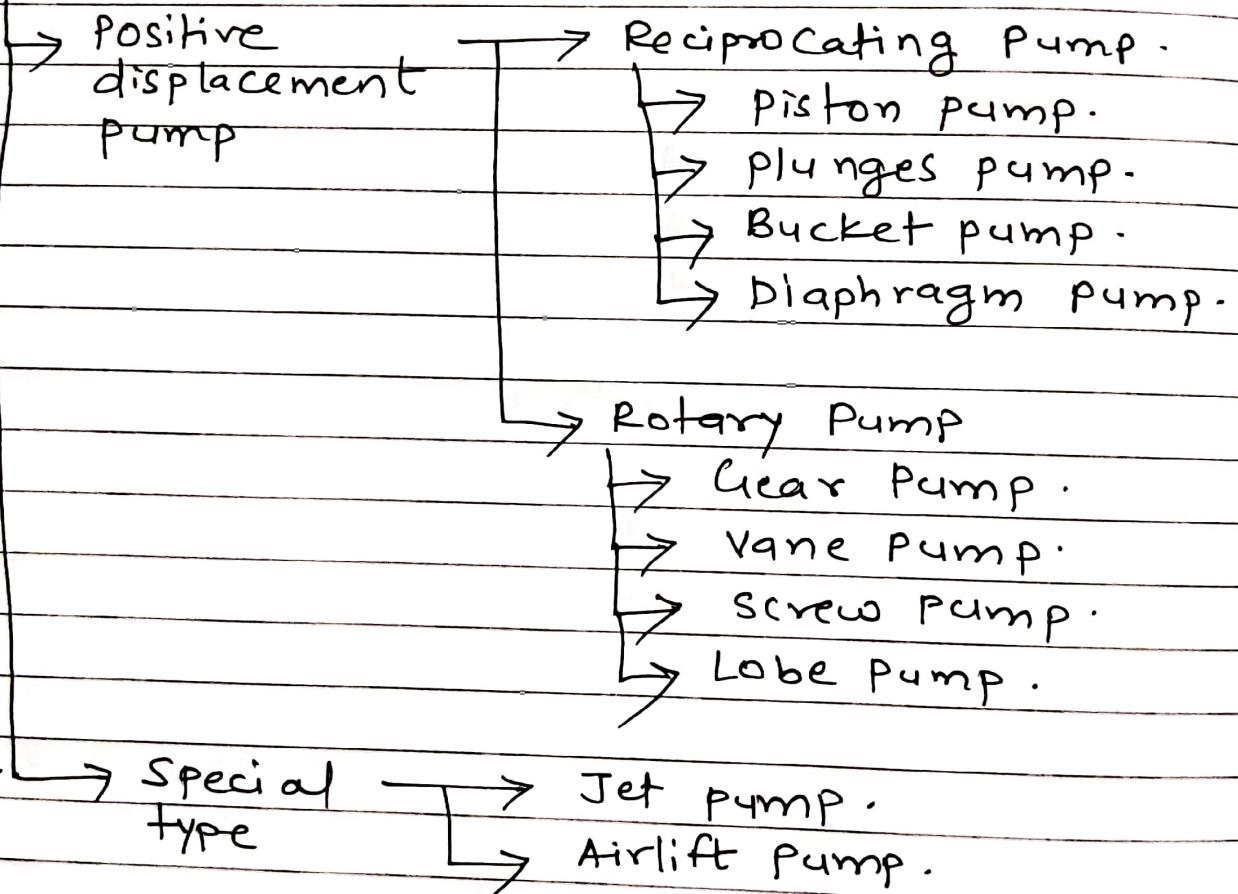
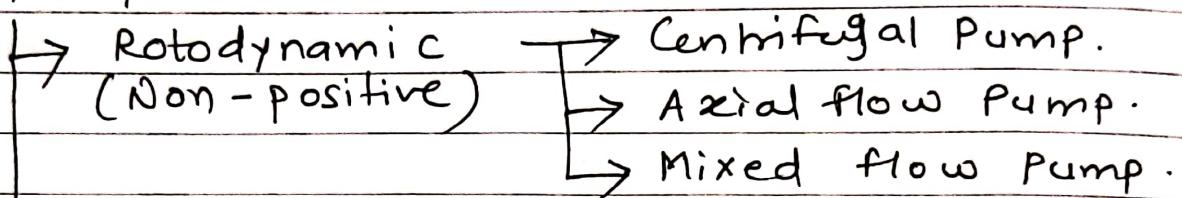


* Classification of Pumps

Pumps



I) Rotodynamic pumps, liquid is subjected to whirling motion by rotating disc having number of blade (usually 6 to 12) known as impeller & gain in kinetic energy of liquid is converted into pressure energy inside pump.

Centrifugal pump is most widely used
III) rotodynamic pump is suitable for low head & high discharge.

II) Positive displacement pump:

fixed quantity of liquid is taken inside the available volume & positively displaced after every rotation of shaft.

Reciprocating pump can be classified as ; -

(1) A/C to liquid being in contact with piston

(a) Single acting pump in which liquid remains in contact only with one side of piston

(b) Double acting pump in which liquid remains in contact with both sides of piston .

(2) A/C to no. of cylinder in pump :-

(a) Single cylinder pump -

(b) Multicylinder pump .

(3) A/C to type of reciprocating element ;

(a) Piston pump :

(b) Plunger pump

(c) Bucket pump

Reciprocating elements

(4) A/C to presence of air vessel :

(a) with air vessel

(b) without air vessel .

* Reciprocating pumps :-

I) Diagram } Refer ppt.

II) Components :

(a) Piston & cylinder : Piston reciprocates inside cylinder. Reciprocating motion is obtained by means of connecting rod. Piston is connected to connecting rod by piston pin.

(b) Crank & connecting rod mechanism :-

Crank is mounted on crankshaft which is driven by prime mover. Crank is connected to piston by connecting rod which converts rotary motion of crank into reciprocating motion of piston.

(c) Suction pipe : It connects source of water (sump) & cylinder.

(d) Suction valve : It is a non-return valve which admits water from suction pipe into cylinder.

(e) Delivery pipe : Water is discharged from cylinder at high pressure to required height by means of delivery pipe.

(f) Delivery valve : It is a non-return valve which admits water from cylinder to delivery pipe.

* Working :-

- (1) When power is given to crank, it will rotate & connecting rod also displace along crank. Due to this piston connected to connecting rod can move in linear direction.
- (2) If crank move outwards, piston moves towards right & creates vacuum in cylinder. Then vacuum causes suction valve to open & liquid from source is sucked by suction pipe into cylinder.
- (3) If crank move inwards or towards the cylinder, piston will move to its left & compress liquid in cylinder. Due to this pressure makes delivery valve to open & liquid will discharge through delivery pipe.
- (4) If piston reaches its extreme left position, entire liquid present in cylinder is delivered through delivery valve. This cycle repeats. --.

Advantage :

- (a) It is durable
- (b) It is more efficient

Disadvantage

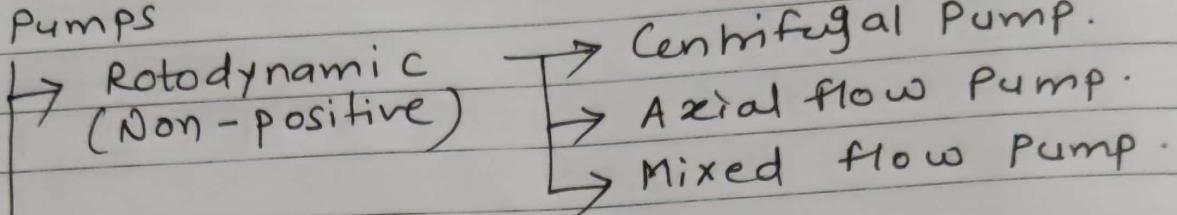
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- (b) It creates pulsation.

Application

- (a) Oil drilling operation
- (b) Pneumatic pressure sys-
- (c) Light oil pumping.

* Classification of pumps ?

Pumps



Positive displacement pump

Reciprocating Pump

- Piston pump.
- plunges pump.
- Bucket pump.
- Diaphragm pump.

Rotary Pump

- Gear Pump.
- Vane Pump.
- Screw Pump.
- Lobe Pump.

Special type

Jet Pump.

Airlift Pump.

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- (c) Light oil pumping.

* Application of pumps:

- (1) Pump water from source to field for agricultural irrigation purpose.
- (2) In petroleum installation to pump oil.
- (3) Power plant to circulate feed & cooling water.
- (4) Water supply in town,
- (5) Hydraulic control system
- (6) Transfer chemical liquid from one place to another.
- (7) Pumping water in building & for fire fighting purpose.
- (8) Hydraulic crane, lifts etc.

* Centrifugal pump:

If mechanical energy is converted into pressure energy by action of centrifugal force acting on fluid, the hydraulic machine is called centrifugal pump. These are known as rotodynamic pumps as dynamic pressure is developed to lift liquid from lower to higher level.

Diagram :

Working :

A centrifugal pump works on principle that when certain mass of liquid is made to rotate by an external prime mover, it is thrown away from central axis of rotation & centrifugal head is imparted which rises liquid to higher level.

Steps :-

(1) The delivery valve is closed & suction pipe casing & portion of delivery pipe upto delivery valve is completely filled with liquid so that no air pocket is left. This process is called priming.

(2) Electric motor is started which rotates impeller. Delivery valve is kept closed. This creates strong suction or vacuum at eye of impeller & causes liquid to rise into suction pipe from sump.

(3) speed of impeller is gradually increased till impeller rotates at its normal speed.

(4) After impeller attains its normal speed, delivery valve is opened. Now liquid is continuously sucked by suction pipe & passes through centre (eye) of impeller. Liquid is allowed to flow through impeller vanes & attain higher velocity & comes out at outlet tip of vanes into casing. As casing is designed with a gradually increasing area, velocity of liquid decreases & pressure head increases.

(5) From casing liquid passes into delivery pipe & is lifted to required height.

(6) When pump is stopped, delivery valve should be closed to stop backflow of liquid, but if a foot valve (non-return valve) is provided then it is not necessary to close delivery valve as it will not allow the back flow to occur.

Advantage & Disadvantage } Refer ppt.

Application:-

(1) Pump are used in building to pump regular water.

(2) Used in fire protection related service.

(3) Used to transport lactose & other drugs.

(4) Used in coolant recirculation, refrigerant.

(5) Agricultural use.