

# SHAPER & PLANER

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# SHAPER

- The shaper is a **reciprocating** type of machine tool intended primarily to produce **flat surfaces**.
- Flat surfaces may be horizontal, vertical or inclined
- In general the shaper can produce any surface composed of straight line elements.
- Modern shapers can produce contoured surface

# Classification of Shapers

- Shapers are classified according to general features of design & purpose

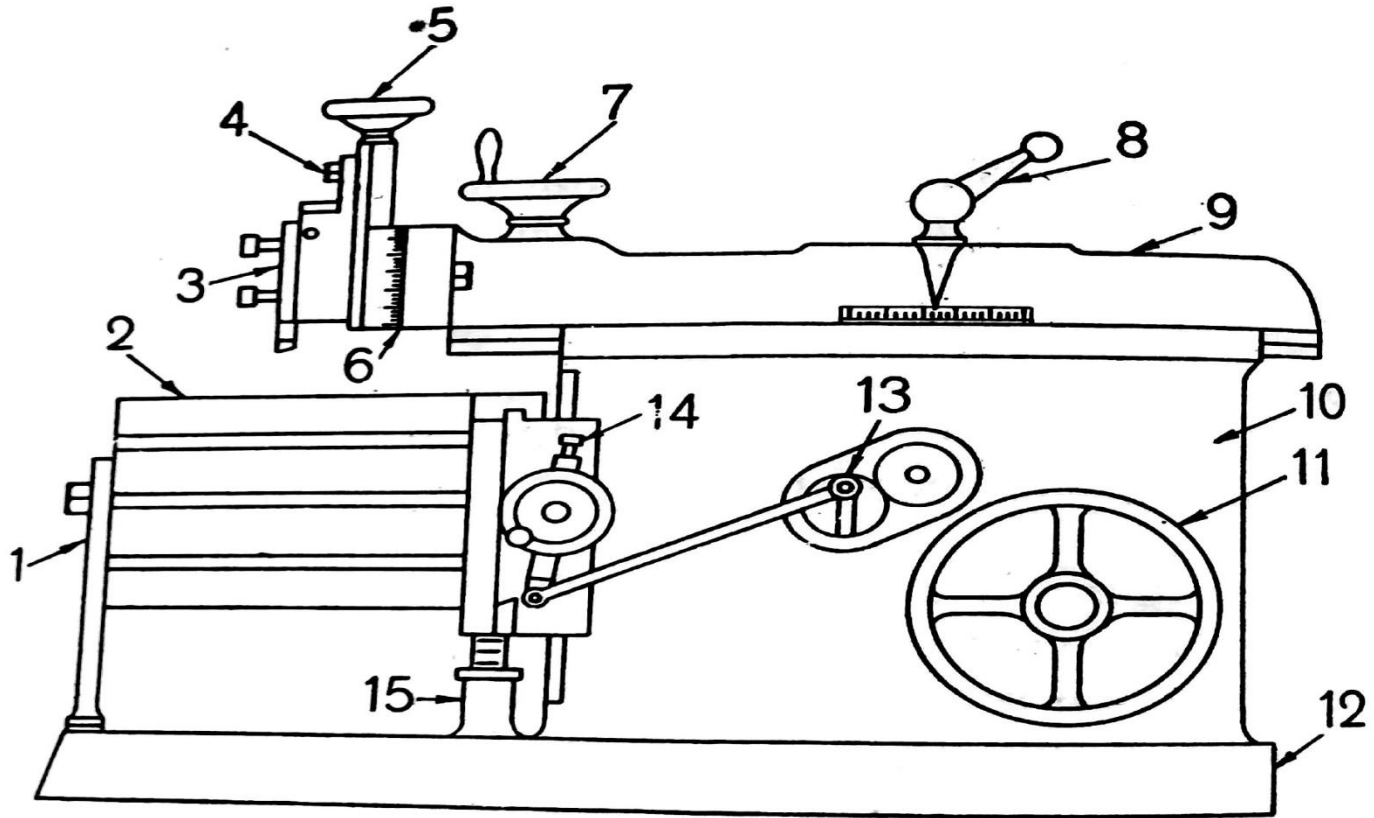
## 7.2 TYPES OF SHAPERS

Shapers are classified in a number of ways depending upon the general features of design or the purpose for which they are intended. Shapers are classified under the following headings.

1. *According to the type of mechanism used for giving reciprocating motion to the ram :* (a) Crank type (b) Geared type (c) Hydraulic type.
2. *According to the position and travel of ram :* (a) Horizontal type (b) Vertical type (c) Traveling head type.
3. *According to the type of design of the table :* (a) Standard shaper (b) Universal shaper
4. *According to the type of cutting stroke :* (a) Push type (b) Draw type.

# Parts of a Standard Shaper

operation -



**Figure 7.1** Parts of a standard shaper

1. Table support, 2. Table, 3. Clapper box, 4. Apron clamping bolts, 5. Downfeed hand wheel, 6. Swivel base degree graduations, 7. Position of stroke adjustment handwheel, 8. Ram block locking handle, 9. Ram, 10. Column, 11. Driving pulley, 12. Base, 13. Feed disc, 14. Pawl mechanism, 15. Elevating screw.

# Shaper Mechanism

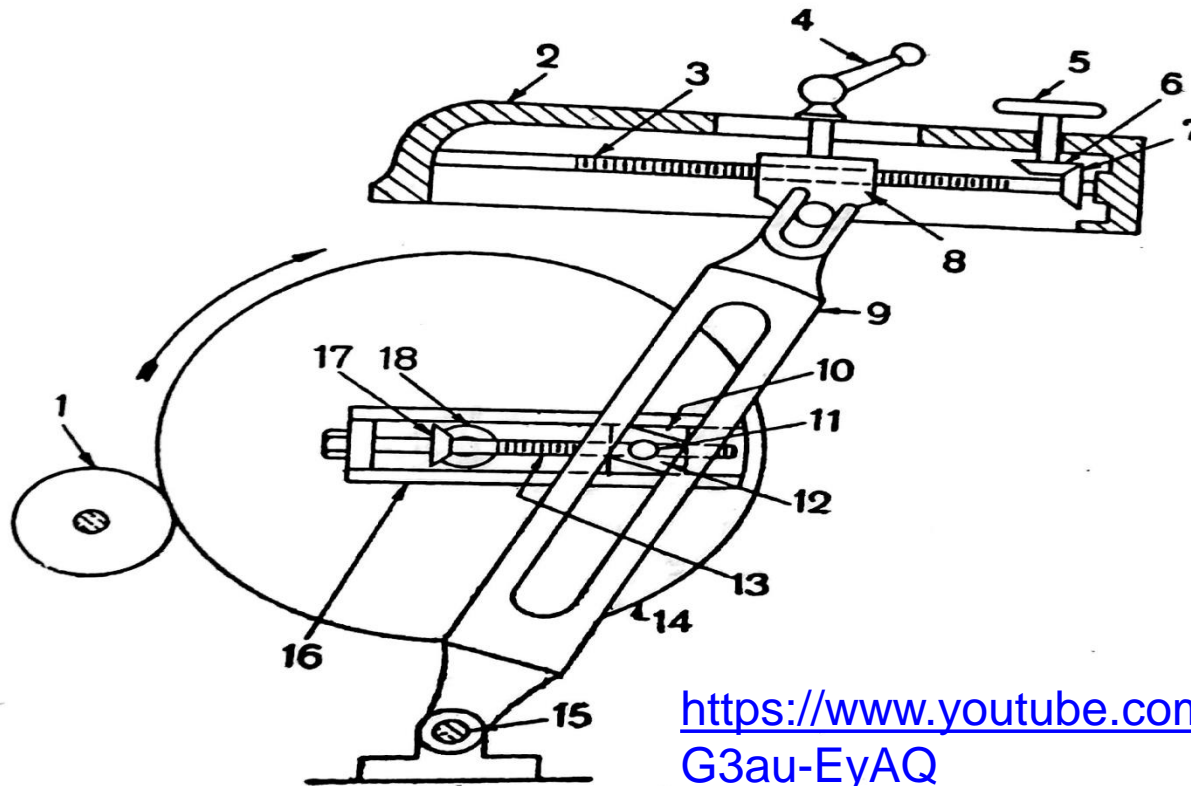
1. Crank and slotted link mechanism

2. Withworth quick return mechanism

<https://www.youtube.com/watch?v=AGn6pPgkZUk>

3. Hydraulic shaper mechanism

# Crank and slotted link mechanism



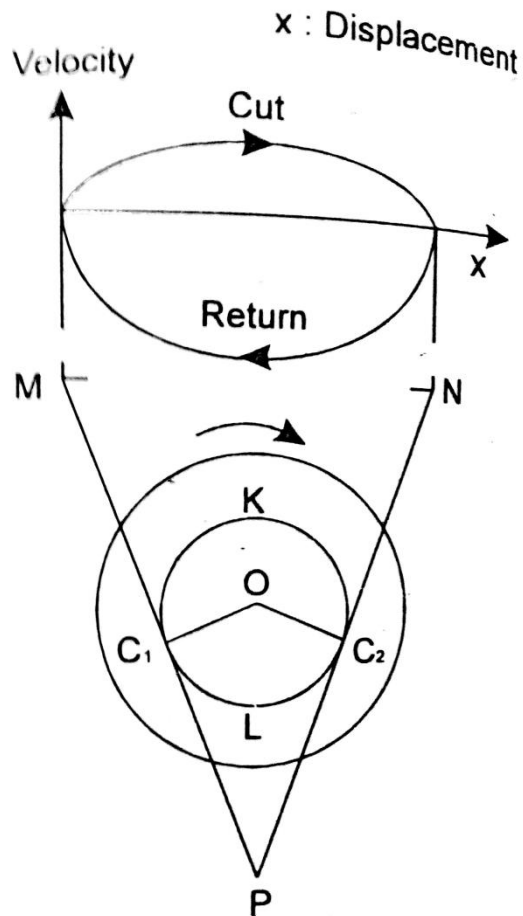
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**Figure 7.3 Crank and slotted link mechanism**

1. Driving pinion, 2. Ram, 3. Screwed shaft, 4. Clamping lever, 5. Handwheel for position of stroke adjustment 6.7. Bevel gears, 8. Ram block, 9. Slotted link or rocker arm, 10. Bull gear sliding block, 11. Crank pin, 12. Rocker arm sliding block, 13. Lead screw. 14. Bull gear, 15. Rocker arm pivot, 16. Bull gear slide, 17,18. Bevel gears.

Crank and slotted link mechanism. The crank and slotted link

# Principle of quick return mechanism



Cutting Time

$C_1KC_2$

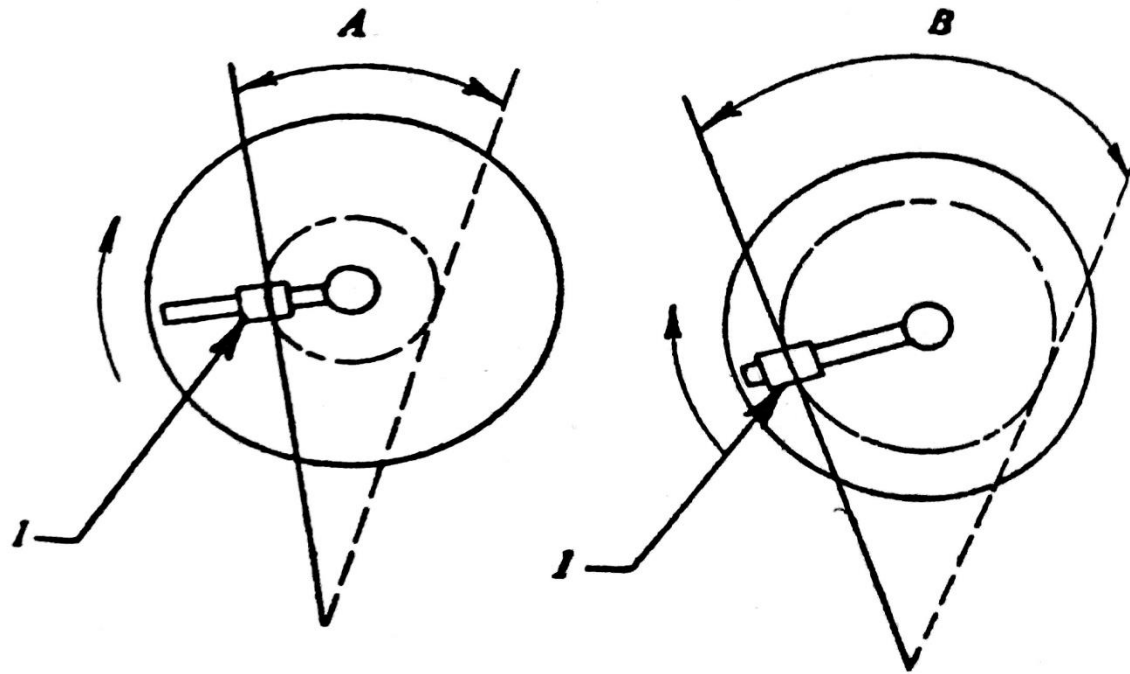
Return Time

$C_2LC_1$

Figure 7.4 Principle of quick return mechanism

# Stroke length adjustment

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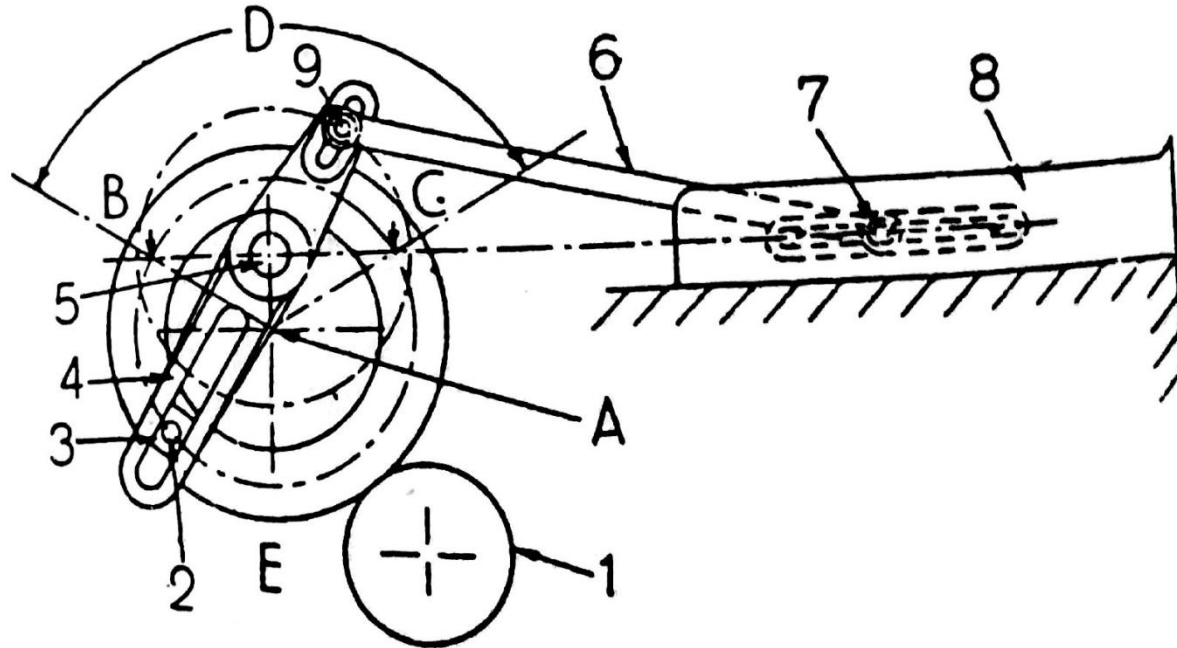
**Figure 7.6 Stroke length adjustment**  
1. Position of crankpin, A. Short stroke length, B.  
Long stroke length.

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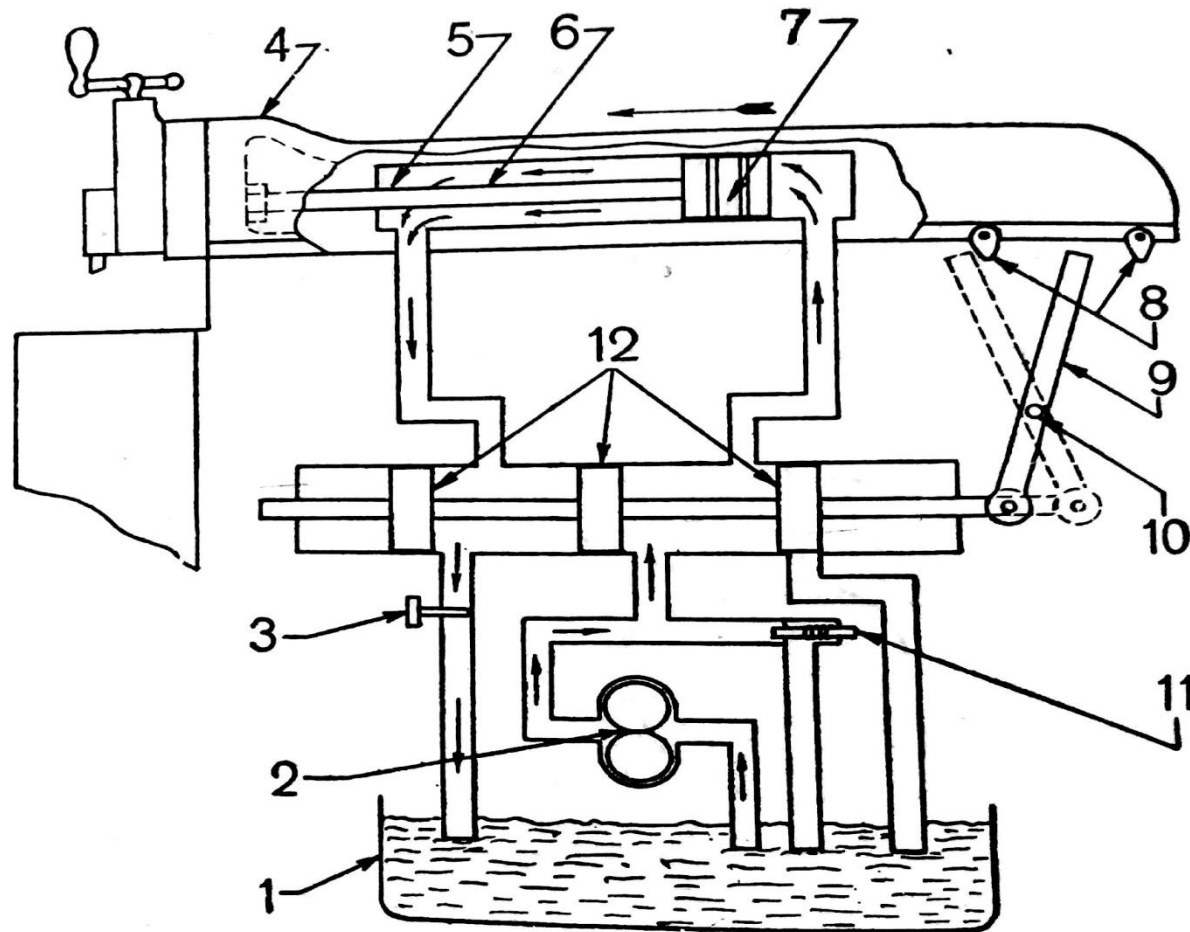


# Withworth quick return mechanism



**Figure 7.7 Whitworth quick return mechanism**  
1. Driving pinion, 2. Crank pin, 3. Sliding block, 4. Crank plate, 5. Pivot for crank plate, 6. Connecting rod, 7. Connecting pin for ram, 8. Ram, 9. Pin, A. Fixed pin.

# Hydraulic shaper mechanism



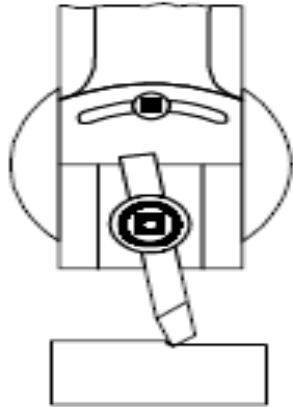
**Figure 7.9 Hydraulic shaper mechanism**

1. Oil reservoir, 2. Oil pump, 3. Throttle valve, 4. Ram, 5. Cylinder, 6. Piston rod.  
7. Piston, 8. Reversing dog, 9. Reversing lever, 10. Reversing lever pivot, 11.  
Relief valve, 12. Valves.

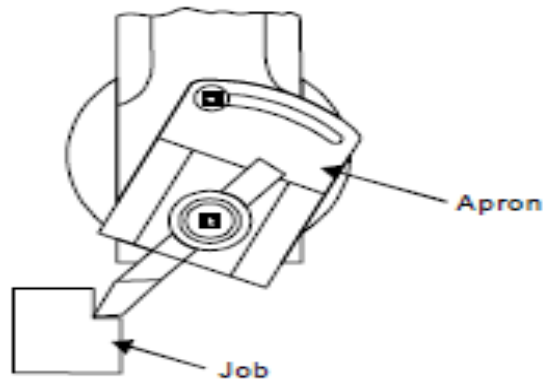
# Shaper operations

- 1) Machining horizontal surface
- 2) Machining vertical surface
- 3) Machining Angular surface
- 4) Cutting slots, grooves and key ways
- 5) Machining irregular surface
- 6) Machining splines or cutting gears

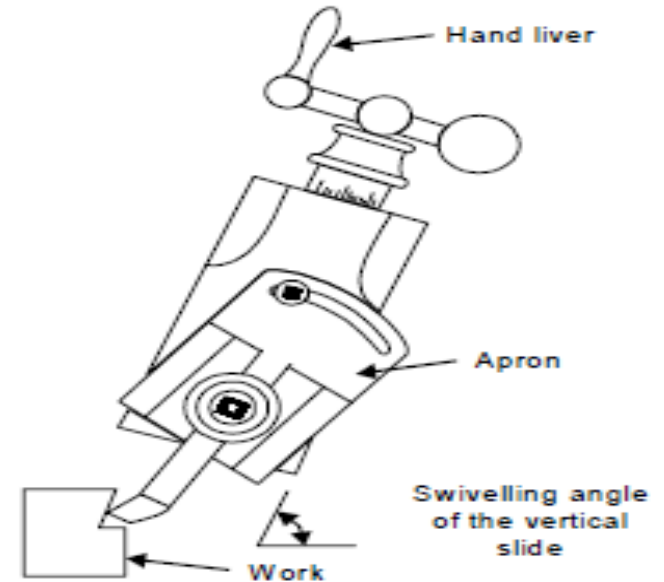
# Shaper operations



**Fig. 23.7** Machining horizontal vertical surface on shaper

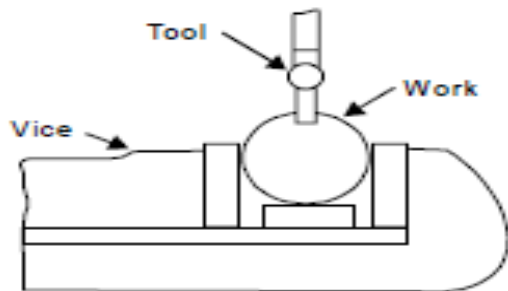


**Fig. 23.8** Machining vertical surface on shaper



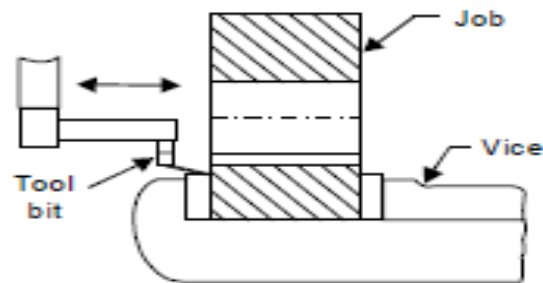
Cutting slots and keyways.

**Fig. 23.9** Machining angular surface on shaper



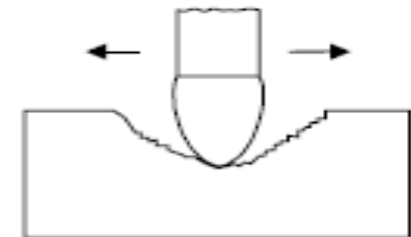
Slot cutting

**Fig. 23.10** Slot cutting on shaper



Keyway cutting

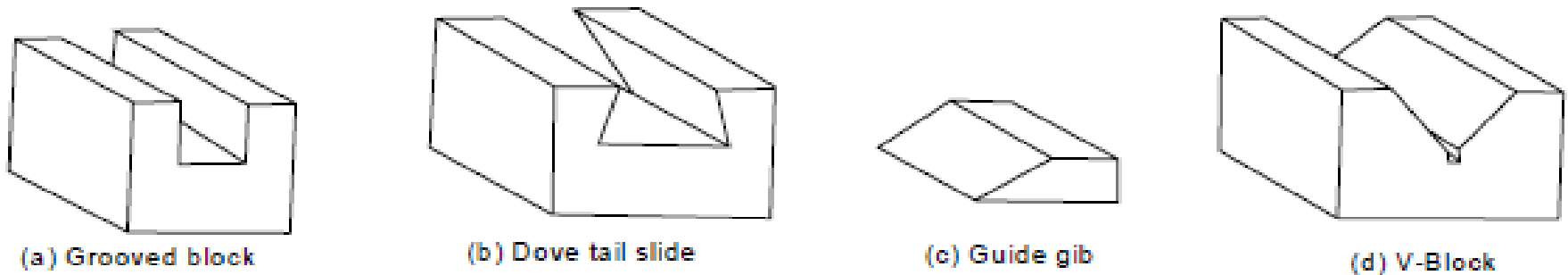
**Fig. 23.11** Keyway cutting on shaper



Irregular machining

**Fig. 23.12** Machining irregular surface on shaper

# Shaper operations



Surface produced by a shaper

Fig. 23.3 Job surfaces generated by shaper

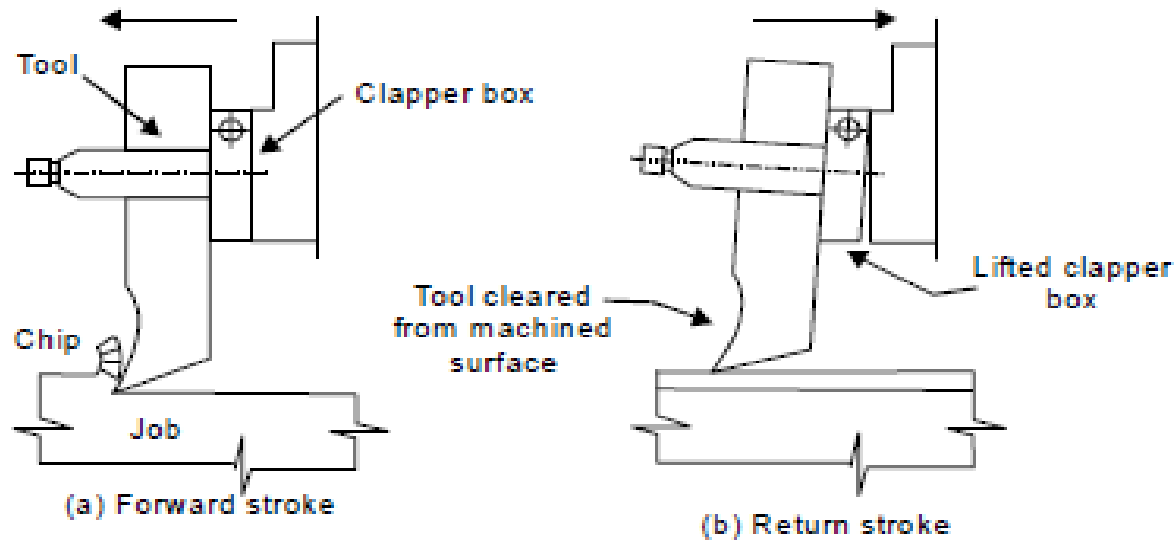
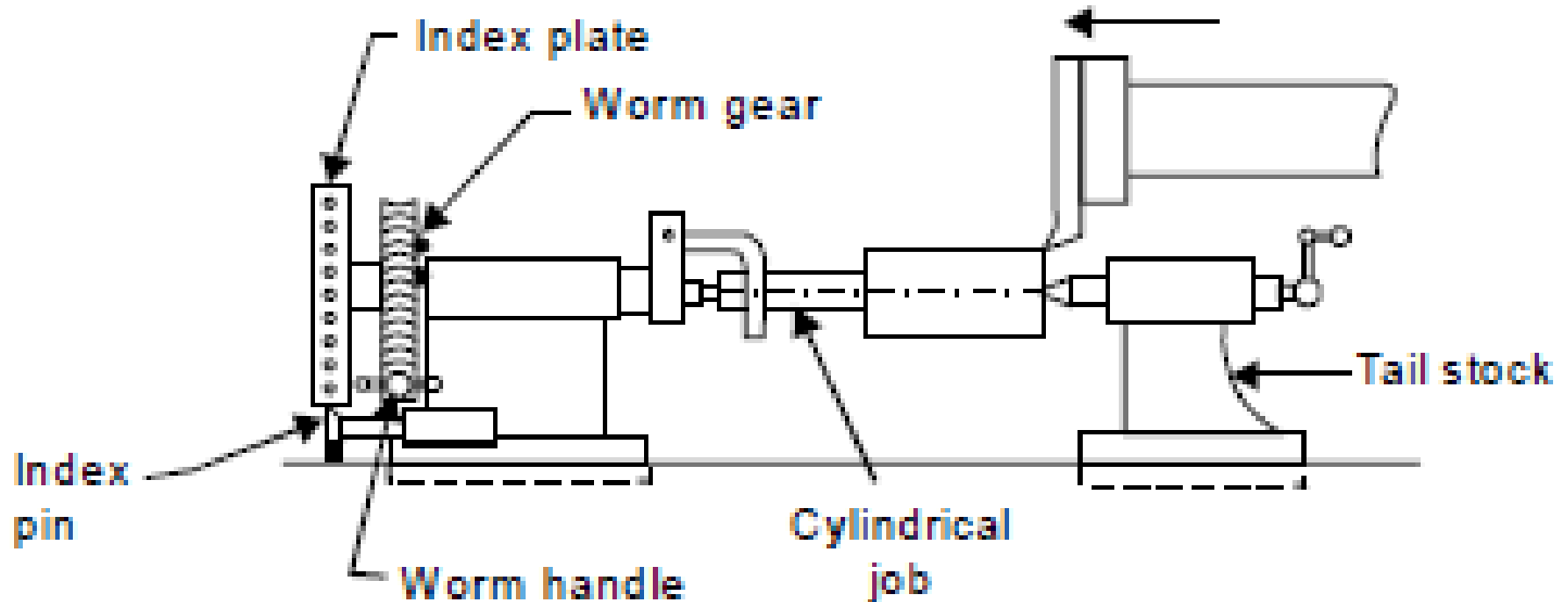


Fig. 23.4 Cutting action and functioning of clapper box

# Shaper operations

## Machining splines and cutting gears



**Fig. 23.13** Machining splines and cutting gears on shaper

# PLANING MACHINES

# PLANER

- Planer is like a shaper, primarily intended to produce flat surfaces.
- Compared to shaper, planer is a very large and massive and capable of machining heavy work pieces which cannot be accommodated on a shaper table

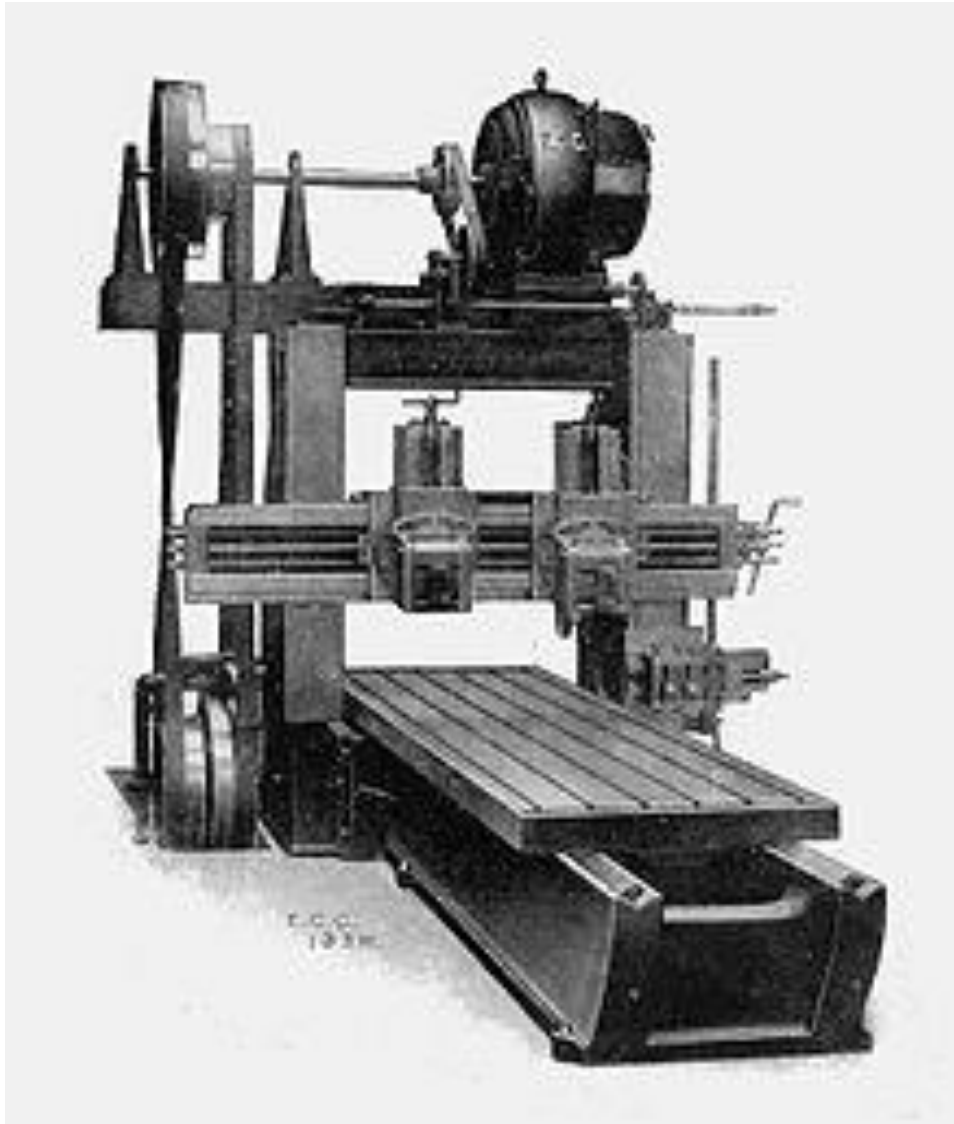


# TYPES OF PLANERS

According to the design, shapers are classified as under:

1. Double housing planer
2. Open side planer
3. Pit planer
4. Edge or pit planer
5. Divided table planer.

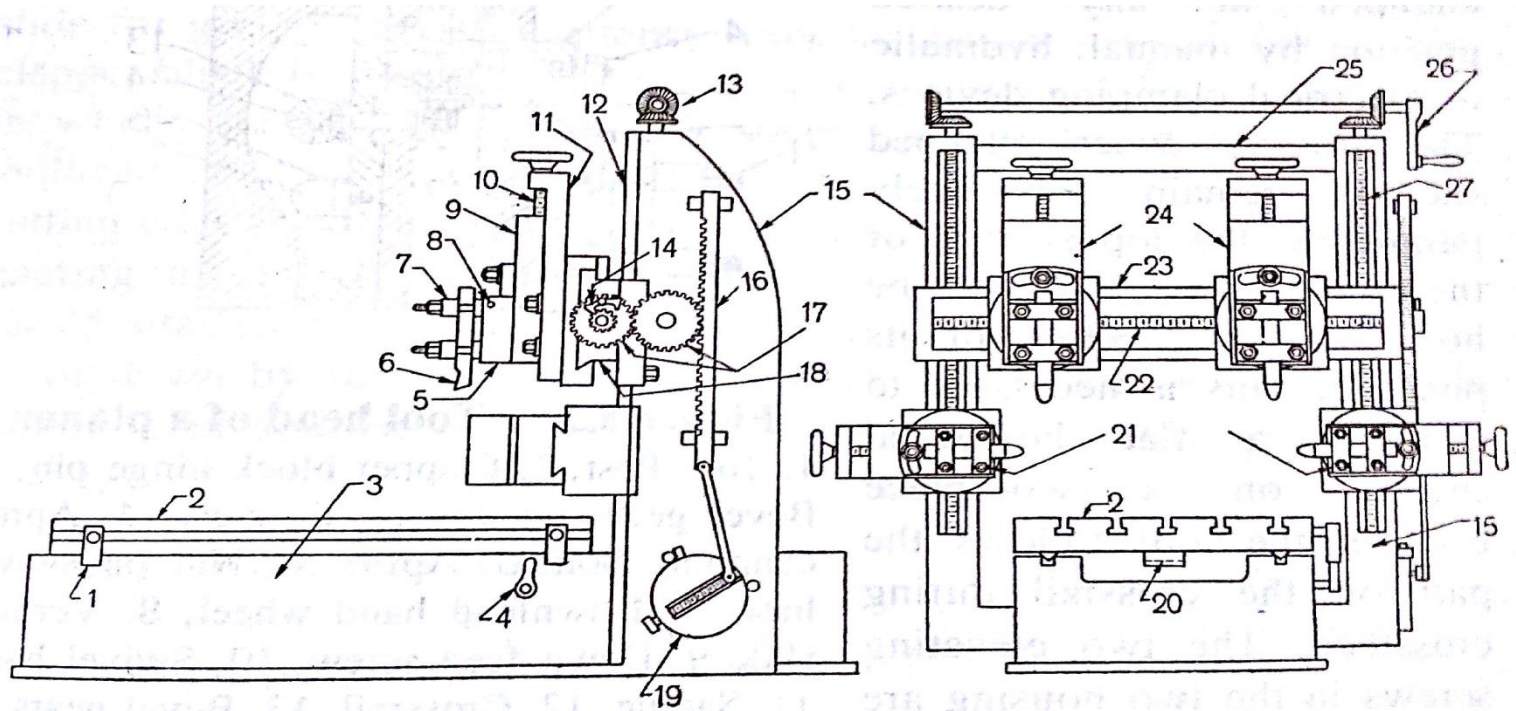
# Parts of a planer



<https://www.youtube.com/watch?v=b0pLvfdiZMM>

<https://www.youtube.com/watch?v=-QpLIQIF1qU>

# Parts of a planer



**Figure 8.1 Standard double housing planer**

1. Trip dog, 2. Table, 3. Bed, 4. Reversing lever, 5. Clapper box, 6. Tool, 7. Tool Post, 8. Hinge pin, 9. Vertical slide, 10. Downfeed screw, 11. Slide, 12. Guideways on column face, 13. Feed screw for elevating crossrail, 14. Pawl, 15. Column or housing, 16. Rack, 17. Feed gears, 18. Saddle, 19. Feed disc, 20. Table rack, 21. Slide toolhead, 22. Feed screw, 23. Crossrail, 24. Vertical toolheads, 25. Crossmember, 26. Crossrail, elevating handle, 27. Cross elevating screw.

# Differences between a shaper and a planer

SN	Shaper	Planer
1	Tool holding ram reciprocates past the stationery work	Table holding the work reciprocates past stationery cutting tool.
2	Single point cutting tool	Single point cutting tool
3	Only one tool at a time can be used	Multiple single point cutting tools can be used at a time with double or four tool heads
4	Meant for smaller jobs (Max size of work 900mmx900mmx900mm)	Meant for bigger jobs (Max size of work 3000mmx3000mmx 18500mm)
5	Overall rigidity of the machine is less	Overall rigidity of the machine is more
6	Accuracy is comparatively less as tool is held on overhanging ram	Accuracy is high as the tool is rigidly supported and work moves on precision ways
7	Due to smaller size consumes less power 10 to 15 hp	Due to larger size consumes more power upto 150hp

# Differences between a shaper and a planer

SN	Shaper	Planer
8	Shaper is suitable for small and medium jobs of smaller quantities	Planer is suitable for heavy jobs of larger quantities of identical pieces.
9	Rate of machining is slow	Rate of machining is faster
10	Work setting is easy and takes less time	Work setting is complex requires skill and takes more time.
11	Cutting and return speed varies along the length of the stroke	Cutting and return speed almost uniform along the length of the stroke
12	Relatively shapers are smaller, lighter and costs less.	Planers are larger, heavier and costlier
13	Tools used are relatively delicate	Tools used are robust