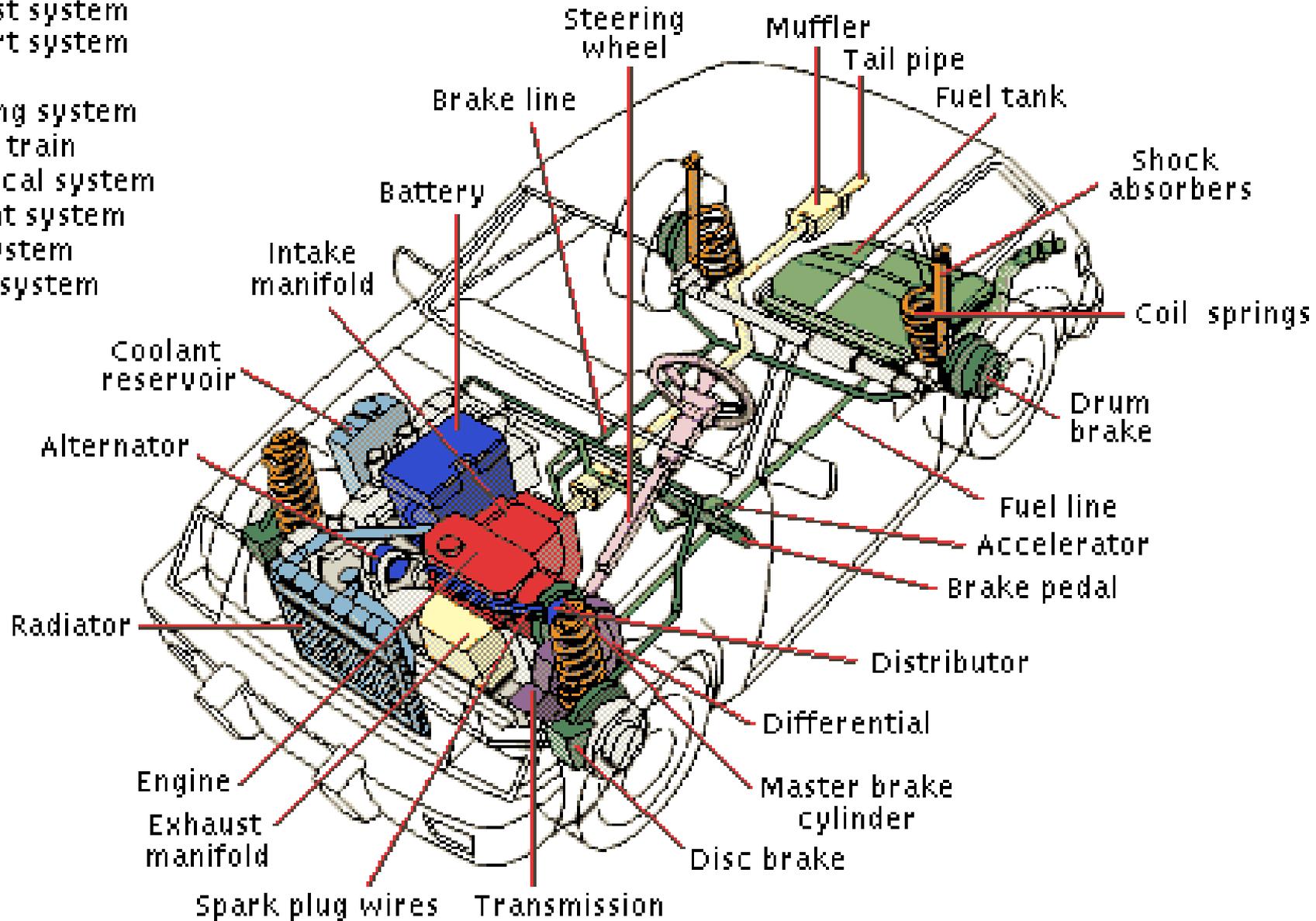


CLASSIFICATION OF AUTOMOBILES

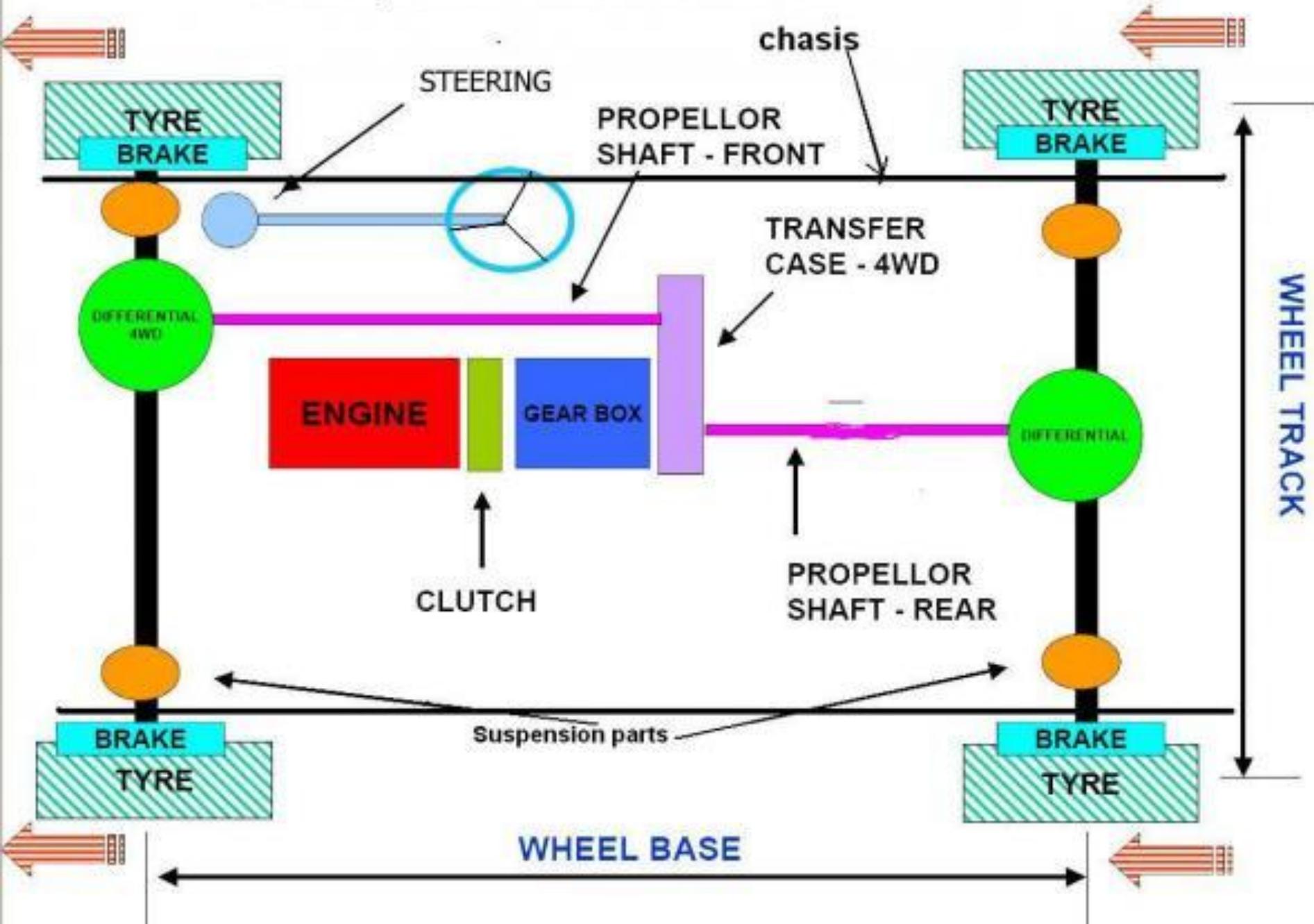
- 1) ***Based on Purpose***: Passenger, Goods, Special Purpose
- 2) ***Based on load carrying capacity***: LMV – Light motor vehicle, HMV – Heavy motor vehicle
- 3) ***Based on Fuel used***: Petrol, Diesel, Gas, Electric, solar, hybrid
- 4) ***Based on position of steering wheel***: Left hand drive, right hand drive
- 5) ***Based on Drive of vehicle***: front wheel drive, back wheel drive, all wheel drive
- 6) ***Based on transmission systems***: Manual, automatic, semi automatic
- 7) ***Based on number of wheels***: 2 wheeler, 3 wheeler, 4 wheeler, 6
- 8) ***Based on position of engine***: front engine, rear engine

LAYOUT OF AN AUTOMOBILE

- Exhaust system
- Support system
- Engine
- Steering system
- Power train
- Electrical system
- Coolant system
- Fuel system
- Brake system



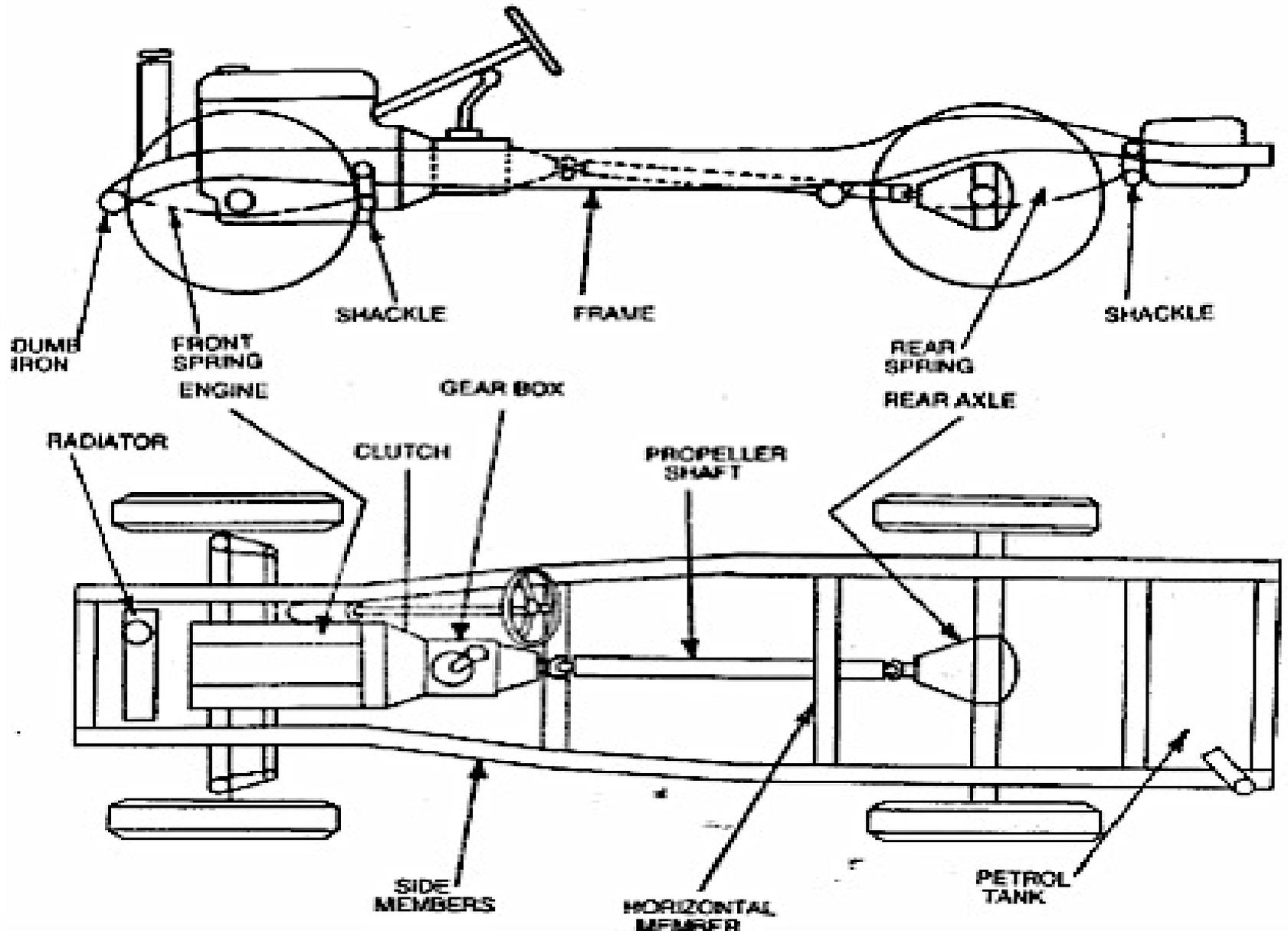
Basic layout of a 4wheel drive motor car



COMPONENTS OF AN AUTOMOBILE

- a) ***The Frame and Chassis*** : It supports engine, wheels, body, braking system, steering, etc.
- b) ***The Engine or Power Plant*** : It is source of power.
Air intake system, Fuel system, coolant system, lubrication system, ignition, exhaust system
- c) ***The body.***
- d) ***Transmission system***: transmits power from the engine to the car wheels. It consists of clutch, propeller shaft, axles and differential.
- e) ***Accessories***: light, air conditioner/heater, stereo, wiper, etc.

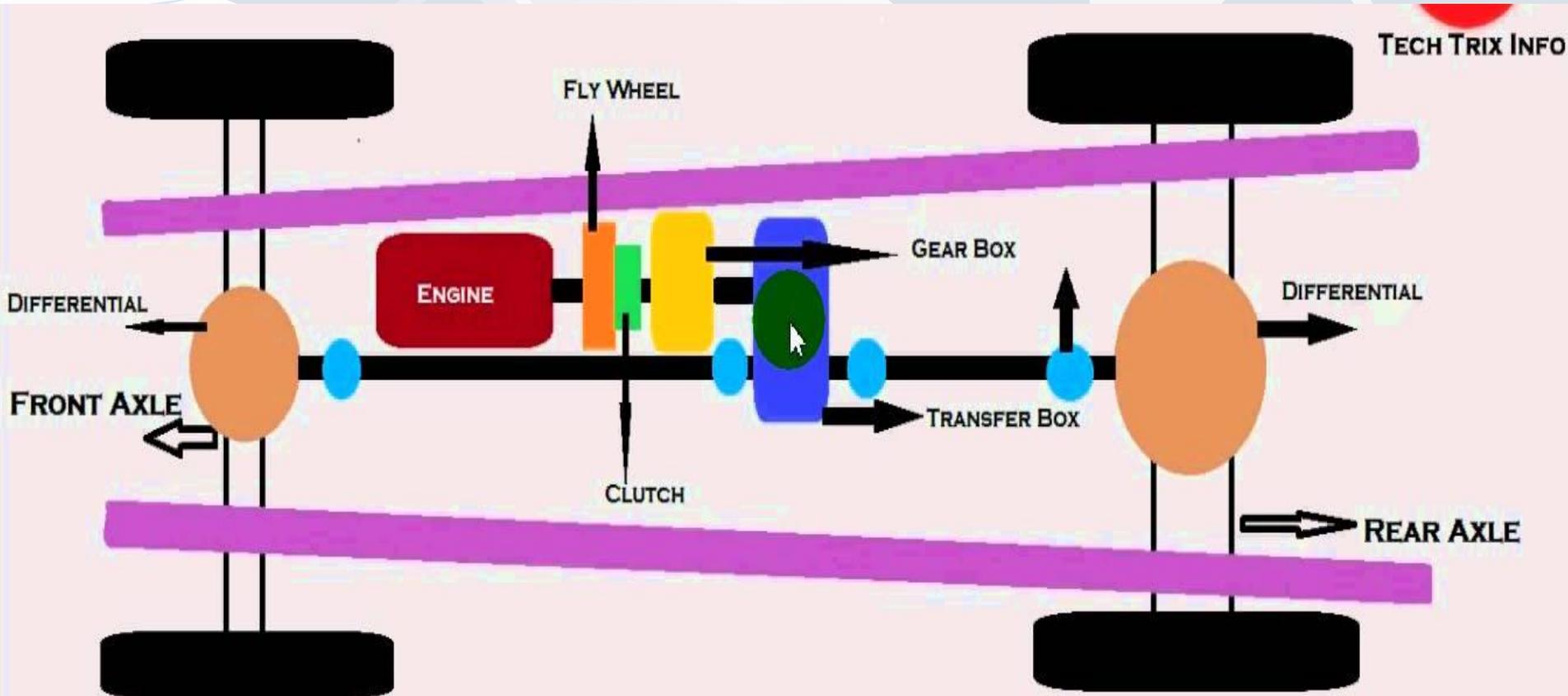
CHASSIS & FRAME



TRANSMISSION SYSTEMS

Clutch, Transmission (gear box), Propeller shaft, Differential, Axles

*connect/disconnect engine with wheels without shock,
*provide different gear ratios, *turn drive through right angle



CLUTCH

Helps to engage and disengage the driven shaft from driver shaft

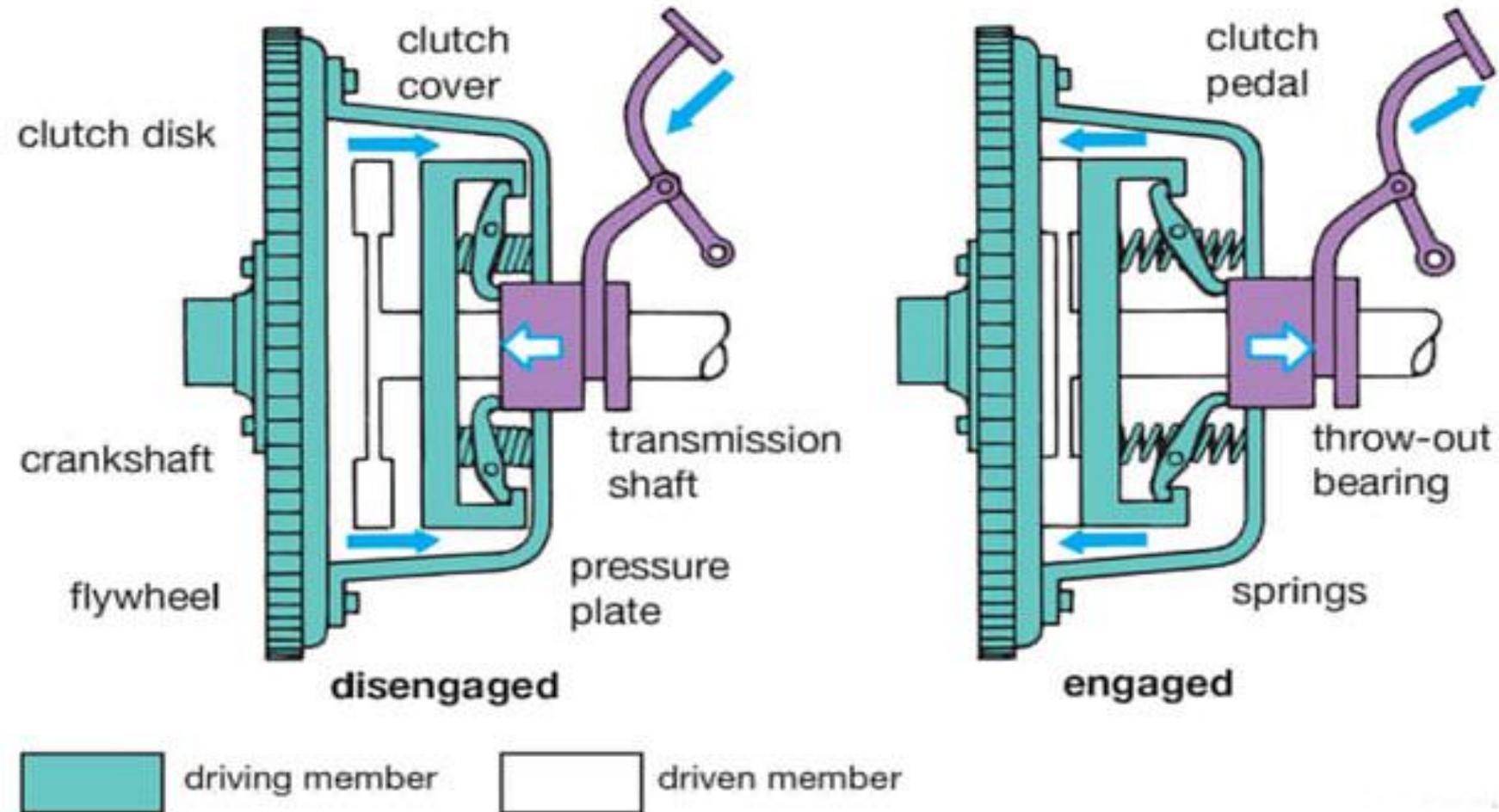
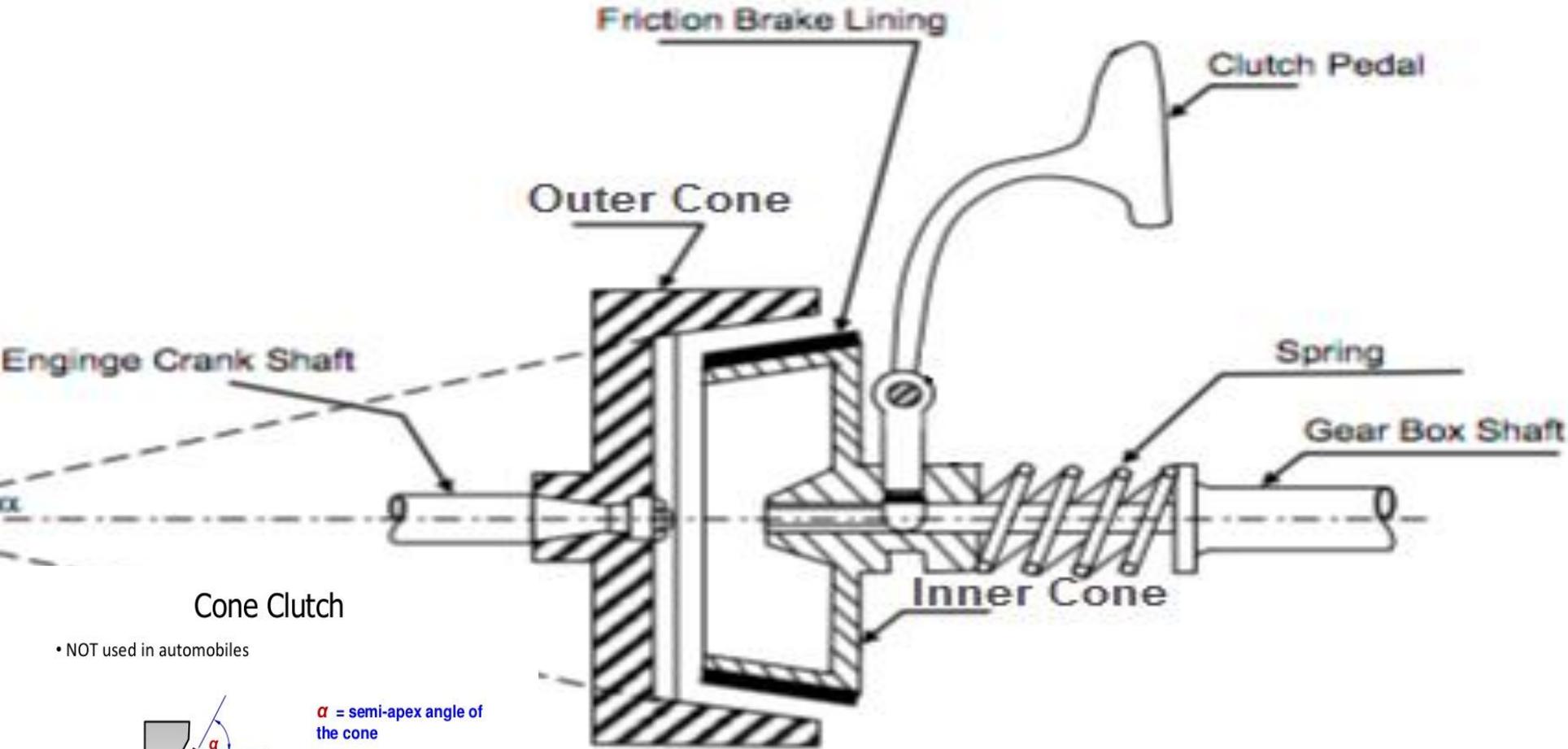


Fig. 10.2: Principle of friction clutch

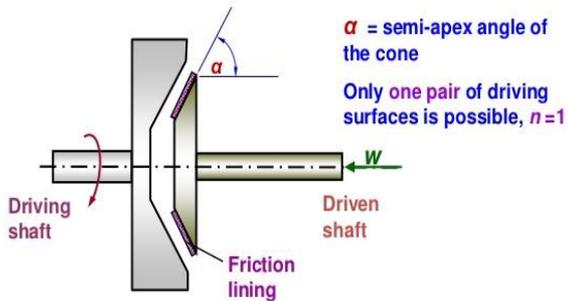
(Source: <http://media.web.britannica.com/eb-media/41/104141-004-5B075D35.gif>)

CONE CLUTCH



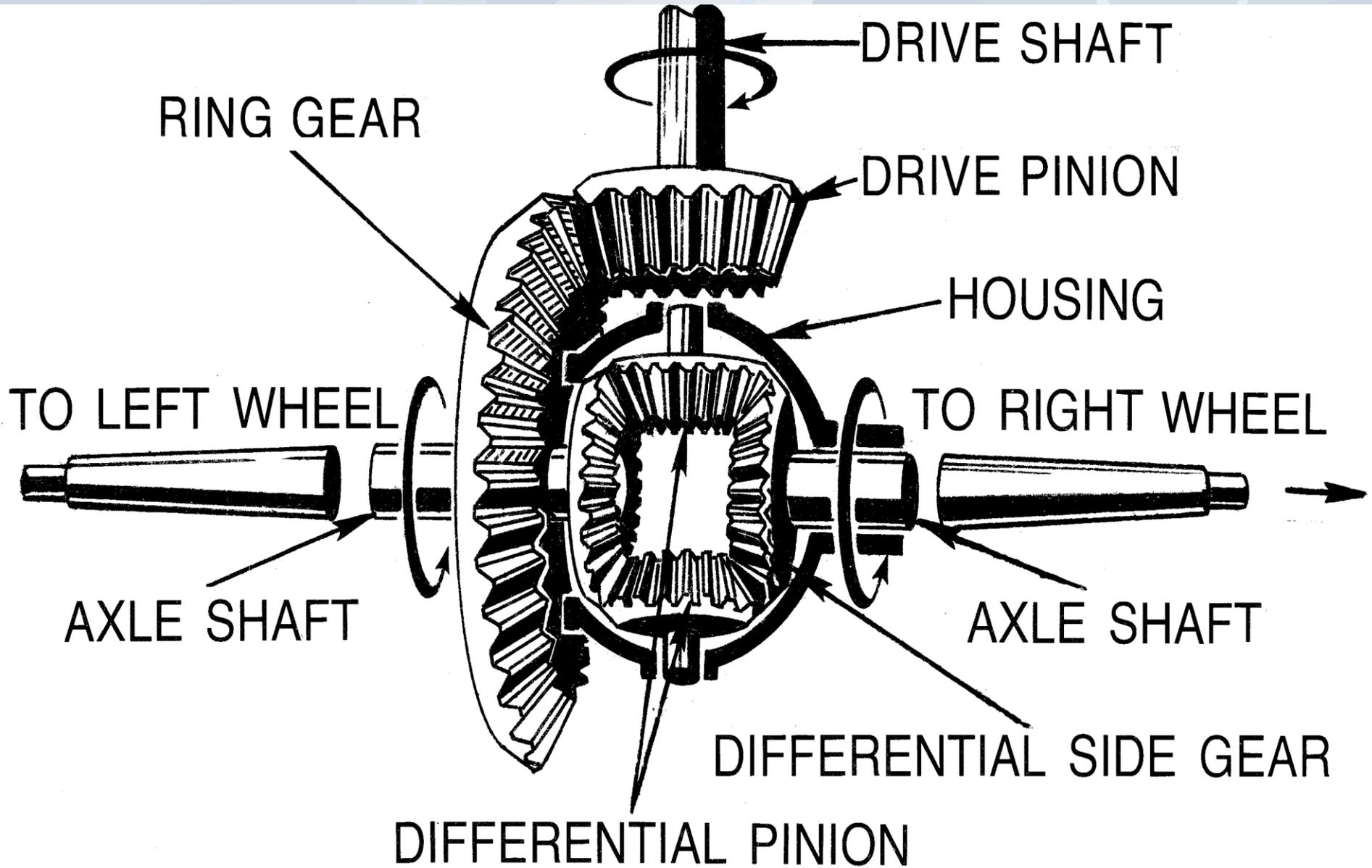
Cone Clutch

- NOT used in automobiles



Maximum torque transmitted (T) = $\mu W r_m \text{ cosec } \alpha$

DIFFERENTIAL

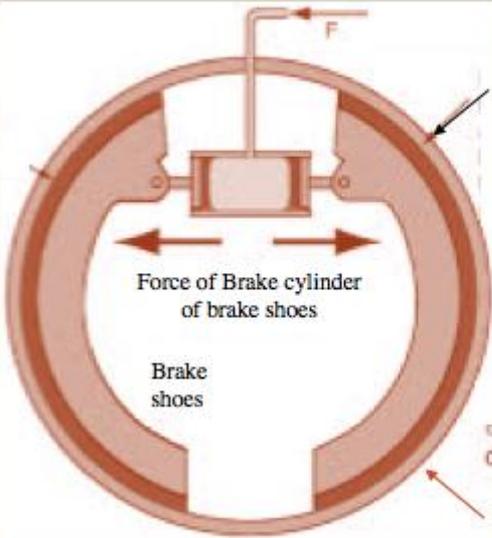


BRAKES

Used for decelerating or stopping a machine

Hydraulic brakes

Force on brake fluid by
brake pedal mechanism

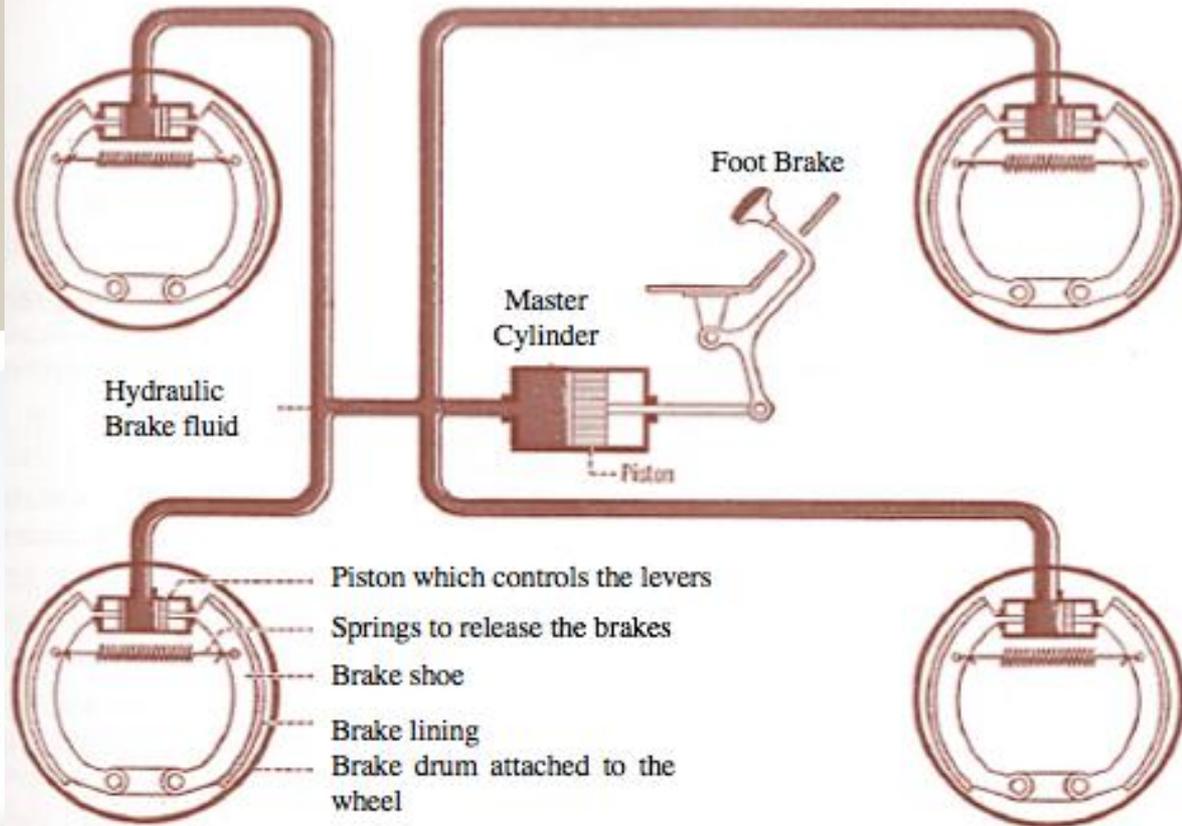


Friction force of the
brake shoes against
the metal brake
drum provides the
braking force to
stop the car

Force of Brake cylinder
of brake shoes

Brake
shoes

Brake drum



Foot Brake

Master
Cylinder

Hydraulic
Brake fluid

Piston

Piston which controls the levers

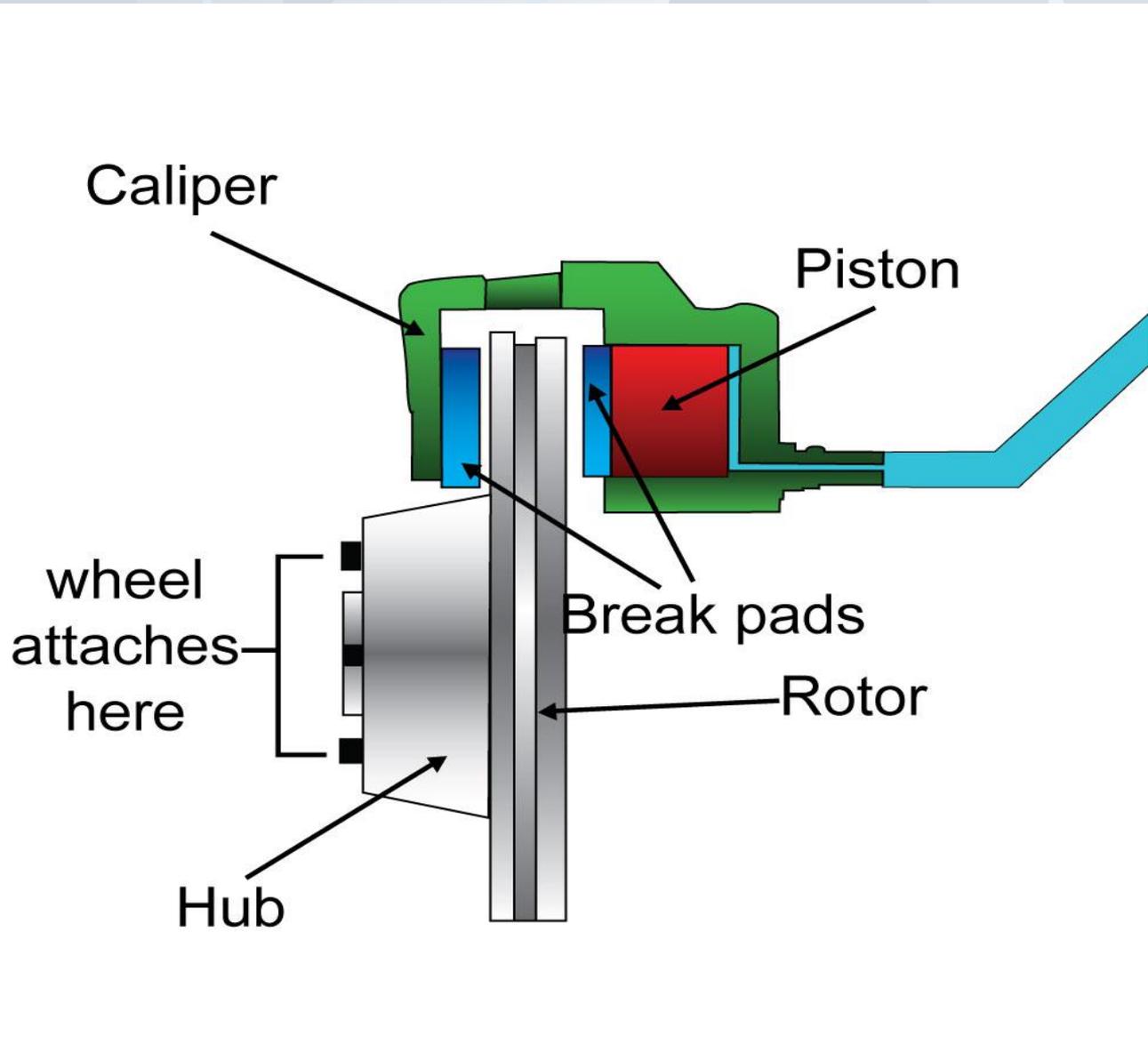
Springs to release the brakes

Brake shoe

Brake lining

Brake drum attached to the
wheel

DISC BRAKES



Suspension System:

The job of a car suspension is :

- *to maximize the friction between the tires and the road surface*
- *to provide steering stability with good handling and to ensure the comfort of the passengers*
- *To prevent the road shocks from being transmitted to the vehicle components*
- *To safeguard the occupants from road shocks.*
- *To preserve the stability of the vehicle while in motion.*

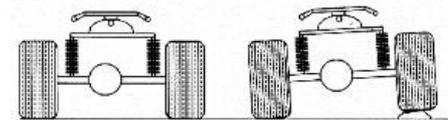
A basic suspension system consists of springs, axles, shock absorbers, arms, rods, and ball joints.

Two types:

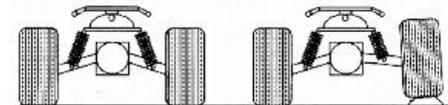
- *Rigid suspension: Road springs are attached to a rigid beam axle.*
- *Independent system: No rigid axle beam and wheel is free to move vertically without any reaction on the other wheel.*

Types of Suspension System

LOW SPEED BUMP WITH THE PATENTED LEHMAN "NO LEAN" SUSPENSION



LOW SPEED BUMP WITH INDEPENDENT SUSPENSION



1. Non-independent/Rigid suspension has both right and left wheel attached to the same solid axle. When one wheel hits a bump in the road, its upward movement causes a slight tilt of the other wheel.

2. Independent suspension allows one wheel to move up and down with minimal effect to the other.

Steering System

- Front wheels can be turned to left and right by steering system so that the vehicle can be steered. It is mechanically linked to the wheels to provide the steering control.*
- It also provides directional stability to vehicle when the vehicle moves ahead in straight line. Now-a-days, many vehicles are equipped with power steering which uses pressure of a fluid to reduce steering effort.*
- When driver turns the steering wheel, a hydraulic mechanism comes into play to provide most of the effort needed to turn the wheel.*
- There are two steering systems in common use - the rack and pinion and the steering box.*

