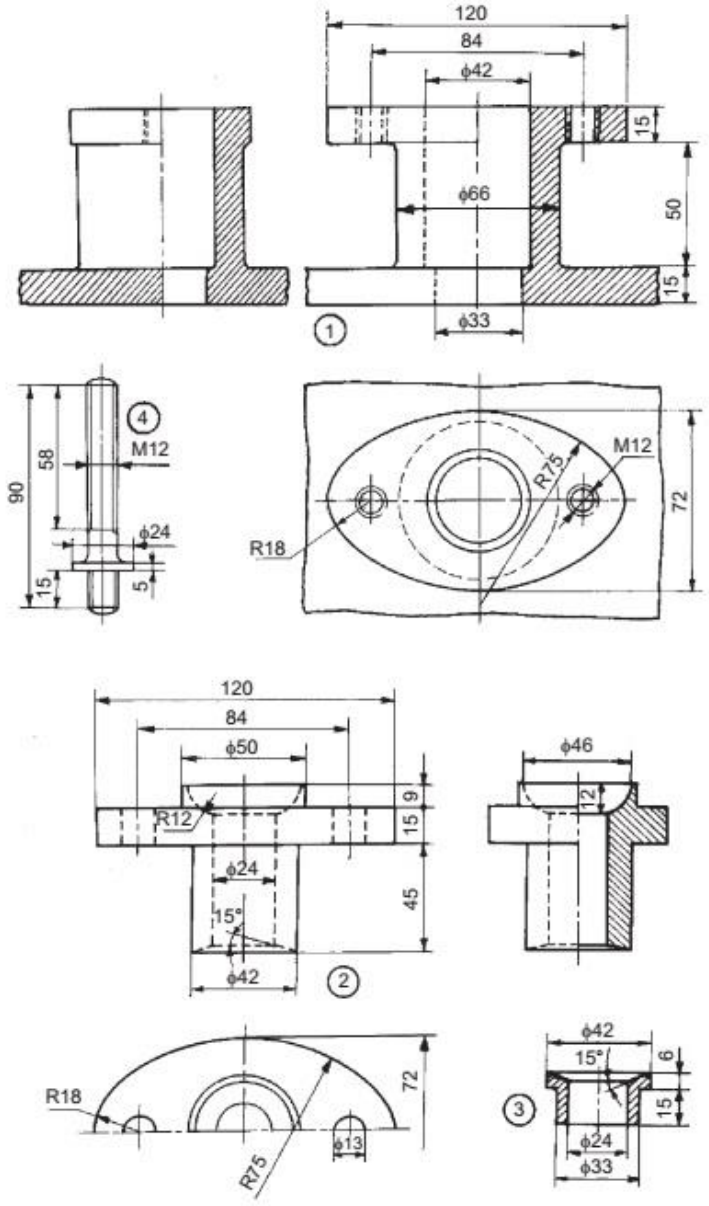
STEAM ENGINE CONNECTING ROD:

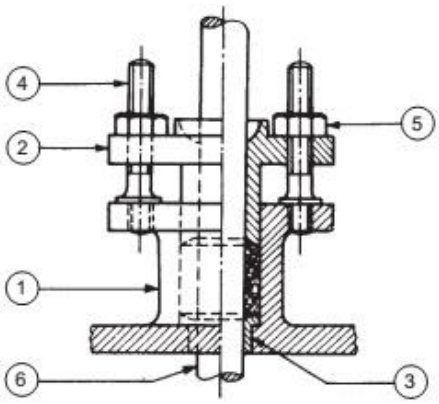
STUFFING BOX:

- The **Stuffing Box** is a cylindrical space in the ***pump casing*** surrounding the ***shaft***.
- **Packing** is the material in the form of ***rings*** or strands that is placed in the stuffing box to form a ***seal*** to control the rate of leakage around the shaft.
- Packing is then held in place and ***compressed*** by the '**Gland**' to give a give a leak-tight seal.



PARTS OF A STUFFING BOX:



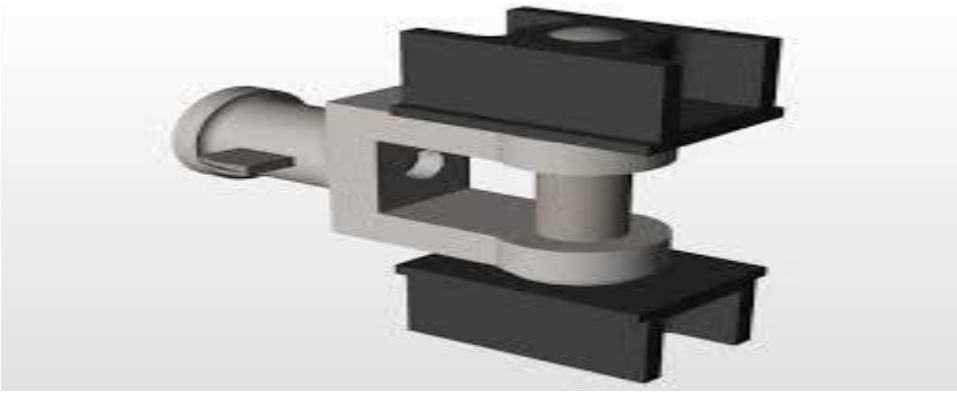


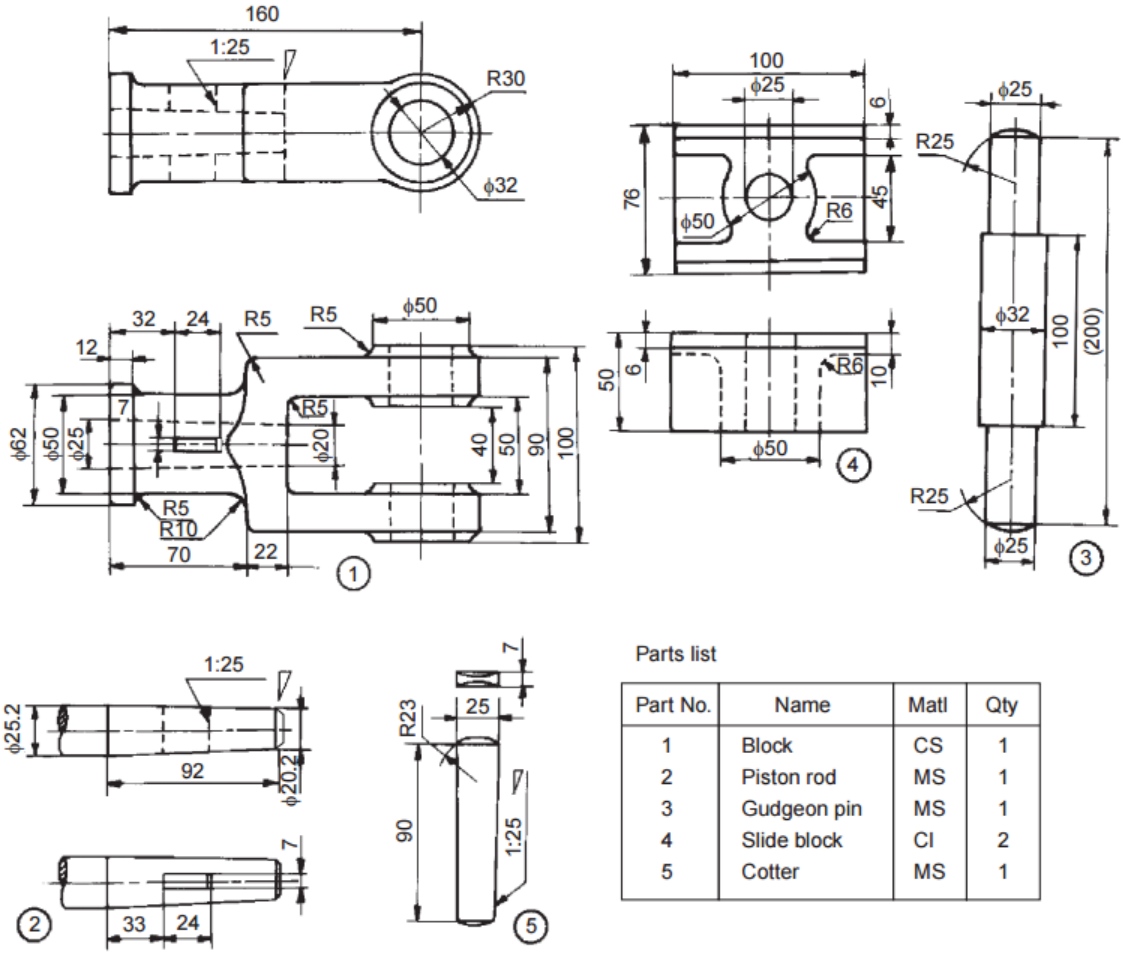
Parts list

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

CROSS HEAD:

The crosshead of a steam engine is the sliding bearing used to support the sideways forces from the connecting rod without placing this sideways load onto the piston or piston rod seals.





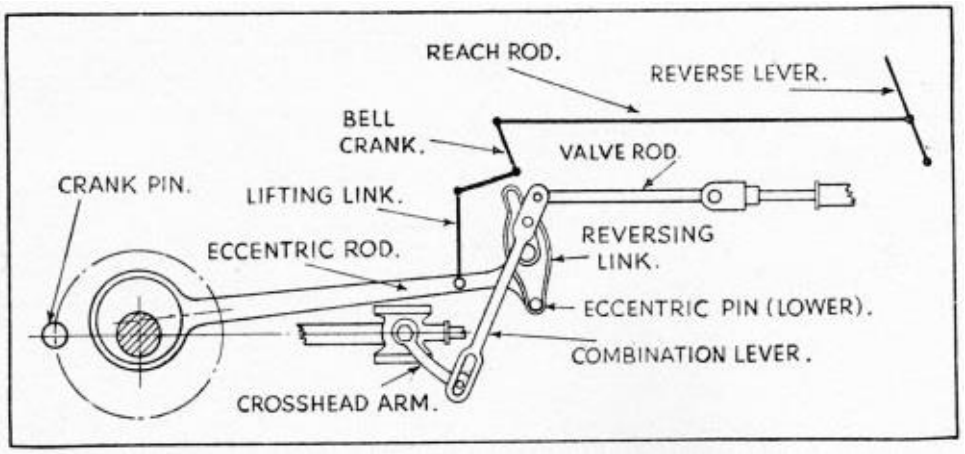
Parts list

Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

STEAM ENGINE ECCENTRIC:

In mechanical engineering, an **eccentric** is a circular disk (*eccentric sheave*) solidly fixed to a rotating axle with its centre offset from that of the axle (hence the word "eccentric", out of the centre).

It is used most often in steam engines, and used to convert rotary into linear reciprocating motion to drive a sliding valve or pump ram. To do so, an eccentric usually has a groove at its circumference closely fitted a circular collar (*eccentric strap*). An attached *eccentric rod* is suspended in such a way that its other end can impart the required reciprocating motion. A return crank fulfills the same function except that it can only work at the end of an axle or on the outside of a wheel whereas an eccentric can also be fitted to the body of the axle between the wheels. Unlike a cam, which also converts rotary into linear motion at almost any rate of acceleration and deceleration, an eccentric or return crank can only impart simple harmonic motion.



IC ENGINE PARTS:

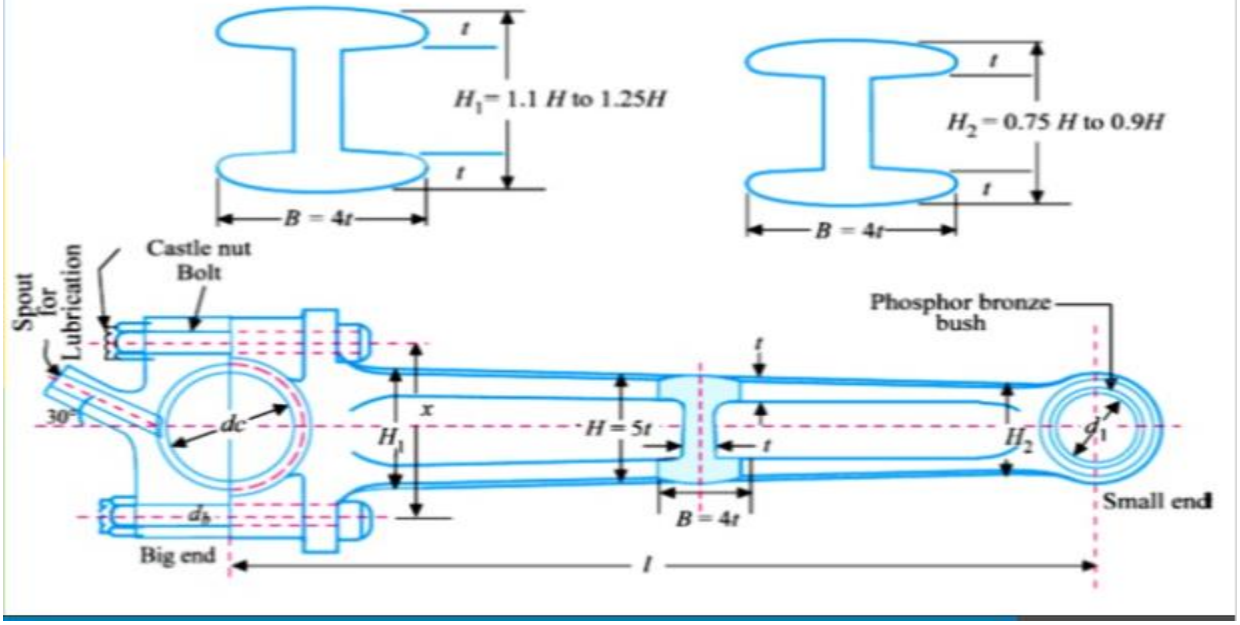
1.CONNECTING ROD:

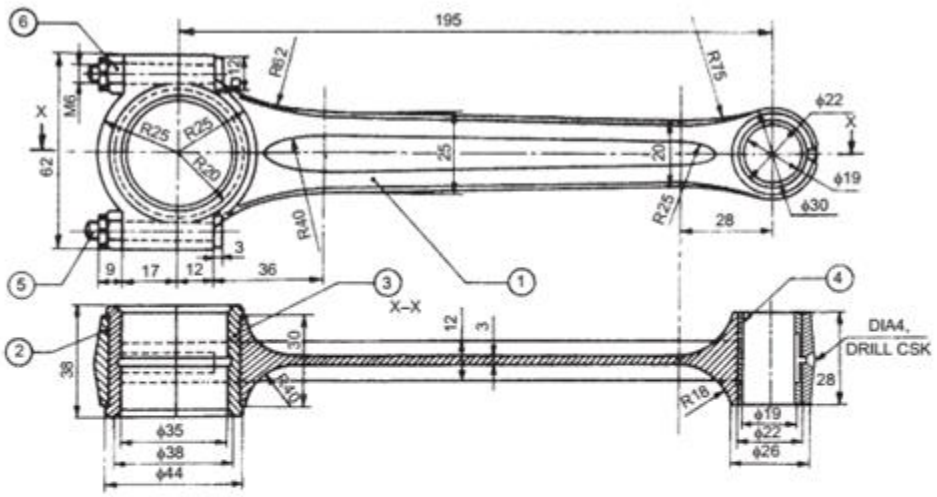
5. Connecting Rod

- The connecting rod is the intermediate member between the piston and the crankshaft.
- Its primary function is to transmit the push and pull from the piston pin to the crankpin and thus convert the reciprocating motion of the piston into the rotary motion of the crank.
- The usual form of the connecting rod in internal combustion engines is shown in Fig.
- It consists of a long shank, a small end and a big end.
- The cross-section of the shank may be circular, rectangular, tubular, *I*-section or *H*-section. Generally circular section is used for low speed engines while *I*-section is preferred for high speed engines.
- The *length of the connecting rod (*l*) depends upon the ratio of ***l* / r,** where r is the radius of crank.
- It may be noted that the smaller length will decrease the ratio ***l* / r.** This increases the angularity of the connecting rod which increases the side thrust of the piston against the cylinder liner which in turn increases the wear of the liner.

* It is the distance between the centres of small end and big end of the connecting rod.

5. Connecting Rod





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

2.PISTON

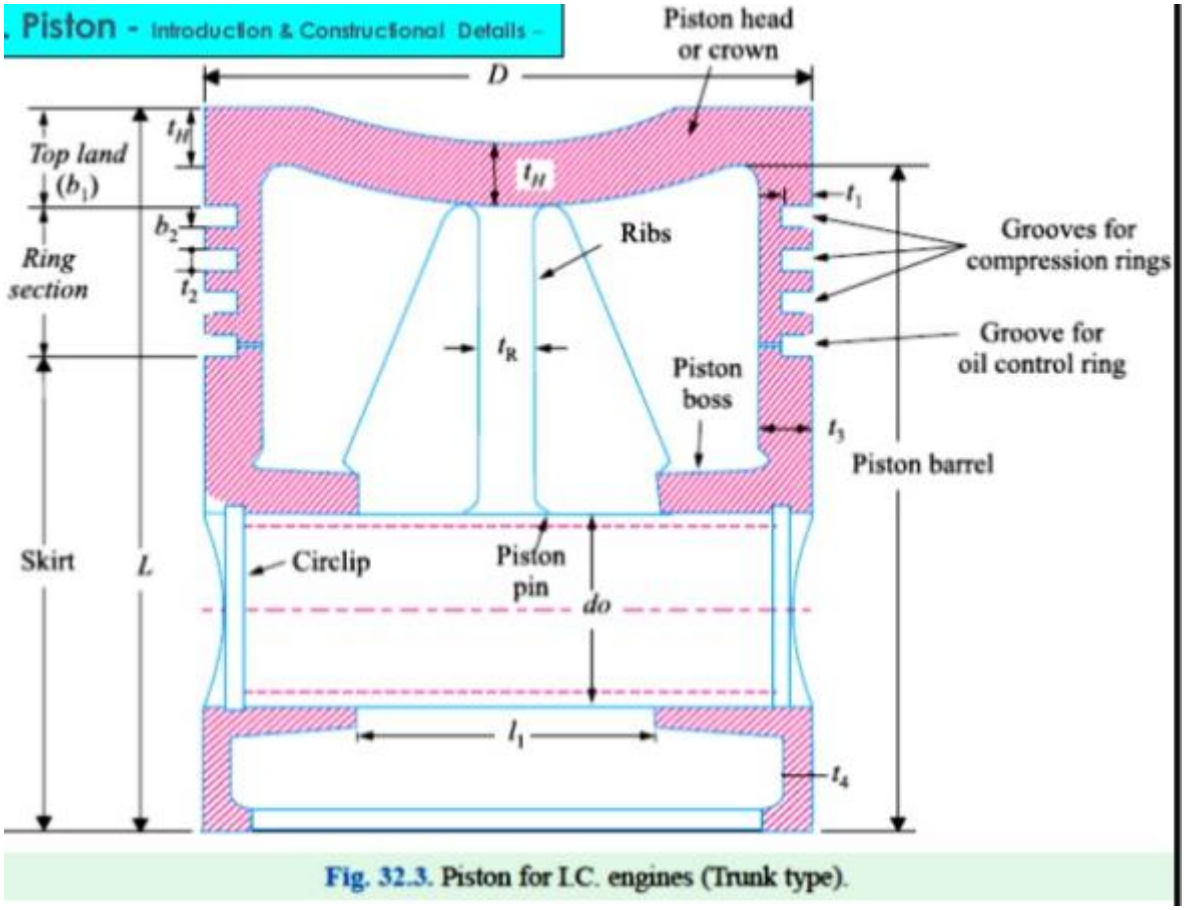


Fig. 32.3. Piston for I.C. engines (Trunk type).

The piston is a disc which reciprocates within a cylinder. It is either moved by the fluid or it moves the fluid which enters the cylinder.

The main **function** *of the piston of an internal combustion* **engine is to receive the impulse from the expanding gas and to transmit the energy to the crankshaft through the connecting rod.**

The piston must also disperse a large amount of heat from the combustion chamber to the cylinder walls.

The piston of IC Engines of trunk type (open at one end) & of following parts as shown in Fig.

1. Head or crown. *The piston head or crown may be flat, convex or concave depending upon the design of combustion chamber. It withstands the pressure of gas in the cylinder.*

2.Piston rings. *The piston rings are used to seal the cylinder in order to prevent leakage of the gas past the piston.*

3.Skirt. *The skirt acts as a bearing for the side thrust of the connecting rod on the walls of cylinder.*

4.Piston pin. *It is also called gudgeon pin or wrist pin. It is used to connect the piston to the connecting rod.*

PISTON RINGS:

2. Piston Rings

The piston rings are used to impart the necessary radial pressure to maintain the seal between the piston and the cylinder bore. These are usually made of grey cast iron or alloy cast iron because of their good wearing properties and also they retain spring characteristics even at high temperatures.

The piston rings are of the following two types :

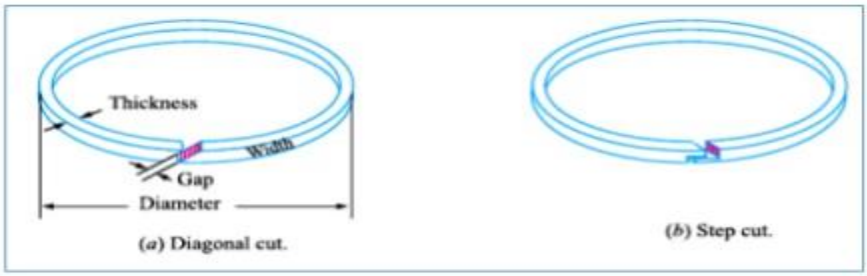
1. Compression rings or pressure rings, and 2. Oil control rings or oil scraper.

*The **compression rings** or **pressure rings** are inserted in the grooves at the top portion of the piston and may be three to seven in number. These rings also transfer heat from the piston to the cylinder liner and absorb some part of the piston fluctuation due to the side thrust.*

*The **oil control rings** or **oil scrapers** are provided below the compression rings. These rings provide proper lubrication to the liner by allowing sufficient oil to move up during upward stroke and at the same time scraps the lubricating oil from the surface of the liner in order to minimize the flow of the oil to the combustion chamber.*

2. Piston Rings

- *The compression rings are usually made of rectangular cross-section and the diameter of the ring is slightly larger than the cylinder bore.*
- *A part of the ring is cut-off in order to permit it to go into the cylinder against the liner wall.*
- *The diagonal cut or step cut ends, as shown in Fig. (a) and (b) respectively, may be used.*
- *The gap between the ends should be sufficiently large when the ring is put cold so that even at the highest temperature, the ends do not touch each other when the ring expands, otherwise there might be buckling of the ring.*



PISTON PIN:

5. Piston Pin

- **The piston pin (also called gudgeon pin or wrist pin)** **It is used to connect the piston and the connecting rod.**
- *It is usually* **made hollow and tapered on the inside**, *the smallest inside diameter being at the centre of the pin, as shown in Fig. 2*
- **The piston pin passes through the bosses provided on the inside of the piston skirt and the bush of the small end of the connecting rod.**
- *The* **centre of piston pin should be 0.02 D to 0.04 D above the centre of the skirt**, *in order to off-set the turning effect of the friction and to obtain uniform distribution of pressure between the piston and the cylinder liner.*

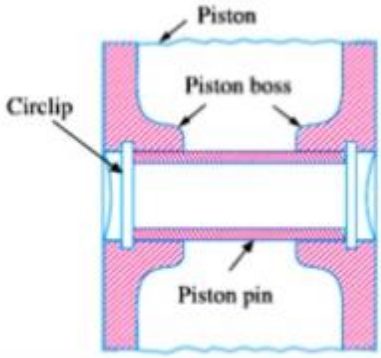


Fig. 32.6. Full floating type piston pin.

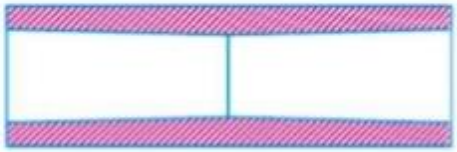


Fig. Piston pin.