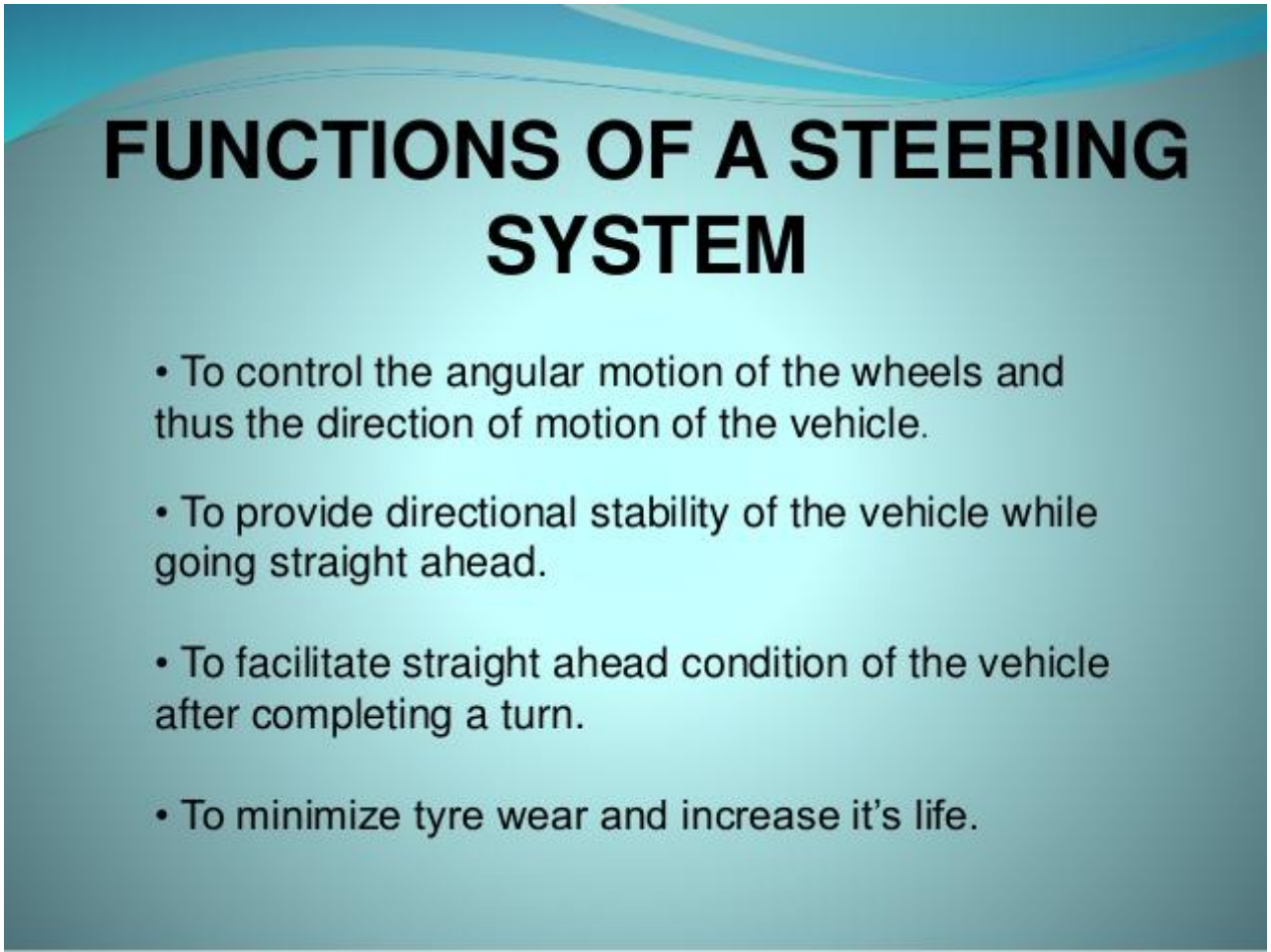
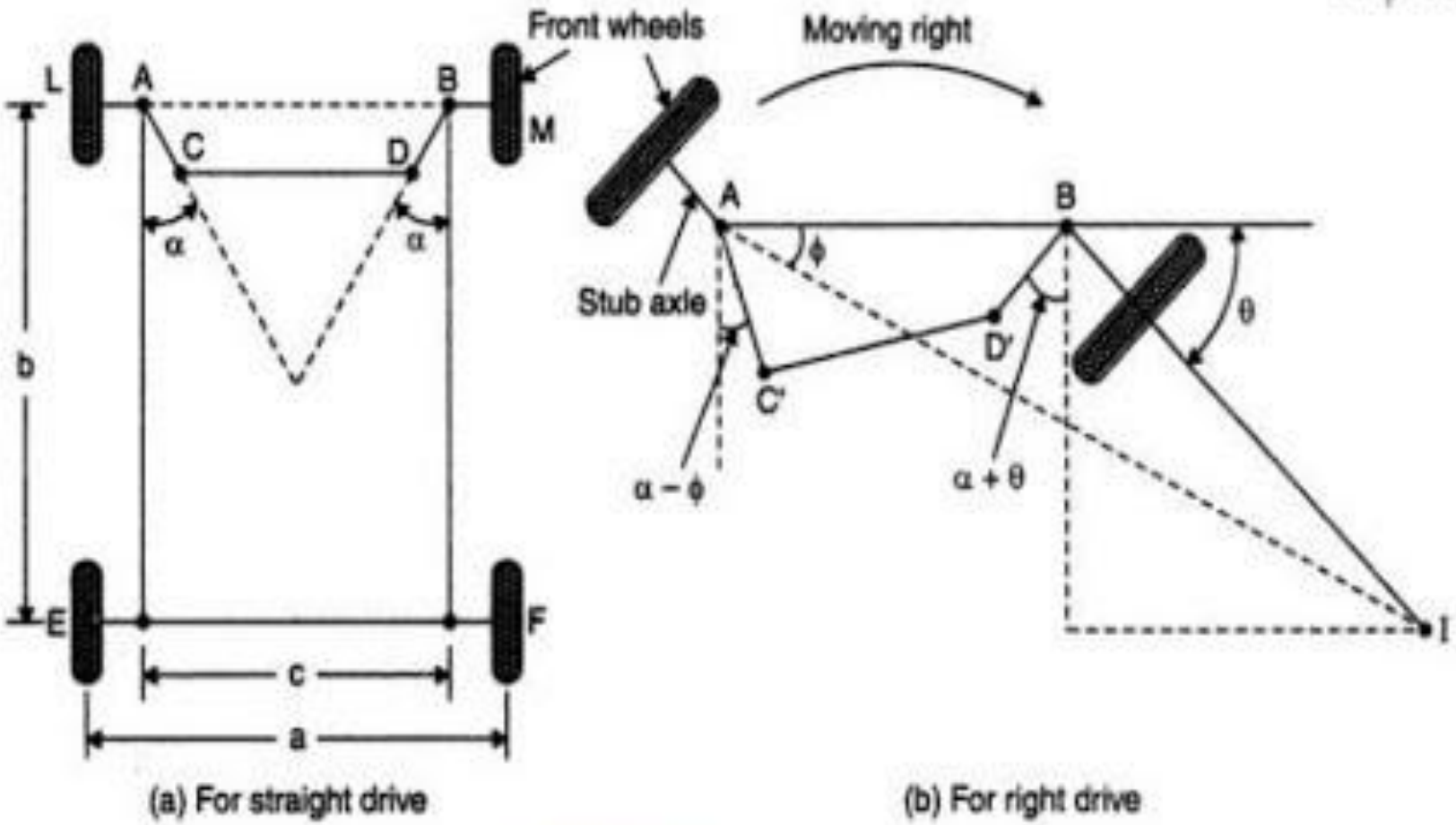
The **steering system** converts the rotation of the **steering** wheel into a swivelling movement of the road wheels in such a way that the **steering**-wheel rim turns a long way to move the road wheels a short way. The **system** allows a driver to use only light forces to **steer** a heavy car.



Ackerman steering mechanism

$$\tan\alpha = \frac{\sin\phi - \sin\theta}{\cos\phi + \cos\theta - 2}$$



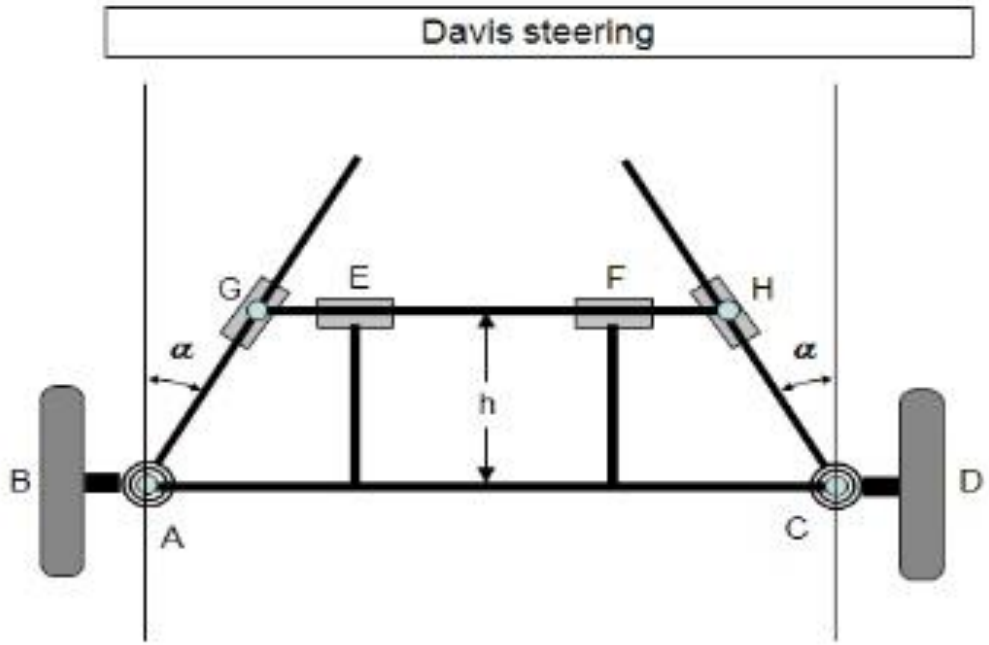
Ackermann steering gear mechanism.

- When a vehicle is turning, the inner front wheel needs to turn at a different **angle** to the outer because they are turning on different radii.

- The **Ackermann steering mechanism** is a geometric arrangement of linkages in the **steering** of a vehicle designed to turn the inner and outer wheels at the appropriate angles.

Davis Steering

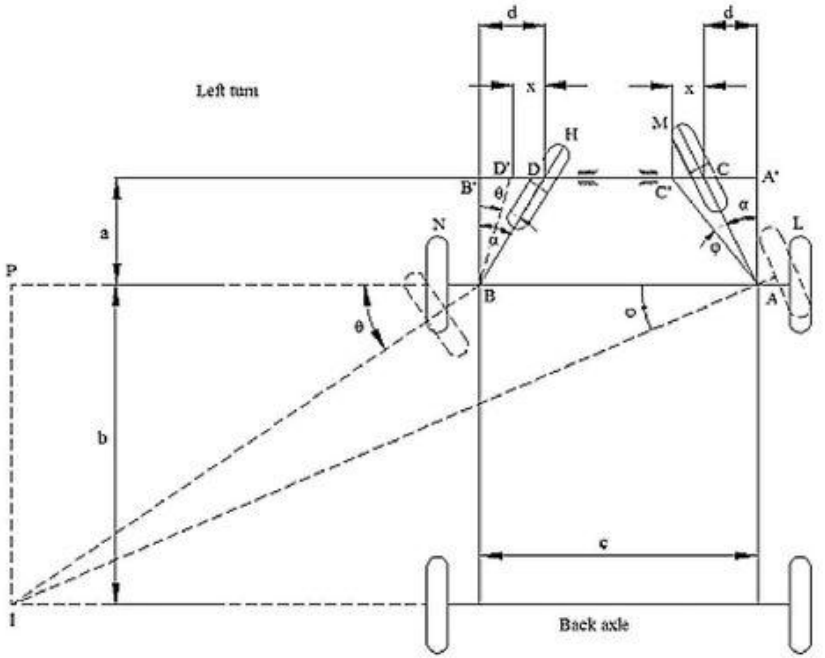
- This is an exact steering gear mechansm. This mechanism fulfils the above steering condition. But due to presence of more sliding members, the wear will be increased and this eliminates the accuracy.



1.Davis steering gear mechanism:

It is the "**PERFECT**" steering gear mechanism.

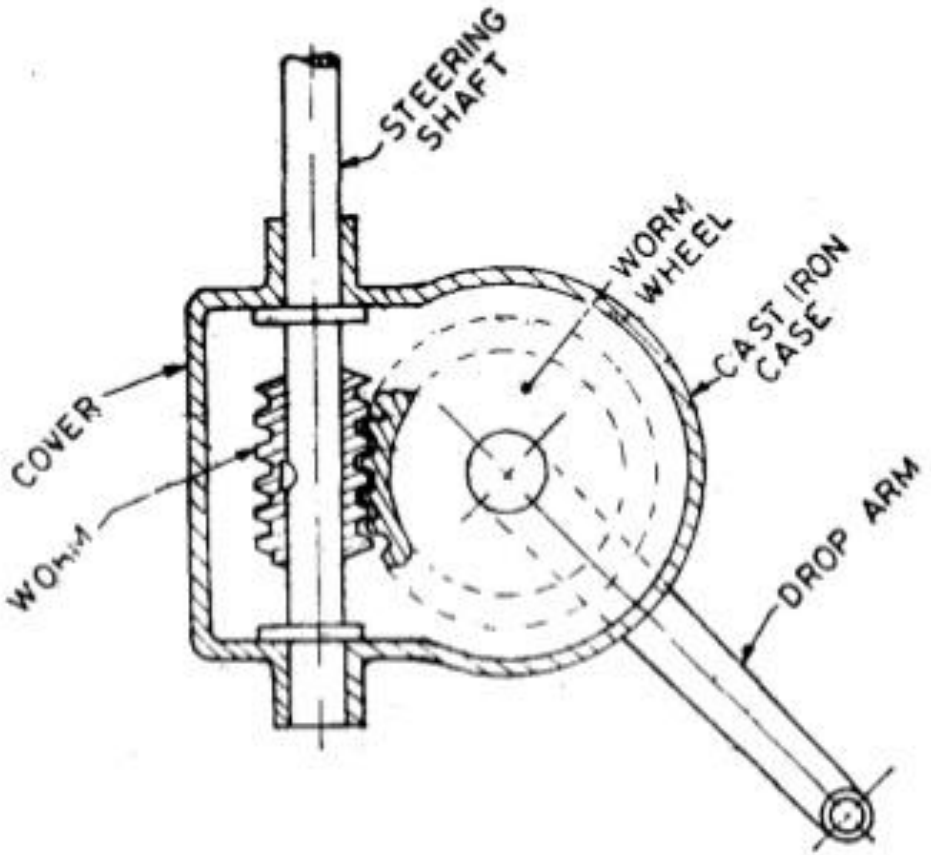
Due to presence of many number of sliding pairs it is not preferred for general purpose.



- **Davis steering gear** is an exact **steering gear mechanism**.
- It has two sliding pairs and two turning pairs.
- In this **mechanism**, the slotted links are attached to the front wheel axle, which turn about two pivotal points.
- It has the rod and it is constrained to move in the direction of its length by the sliding two members.

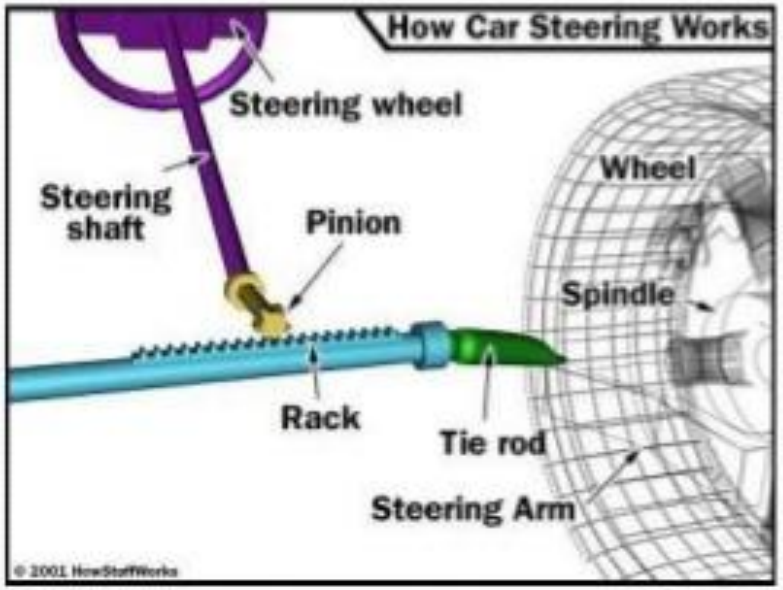
WORM AND WHEEL STEERING GEAR

- Worm wheel is carried in bearings in a cast iron case.
- Worm wheel is connected to a drop arm.
- The worm which is keyed on to steering shaft meshes with the worm wheel.
- Steering wheel is mounted at the upper end of the steering shaft.
- When driver rotates the steering wheel, drop arm moves in backward or forward direction.
- This results in motion of the stub axles.

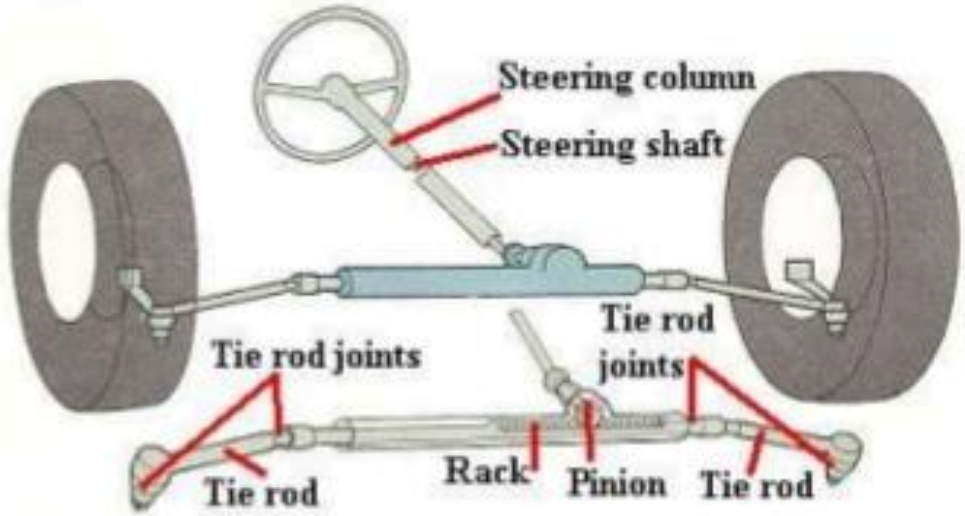


Rack and Pinion steering gear

- This type of steering gear is use on light vehicles like cars and in power steering.
- It occupies very small space and uses lesser number of linkage components compared to worm and wheel type of gear
- The rotary motion of the steering wheel is transmitted to the pinion of the steering gear through universal joints.
- The pinion is in mesh with a rack.
- The circular motion of the pinion is transferred into the linear rack movement , which is further relayed through the ball joints and tie rods to the stub axles for the wheels to be steered.



BASIC STEERING SYSTEM



PINION GEAR :- Rotated by the steering wheel and steering shaft, it's teeth mesh with the teeth on the rack.

RACK :- Long steel bar with the teeth along one section, slides sideways as the pinion gear turns.

TIE RODS :- Connects the rack with the steering Knuckle.

System Overview

Types Of Electric Power Steering

1 Column type EPS

2 Pinion type EPS

3 Dual pinion type EPS

4 Offset Ball Screw type EPS

5 Direct drive type EPS