MACHINE DRAWING
PART-B

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VKR VNB & AGK COLLEGE OF ENGINEERING

II Year - II Semester **MACHINE DRAWING**

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Course Objective: The student will acquire knowledge of fastening arrangements such as welding, riveting the different styles of attachment for shaft. The student also is enabled to prepare the assembly of various machine or engine components and miscellaneous machine components.

Machine Drawing Conventions :

Need for drawing conventions – introduction to IS conventions

a) Conventional representation of materials, common machine elements and parts such asscrews, nuts, bolts, keys, gears, webs, ribs.

b) Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.

c) Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.

d) Title boxes, their size, location and details - common abbreviations & their liberal usage

e) Types of Drawings – working drawings for machine parts.

PART-A

I. Drawing of Machine Elements and simple parts

Objective: To provide basic understanding and drawing practice of various joint, simple mechanical parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportions.

a) Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.

b) Keys, cotter joints and knuckle joint.

c) Riveted joints for plates

d) Shaft coupling, spigot and socket pipe joint.

e) Journal, pivot and collar and foot step bearings

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PART-B

II. Assembly Drawings:

Objective: The student will be able to draw the assembly from the individual part drawing.

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

a) Engine parts –Gear pump, Fuel pump Petrol Engine connecting rod, piston assembly.

b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

c) Valves: spring loaded safety valve, feed check valve and air cock, Control valves

NOTE : First angle projection to be adopted. The student should be able to provide working drawings of actual parts. End semester examination for 70 Marks, Part A- 20 Marks (Answer two questions out of Three), Part B- 50 Marks (Assembly Drawing).

Text Books:

1. Machine Drawing – N.Siddeswar, K.Kannaiah & V.V.S.Sastry - TMH

2. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers

References:

1. Machine Drawing – P.S.Gill,
2. Machine Drawing – Luzzader
3. Machine Drawing – Rajput
4. Machine Drawing – N.D. Junnarkar, Pearson
5. Machine Drawing – Ajeeth Singh, McGraw Hill
6. Machine Drawing – KC John, PHI
7. Machine Drawing – B Battacharya, Oxford
8. Machine Drawing – Gowtham and Gowtham, Pearson

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For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for continuous Assessment (day–to–day work) and 10 marks for internal tests) and 70 marks for end examination.

There shall be two internal tests in a Semester for 10 marks each and final marks can be calculated with 80% weightage for better of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.

MACHINE DRAWING

PART-B

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Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

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b) Other machine parts - Screws jacks, Machine Vices Plummer block, Tailstock.

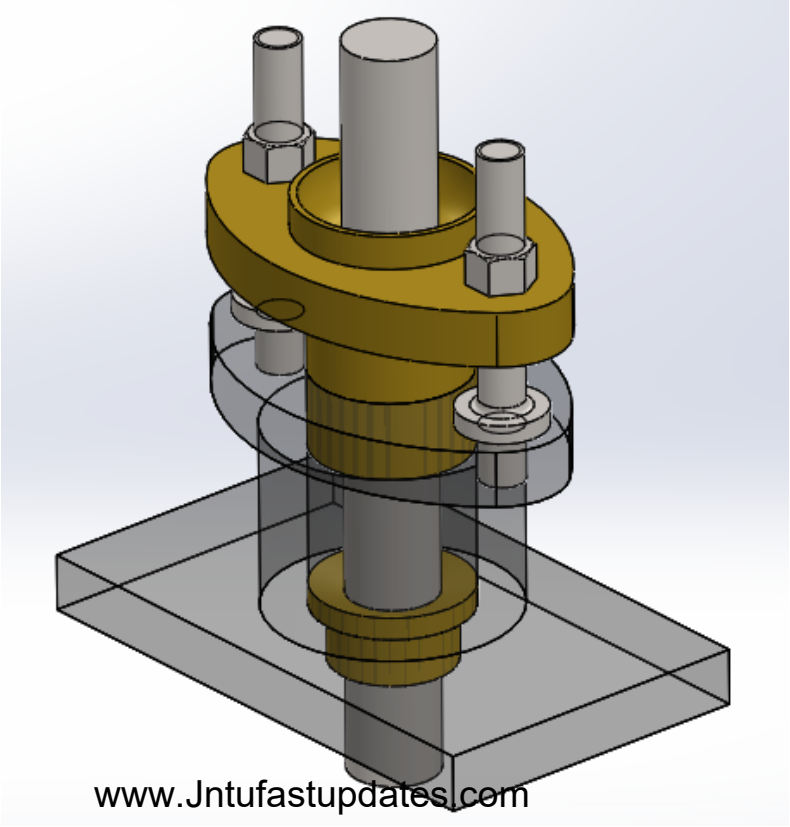
c) Valves: spring loaded safety valve, feed check valve and air cock, Control valves

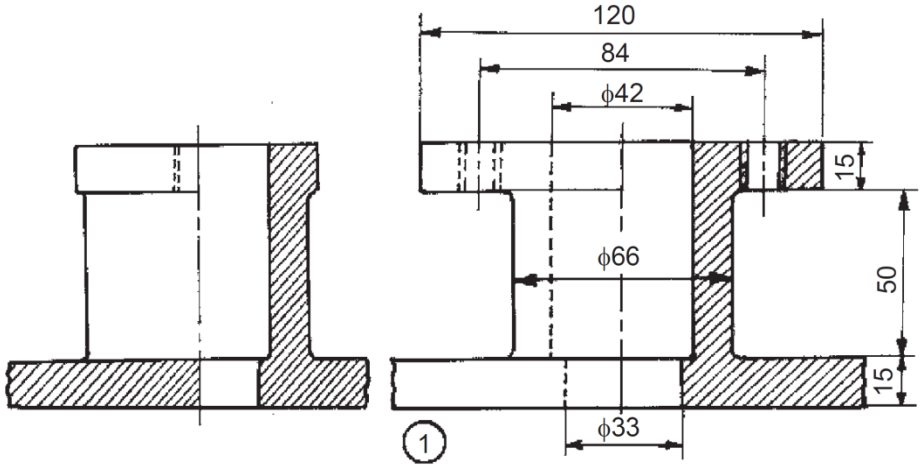
STUFFING BOX

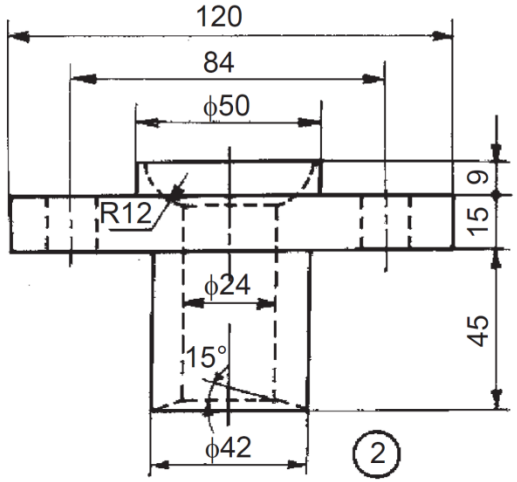
It is used to prevent loss of fluid such as steam, between sliding or turning parts of machine elements. In a steam engine, when the piston rod reciprocates through the cylinder cover; stuffing box provided in the cylinder cover, prevents leakage of steam from the cylinder.

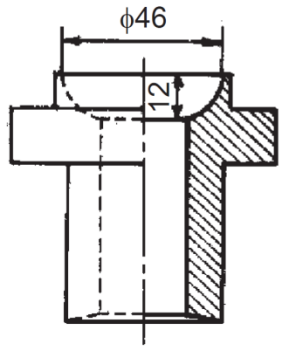
Figure shows (next slide) the various parts of a stuffing box. At the base of stuffing box body 1, a bush 3 is placed such that the bevelled edge of the bush is at the inner side of the body. Gland 2 is placed at the other end of the body and is connected to the main body by means of studs 4 and nuts 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.

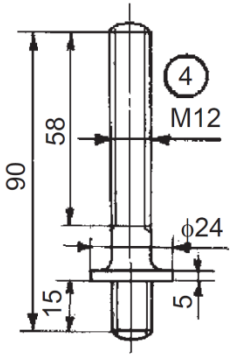
Assemble all parts of the stuffing box for a vertical steam engine, shown in Fig. (below) and draw, (*i*) half sectional view from the front, with left half in section, (*ii*) half sectional view from the right and (*iii*) view from above.

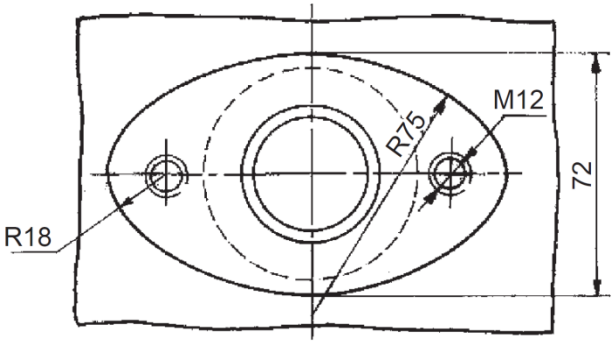


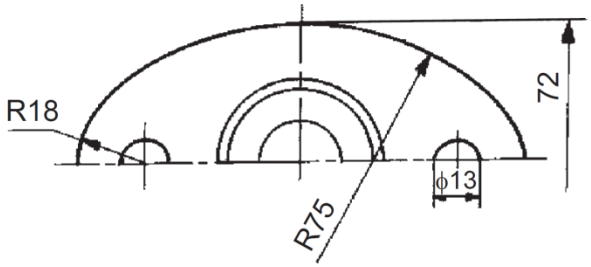


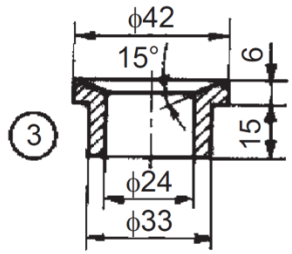






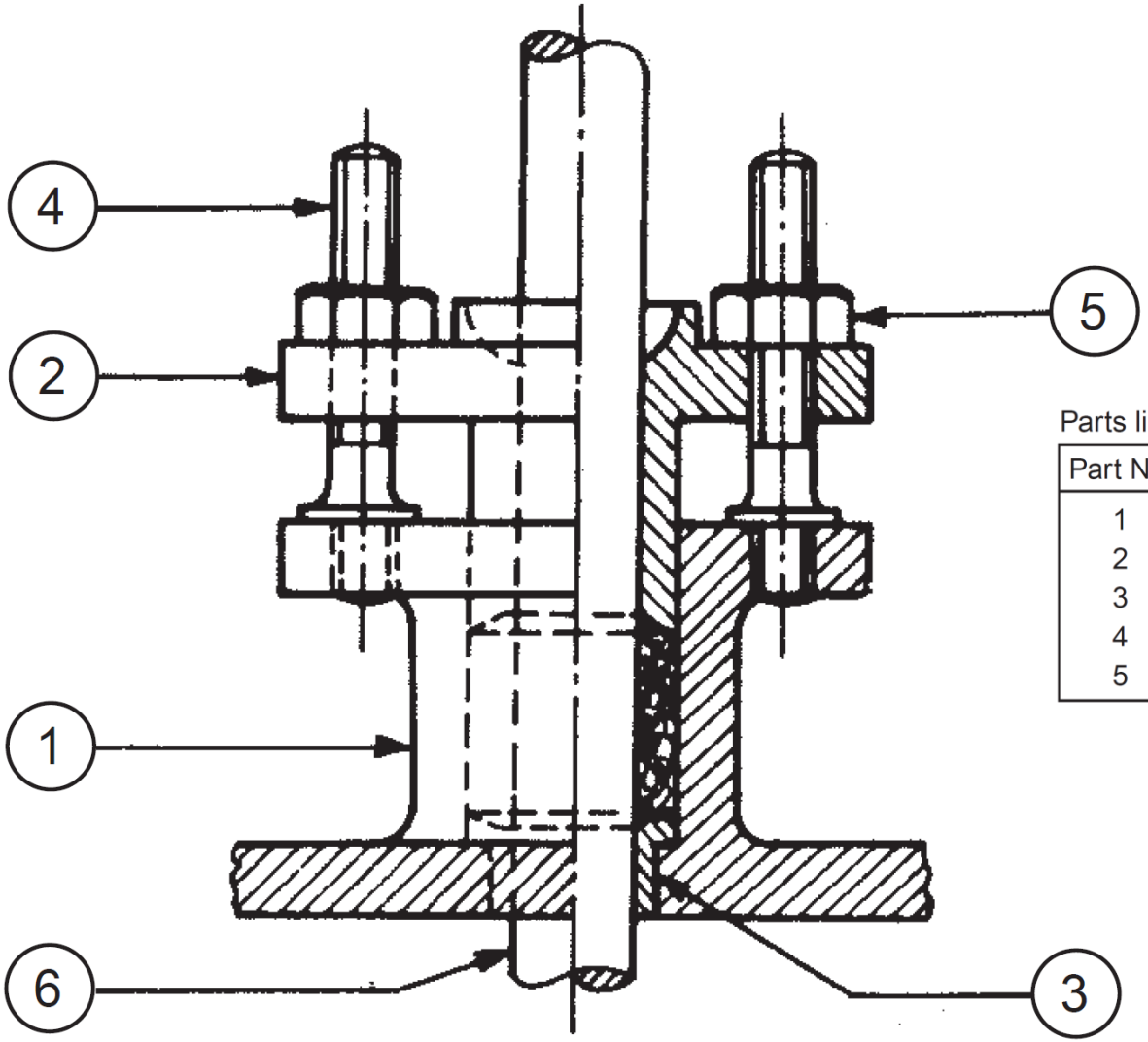






Parts list

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



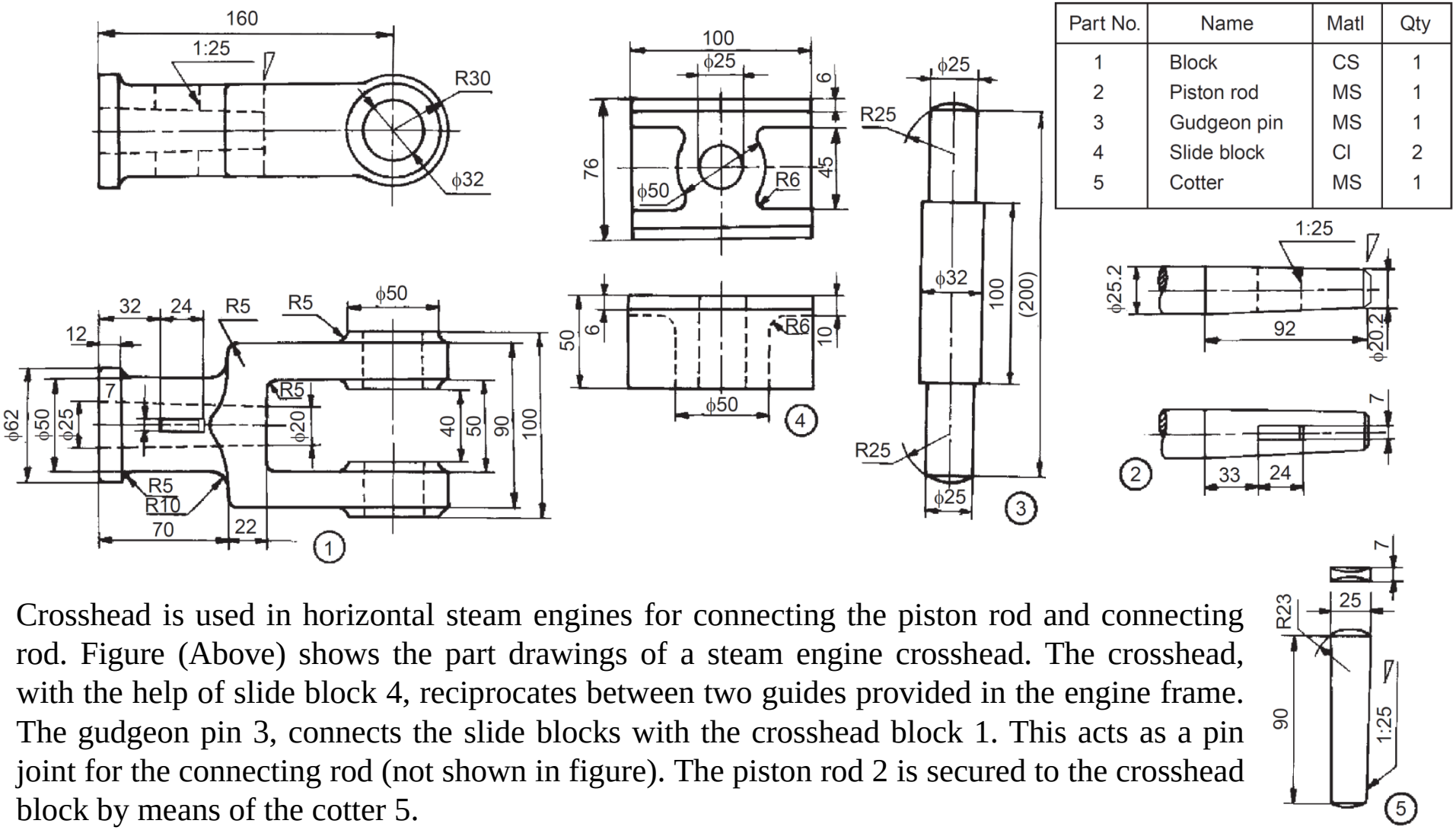
Parts list

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

STEAM ENGINE CROSSHEAD

Parts list

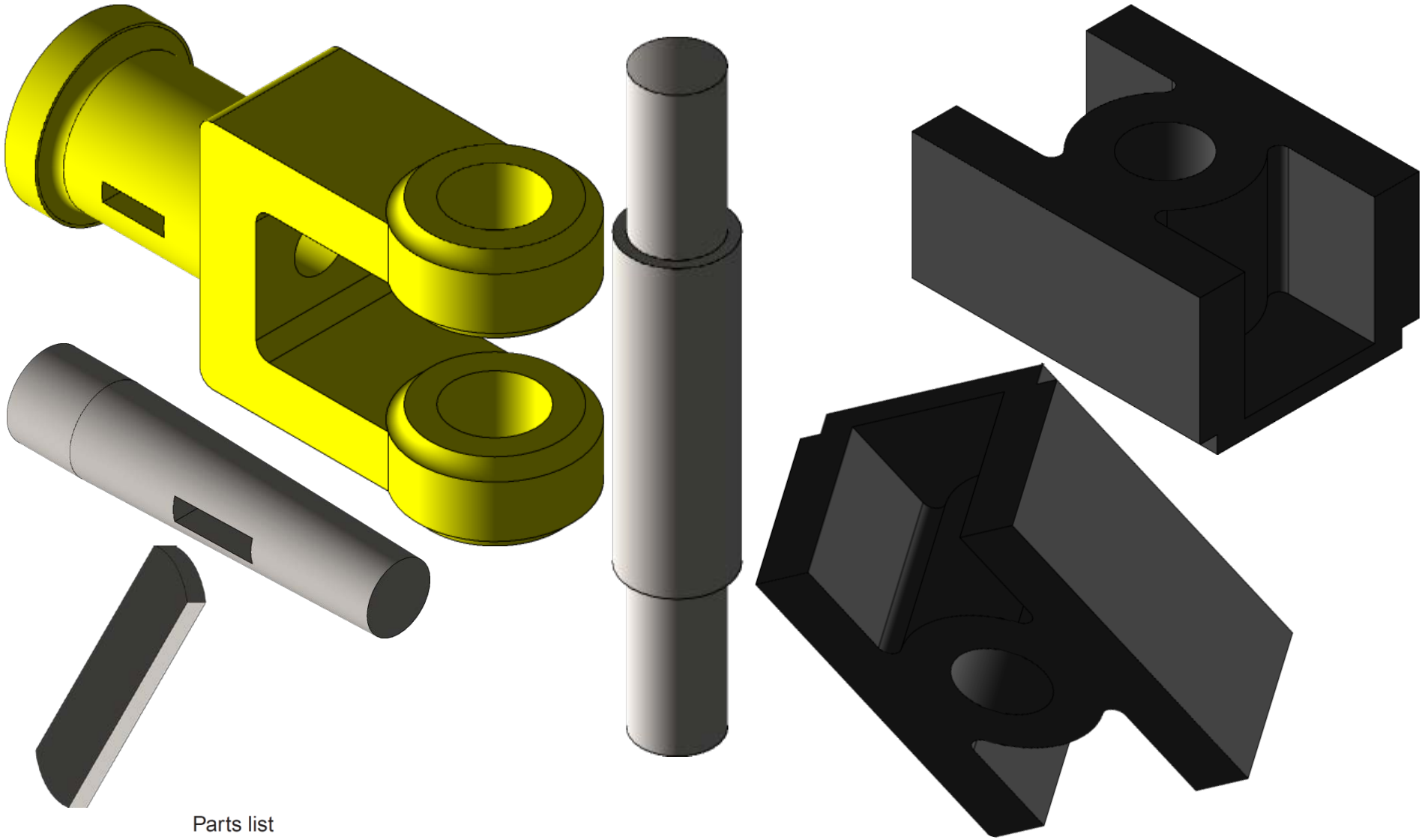
Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1



Crosshead is used in horizontal steam engines for connecting the piston rod and connecting rod. Figure (Above) shows the part drawings of a steam engine crosshead. The crosshead, with the help of slide block 4, reciprocates between two guides provided in the engine frame. The gudgeon pin 3, connects the slide blocks with the crosshead block 1. This acts as a pin joint for the connecting rod (not shown in figure). The piston rod 2 is secured to the crosshead block by means of the cotter 5.

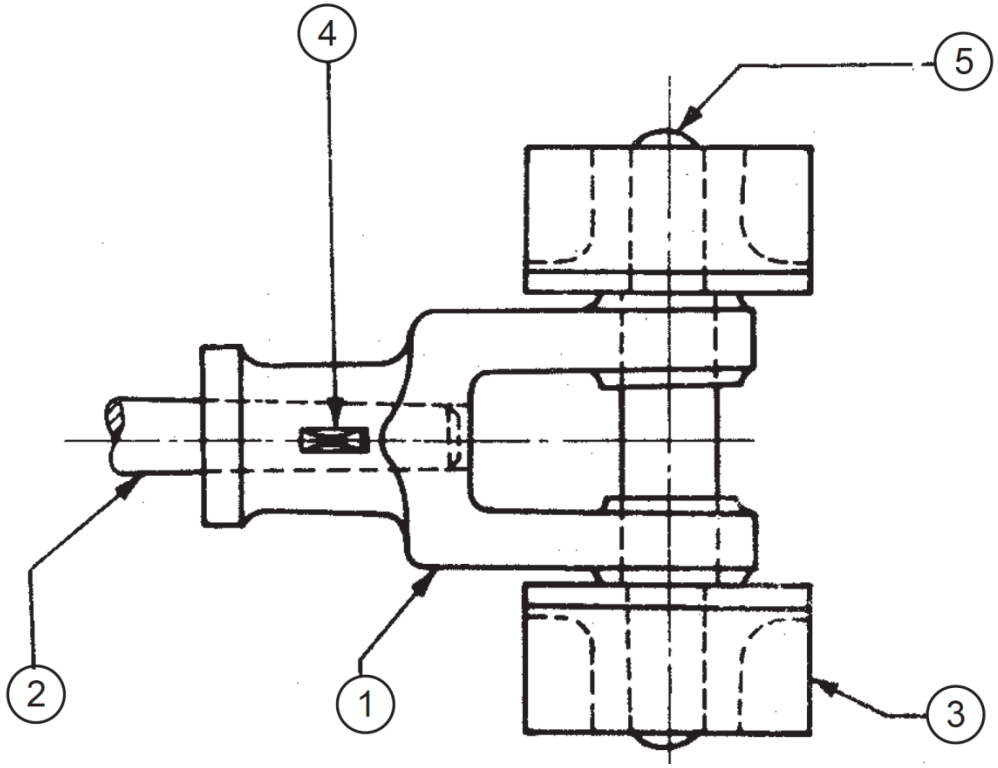
The assembly ensures reciprocating motion along a straight line for the piston rod and reciprocating cum oscillatory motion for the connecting rod.

Assemble the parts and draw, (*i*) half sectional view from the front, with bottom half in section and (*ii*) view from above.



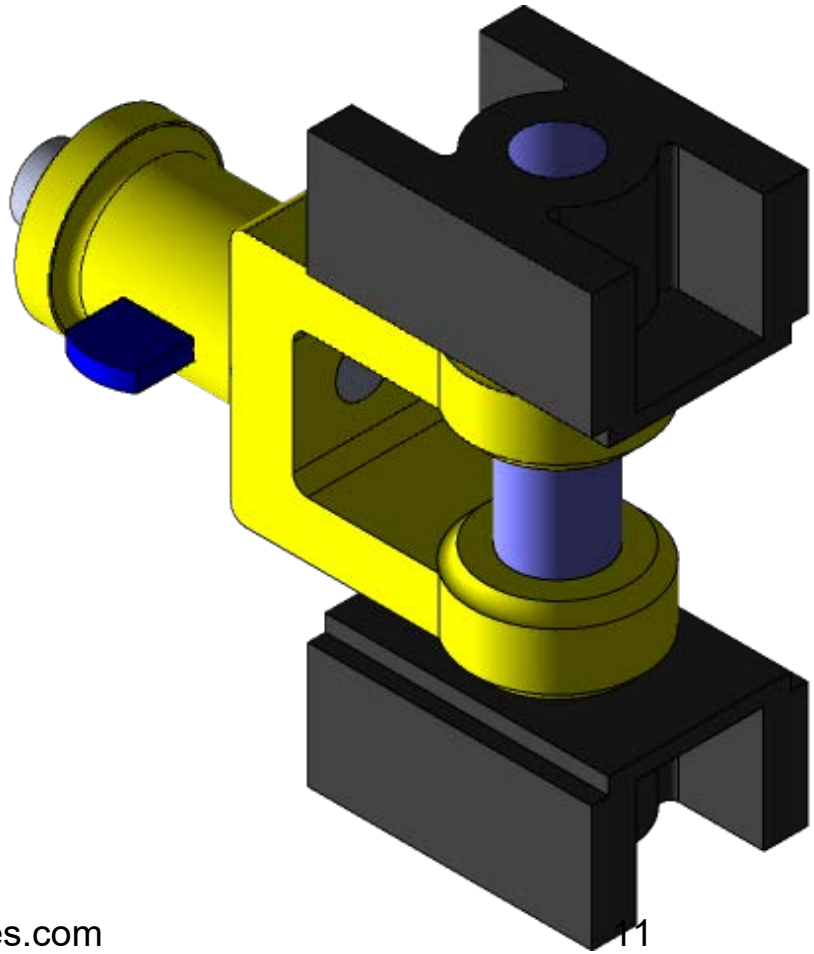
Parts list

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

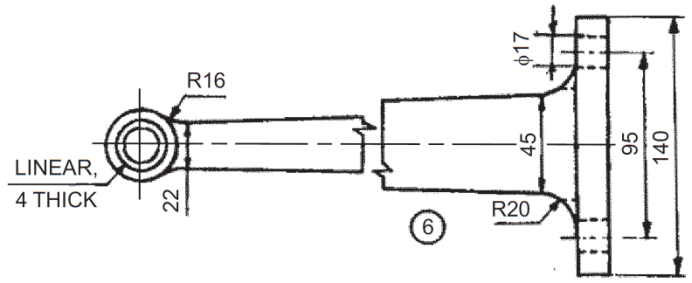


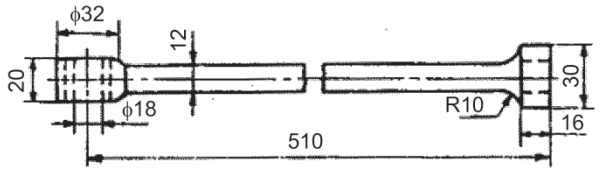
Parts list

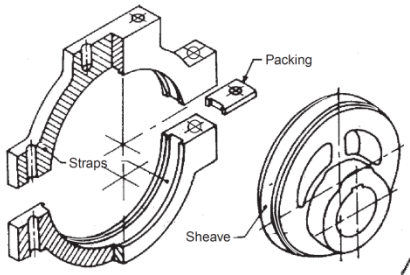
Part No.	Name	Matl	Qty
1	Block	CS	1
2	Piston rod	MS	1
3	Gudgeon pin	MS	1
4	Slide block	CI	2
5	Cotter	MS	1

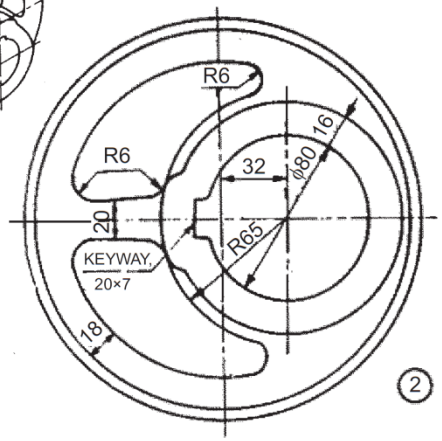


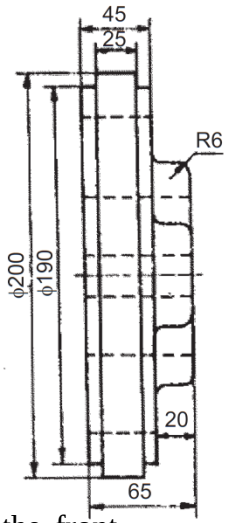
ECCENTRIC

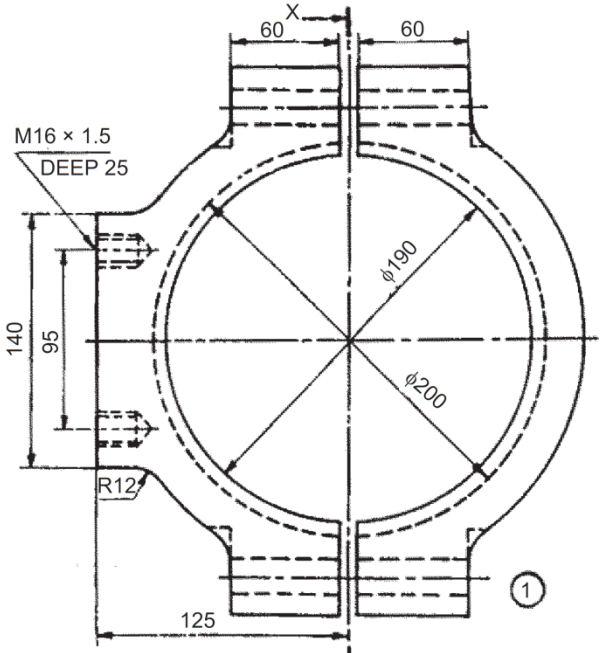


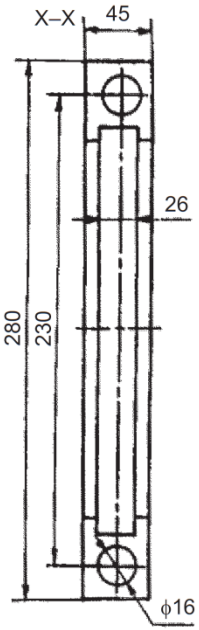


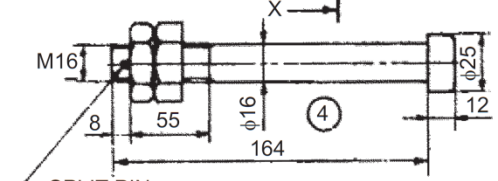


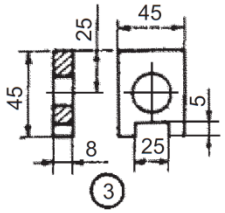


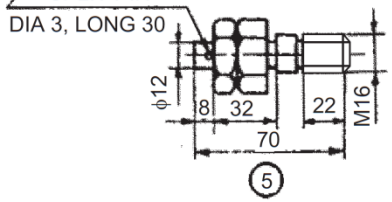












Assemble the parts and draw, (*i*) half sectional view from the front, with top half in section, (*ii*) view from the right and (*iii*) view from above.

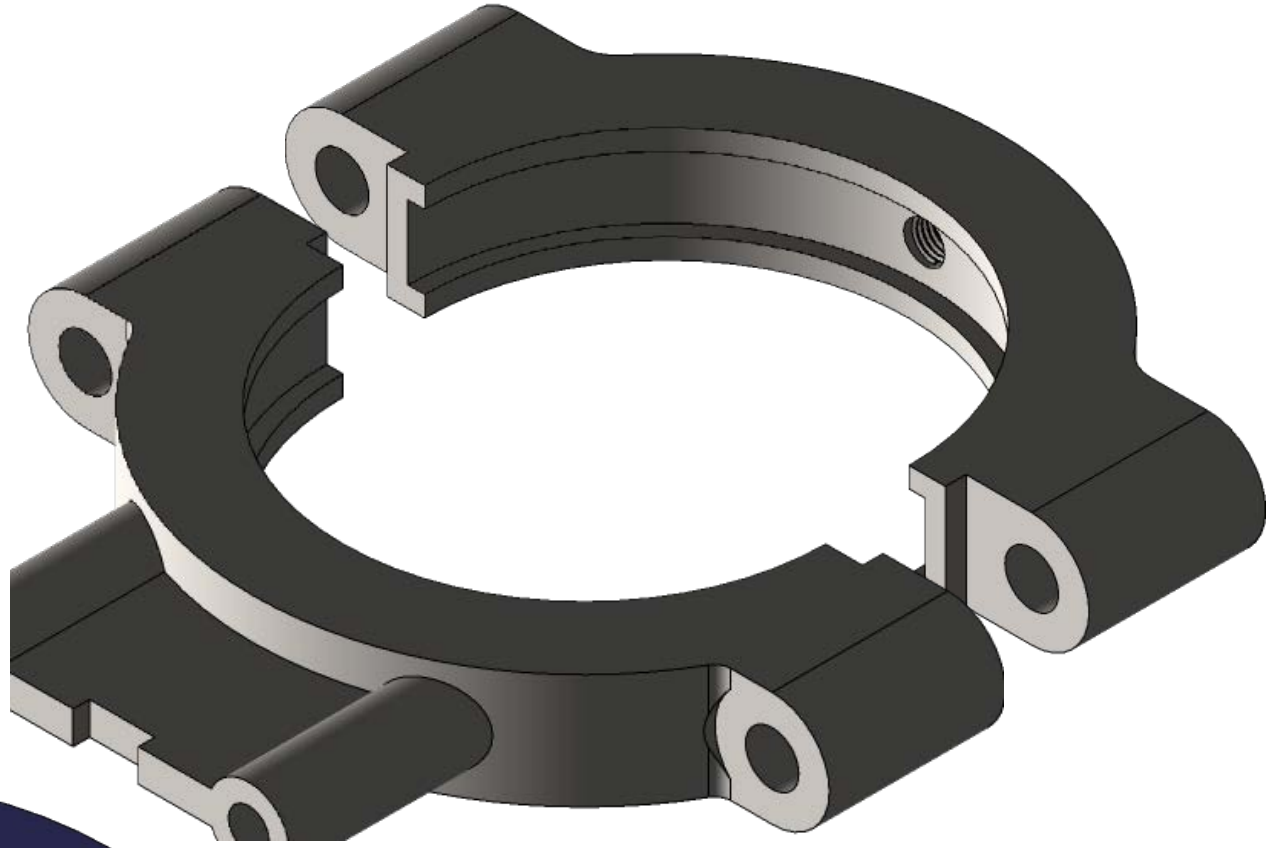
Parts list

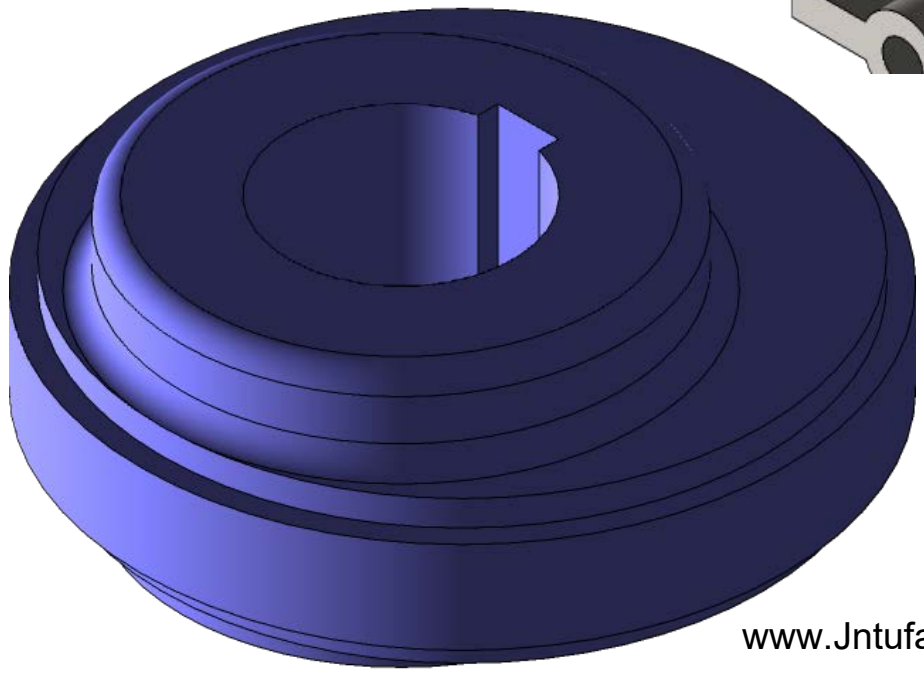
Part No.	Name	Matl	Qty
1	Straps	CI	2
2	Sheave	CI	1
3	Packing strip	Leather	2
4	Strap bolt	MS	2
5	Stud with nut	MS	2
6	Eccentric rod	Forged steel	1

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 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.

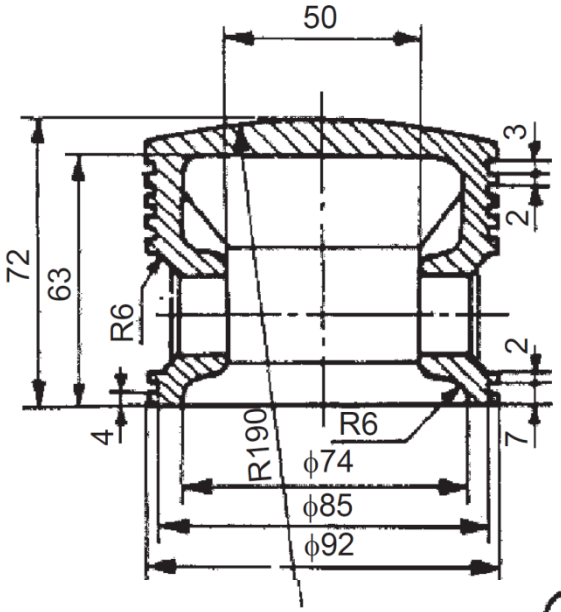
The straps 1 are semi-circular elements with an annular recess to accommodate the stepped rim of the sheave. These are held together on the sheave by means of strap bolts 4, with packing strips 3 placed between them. The eccentric rod is fixed to the eccentric strap by means of the studs and nuts 5.

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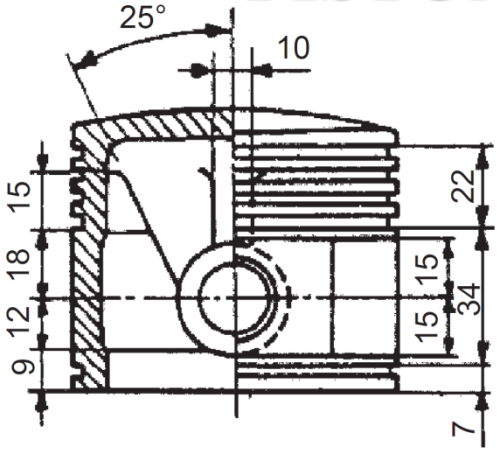


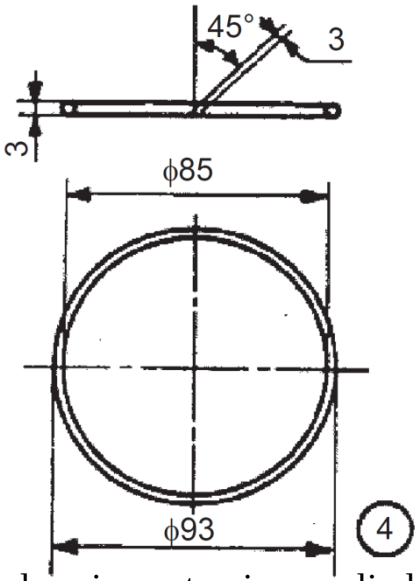


PISTON

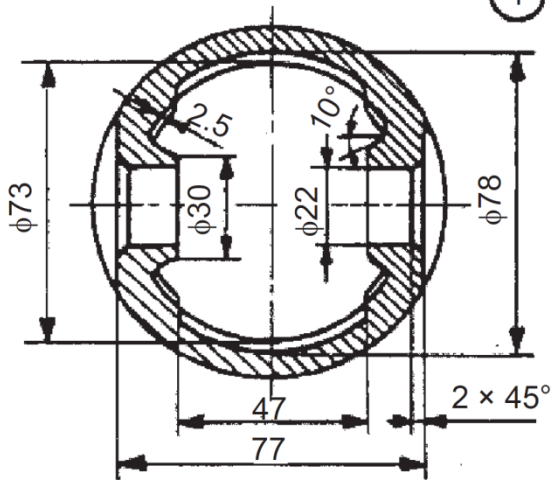


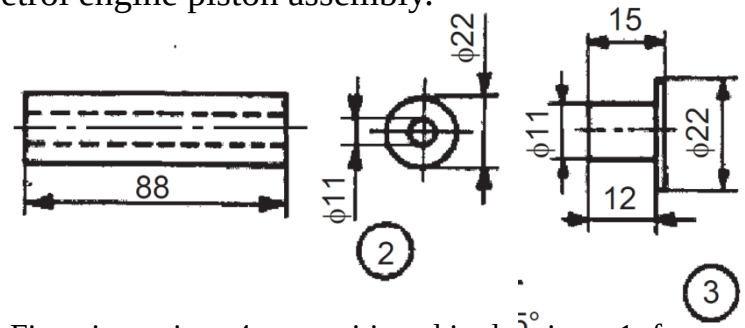
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A piston is cylindrical in form and reciprocates in a cylinder. The petrol engine piston is generally die cast in aluminium alloy. It is connected to the small end of the connecting rod by means of a gudgeon pin. Figure (above) shows the details of the petrol engine piston assembly.





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

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.

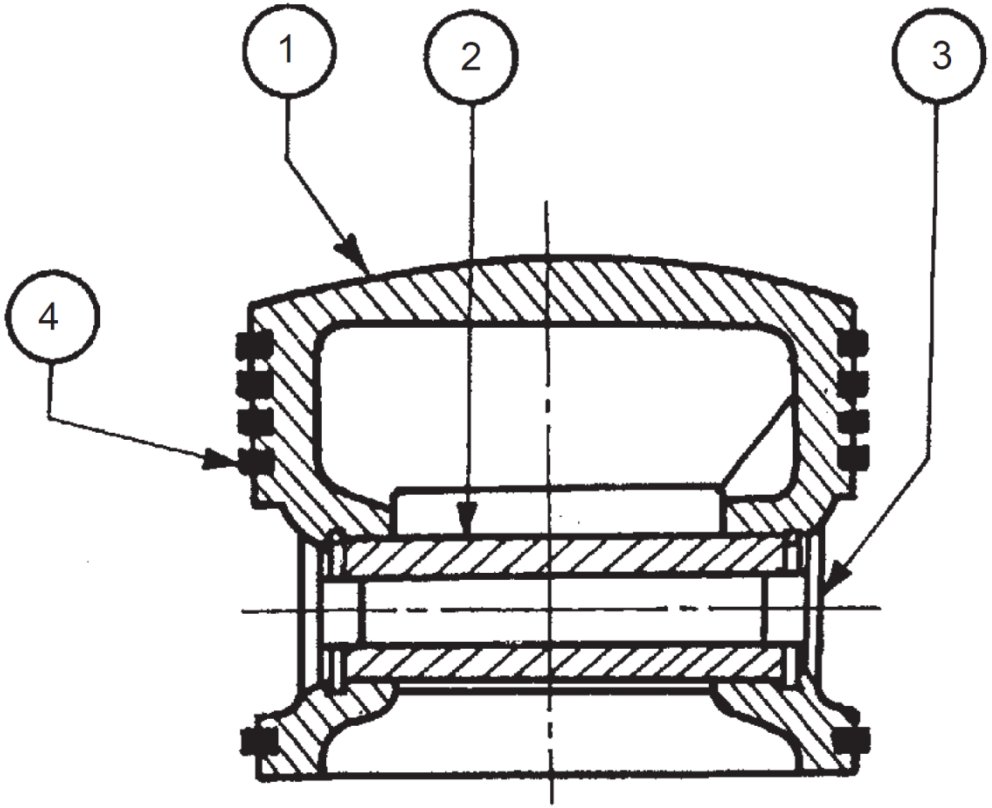
The piston is connected to the small end of the connecting rod, by means of the gudgeon or piston pin 2; the axial movement of which is prevented by piston plugs 3.

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.

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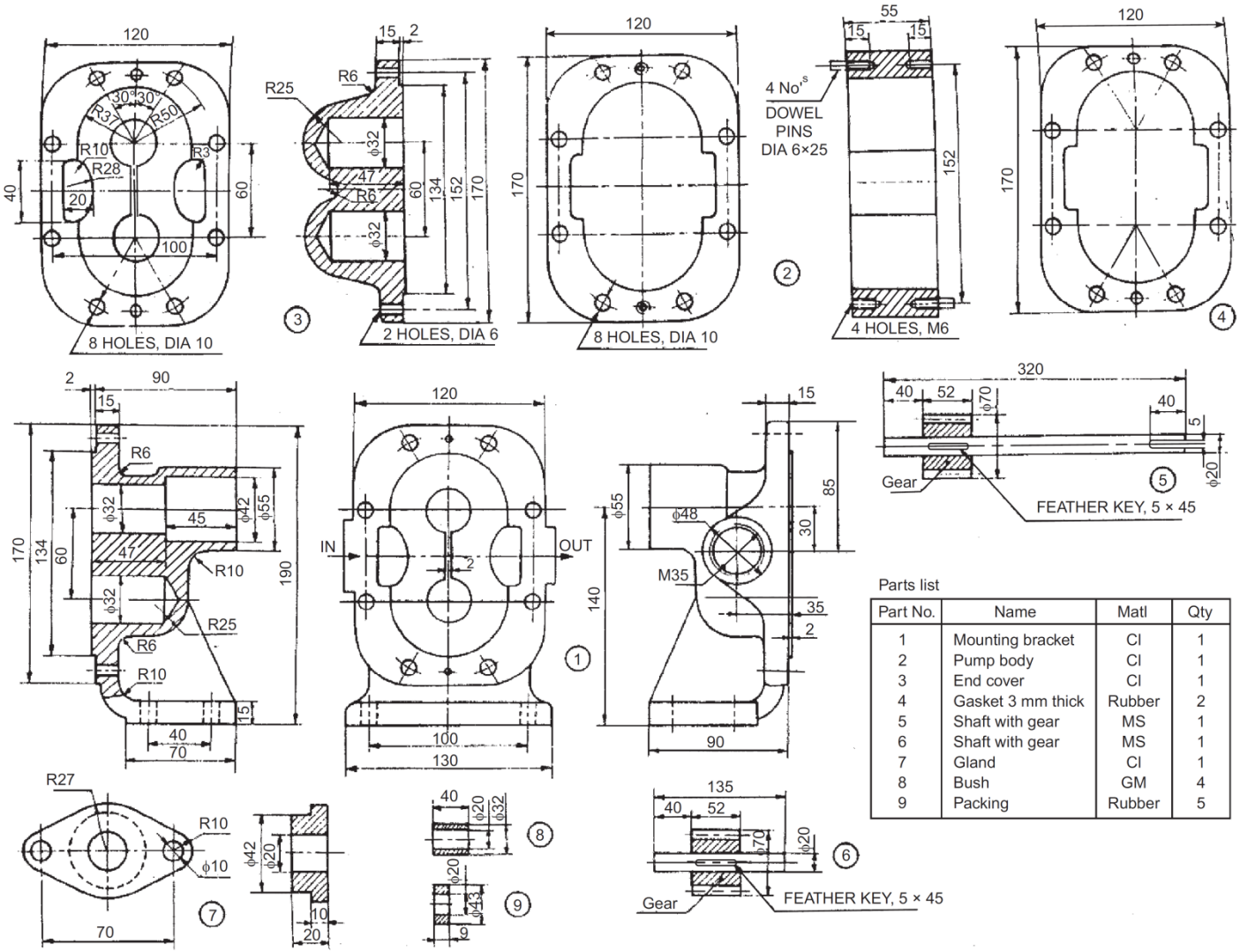


Parts list

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

ROTARY GEAR PUMP

It is used to supply lubricating oil from the sump to the required places of an internal combustion engine, under pressure and is positive displacement type. Figure (below) shows the details of a rotary gear pump.



Parts list

Part No.	Name	Matl	Qty
1	Mounting bracket	CI	1
2	Pump body	CI	1
3	End cover	CI	1
4	Gasket 3 mm thick	Rubber	2
5	Shaft with gear	MS	1
6	Shaft with gear	MS	1
7	Gland	CI	1
8	Bush	GM	4
9	Packing	Rubber	5

The two gaskets 4 are placed; one on the end cover 3 and the other on the mounting bracket1 in position.

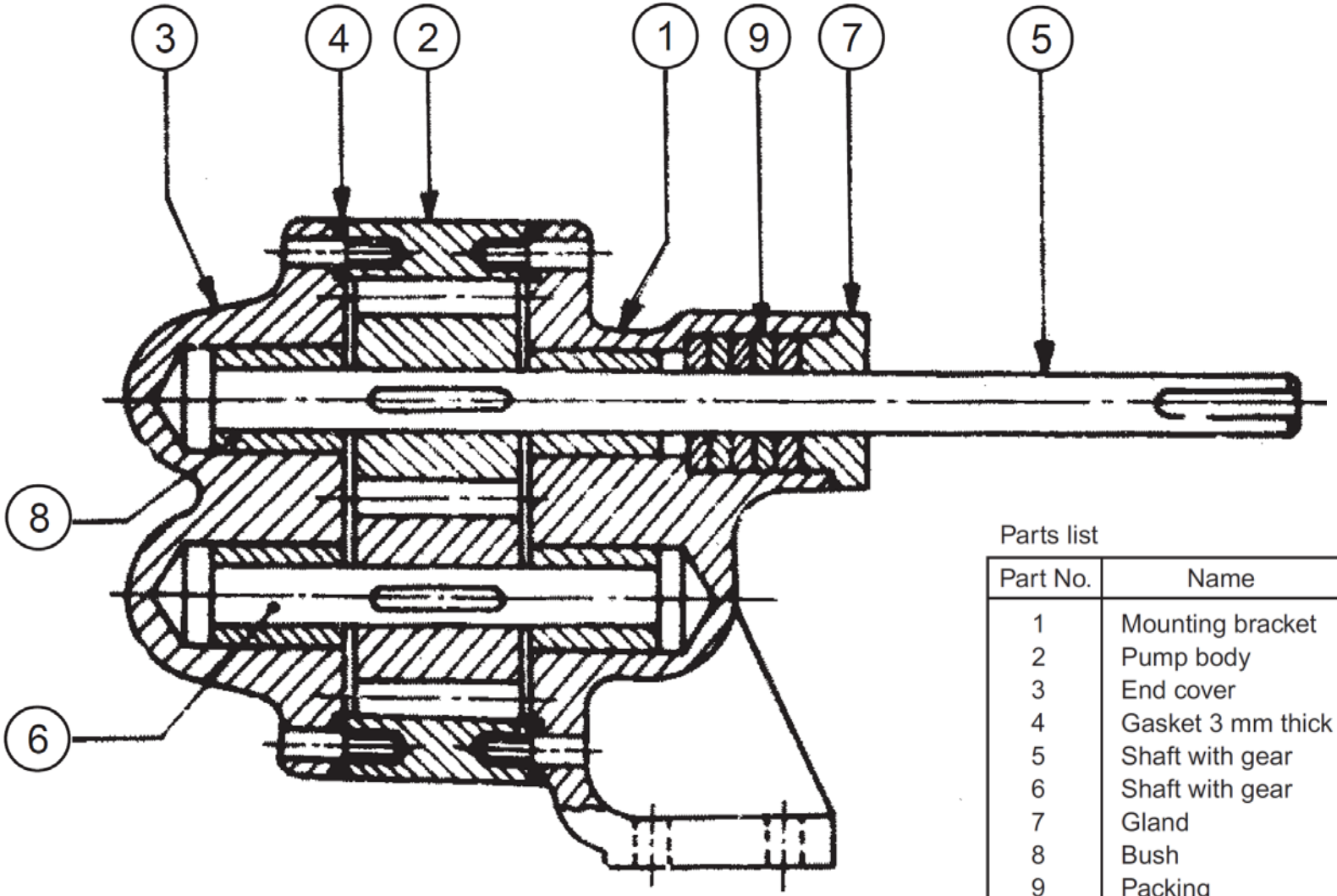
Two each of bushes 8 are placed on the end cover and mounting bracket to provide bearing surfaces for the gear shafts.

End cover is connected to the pump body 2 after placing the dowel pins in the body.

The shaft with gear 6 is placed in the bottom recess, whereas the shaft with gear 5 is located in the top recess of the end cover and pump body assembly. Finally, the mounting bracket is connected to the pump body after locating the dowels in the pump body.

The gland 7 is placed on the mounting bracket, after locating the packing 9 between the mounting bracket and the shaft with gear 5.

The end cover, pump body and the mounting bracket are connected or fastened, using bolts and nuts (not shown). Similarly, the gland is fastened to the mounting bracket by using two studs and nuts (not shown). At the end, oil inlet and outlet connections are made through the mounting bracket.



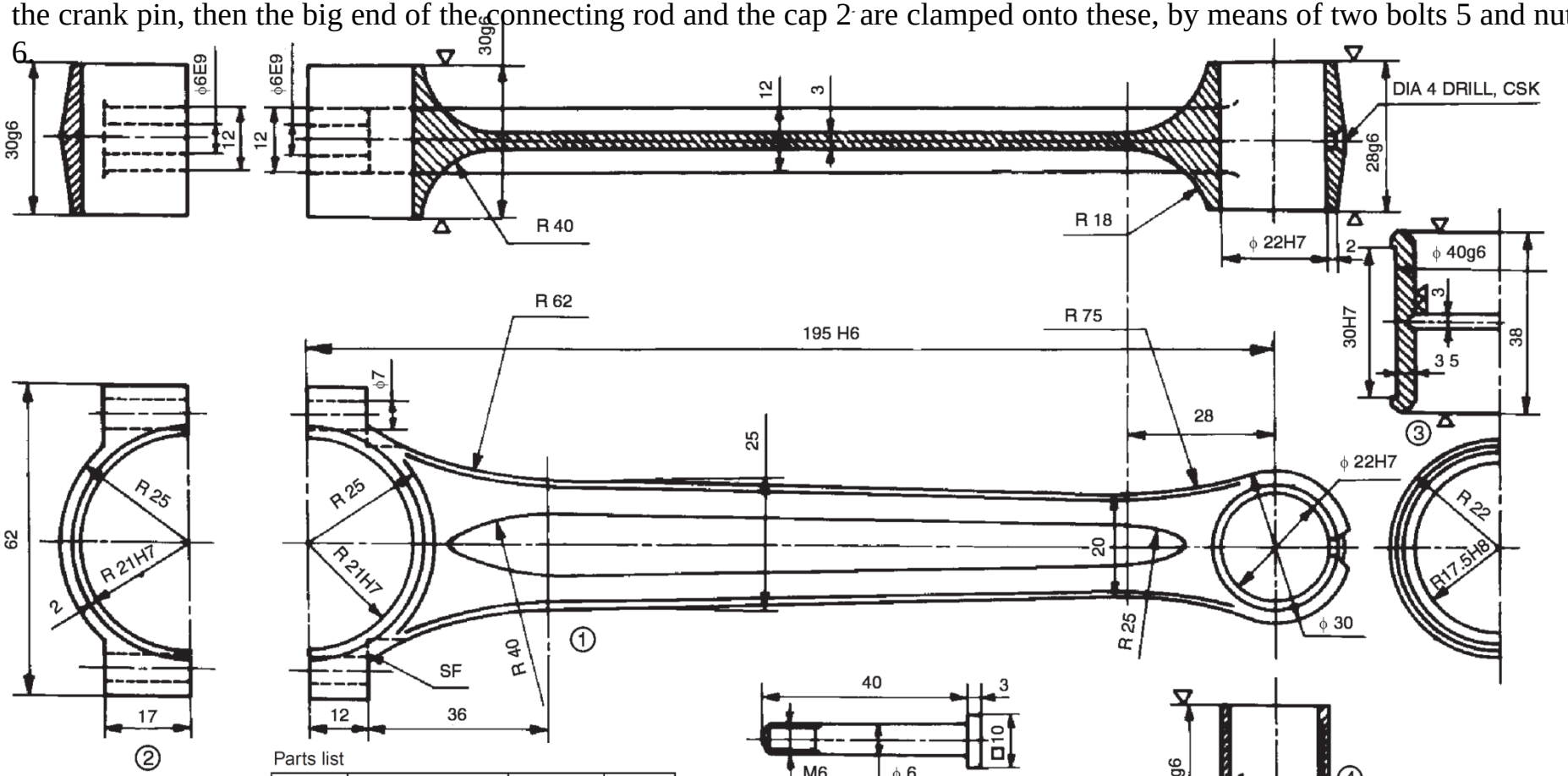
Parts list

Part No.	Name	Matl	Qty
1	Mounting bracket	CI	1
2	Pump body	CI	1
3	End cover	CI	1
4	Gasket 3 mm thick	Rubber	2
5	Shaft with gear	MS	1
6	Shaft with gear	MS	1
7	Gland	CI	1
8	Bush	GM	4
9	Packing	Rubber	5

PETROL ENGINE CONNECTING ROD

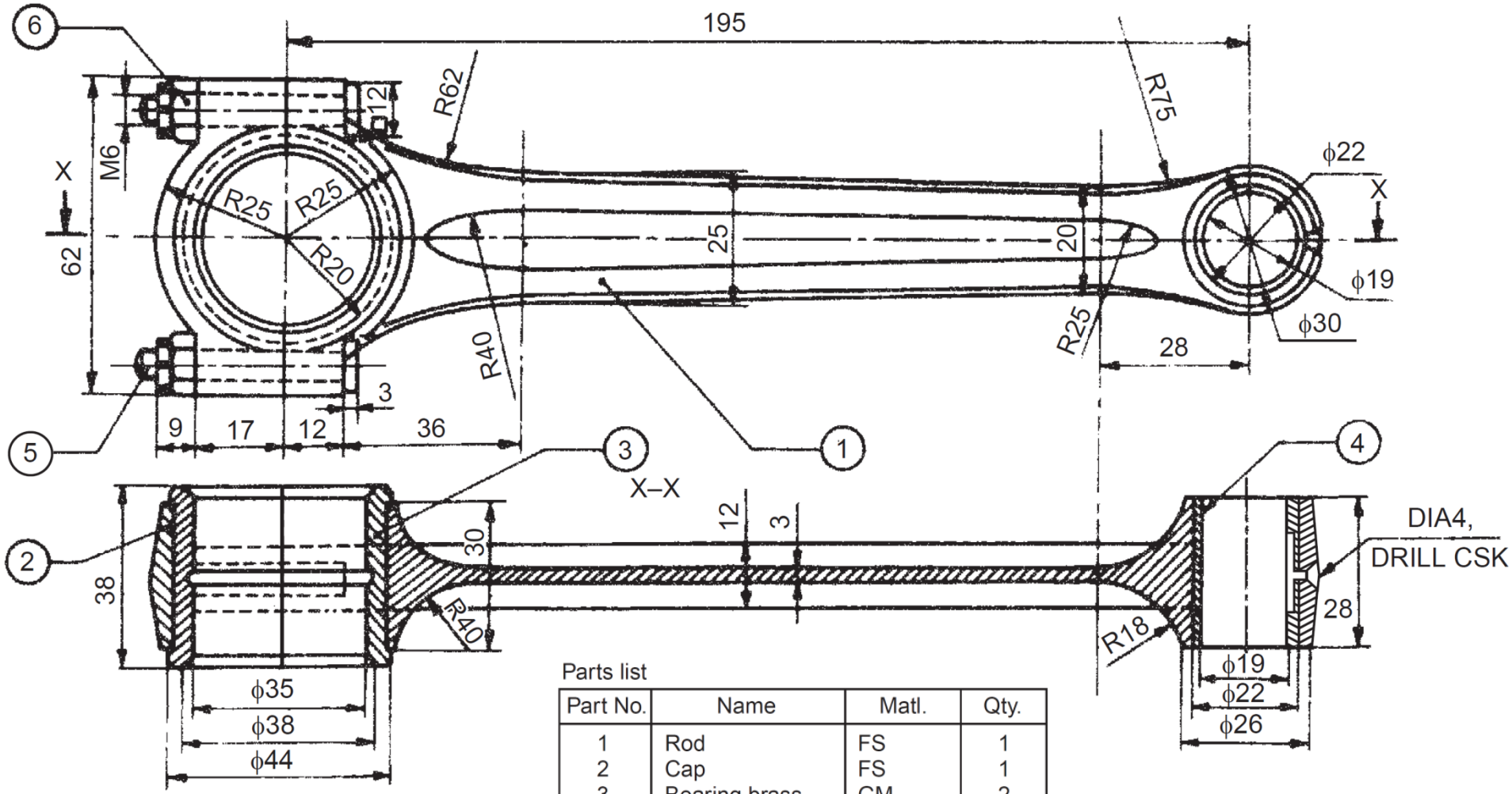
Figure (below) shows the assembly drawing of a petrol engine connecting rod, the big end of which is split into two halves. It is used in center crank engines.

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.



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



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

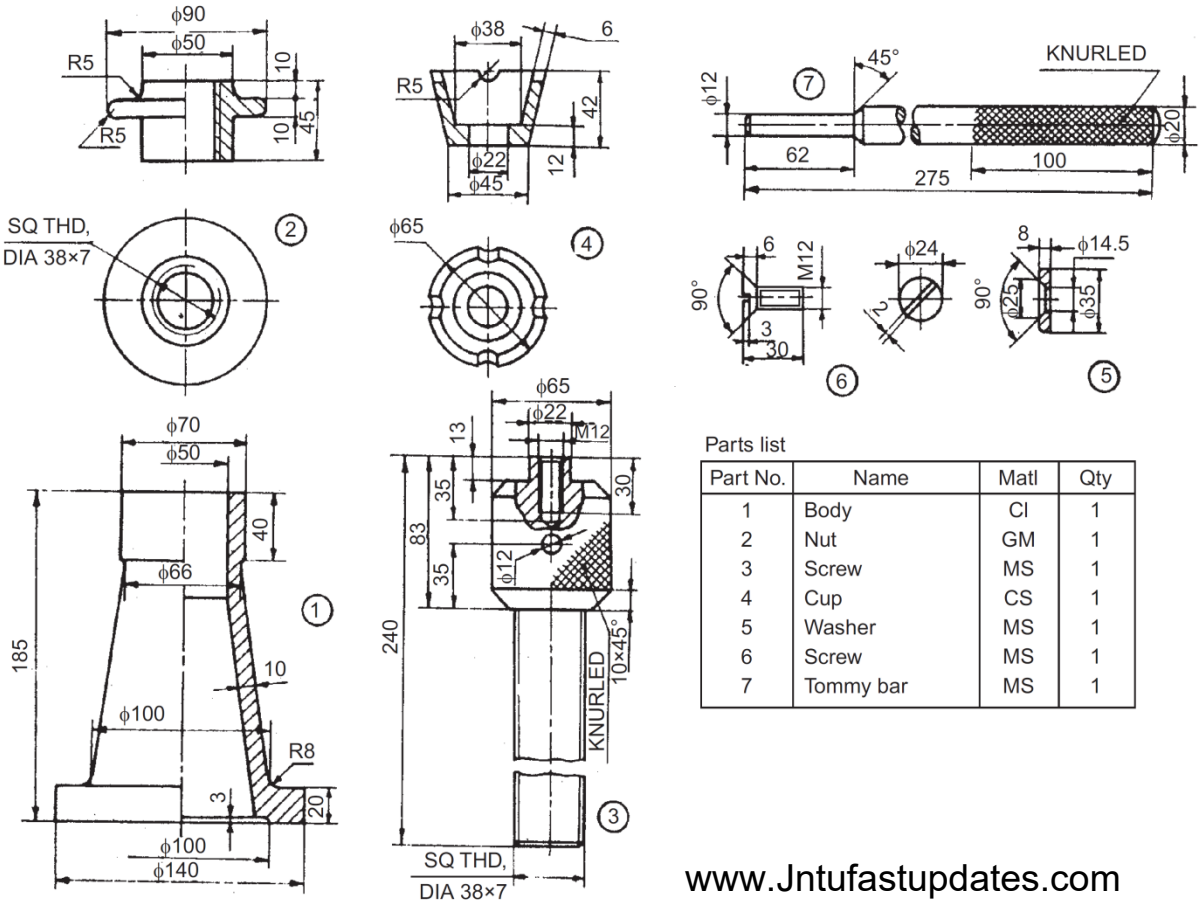
SCREW JACK

- Screw jacks are used for raising heavy loads through very small heights.
- Figure (Below) 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.

Assemble all parts of the screw jack, shown in Fig, and draw the following views:

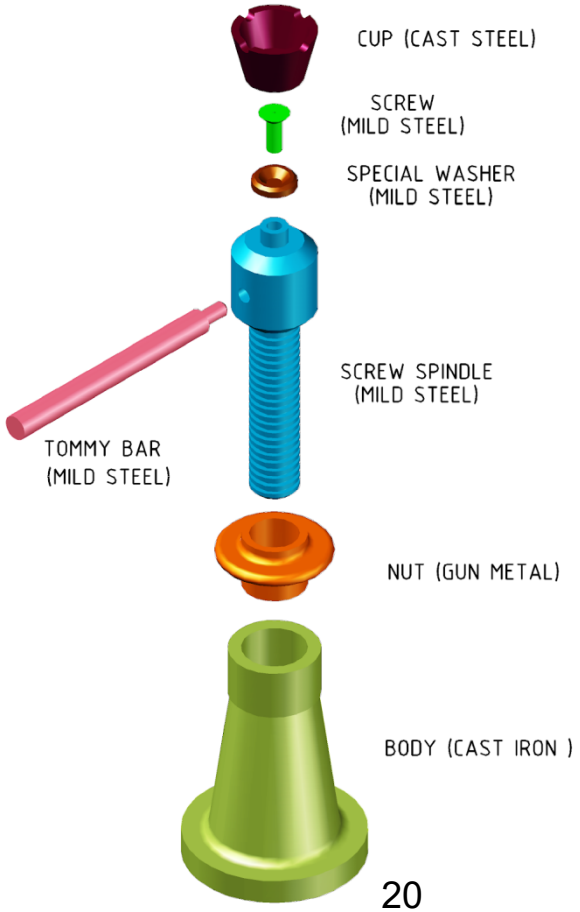
(*i*) Half sectional view from the front, and

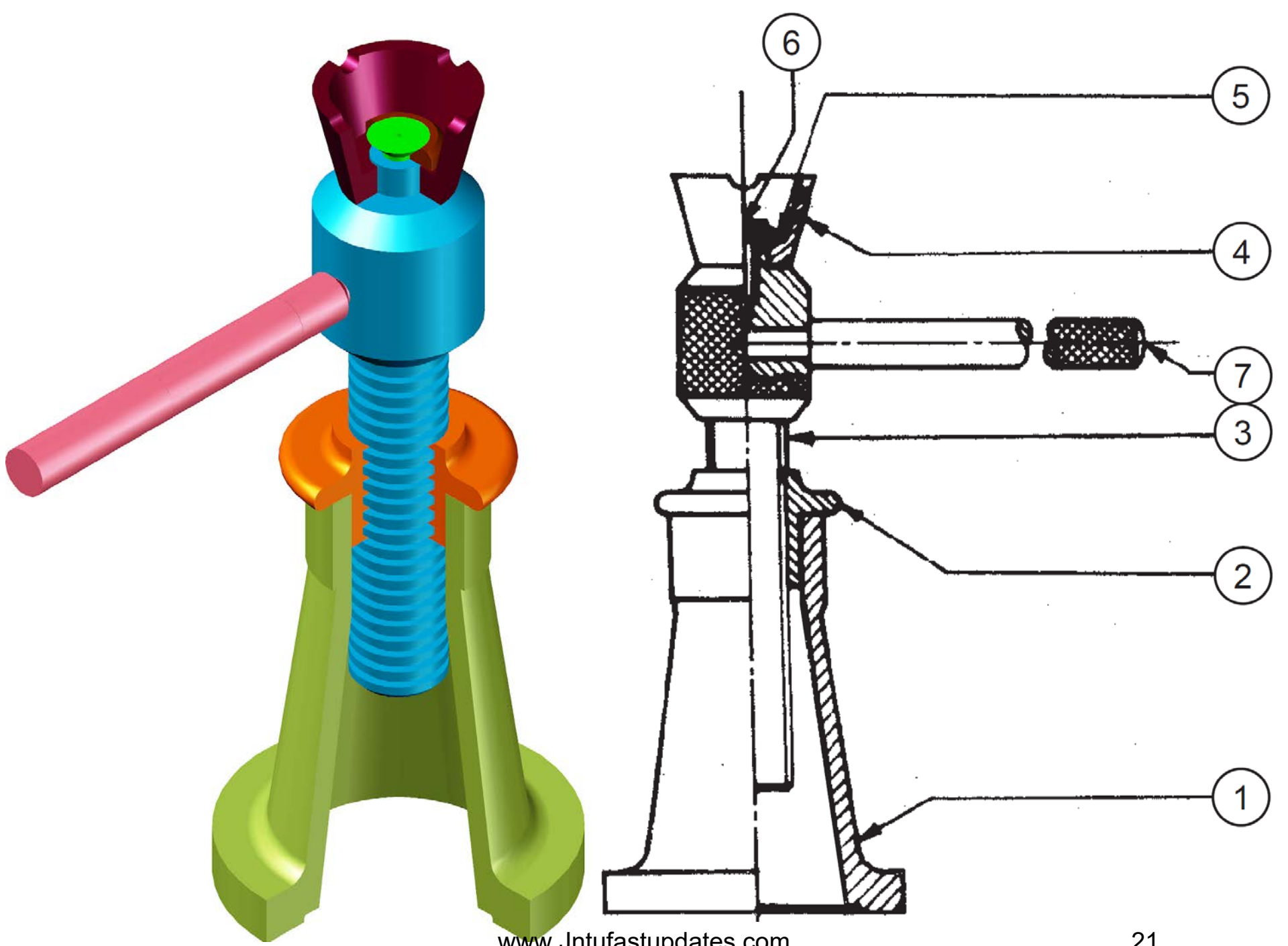
(*ii*) View from above.



Parts list

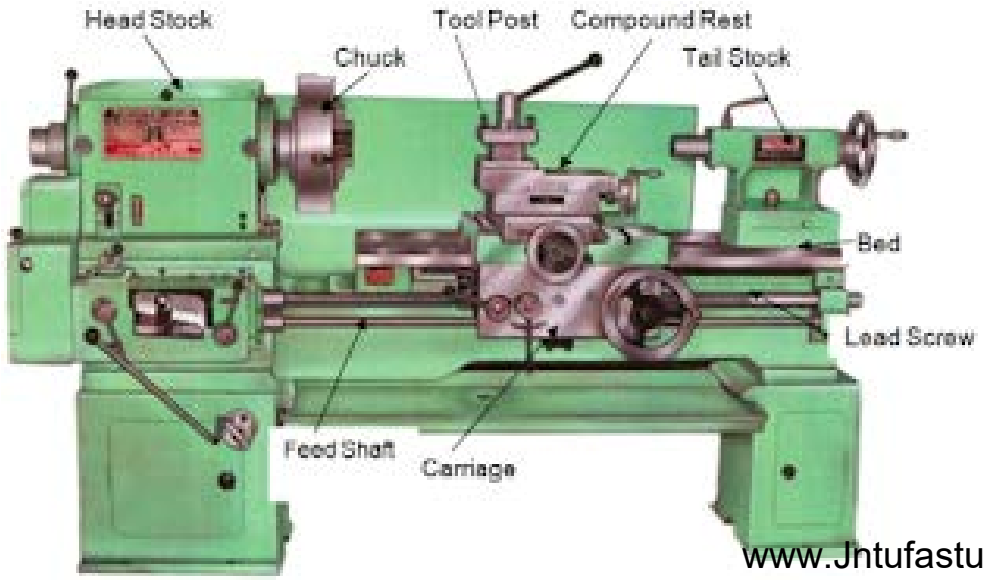
Part No.	Name	Matl	Qty
1	Body	CI	1
2	Nut	GM	1
3	Screw	MS	1
4	Cup	CS	1
5	Washer	MS	1
6	Screw	MS	1
7	Tommy bar	MS	1

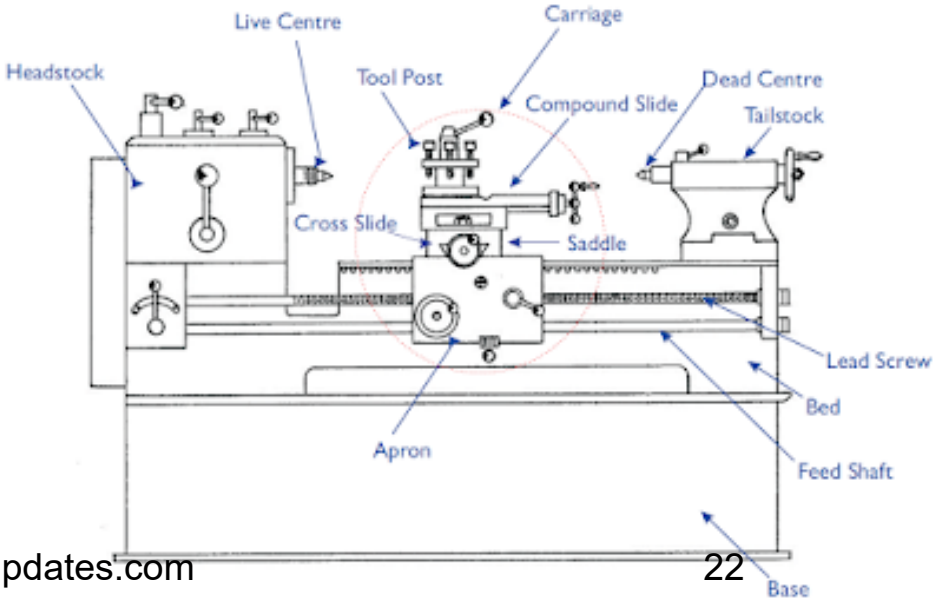


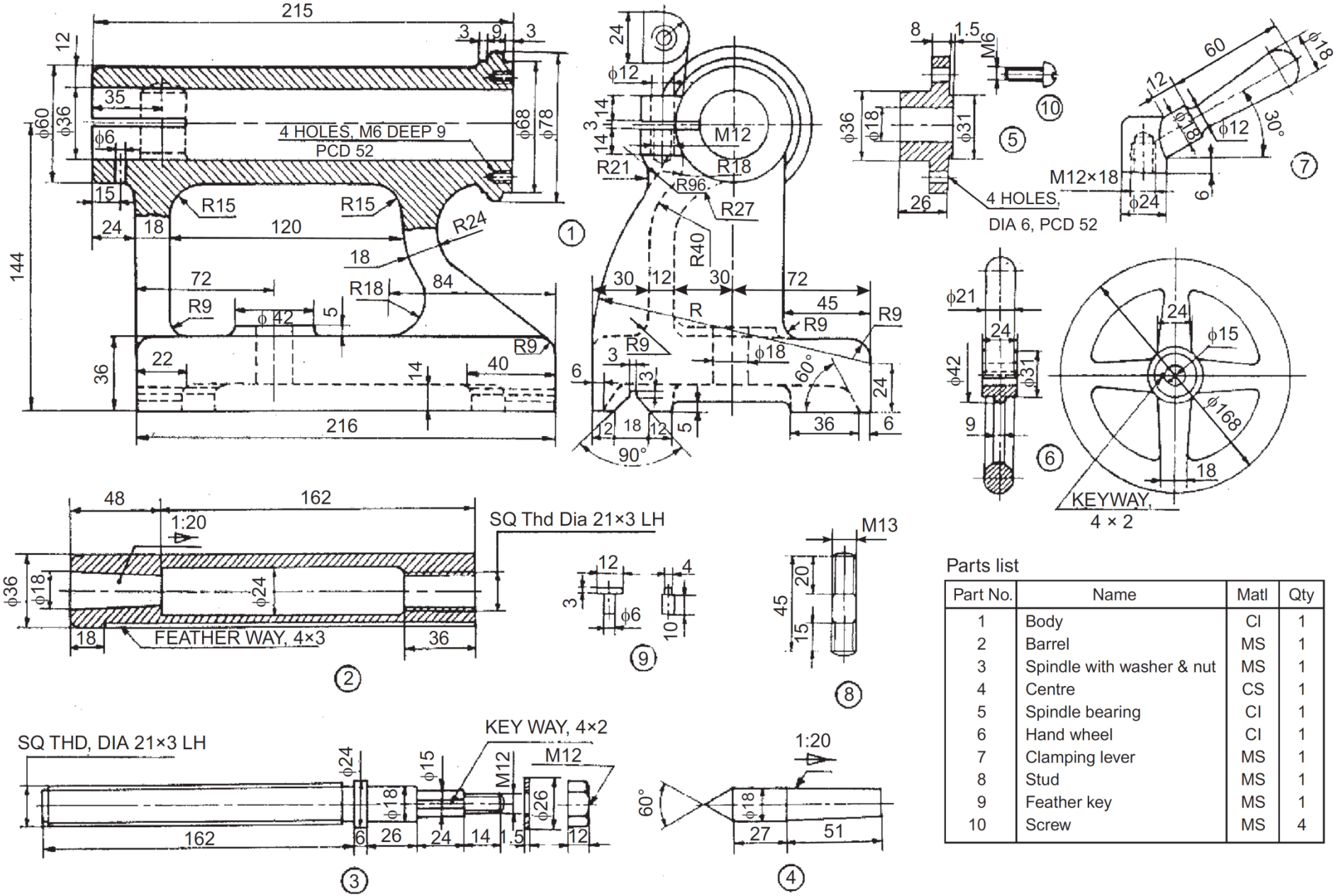

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LATHE TAIL-STOCK

- It is a part of a lathe machine and is used to support lengthy jobs. To accommodate works of different lengths between centres, the tail-stock may be moved on the lathe bed to the required position and clamped by means of a clamping bolt. Figure shows various parts of a tail-stock.
- The barrel 2 is fitted into the bore of the tail-stock body 1 and is prevented from rotation by the feather key 9 placed underneath of it. The barrel has a threaded portion at its end and the spindle 3 is inserted into the barrel through this.
- The hand wheel 6 is mounted on the spindle by a key and is retained in position by a nut. The spindle bearing 5 is placed between the hand wheel and the tail-stock body. A tapered hole provided at the front end of the barrel, receives the dead centre 4 or a tapered shank of the drill or reamer.
- When the hand wheel is operated, the barrel is made to move in or out of the tail-stock body. In the required position of the barrel, clamping may be made by means of the clamping lever 7 and stud 8 which is fitted to the tail-stock body. The spindle bearing is fixed to the body by means of the screws 10.
- Assemble the parts and draw to a suitable scale, (*i*) sectional view from the front and (*ii*) view from the left.

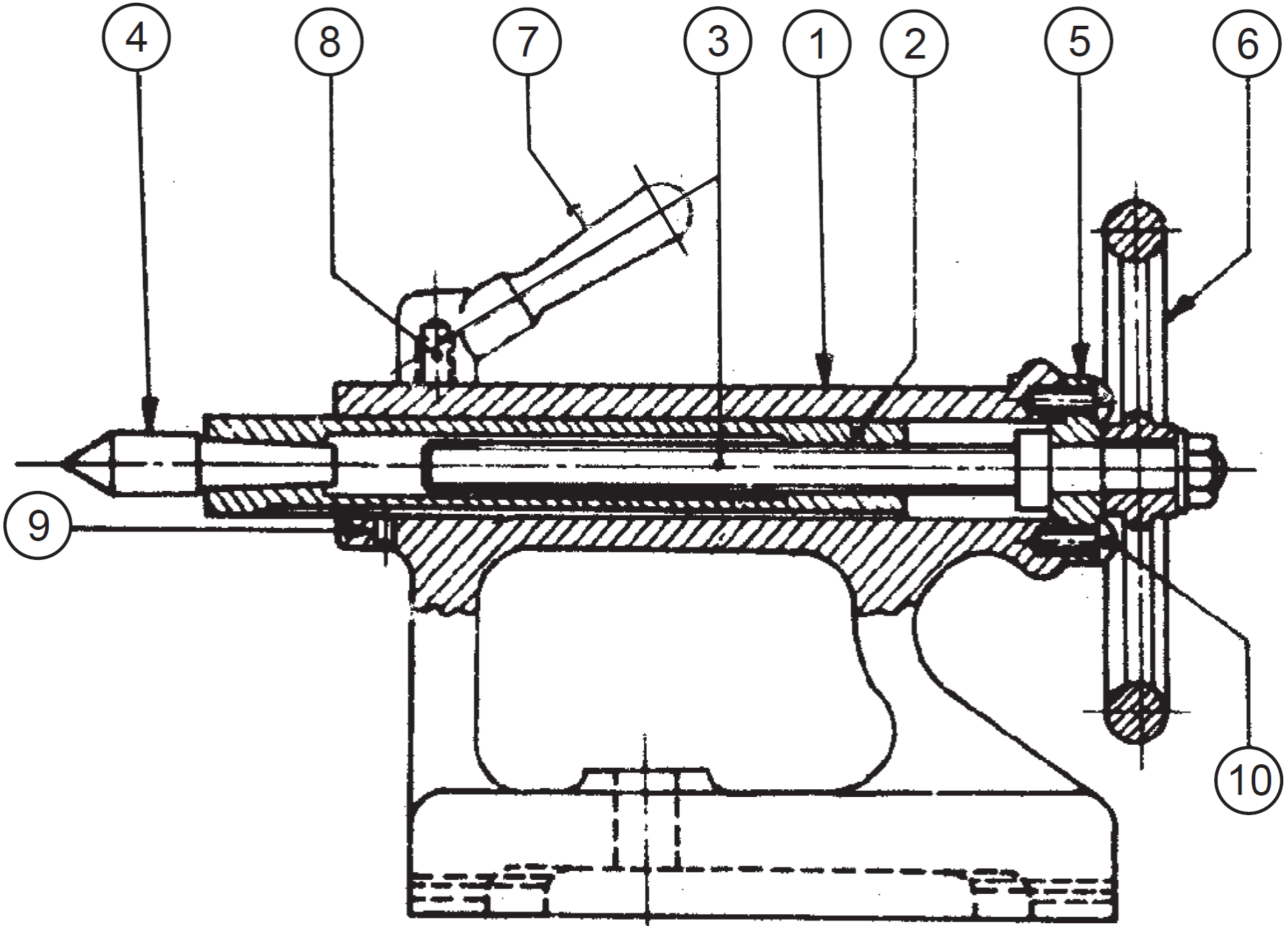


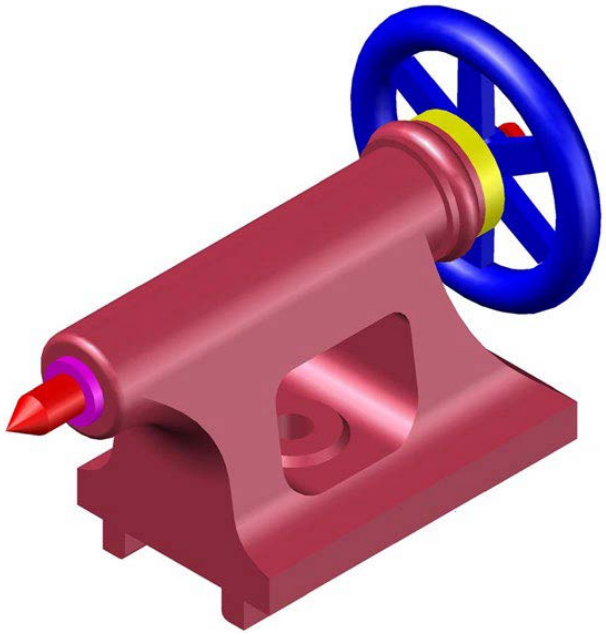




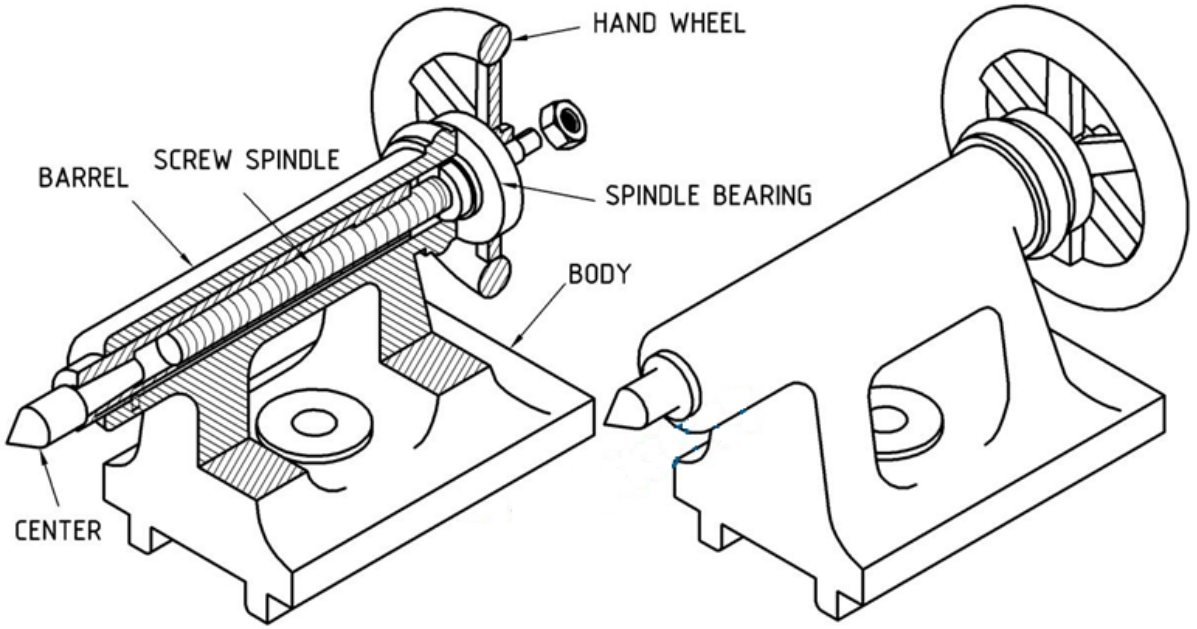
Parts list

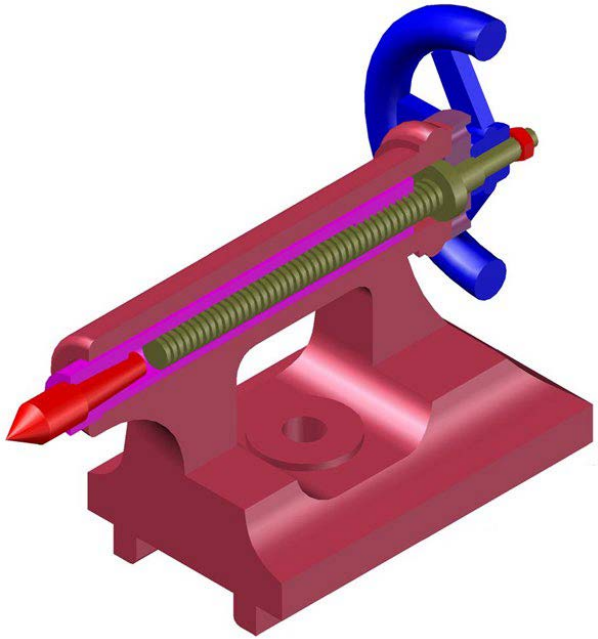
Part No.	Name	Matl	Qty
1	Body	CI	1
2	Barrel	MS	1
3	Spindle with washer & nut	MS	1
4	Centre	CS	1
5	Spindle bearing	CI	1
6	Hand wheel	CI	1
7	Clamping lever	MS	1
8	Stud	MS	1
9	Feather key	MS	1
10	Screw	MS	4

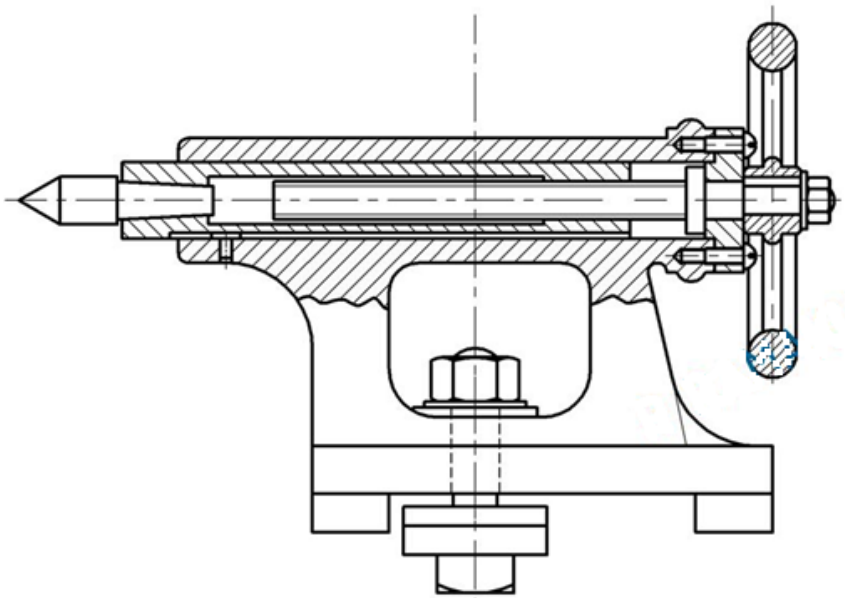

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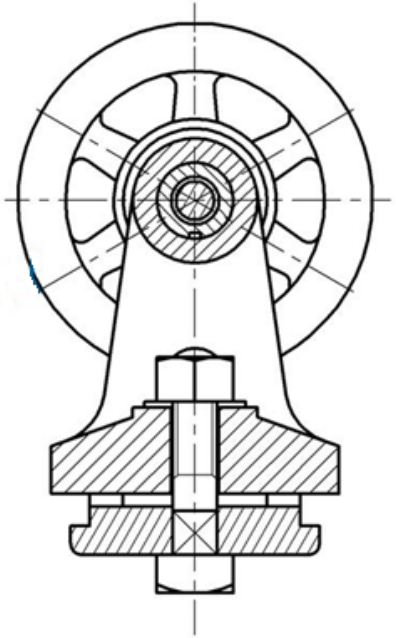


Tailstock Assembly



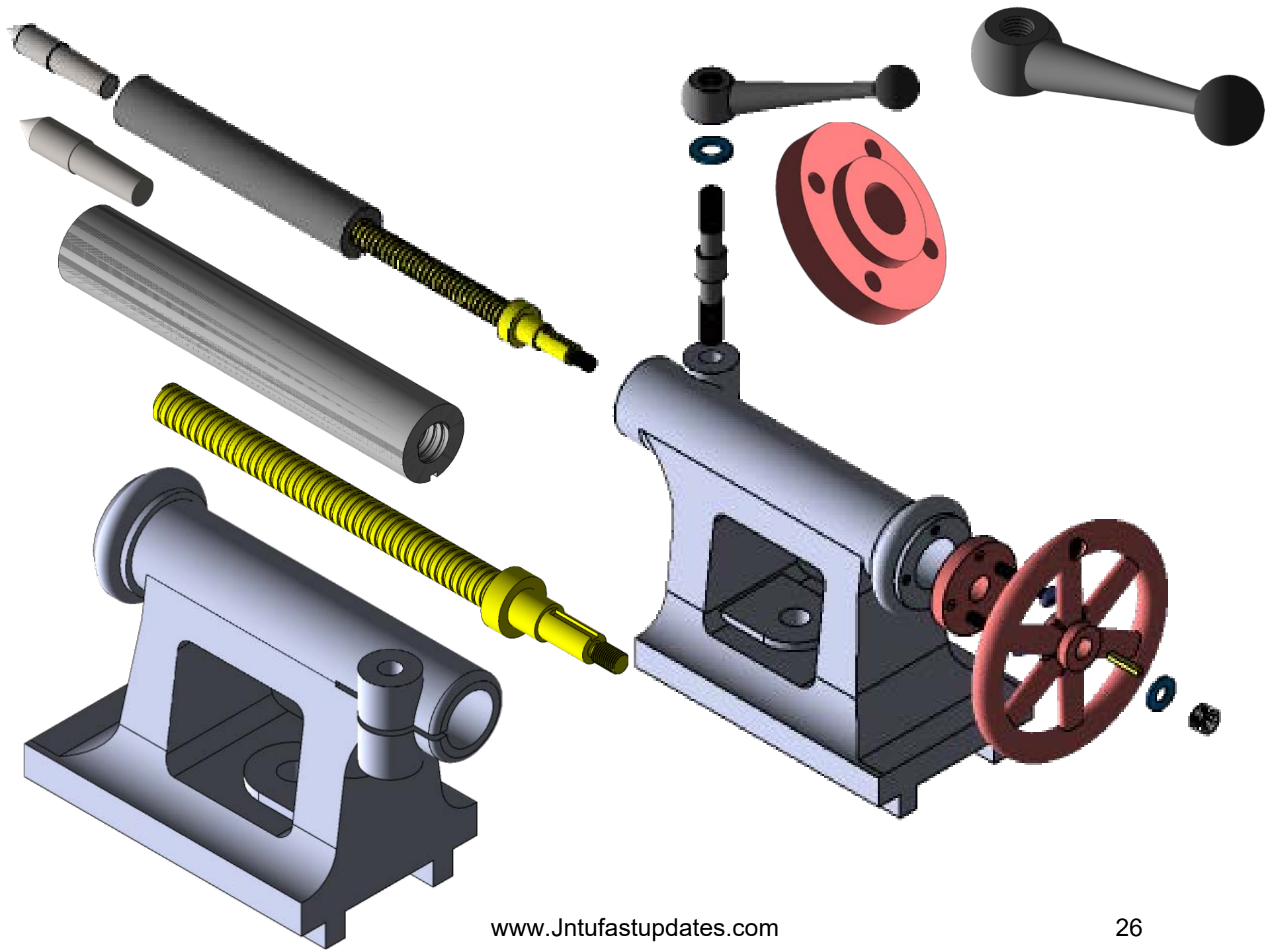






Sectional Elevation

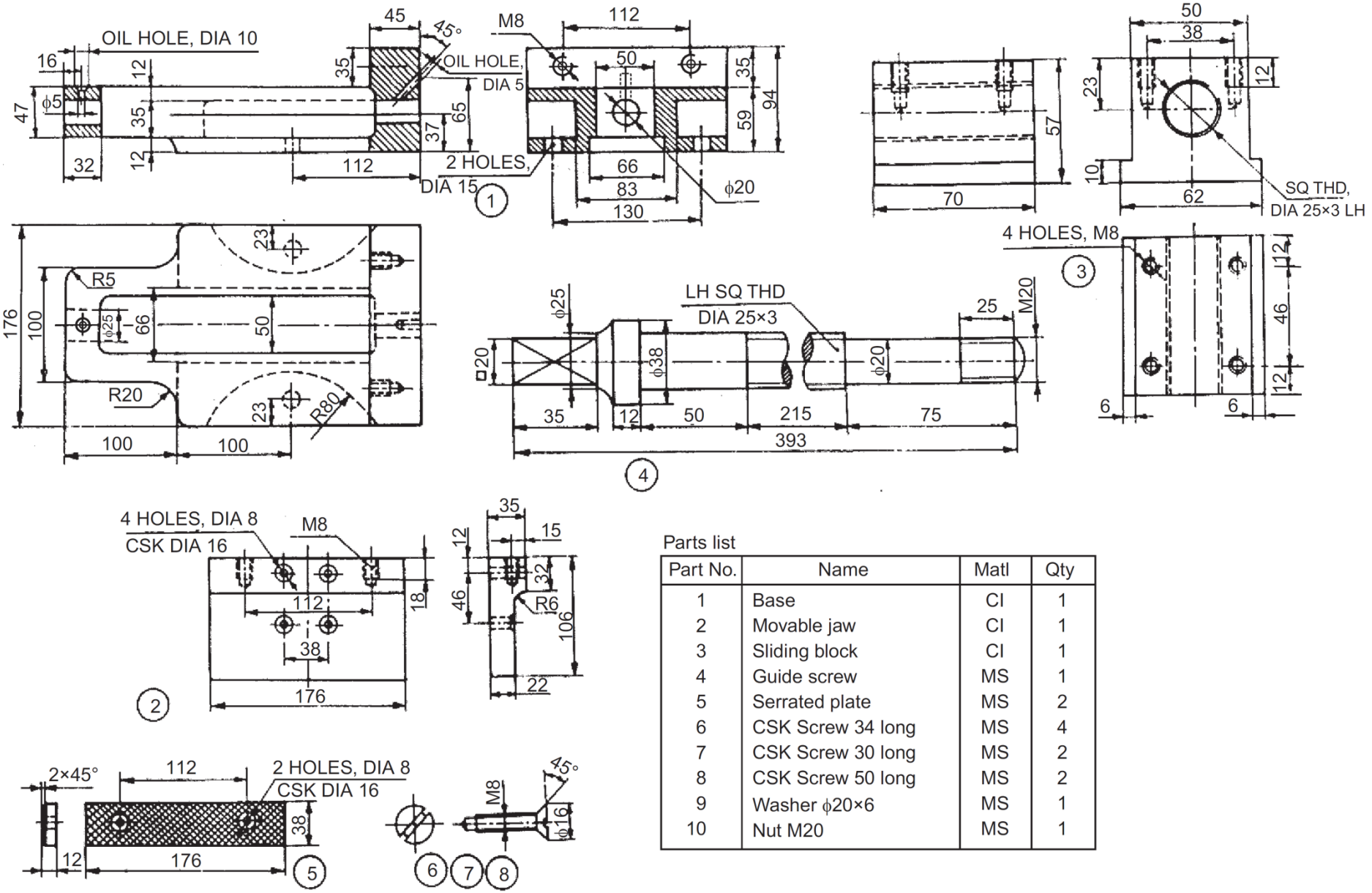
Side View



MACHINE VICE

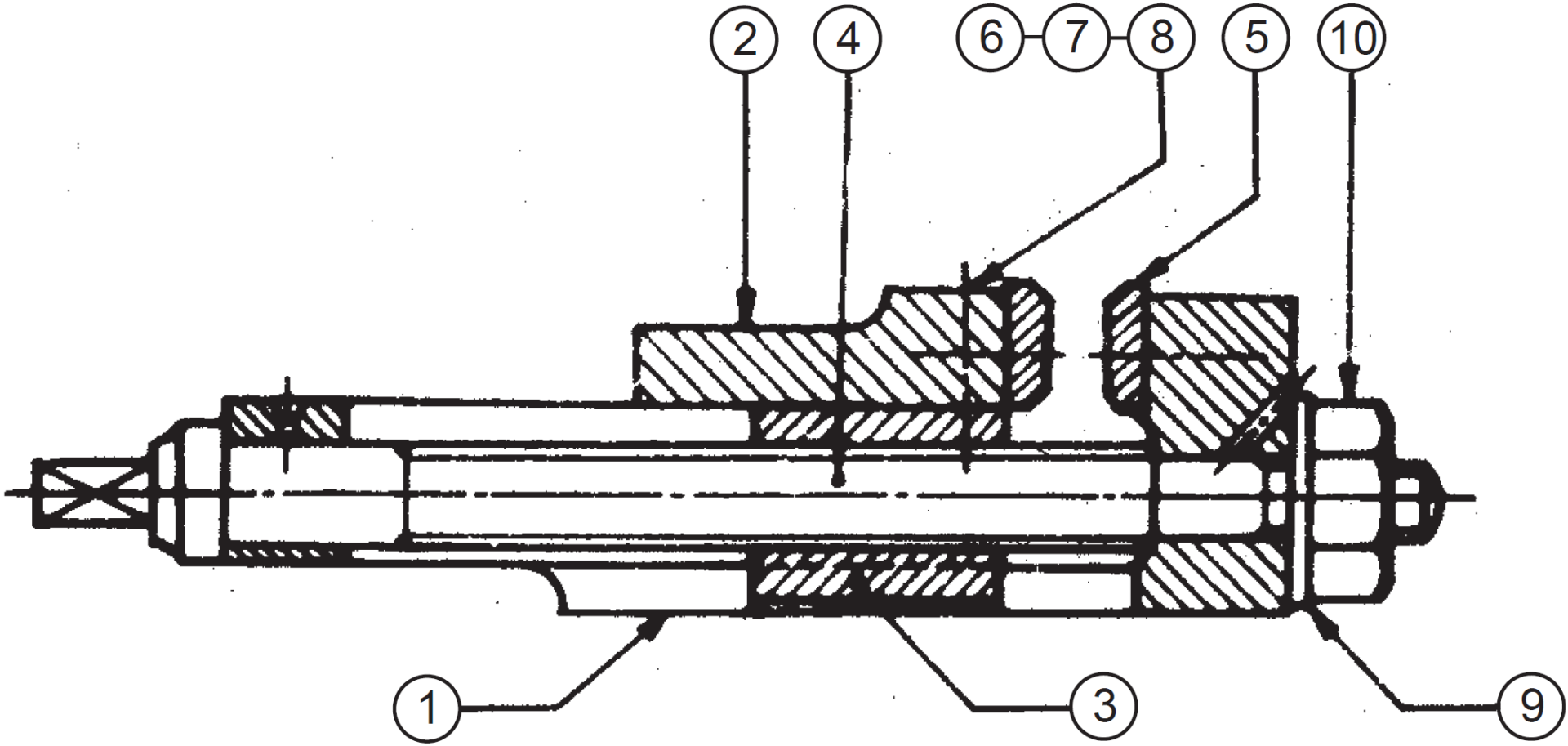
- The details of a plain machine vice are shown in Fig. 18.22.
- It consists of the base 1 which is clamped to the machine table using two T-bolts.
- The sliding block 3 is fixed in the centre slot of the base by means of the guide screw 4.
- The movable jaw 2 is fixed to the sliding block with four screws 8 and 7.
- One of the serrated plates 5 is fixed to the jaw of the base by means of screws 6 and the other to the movable jaw by the screws 7.
- One end of the guide screw is fixed to the base by means of the washer 9 and nut 10 (not shown in figure).
- The movable jaw is operated by means of a handle (not shown) which fits onto the square end of the guide screw.

- Assemble the parts and draw, (*i*) sectional view from the front, (*ii*) view from above and (*iii*) view from the left. Use suitable scale.



Parts list

Part No.	Name	Matl	Qty
1	Base	CI	1
2	Movable jaw	CI	1
3	Sliding block	CI	1
4	Guide screw	MS	1
5	Serrated plate	MS	2
6	CSK Screw 34 long	MS	4
7	CSK Screw 30 long	MS	2
8	CSK Screw 50 long	MS	2
9	Washer ϕ20×6	MS	1
10	Nut M20	MS	1


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SWIVEL MACHINE VICE

- A machine vice is a work holding device, used in machines such as drilling, milling, etc. A swivelling type machine vice permits swivelling about its vertical axis, so that the work may be clamped at any angular position required in the machining operation. T-bolts (not shown) are used through the base plate, to fix the vice to the machine table. Figure 18.23 shows the details of a swivel machine vice.
- It consists of the swivel body 1 which is fixed to the base plate 3 by two bolts 6. The heads of the bolts are so shaped, that they can slide freely in the circular T-slot of the base plate. The graduations marked in degrees on the flange of the base plate, facilitate setting of the swivel body at any desired angle.
- The swivel body has a fixed jaw at one end. The movable jaw 2 is mounted on the swivel body by the screw 4. After the screw is inserted fully, it is held in position by a nut and pin to prevent its axial motion. Thus, when the screw is turned, the movable jaw slides on the swivel body guide ways. Steel jaw plates 5 are fitted to jaws by machine screws.



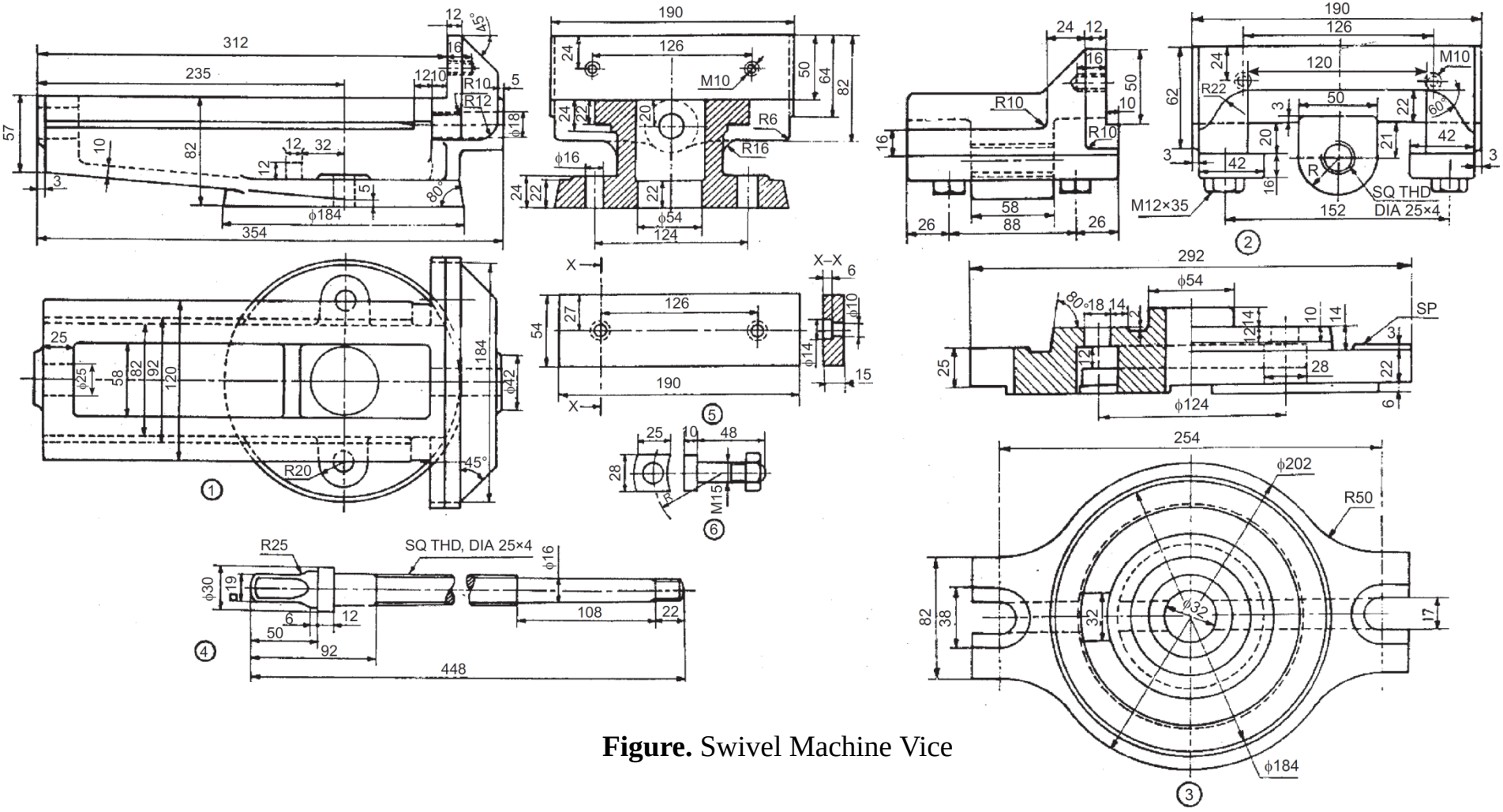
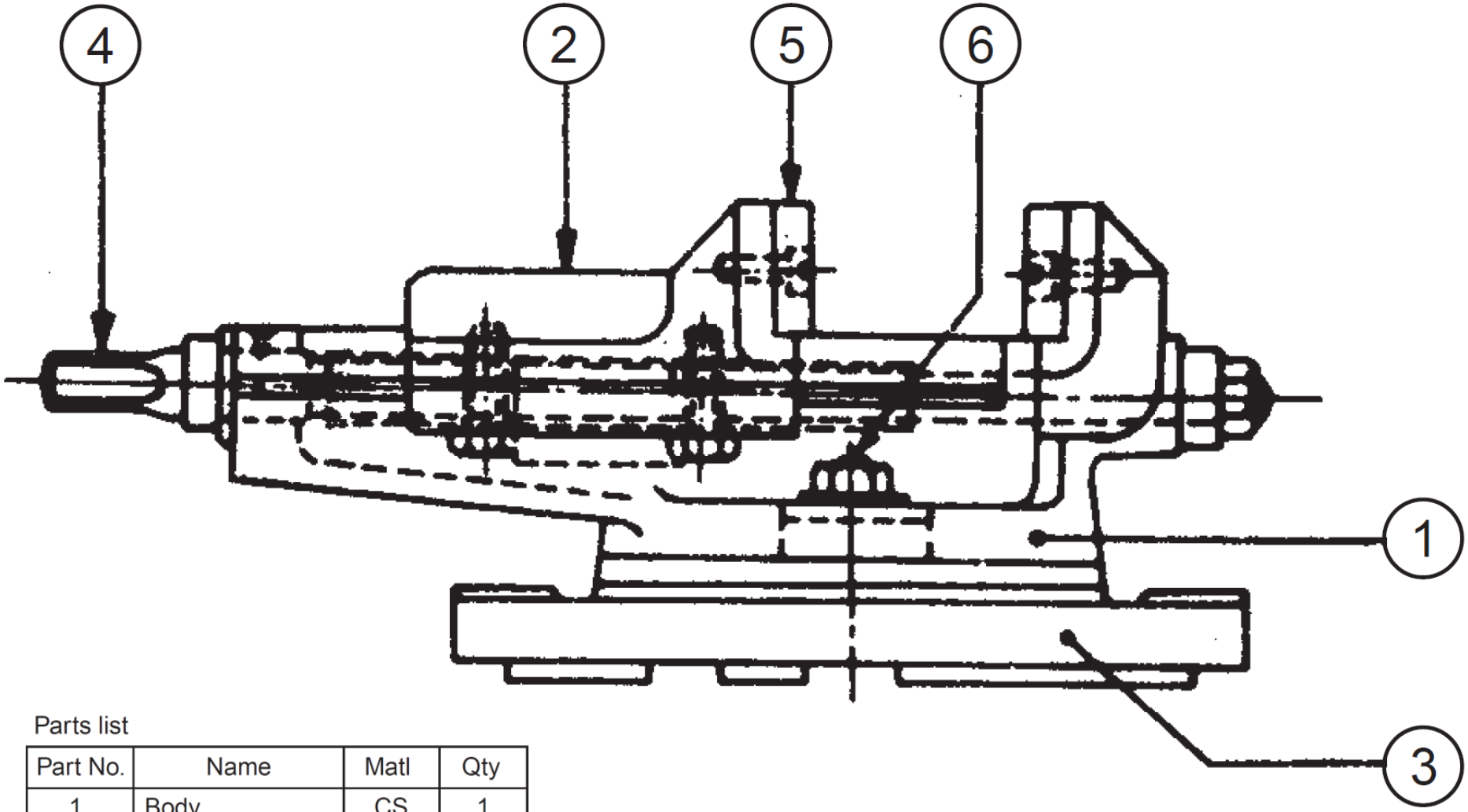


Figure. Swivel Machine Vice

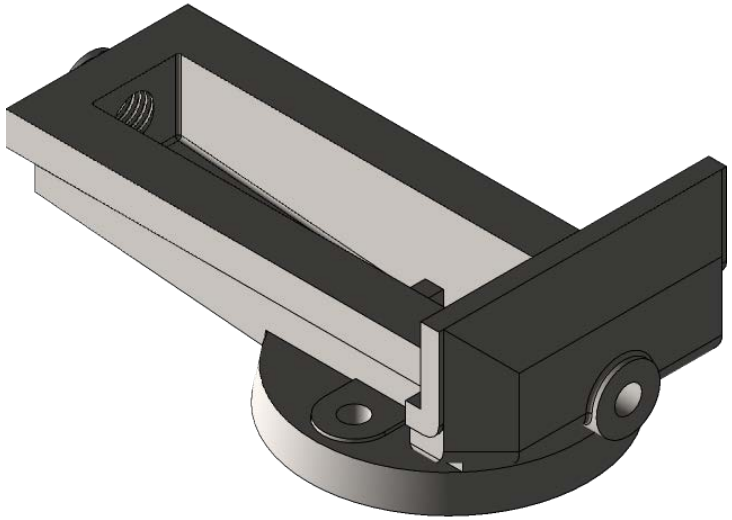
Parts list

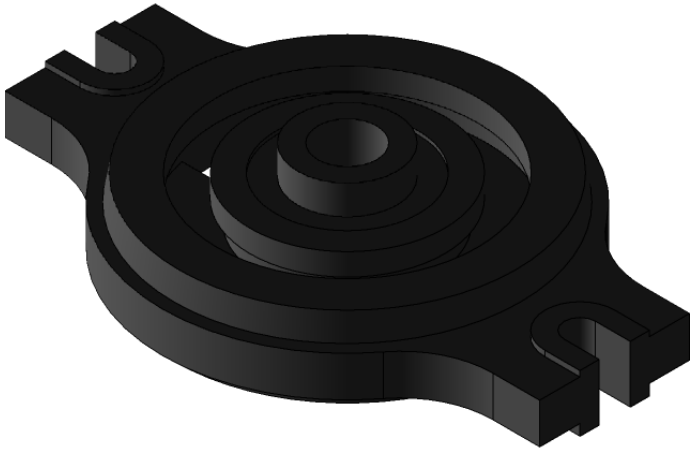
Part No.	Name	Matl	Qty
1	Body	CS	1
2	Moving jaw	CS	1
3	Swivel base	CI	1
4	Screw rod	MS	1
5	Jaw plate	HCS	2
6	Clamping bolt	MS	2

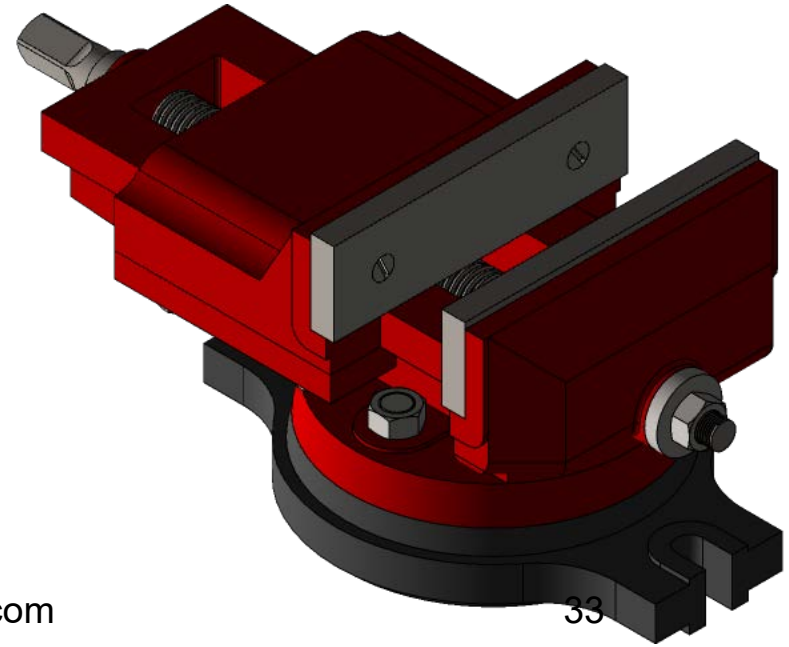


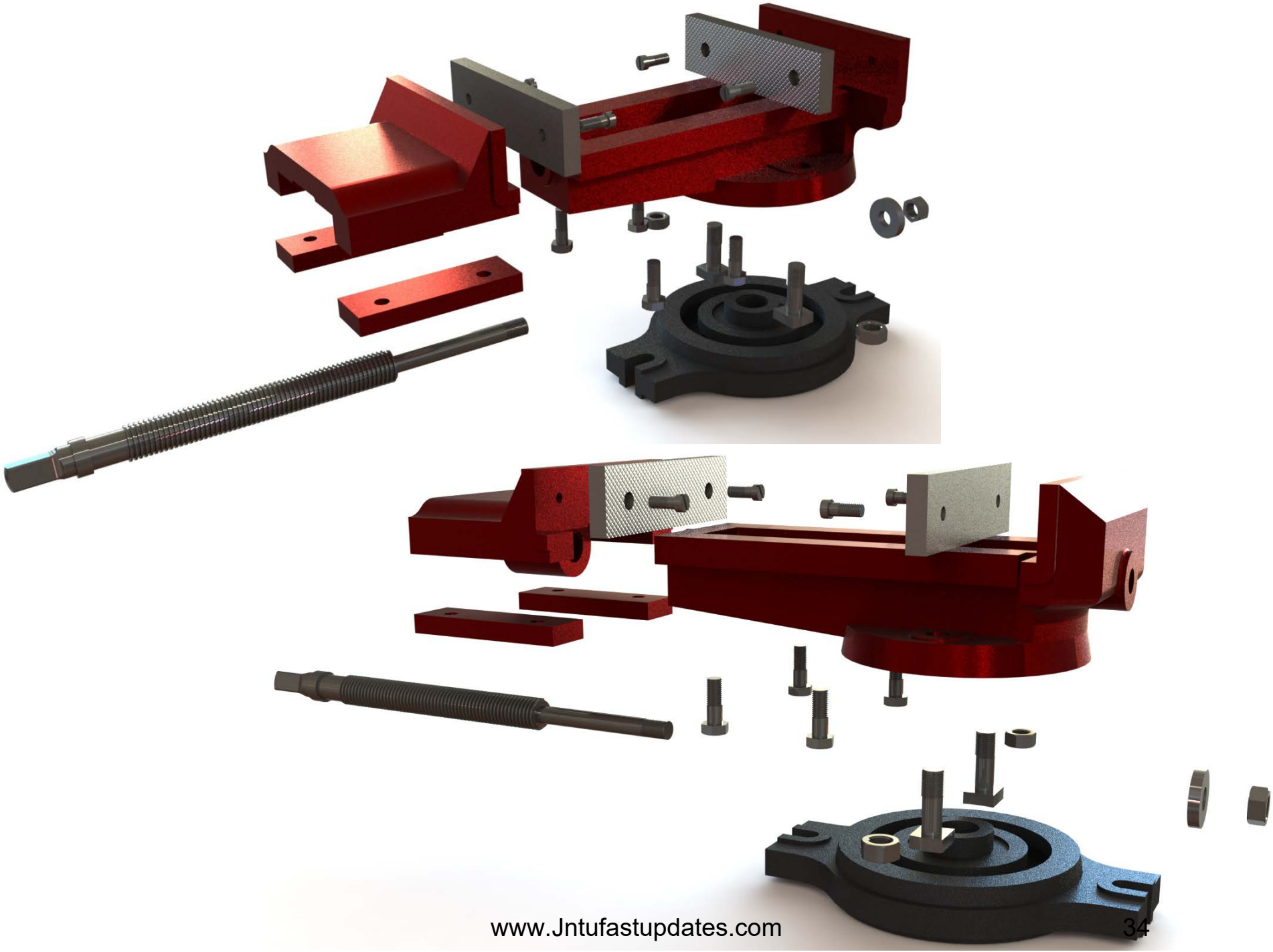
Parts list

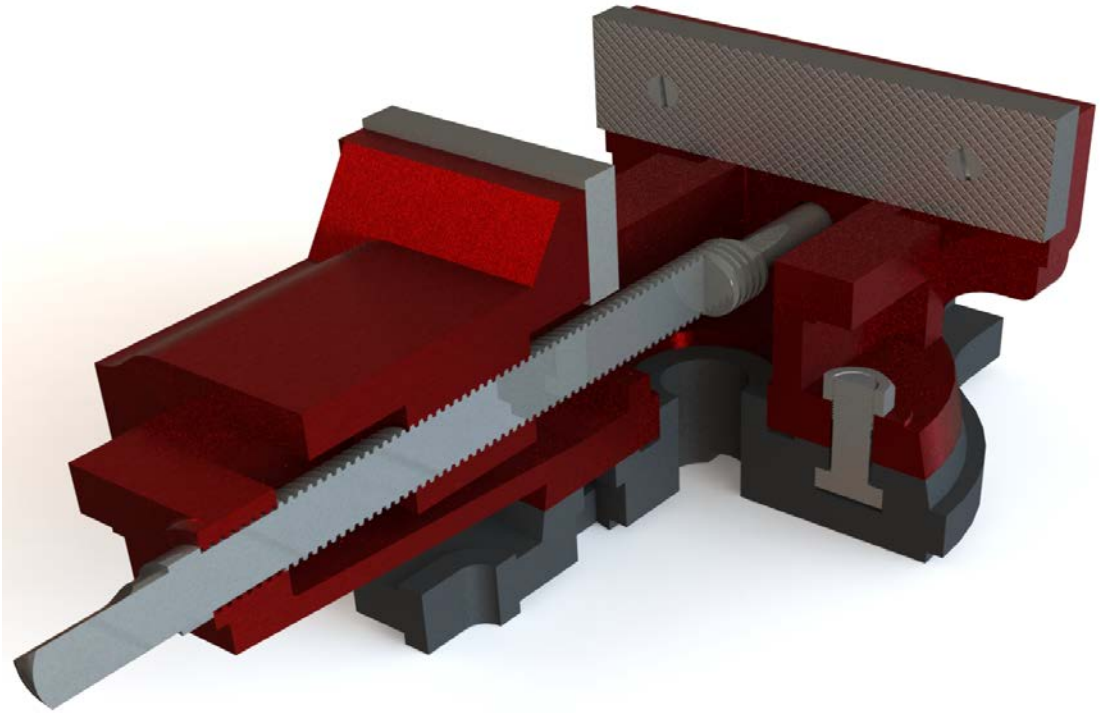
Part No.	Name	Matl	Qty
1	Body	CS	1
2	Moving jaw	CS	1
3	Swivel base	CI	1
4	Screw rod	MS	1
5	Jaw plate	HCS	2
6	Clamping bolt	MS	2

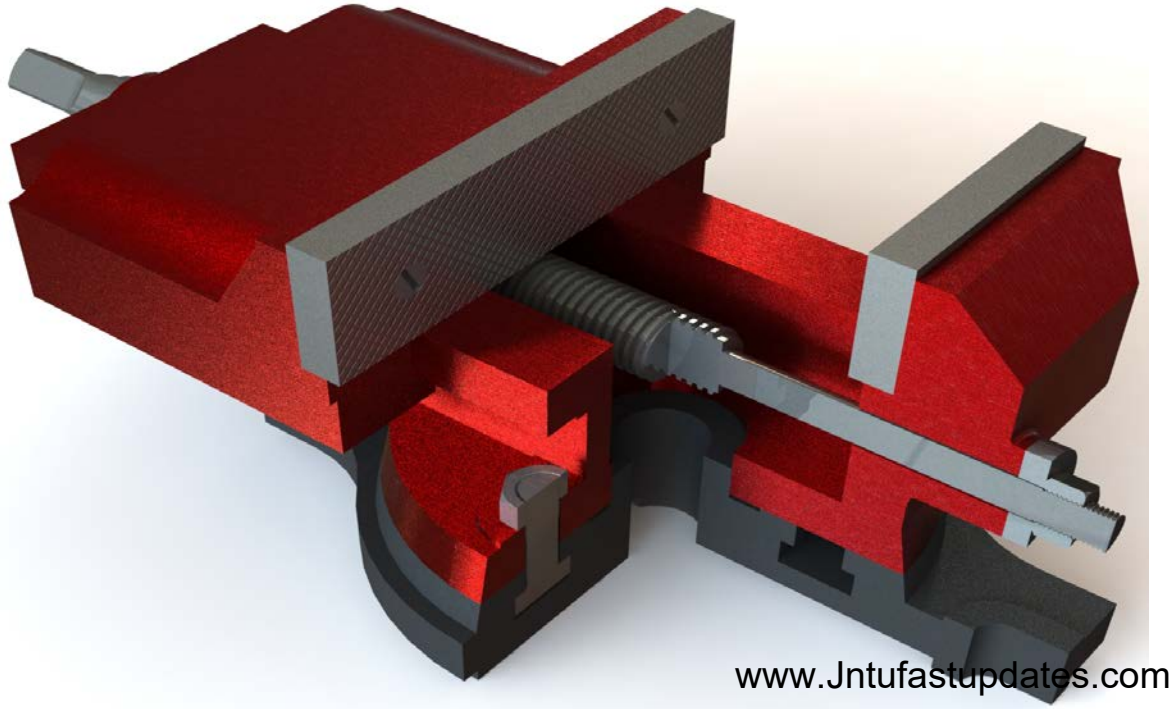








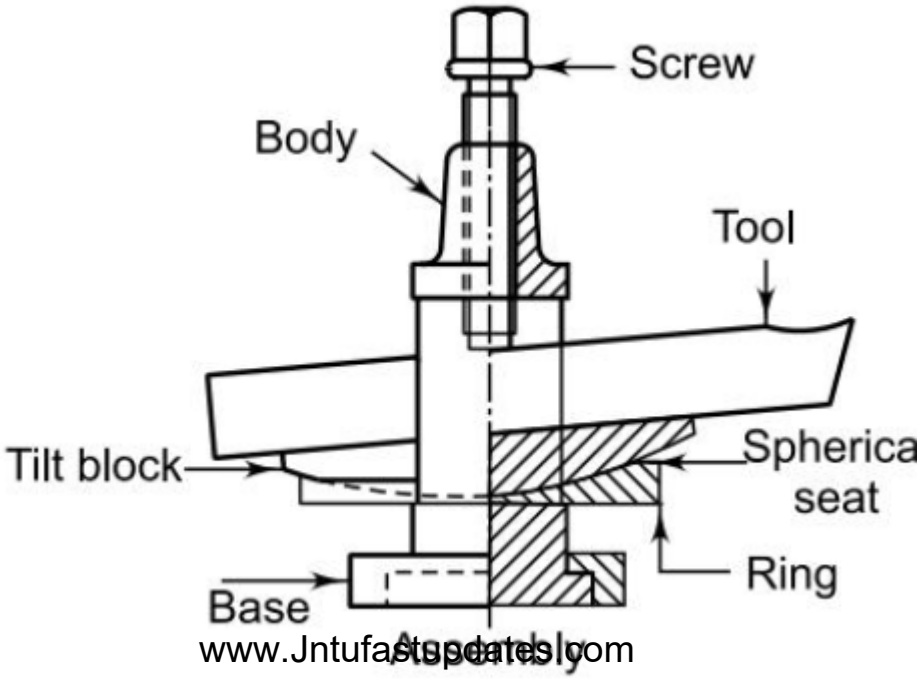


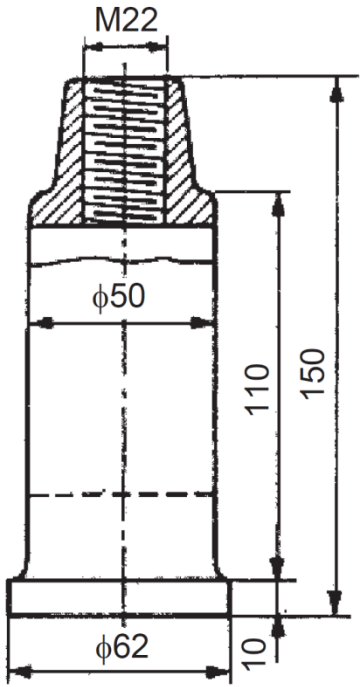


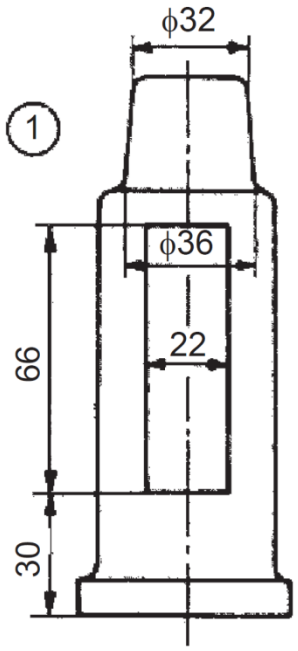
TOOL POST

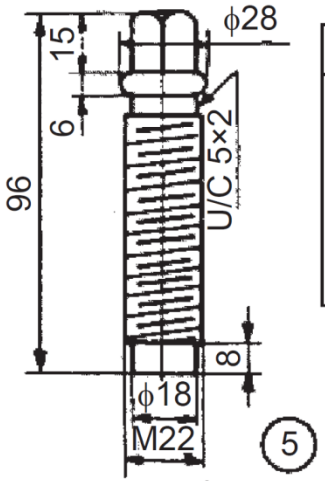
Tool posts of various designs are available to support the cutting tools in lathe machines. Figure 18.14 shows the details of a single tool post which supports one cutting tool and is used on small size lathes. This unit is fixed on the compound rest of the lathe carriage.

The body of the tool post is in the form of a circular pillar 1 with a collar at one end and a threaded hole at the other end. A vertical slot is also provided to accommodate the tool or tool holder. The pillar is slid through a square block 5, which finally is located in the T-slot, provided in the compound rest. The design permits swivelling of the pillar about its vertical axis. A circular ring 4 is slid over the pillar and wedge 3 is located in the vertical slot of the pillar. The tool or tool holder is placed over the wedge. By sliding the wedge on the spherical surfaced ring, the tool tip can be finally adjusted and clamped in position by means of a square headed clamping screw 2, through the pillar head.





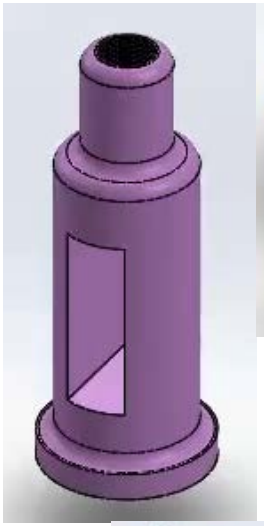




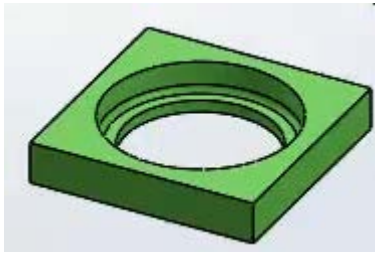


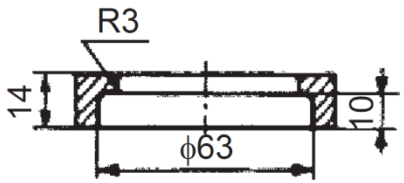
Parts list

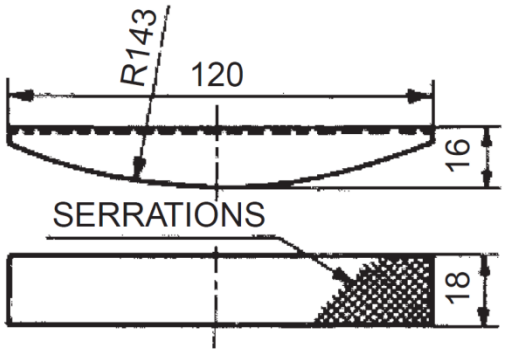
No.	Name	Matl	Qty
1	Piller	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1



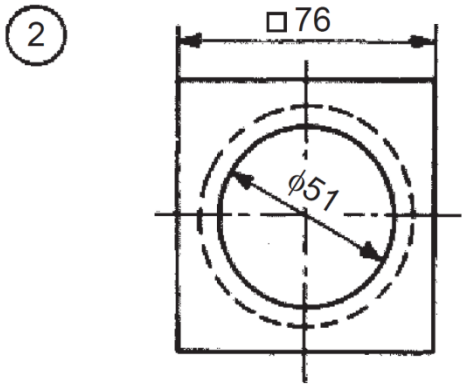


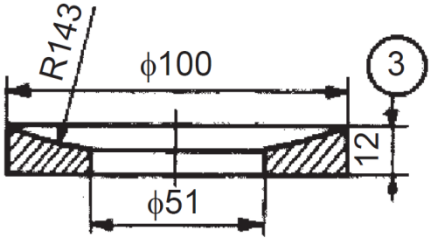


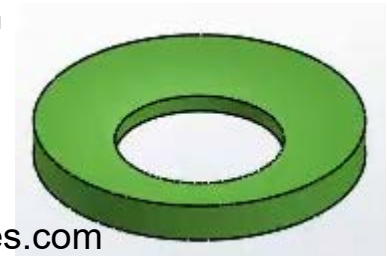


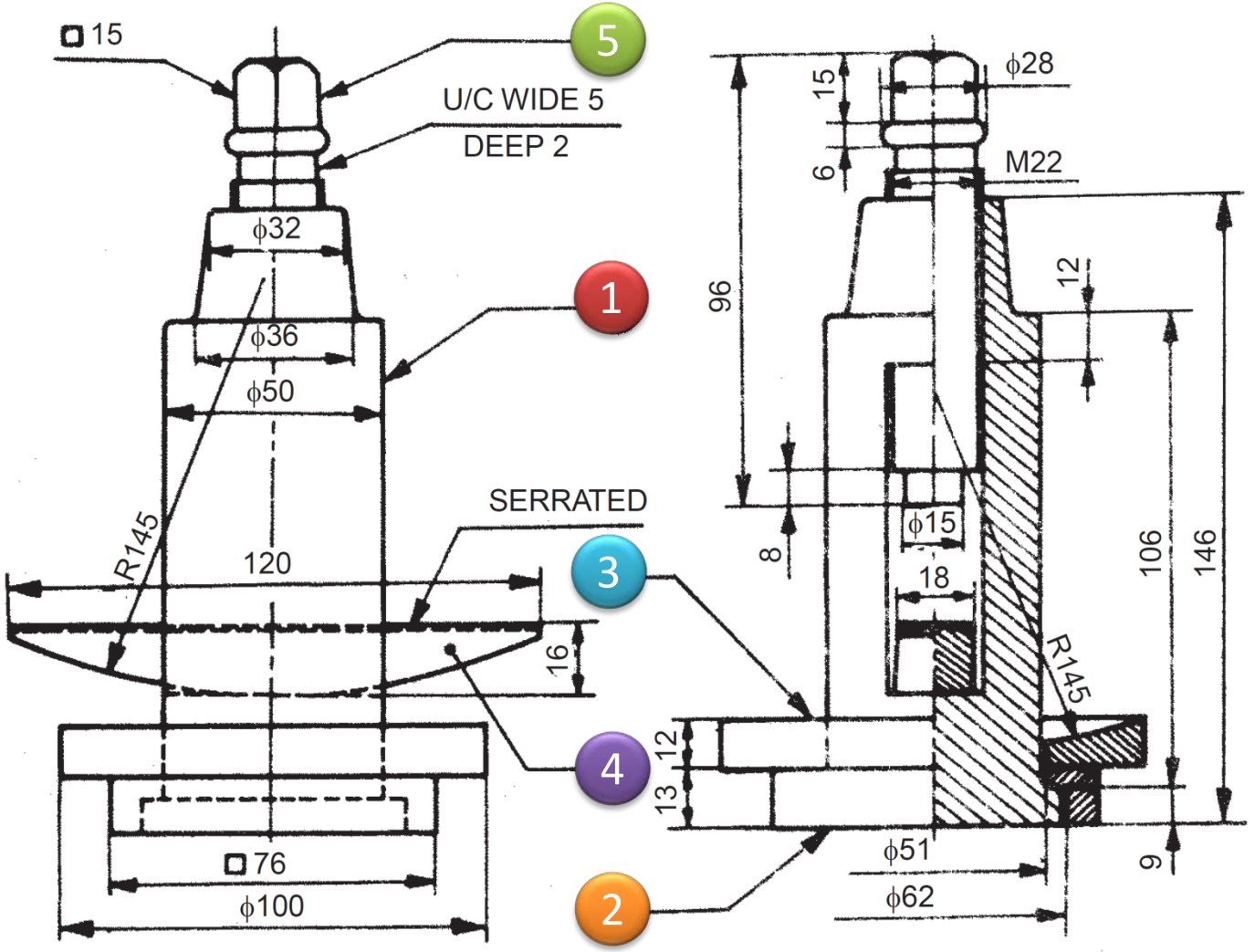












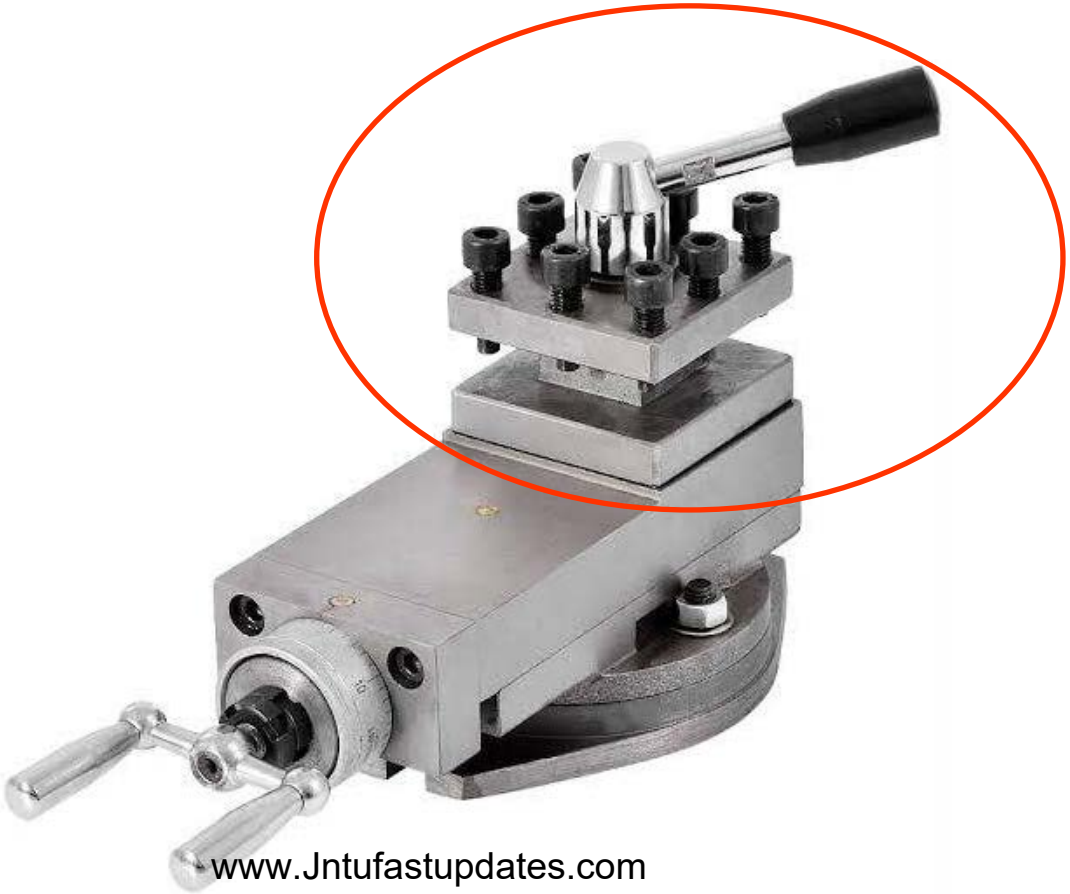
Parts list

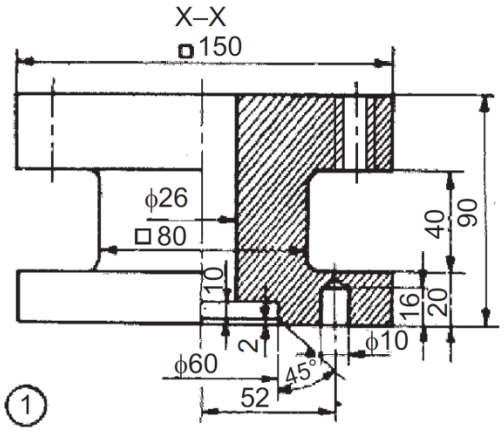
No.	Name	Matl	Qty
1	Piller	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

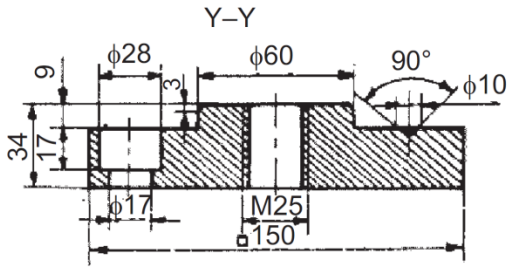
SQUARE TOOL POST

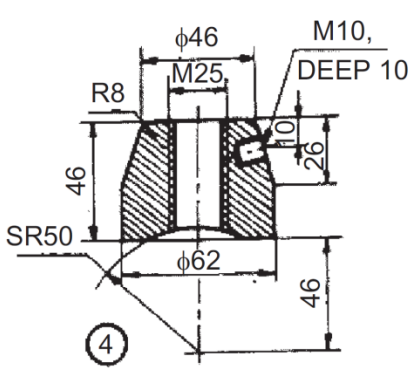
This is used to hold four different tools at a time. The tool holder may be rotated and clamped to facilitate the use of any one of the tools at a time. The details of the square tool post are shown in Fig. 18.15.

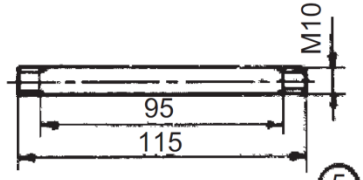
The tool holder 1 is located on the base plate 2 by means of the stud 3. It can be fixed to the base plate in any position rigidly by the clamping nut 4 and handle 5. The knob 6 is fitted to the handle for smooth operation. The tools are held in the tool post by means of the set screws 7. Each tool can be indexed readily by rotating the tool holder on the base plate and located in the correct position by the spring 9 and the ball 10. The ball is seated in the V-groove, provided for this purpose in the base plate.

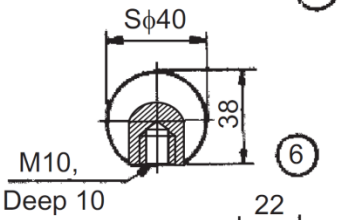


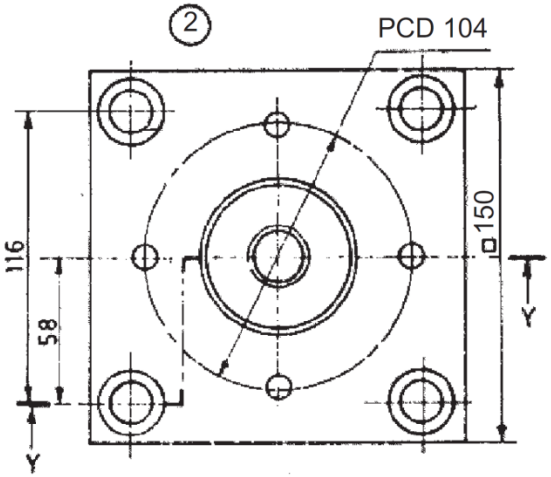


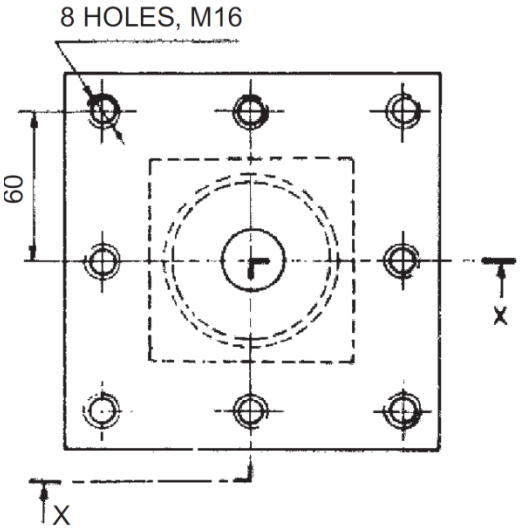


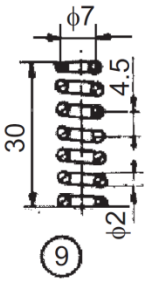


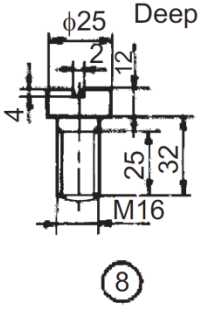


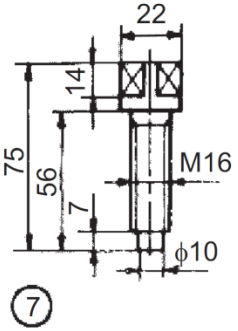


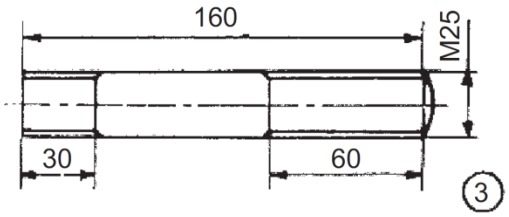






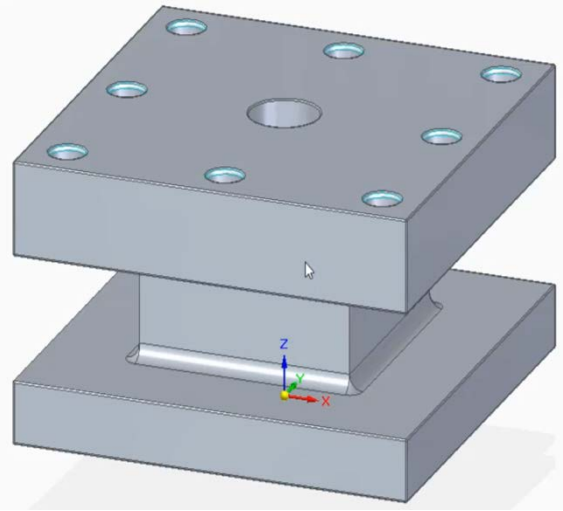


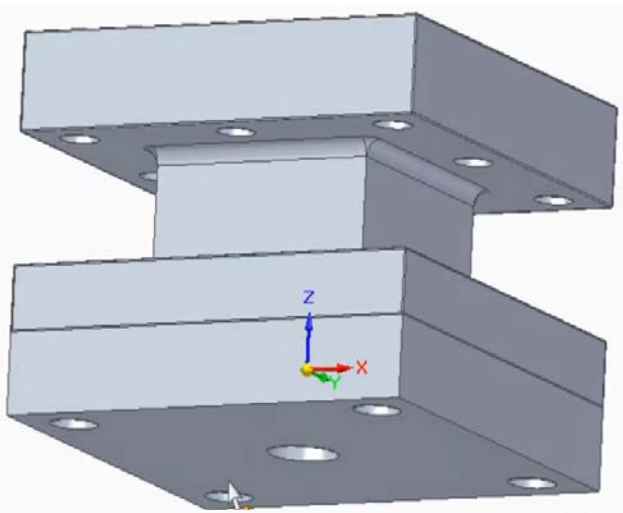


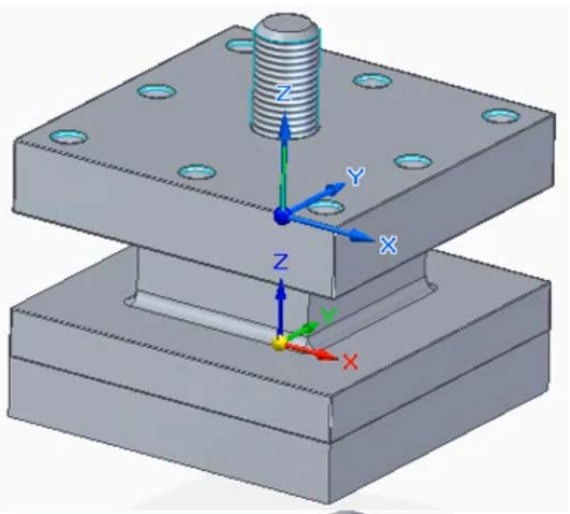


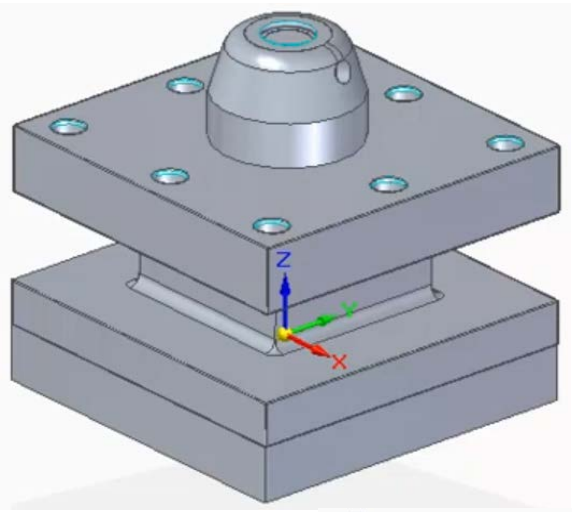
Parts list

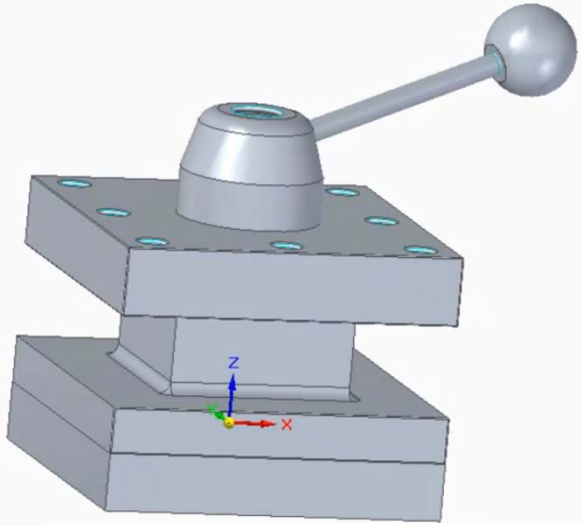
Part No.	Name	Matl	Qty
1	Tool holder	MS	1
2	Base plate	MS	1
3	Stud	MS	1
4	Clamping nut	MS	1
5	Handle	MS	1
6	Knob	Ebonite	1
7	Set screw	MS	8
8	Grub screw	MS	4
9	Spring	Steel	1
10	Ball ϕ9	MS	1

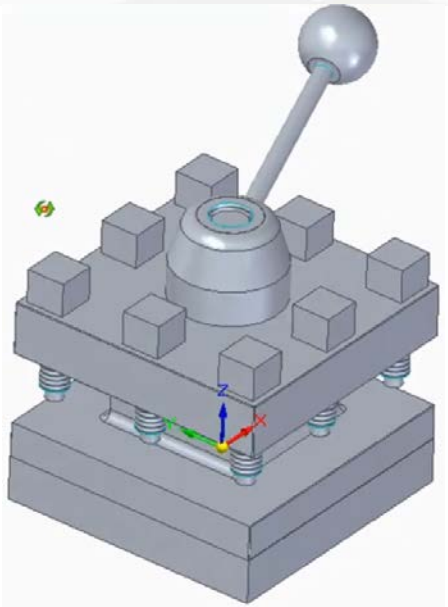


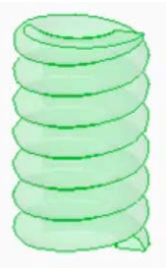


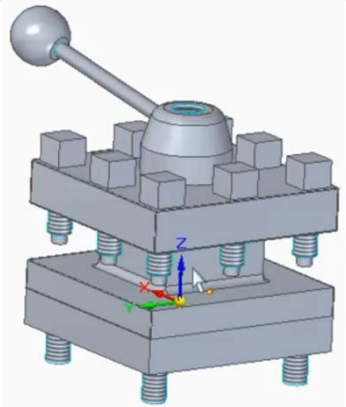


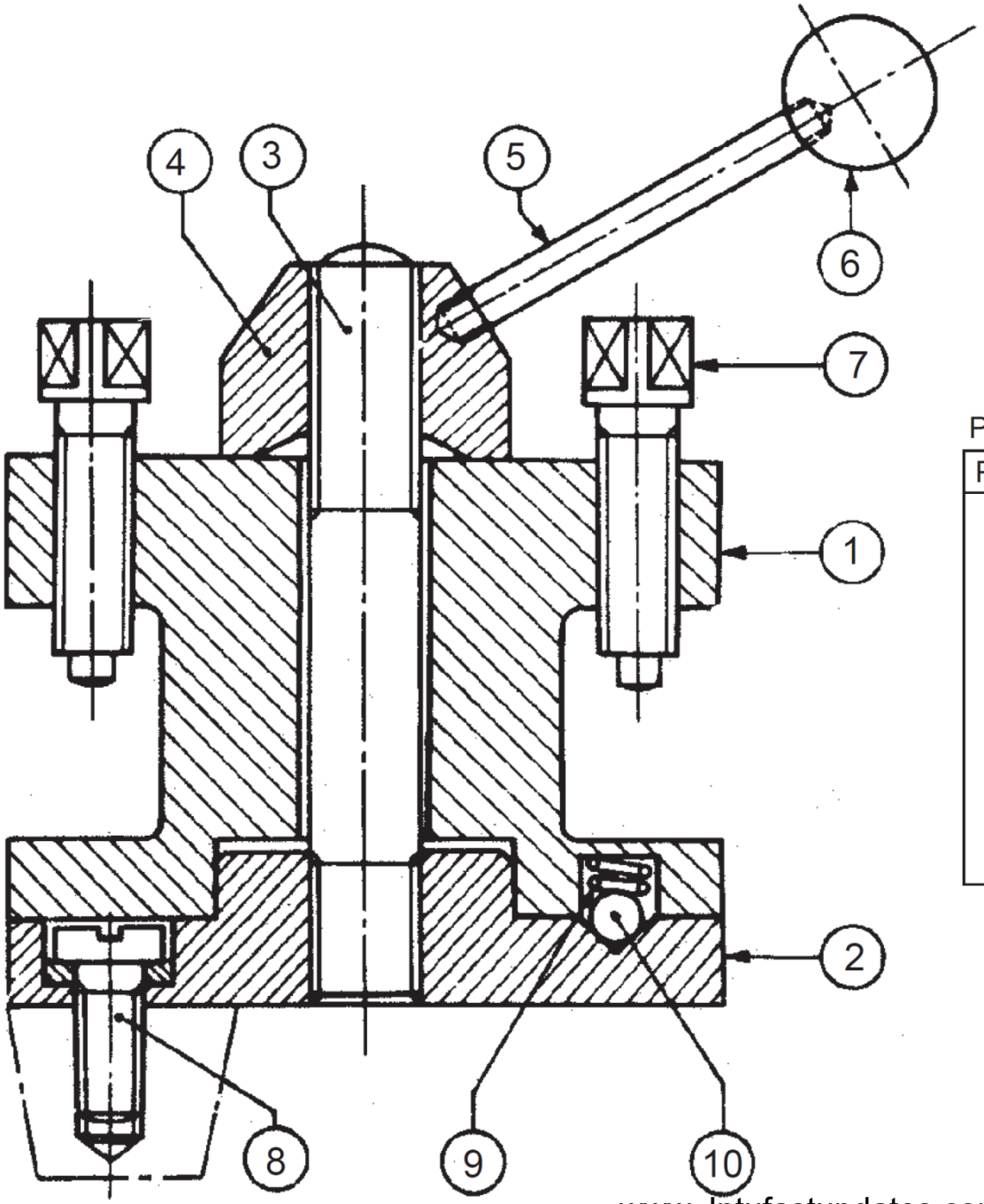












Parts list

Part No.	Name	Matl	Qty
1	Tool holder	MS	1
2	Base plate	MS	1
3	Stud	MS	1
4	Clamping nut	MS	1
5	Handle	MS	1
6	Knob	Ebonite	1
7	Set screw	MS	8
8	Grub screw	MS	4
9	Spring	Steel	1
10	Ball ϕ9	MS	1

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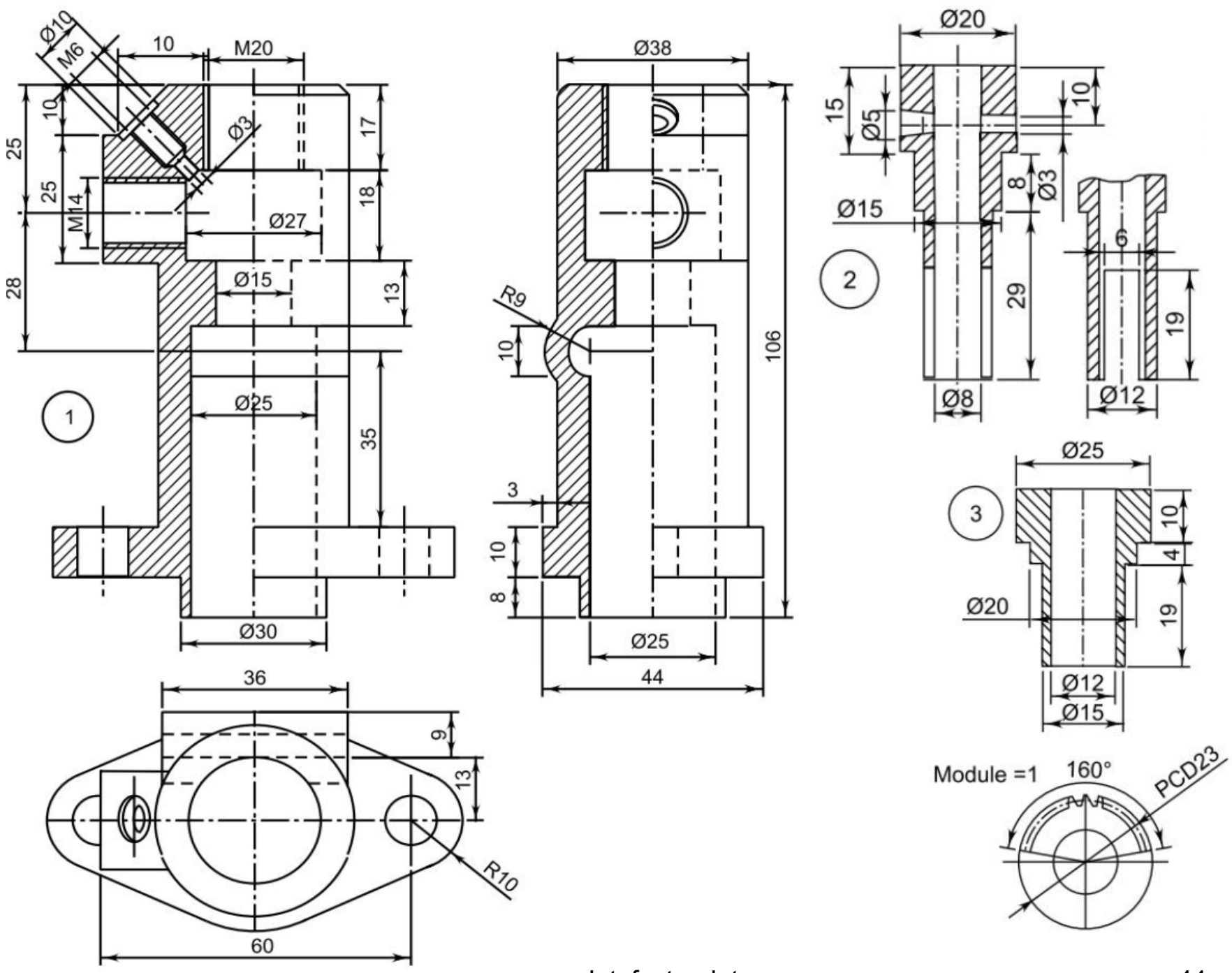
Diesel Fuel Pump

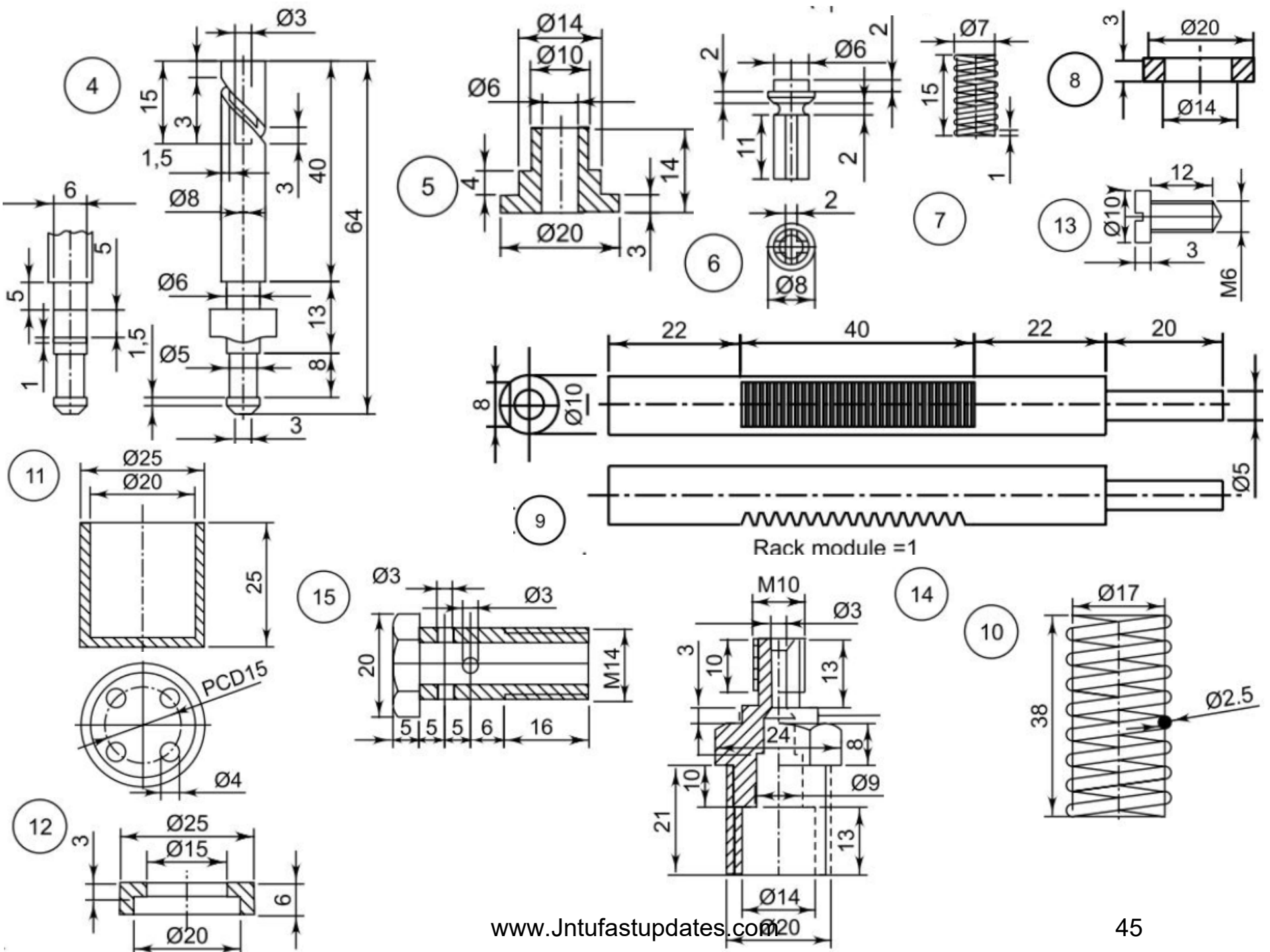
In diesel engines, fuel is supplied at high pressure and quantity is regulated according to the load and speed of the engine. It has a precisely ground helical grooved plunger (4) reciprocating in a ground barrel (2) with the help of a cam. The plunger can be rotated in the barrel with the help of a rack (9) and pinion (3) arrangement, to change the effective stroke of the plunger due to its helical groove. Both rack and pinion are positioned in the body (1). The plunger is reciprocated by a cam follower (11) operated by a cam on the cam shaft and is returned by a return spring (10).

Fuel is supplied to the fuel pump through a banjo bolt (15) screwed in the body. Any air trapped in the inlet system can be bled off by the bleed screw (13). When the plunger moves up, a delivery valve (6) positioned above valve seat (5) opens against the force of spring (7), when pressure inside the cylinder is more than the set pressure (120 to 200 bars). The plunger returns back due to force of spring (10).

Part list

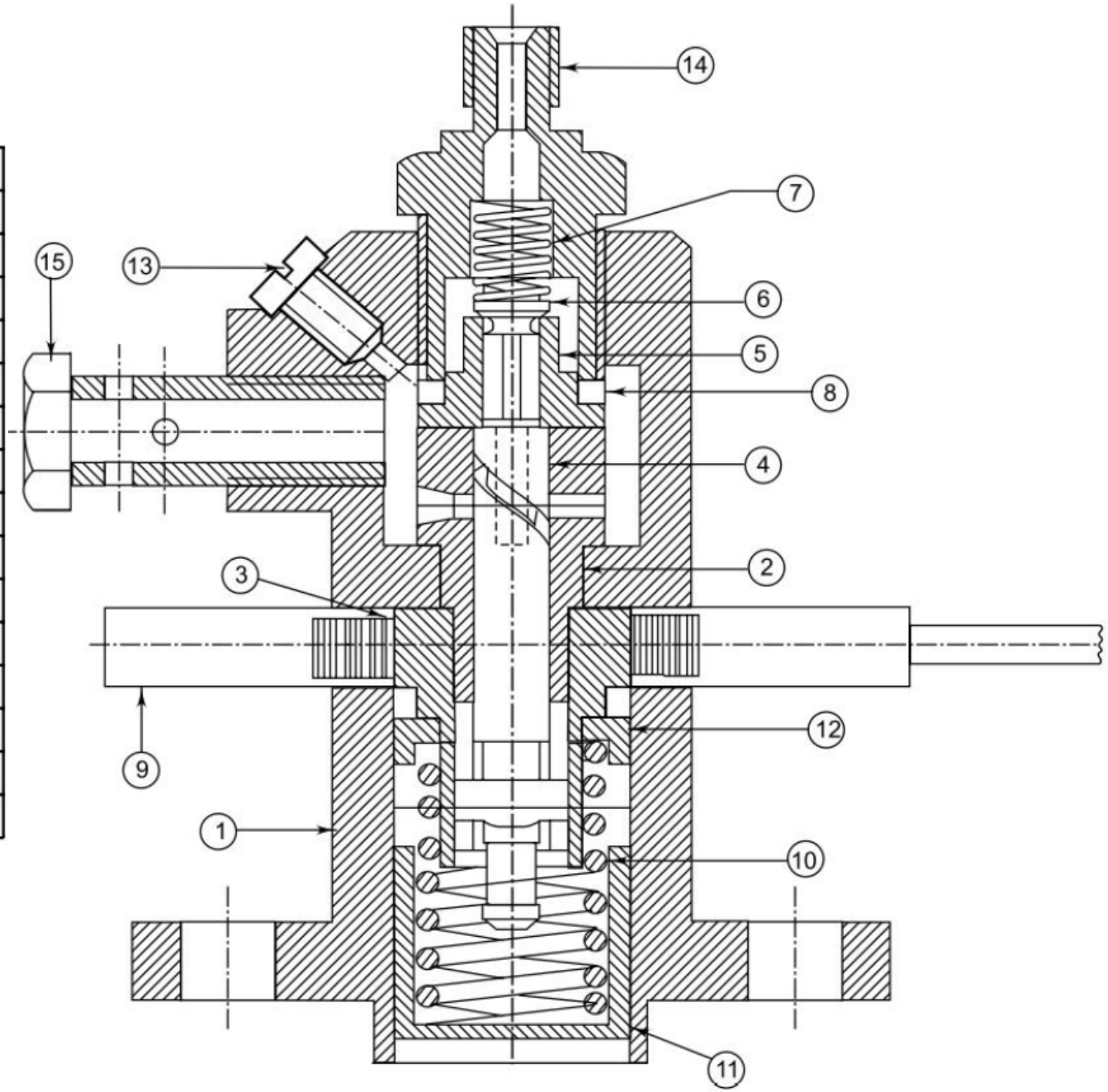
S.N.	Part name	Material	Qty
1	Body	Cast iron	1
2	Barrel	C.Steel	1
3	Pinion	C.Steel	1
4	Plunger	C.Steel	1
5	Valve seat	M.S.	1
6	Valve	M.S.	1
7	Valve spring	Sp.S.	1
8	Washer	Copper	1
9	Rack	C.steel	1
10	Return spring	Sp.steel	1
11	Cam follower	C.steel	1
12	Spring seat	M.S.	1
13	Bleed screw	M.S.	1
14	Outlet nipple	M.S	1
15	Banjo bolt	M.S.	1

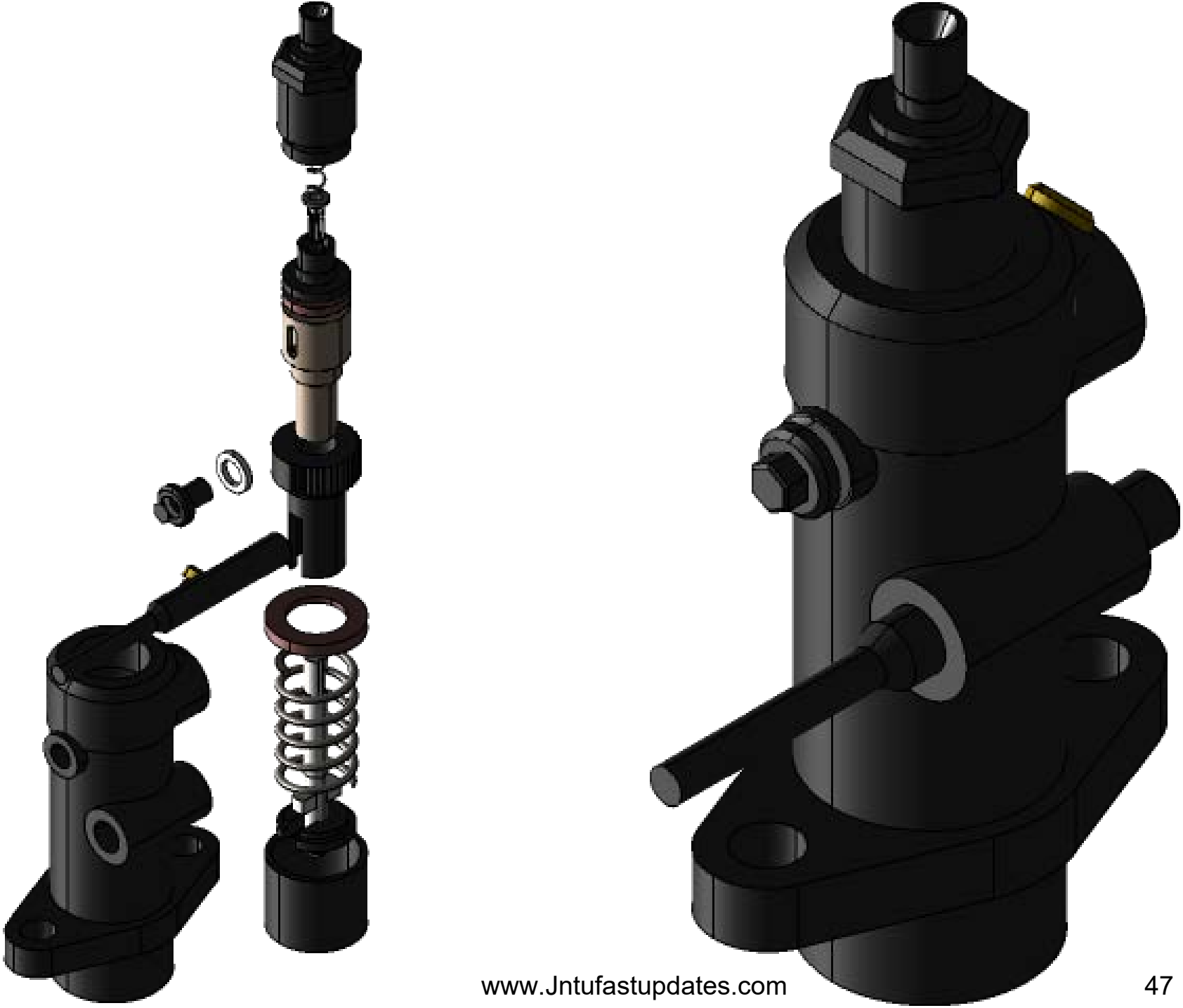

Ø10
M6
10
M20
10
25
25
M14
28
Ø3
17
18
Ø27
Ø15
13
Ø25
35
Ø30
1
Ø38
R9
10
106
3
10
8
Ø25
44
Ø20
15
Ø5
10
8
Ø3
Ø15
29
6
19
Ø8
Ø12
2
Ø25
3
10
4
Ø20
19
Ø12
Ø15
36
9
13
R10
60
Module =1
160°
PCD23

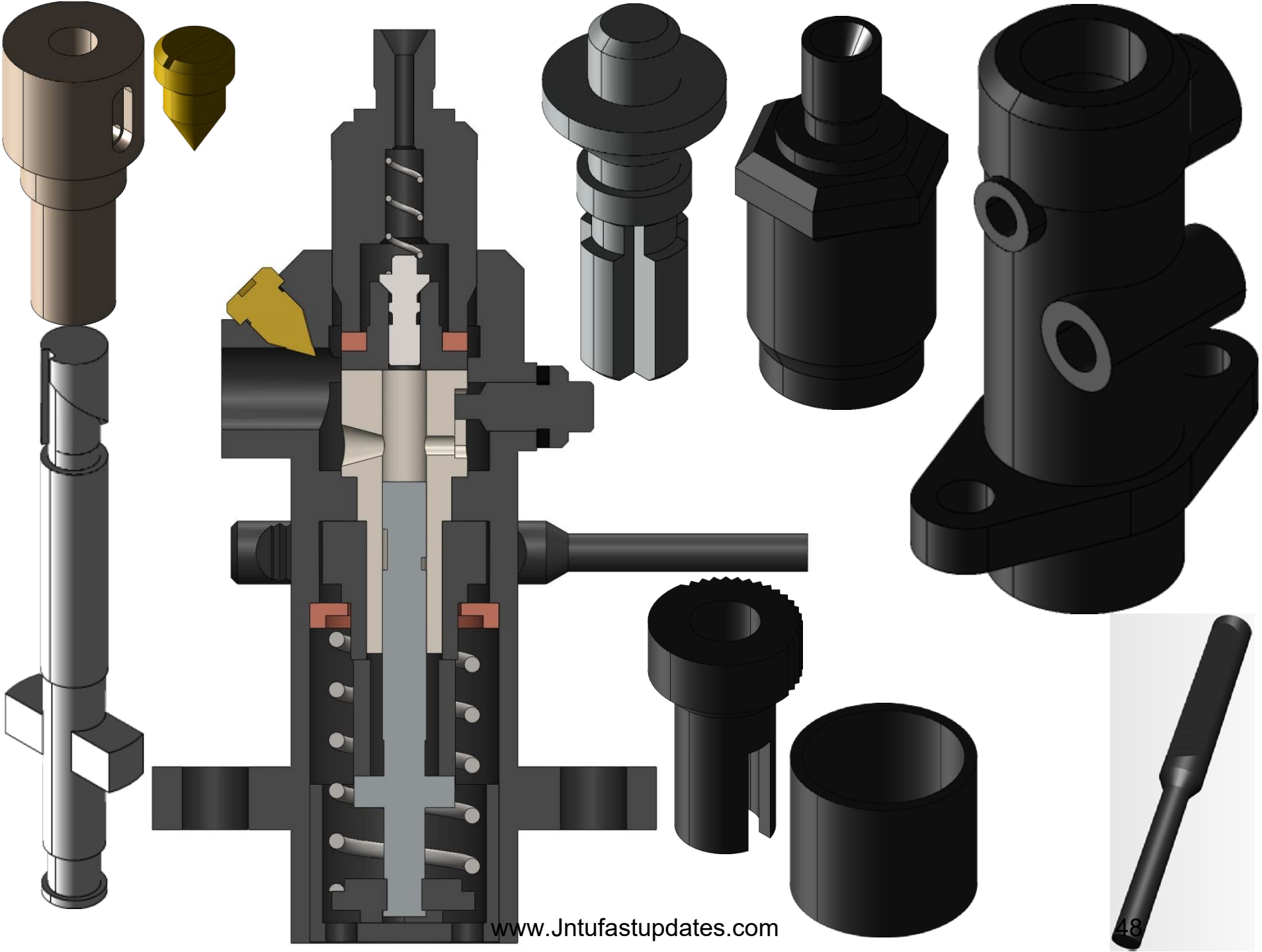

4
Ø3
15
3
1,5
3
40
64
Ø8
6
5
5
Ø6
13
1,5
Ø5
8
1
3
5
Ø14
Ø10
Ø6
4
14
Ø20
3
6
Ø8
2
Ø6
2
2
11
2
1
7
Ø7
15
1
8
3
Ø20
Ø14
13
12
Ø10
3
M6
22
40
22
20
8
Ø10
Ø5
9
Rack module =1
11
Ø25
Ø20
25
PCD15
Ø4
15
Ø3
Ø3
20
M14
5
5
5
6
16
14
M10
Ø3
3
10
13
24
8
10
Ø9
21
13
Ø14
Ø20
10
Ø17
38
Ø2.5
12
Ø25
3
Ø15
6
Ø20

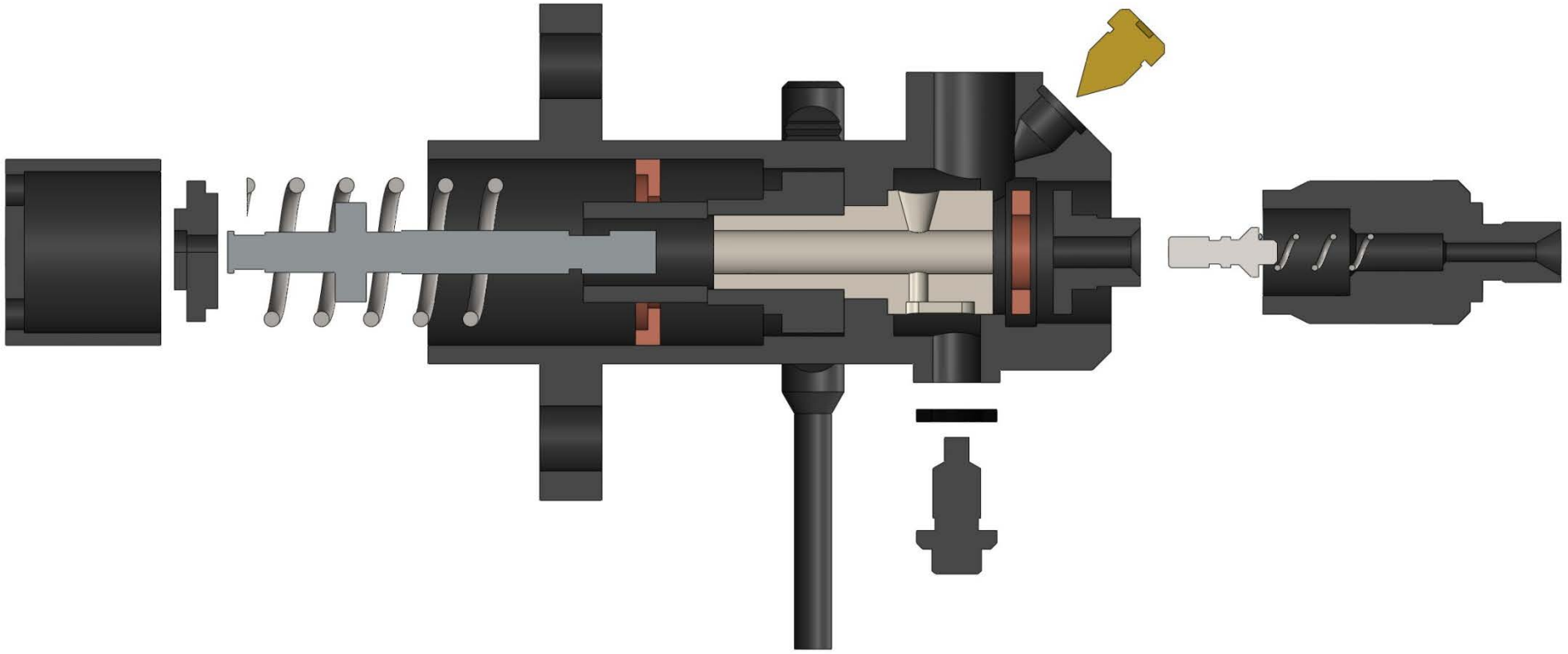
Part list

S.N.	Part name	Material	Qty
1	Body	Cast iron	1
2	Barrel	C.Steel	1
3	Pinion	C.Steel	1
4	Plunger	C.Steel	1
5	Valve seat	M.S.	1
6	Valve	M.S.	1
7	Valve spring	Sp.S.	1
8	Washer	Copper	1
9	Rack	C.steel	1
10	Return spring	Sp.steel	1
11	Cam follower	C.steel	1
12	Spring seat	M.S.	1
13	Bleed screw	M.S.	1
14	Outlet nipple	M.S	1
15	Banjo bolt	M.S.	1

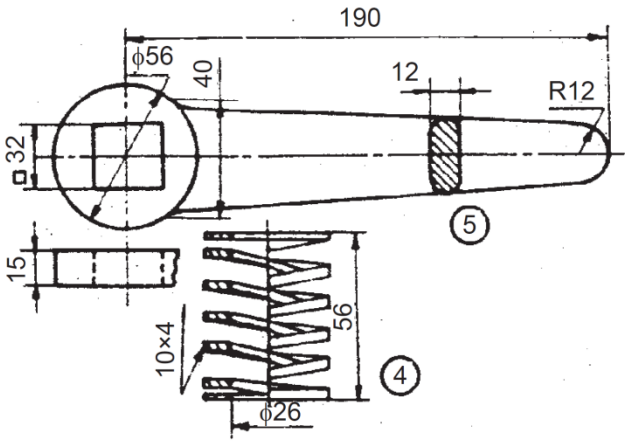


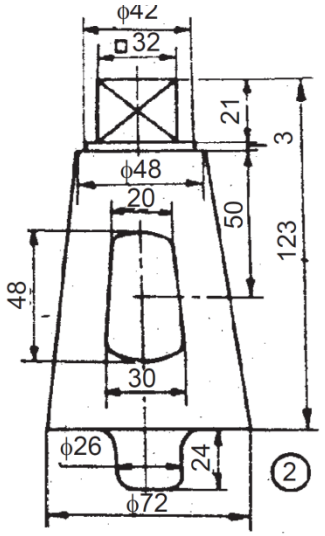


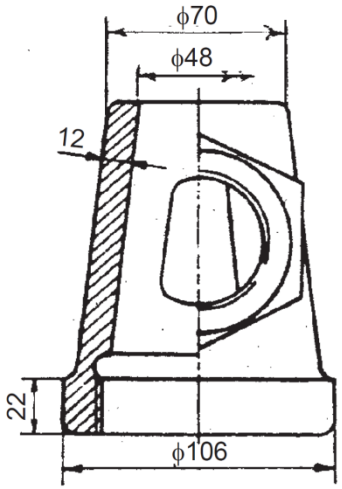


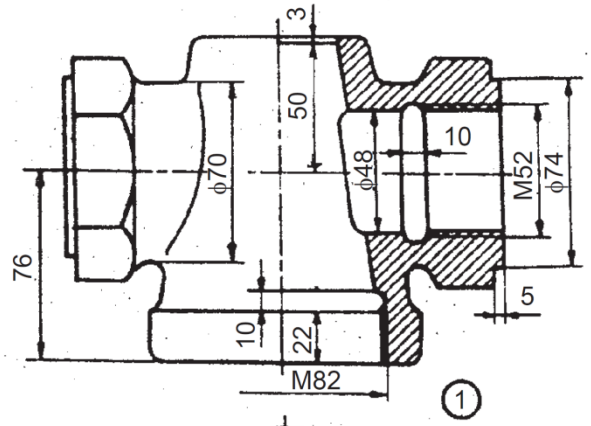


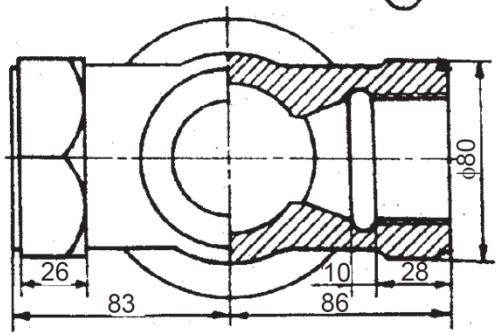
AIR COCK









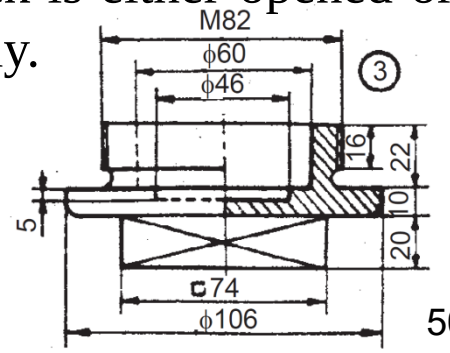


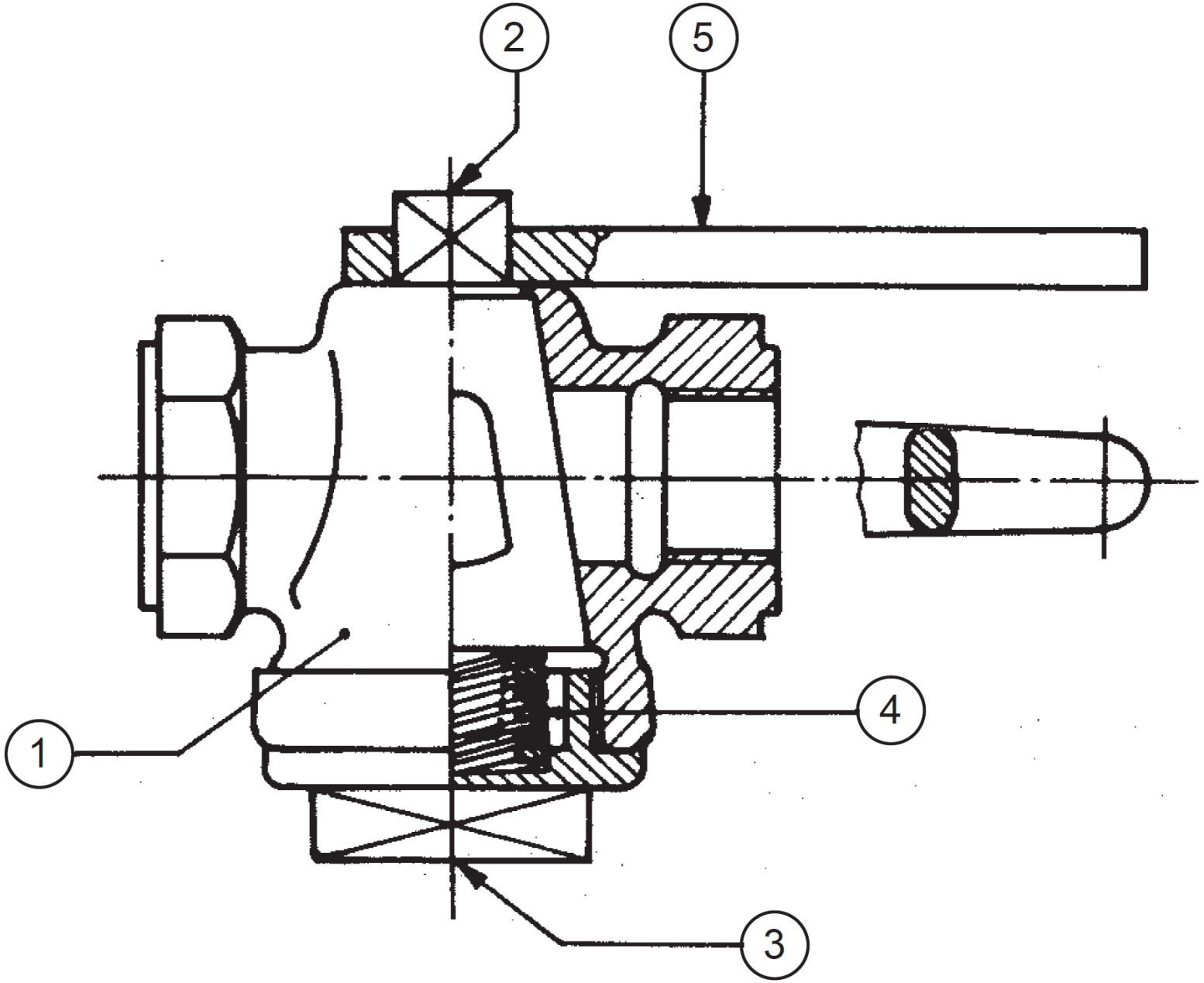
Parts list

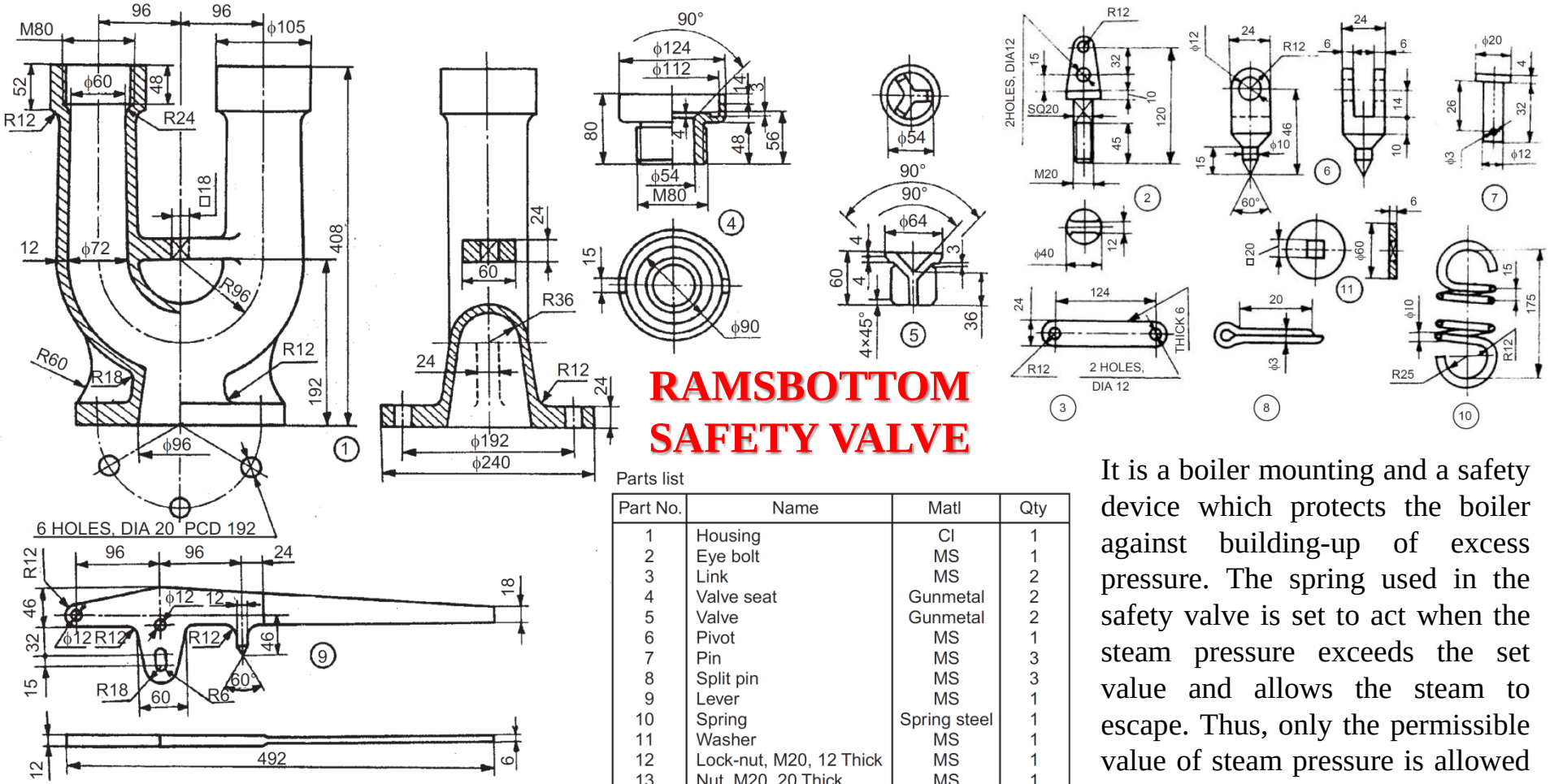
Part No.	Name	Matl	Qty
1	Body	CI	1
2	Plug	CI	1
3	Screw cap	MS	1
4	Spring	Spring S	1
5	Lever	FS	1

This valve is used to control air or gas supply. The details of an air cock are shown in Fig. 18.32.

It consists of a plug 2 which is inserted into the body 1, from the bottom. The rectangular sectioned spring 4 is placed in position at the bottom of the plug and seated over the screw cap 3. The screw cap is operated to adjust the spring tension. Lever 5 with square hole is used to operate the cock. By a mere 90° turn, the cock is either opened or closed fully.




2
5
1
4
3



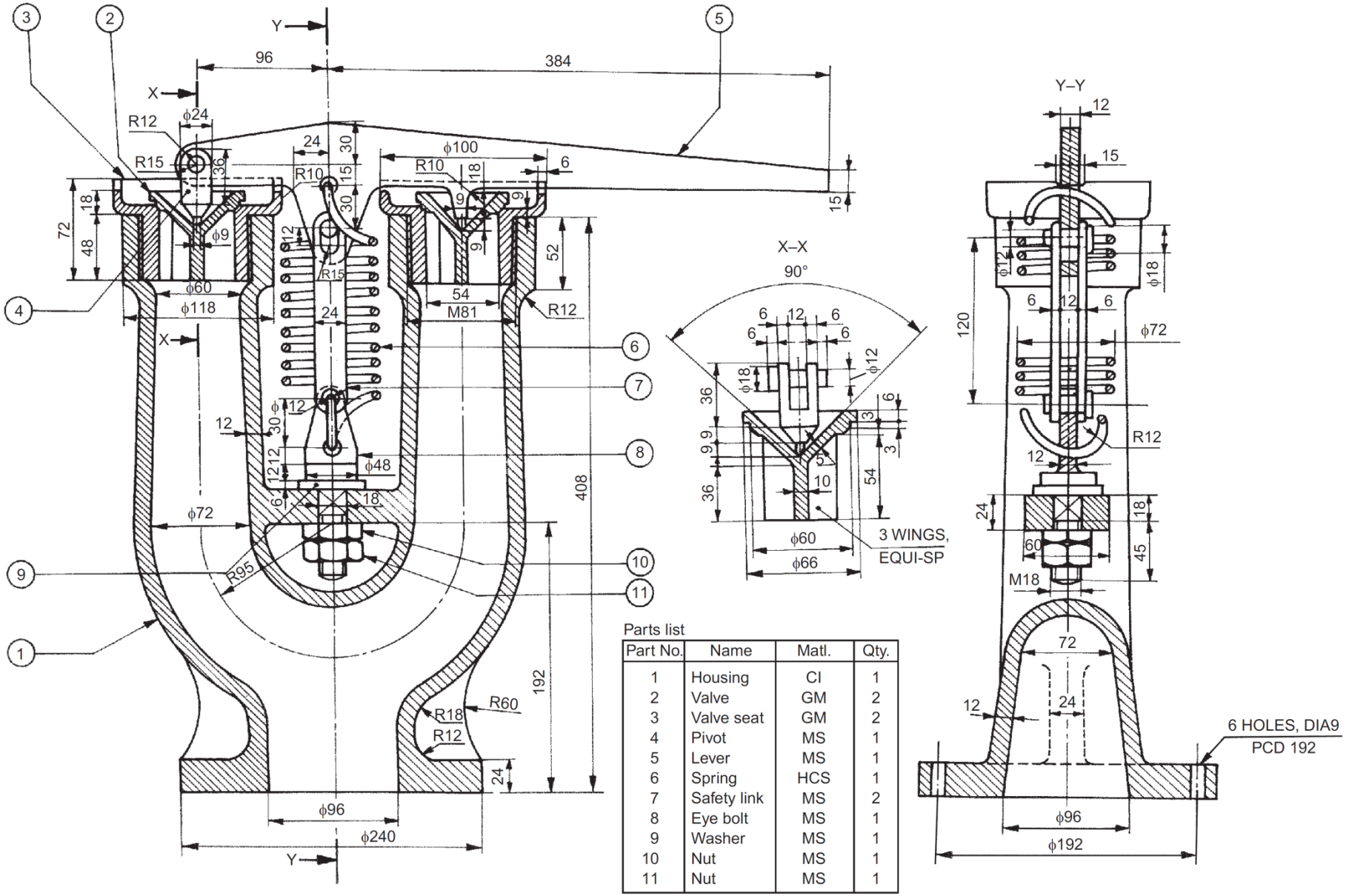
RAMSBOTTOM SAFETY VALVE

Parts list

Part No.	Name	Matl	Qty
1	Housing	CI	1
2	Eye bolt	MS	1
3	Link	MS	2
4	Valve seat	Gunmetal	2
5	Valve	Gunmetal	2
6	Pivot	MS	1
7	Pin	MS	3
8	Split pin	MS	3
9	Lever	MS	1
10	Spring	Spring steel	1
11	Washer	MS	1
12	Lock-nut, M20, 12 Thick	MS	1
13	Nut, M20, 20 Thick	MS	1

It is a boiler mounting and a safety device which protects the boiler against building-up of excess pressure. The spring used in the safety valve is set to act when the steam pressure exceeds the set value and allows the steam to escape. Thus, only the permissible value of steam pressure is allowed inside the boiler.

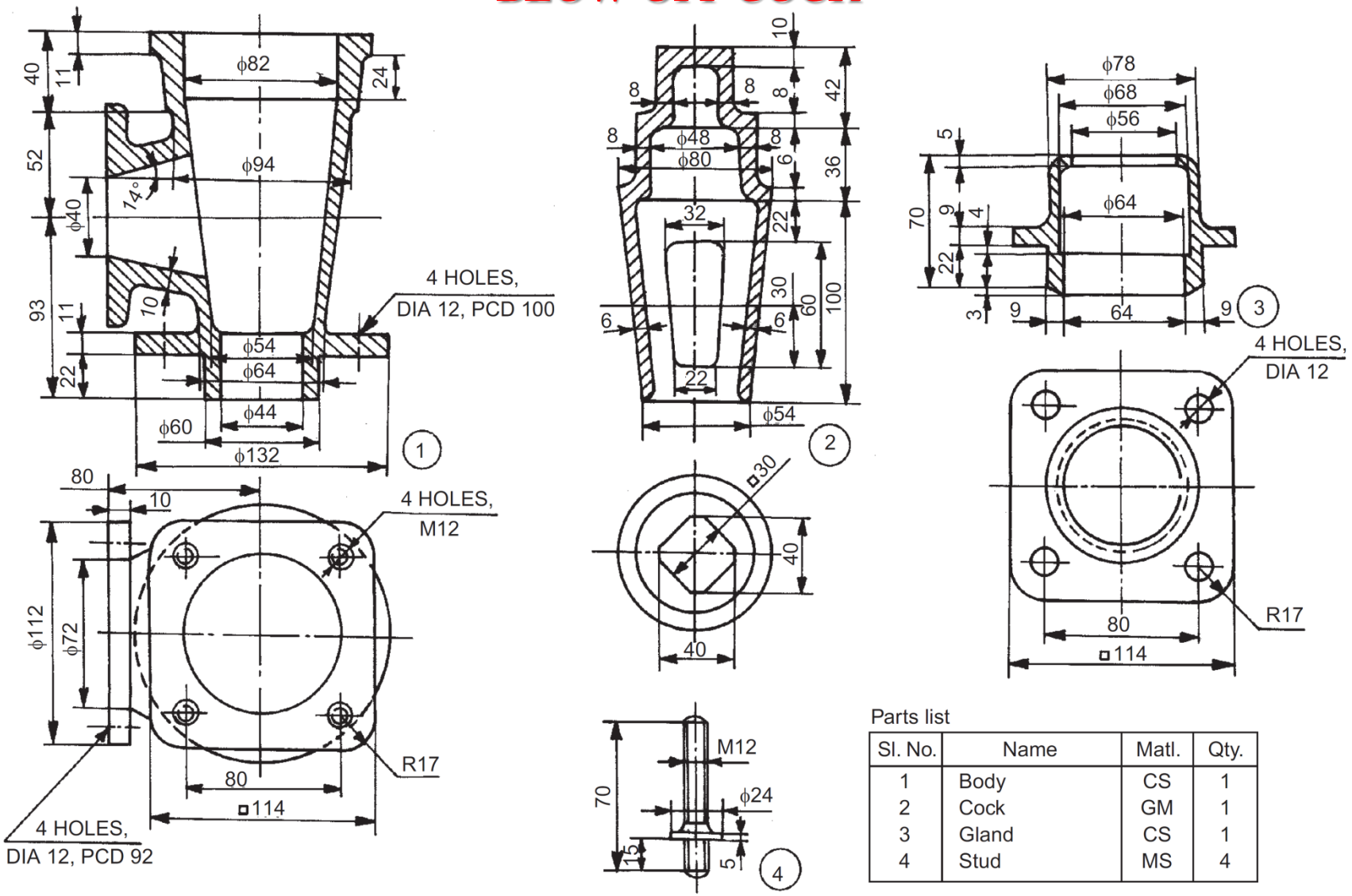
It consists of housing 1 with two valve chests. The valve seats 3 are screwed into the housing and valves 2 are located in the valve seats. The eye bolt 8 is fastened to the bridge of the housing, by means of washer 9 and both the nuts 10 and 11. Pivot 4 is pinned to the lever 5 and it is placed over the valves and held in position by safety links 7 and spring 6. The safety links 7 are fixed at one end to the lever and the other end to the eye bolt 8 by pins 12 and split pins 13. The required rigidity is provided to this assembly by fixing the spring 6 between the eye bolt and the lever (holes are provided in the lever and eye bolt for this purpose). When the set value of the pressure exceeds in the boiler, the lever moves and allows the valves to get lifted from the seats concerned. The movement of the lever is permitted due to the slot provided centrally in it and returns to the original position due to spring action.



Parts list

Part No.	Name	Matl.	Qty.
1	Housing	CI	1
2	Valve	GM	2
3	Valve seat	GM	2
4	Pivot	MS	1
5	Lever	MS	1
6	Spring	HCS	1
7	Safety link	MS	2
8	Eye bolt	MS	1
9	Washer	MS	1
10	Nut	MS	1
11	Nut	MS	1

BLOW-OFF COCK

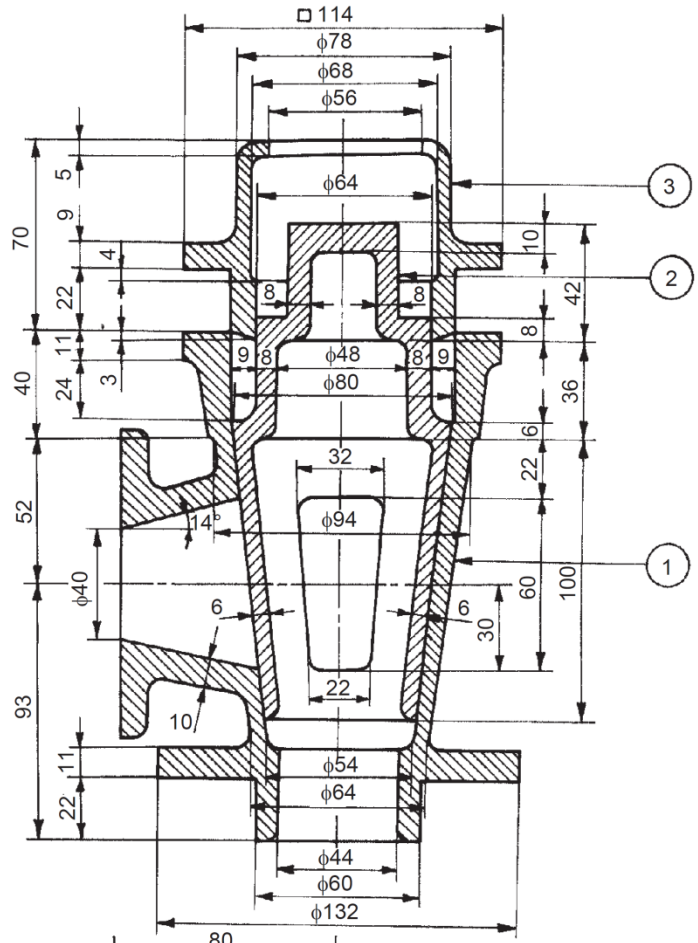


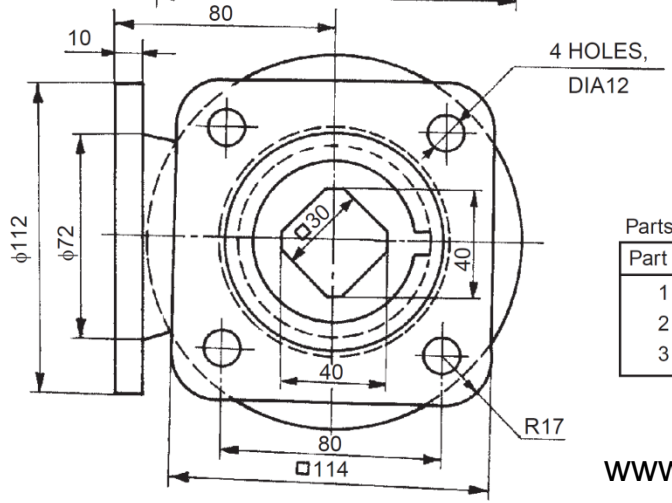
Parts list

Sl. No.	Name	Matl.	Qty.
1	Body	CS	1
2	Cock	GM	1
3	Gland	CS	1
4	Stud	MS	4

The blow-off cock is fitted at the lowest part of the boiler, to remove the sediments collected. When operated, water and sediments rush through the side flange of the cock (due to pressure in the boiler) and escape through the bottom flange. Figure 18.33 shows the parts of a blow-off cock. It consists of a hollow conical body 1 into which the cock 2 is located. Both the cock and body have vertical slots and when they are aligned, water gushes through the cock. Gland 3 is fastened to the body by means of studs 4. To prevent leakage, packing material is placed between the cock and gland

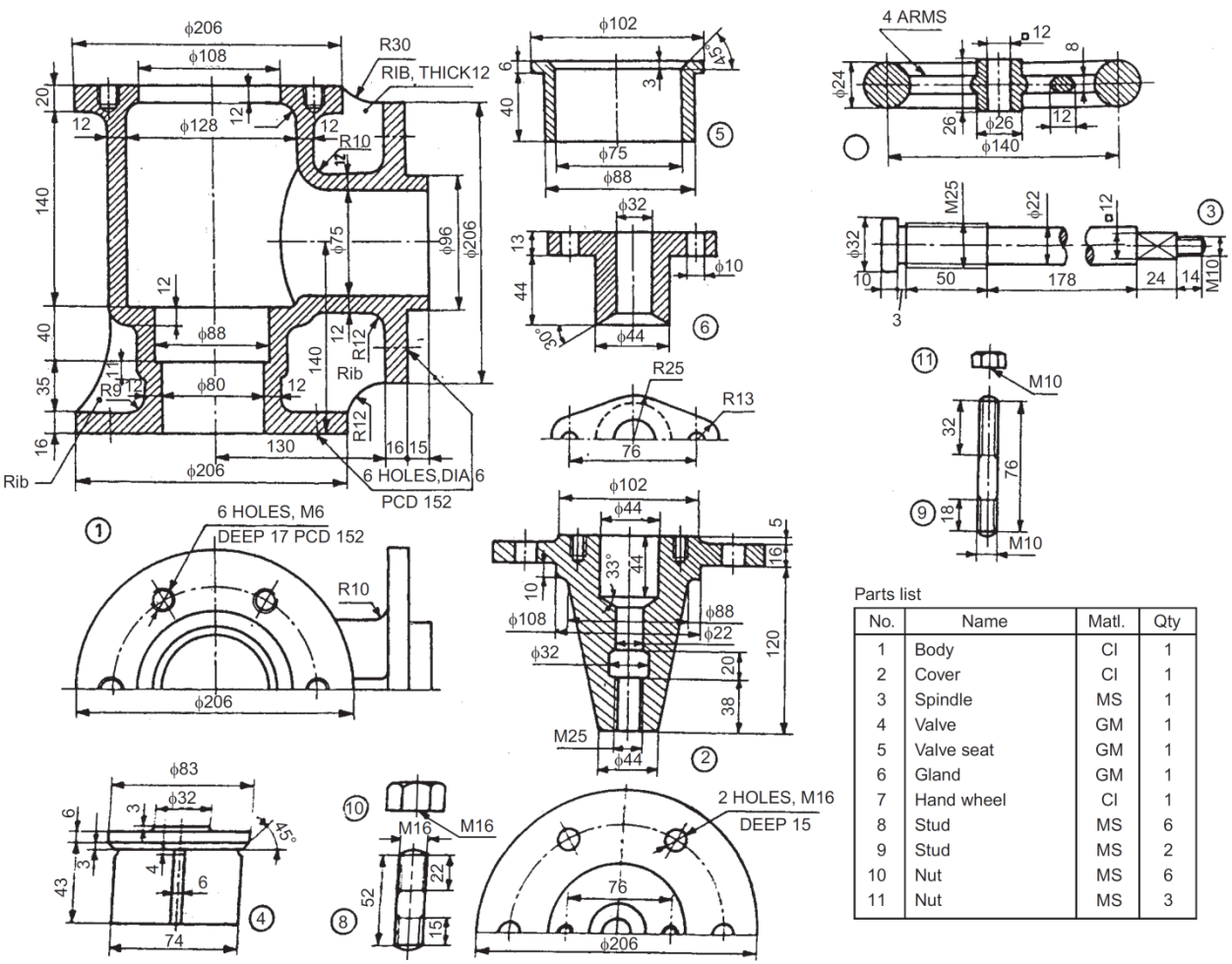
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Parts list

Part No.	Name	Matl.	Qty.
1	Body	CS	1
2	Cock	GM	1
3	Gland	CS	1



Parts list

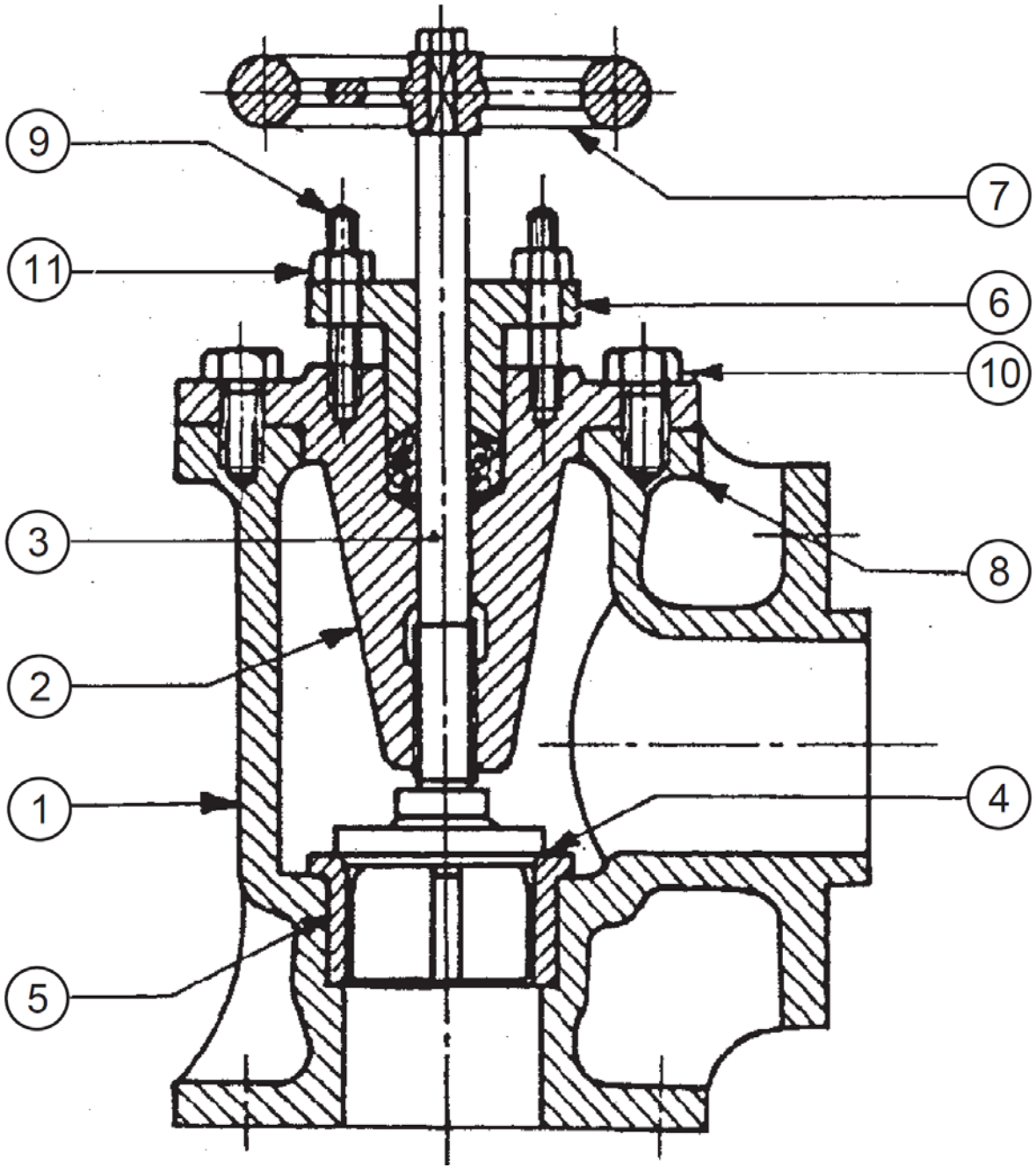
No.	Name	Matl.	Qty
1	Body	CI	1
2	Cover	CI	1
3	Spindle	MS	1
4	Valve	GM	1
5	Valve seat	GM	1
6	Gland	GM	1
7	Hand wheel	CI	1
8	Stud	MS	6
9	Stud	MS	2
10	Nut	MS	6
11	Nut	MS	3

It is used in boilers to regulate the supply of feed water and to maintain the water level. It is fitted close to the boiler shell and in the feed pipe line. Figure shows the details of a feed check valve. The valve prevents water from being returned to the supply line, due to steam pressure in the boiler. Hence, it functions like a non-return valve.

FEED CHECK VALVE

It consists of a body with two flanges at right angle and feed water enters at the bottom and enters the boiler through the side opening. The valve seat 5 is introduced into the body of the valve from the top opening. The valve 4 is located in the valve seat, which guides the movement of the valve. The spindle 3 is screwed from bottom of the cover 2 such that, the square end of the spindle projects out through the cover. Studs 8 are screwed to the body and the spindle and cover assembly is fastened to the body by nuts 10. Studs 9 are screwed to the cover and the gland 6 is inserted into the cover and tightened by nuts 11. To prevent the leakage of water through the cover, packing material is introduced between the cover and gland. Hand wheel 7 is located on the spindle such that, the square hole in the hand wheel meshes with the square portion of spindle. The hand wheel is fixed to the spindle by nut 11. By operating the hand wheel, the spindle permits the valve to get lifted from the valve seat and allows feed water to enter the boiler.

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9
11
3
2
1
5
7
6
10
8
4