Chapter 12: Threshing –threshers for different crops, parts, terminology, care and maintenance

Threshing

- Process of detaching grains from ear heads or from the plants
- Threshing can be achieved by three methods namely rubbing, impact and stripping
- Threshing loosens the grains and separates from the stalk

Principle

- **Bases on the principle that when**
  - Impact is given on crops, the grains are separated
  - The crop mass passes thru a gap between drum and concave, wearing or rubbing action takes place-separates grain from panicle
- **Rupture of the bond between grains and ears is due to**
  - Impact of beaters or spikes over grains
  - Wearing or rubbing action
- **Strength of the bond between grain and panicles depends upon**
  - Type of crop
  - Variety of crop
  - Moisture content of grain
  - Ripening phase of grain

Efficiency and quality of threshing depends upon

- Drum speed
- No. of beaters
- Gap between drum and concave
- Quality & condition of plant mass fed to thresher
- Direction of feeding
- Rate of feeding

Methods

- **Based on power**
  - Manual – capacity varies from 30 to 50 kg/h
  - Power - capacity varies from 300 to 50 0kg/h

- **Based on type of feeding**
  - **Throw-in**
    - Entire crop is thrown into the cylinder
    - Major portion is threshed by initial impact or spikes of the cylinder
  - **Hold-on**
    - Holds the panicle end against the wire loop of the rotation

Based on flow of material

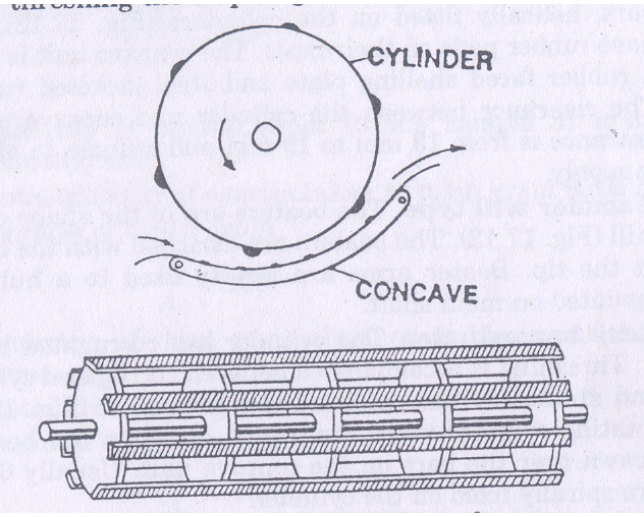
- **Through flow**
  - Threshed straw and separated grain flow in a direction perpendicular to the axis of the threshing cylinder
- **Axial flow**
  - Threshed straw and separated grain flow in a direction parallel to the axis of the threshing cylinder

Components of thresher

- Concave
- Threshing cylinder
- Cleaning unit

Concave

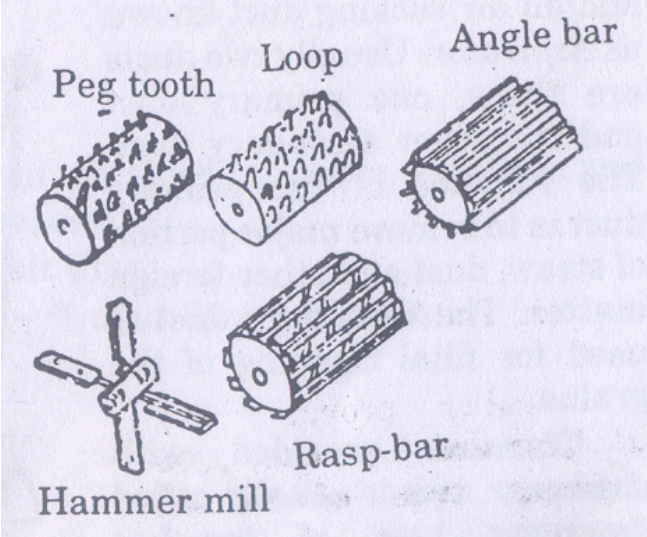
Concave shaped metal grating, partly surrounding the cylinder against which the cylinder rubs the grain from the plant or ear heads & thru which the grains fall on the sieve



Threshing cylinder

- Most important component of thresher
- Balanced rotating assembly comprising rasp beater bar or spikes on its periphery and their support for threshing the crop
- Types
    - Peg tooth
    - Wire loop
    - Rasp bar
    - Angle bar
    - Hammer mill

Types of threshing cylinder



Peg tooth

- The teeth on the concave & cylinder are so arranged that the cylinder teeth pass midway between the staggered teeth on the concave
- The clearance between the cylinder & the concave is adjusted according to the requirement
- As the stalks pass thru the clearance space, the grains get separated from the head due to impact action between the teeth

Wire loop

- Cylinder is studded with number of wire loops through out its outer periphery

- Mostly used on paddy thresher

Angle bar

- Cylinder is equipped with angle iron bars, helically fitted on the cylinder
- The bars have rubber pads on their faces
- The clearance between cylinder and concave unit at the entrance is from 13 mm to 19 mm and reduces to 6 to 9 mm only

Hammer mill type

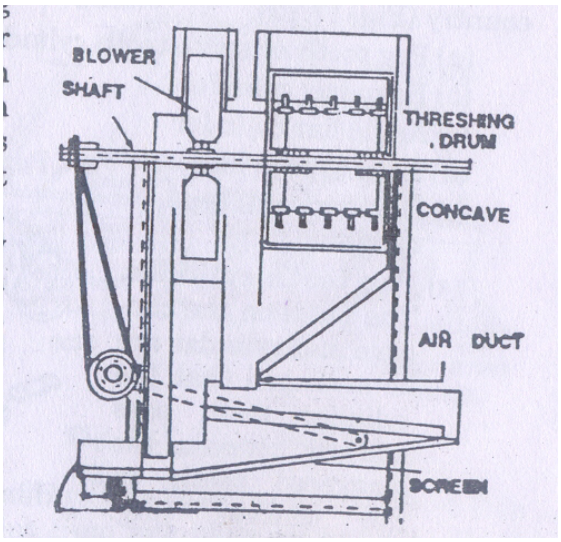
- Beaters are in the shape of hammer mill
- Beaters are attached with the beater arm at the tip
- Beater arms are rigidly fixed to a hub which is mounted on main shaft

Rasp bar cylinder

- Cylinder has corrugated bars round it
- Threshing is accomplished between corrugated cylinder bars and stationary bars of the concave portion
- Rotating cylinder takes the grains out from the head as it is drawn over the bars on the concave unit
- Usually 6 to 8 bars are spirally fixed on the cylinder

Cleaning unit

- Function is to separate & clean the threshed grain
- Mainly consists of two or more oscillating sieves, a fan and air sucking duct known as aspirator
- Usually two ducts viz. primary and secondary duct
- Function of primary duct is to remove major portion of straw, dust and other foreign matter
- Secondary duct is used for final cleaning of the grain



Thresher with aspirator

Threshing efficiency

- The threshed grain received from all outlets with respect to total grain input expressed as percentage by mass
  - Efficiency = 100- % of unthreshed grain
- Factors affecting threshing efficiency
  - Peripheral speed of the cylinder
  - Cylinder concave clearance
  - Type of crop
  - Moisture content of crop
  - Feed rate

Cleaning efficiency

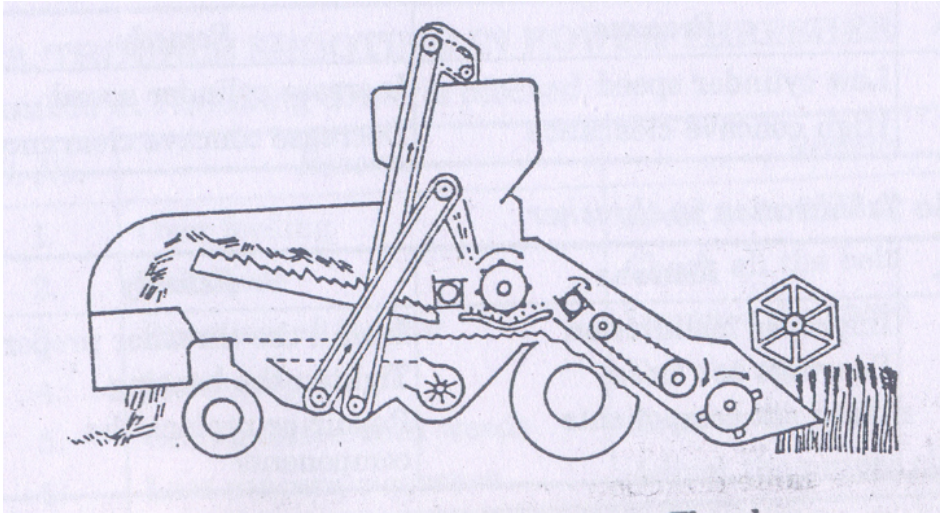
Efficiency = M/F X 100

- M – Quantity of clean grain obtained from the sample taken at main grain outlet
- F – Total quantity of sample taken at main grain outlet

Combine –Harvester-Thresher

- Machine designed for harvesting, threshing, separating, cleaning and collecting grains while moving through the standing crop
- Main functions are
  - Cutting the standing crops

- Feeding the crop to threshing unit
- Threshing the crops
- Cleaning the grains from straw
- Collecting the grains in a container



Combine-Harvester-Thresher