

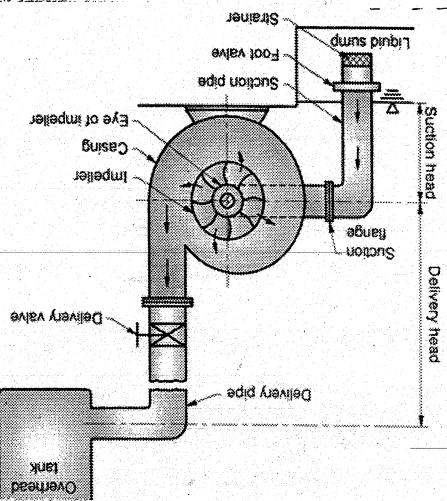
Above diagram shows systematic sketch of centrifugal pump.

Construction

Function = The main function of pump is to move liquid from one position to another position by increasing pressure energy of liquid.

It is an device which converts mechanical energy of electric motor shaft into hydraulic energy.

Pumps :-



Working (Centrifugal pump)

→ Suction pipe is connected to impeller eye.

→ delivery pipe is connected to other side of casing.

→ If this specially gradually increases, it causes suction area clogging.

to casting

gulf & outlet port connected

force on air.

exerts less centrifugal

member which traps air and
lobes specially shaped rotting

to trap air

causing enclose lobes and help

Casing made by CI ~~or~~ steel

to lobes.

Motor to gives ready motion

If consists of

Construction -

Fusiform displacement blockers.

with the application of centrifugal force

circulate air from one section to another section.

The main function of blower is to

Function :-

1) Fusiform displacement blockers.

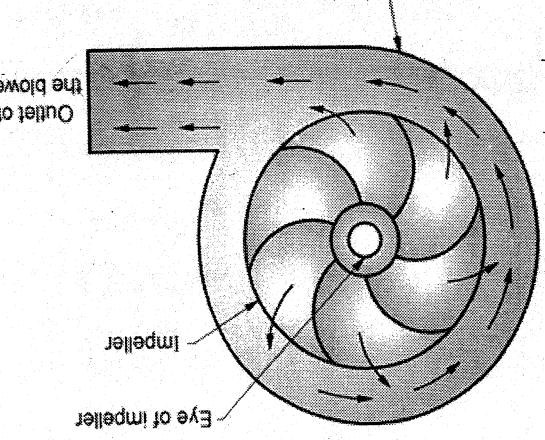
2) Centrifugal blockers.

e.g., Radial lobe blower

1) Fusiform displacement blocker

Blows high flow types.

Blowers



Motor - as electrical device

To supply power & rotating motion of shaft

Impeller with vanes = is mounted on motor shaft

Vanes / blades cut forward

at backward curved

Construction

Object of modernize pressure

It is used to blow air on particles

Centrifugal Blower

as discharge thro', outlet port.

When lobe reaches near outlet part. pressurised

lobes and casing

and trapped between in small and between

→ When rotor rotates air pulled inside blower

another will be driven lobe.

First lobe will be driving rest lobe and

another lobe also drives with same speed.

lobe another lobe paired with first lobe. so

first of all input power is given to one lobe.

Working of positive displacement blower

converging diverging section.

inlet outlet port has

holes

If it is a device which converts mechanical energy of motor shaft into pneumatic energy of air. If such the atmospheric air and delivery system at high pressure.

Compressors

- (i) For complete combustion purpose.
- (ii) For heating and cooling systems.
- (iii) For dust control.
- (iv) Industrial vacuum purposes.
- (v) In pneumatic conveying.
- (vi) For gas movement in petrochemical industries.
- (vii) For filter flushing.

Applications of blowers

Impeller may be mounted in single or double stage according to required speed and air pressure. As soon as motor started impeller starts to rotate. Vacuum is created inside the impeller eye and air enters into impeller axially after divided between impeller blades. Impeller continuously rotating centrifugal force develops on air, due to which air traction outward during this velocity of air increases and in diffuser and using pressure increases and it is discharged out.

$$\text{Working} =$$

Impeller may be mounted in single or double stage according to required speed and air pressure.

Centrifugal compressor.

c) Vane type - " -

b) screw blower type - " -

a) Root blower type rotary compressor

~~Centrifugal compressor~~

(b) Rotary compressor

b) Double acting compressor.

a) Single acting compressor

a) According to number of piston actions

b) Multi stage compressor

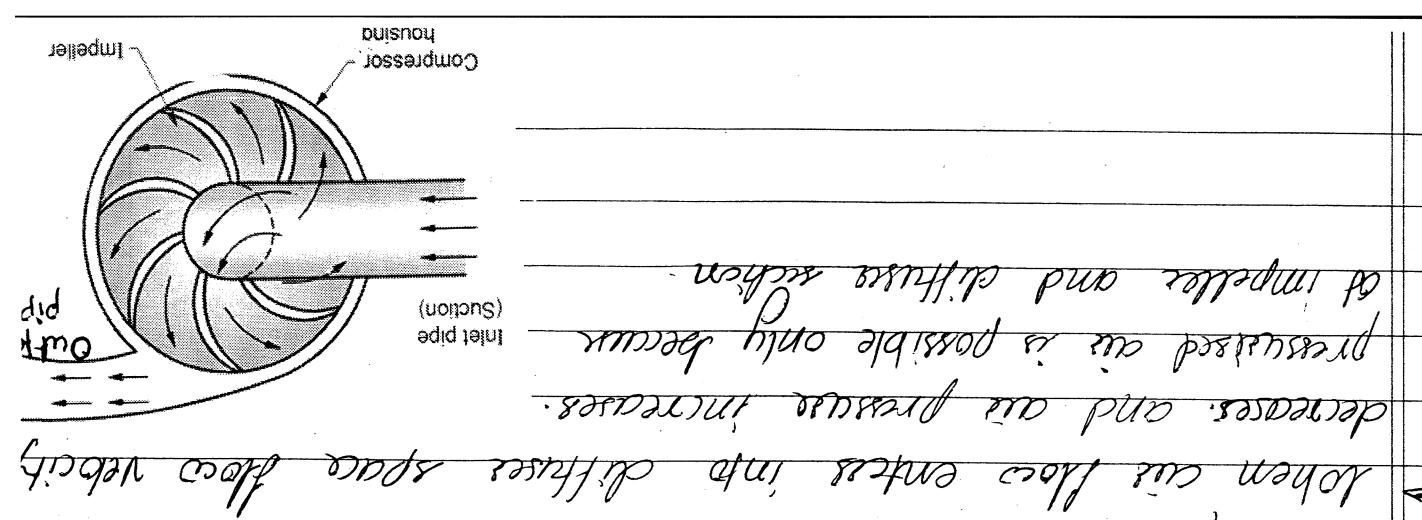
a) Single stage compressor

a) According to number of stages.

(A) Reciprocating air compressor.

Air compressors

Classification of compressors.



\rightarrow When air flows into the diffuser space which decreases and due to pressure increase.

\rightarrow pressure is possible only because of impeller and diffuser action.

\rightarrow when air flows into the diffuser area there is increase in velocity of air flow increases.

\rightarrow due to this pressure increase develops on air because of this pressure and velocity increases in eye.

\rightarrow At starting air is allowed to pass through pressure on fluid.

If works on centrifugal force which develops on centrifugal force.

Working

Impeller: Is provided with blades which rotate forward or backward blades. Impeller is mounted on motor shaft and by rotating it exerts centrifugal force on air if exerts centrifugal force on air which encloses and protect all parts of casing and inlet pipe: Steel or cast iron casing consists of following components.

1) Casing and inlet pipe: Steel or cast iron casing which encloses and protect all parts of which which is provided with blades in which air is moved centrifugally or discharge air through outlet pipe.

= Construction

Centrifugal Compressor

Applications of springs

- In automobile in clutchs brakes, spring to apply force
- For force measurement in spring balance
- In clocks & keys.
- In vehicle suspension systems.
- In door locks. & door closer.
- Shock absorbers.

Springs

It is defined as elastic body whose function is to deflect or deform when load is removed.

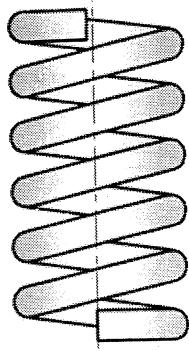
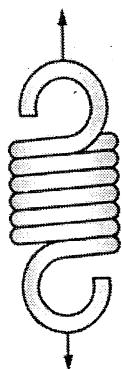
load is applied and leaves its original shape

Not suitable of high pressure
more sensitive for breaking

Disadvantages

Advantages (centrifugal compressor)

- Manufacturing is easy.
- Maintenance is easy.
- No need of special foundation
- If has less weight and feet



- i) Helical compression springs
- ii) Helical tension springs
- iii) Locomotive suspension systems
- iv) Electric coil switches
- v) Shock absorbers

Helical compression = if it is open coiled spring between each turn of coil these will be gap which allows spring to take compressive load.

i) Helical compression ii) Helical Tension spring

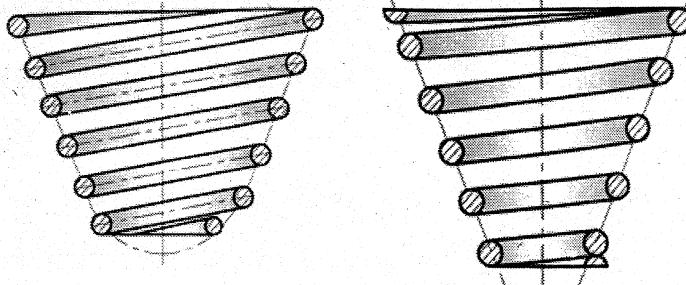
Depending upon type of load applied helical spring has two types

Helical springs are made by wires normally in square cross sections and coiled in the form of helix.

i) Helical Compression and Tension spring

- 1) Leaf spring
- 2) Wire springs
- 3) Spiral spring
- 4) Torsion spring
- 5) Conical spring
- 6) Tension spring
- 7) Helical compression spring

Types of springs



CNC lathe of willing machines

Hydro mobile suspension

Battery contacts

Push buttons.

1) Electrical contacts

Applications

In these springs there is an increase in load, due to decrease in active coils. Thus one cone shaped springs

Conical and Volute spring

form machine.

Medical devices - Surgical lights

Gloves - Balance

Coasters for

Grip Pliers.

Exercise equipment.

Bicycle side stand

Applications

After application of load this spring extends.

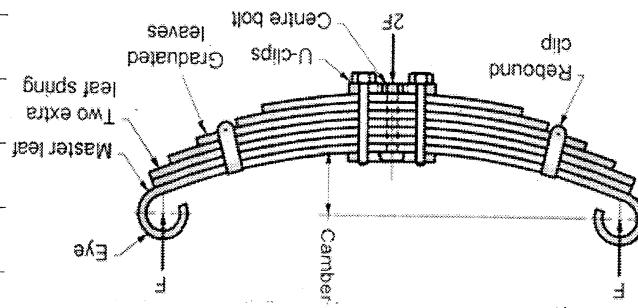
Initially it is maintained with some tension

= This is closed coil spring

Helical tension spring

Gears = If can be defined as the mechanical elements used for transmitting the power and rotary motion from one shaft to another by means of positive engagement of projections called teeth.

Leaf or laminated spring



Gears

- heavy duty suspension springs.

Hippocrate's

Leaves are clamped to axle by U clip

These are graduated leaf leaves.

which longer leaf is bigger as main leaf whereas

length of each leaf goes on to decreasing out of together by means of damage and bolts

If consists of number of leaves

Leaf spring

(3) Inclined teeth gear.

(2) Curved teeth gear

(1) Straight teeth gear

A) Based on teeth profile on gear surface

(3) Rack and pinion

(2) External gears

(1) Internal gears

B) Based on type of gearing

(3) High velocity gears

(2) Medium velocity gears

(1) Low velocity gears

C) Based on peripheral velocity.

(iii) Screw gears

(ii) Hypoid gears

(i) Worm gears

D) Non-parallel and non intersecting axes gears

(iii) Mitre gears.

(ii) Herringbone gears

(i) Bevel gears

E) Intersecting axes gears

(ii) Helical gears

(i) Spur gears

F) Parallel axes gears

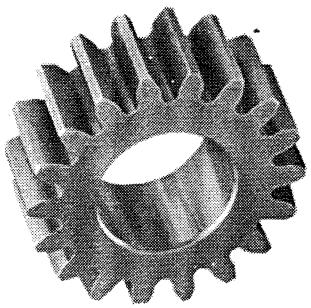
G) Based on position of axes revolution

H) Classification of gears.

- 7) Sugarcane juice juice
- 8) Fuel pump.
- 9) Rolling mills.
- 10) Marine engines and cutters.
- 11) Gear motors
- 12) Metal cutting machines
- 13) Mechanical clocks
- 14) Gear pumps
- 15) Gear pumps
- 16) Rolling mills.

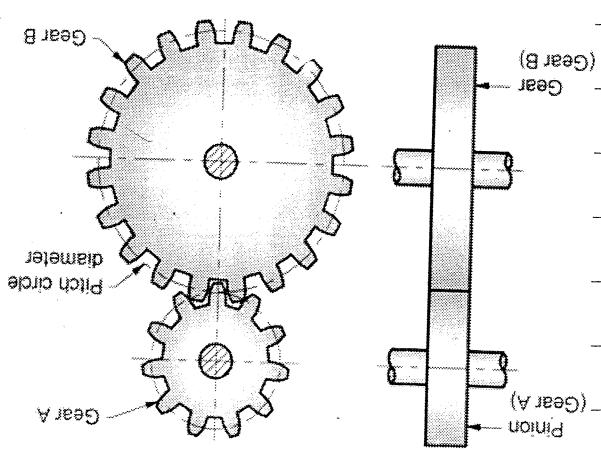
Applications (Spur gear)

- 1) Operation is noisy.
- 2) Not suitable for long distance power transmission.
- 3) Stress absorbed is more.



Disadvantages (Spur gear)

- 1) Lead where high transmission efficiency is required.
- 2) Its construction is complex.
- 3) Its installation is easy.
- 4) Cost and velocity ratio can be maintained.
- 5) Spur gear drive



These gears are used parallel to the axis. These gears also pass parallel to the axis. These gears are used in shafts. As shown in figures: these powers is to be transmitted to two parallel axes of these gears. These gears are used in marine engines and cutters.

Spur gear

Uses of helical gears

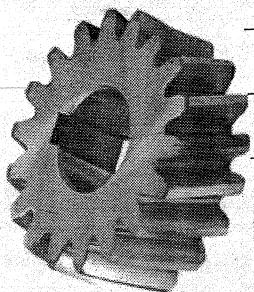
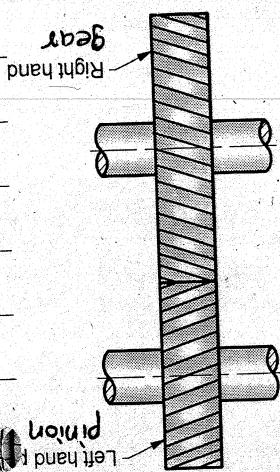
Helical Gears

of specific angle. This angle is known as helix angle. The angle of pinion and gear is

(Hand) Ex: Right hand gear meshes with some magnitude. But in opposite direction

left hand pinion vice versa. If construction

construction as shown in following fig.



Advantages

Advantages

1) Operation is less noisy.

2) Best suitable for heavy load

3) Smooth operation

4) Less efficient as compared with spur gear

Disadvantages

1) Single helical gear drive

2) Process lost is more.

3) Manufacturing cost is high.

4) Axial thrust is more.

5) Weight is more.

6) Application.

Q1: Industries

Vehicle gear box

10) Food industries

Printing industry

Textile industry

Fabric industry

Steel rolling mills

Plastic industries

11) Conveyors, cutters

Conveyors

8) Cutters

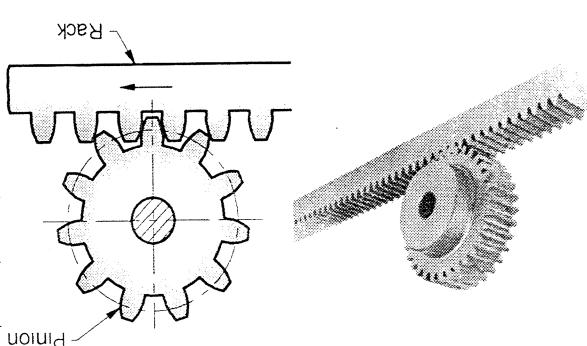
- 3) Converts rotary motion in linear motion.
- 2) Compact construction
- 1) Robust construction

Advantages

- 5) In steering system
- 4) In door closure mechanism
- 3) In Milling machine.
- 2) In Drilling machine.
- 1) In lathe machine.

Rack and pinion gear

Rack and pinion gear mainly used to convert rotary motion of pinion into linear motion of rack.



Rack and pinion

To rack and pinion gear

Rack is a straight line gear it is also called as gear

Width of pitch circle on diameter of gear

and rack meshes with

Rack and pinion gear.

- 1) In differential gear box.
- 2) Hand drill mechanism.

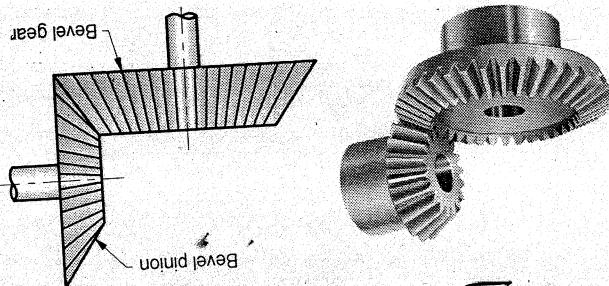
Disadvantages

- 1) Precise assembly is required.
- 2) Noisy operation
- 3) Not suitable for high speed reduction.

Dis-advantages (Bevel gears)

- 1) Efficiency is nearly 90%.
- 2) Manufacturing cost is less.
- 3) Operational angle can be changed as per requirement.
- 4) Sliding by friction is less.

Advantages (Bevel gears)



These gears used to transmit motion in 90° non intersecting axes as shown in following diagram. These are used where shafts are of too short length.

Bevel Gears

② steering system

① conveyor belts

③ wind mills.

④ cranes.

Applications

③ More heat generated during transmission.

② Transmission efficiency is less

If gives high power loss.

Dis-advantages

④ It has effective meshing

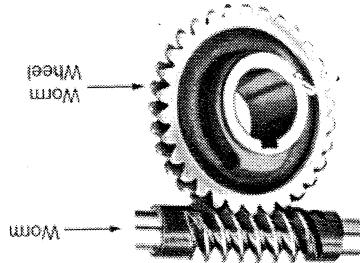
③ It requires less space.

② It gives high velocity ratio

① These are self locking gears

Advantages

Worm and Worm Wheel



easily with soon

worm gear is some like helical gear but slight concave face (hook) so that it can be meshed

worm is some like a screw

interseching

If is used when two shafts axis are non

Worm and worm wheel

- 6) These are most affected by dust & dust.
- 5) Gear drive needs precise alignment.
- 4) It requires lubrication.
- 3) Can not absorb shocks
- 2) Can not transmit power on long distance.
- 1) Gear drives are costly.

Dis-advantages

- Non intersecting and non parallel axes
- Non intersecting and perpendicular axes
- Intersecting axes.
- Ex = Parallel axes
- Axes combinations.
- 7) If can transmit power between different belt drives.
- 6) Life of gear drives is high as compared with
- 5) Gears can give high reduction ratio transmission ~~efficiency~~.
- 4) Gear drives can be used for high power
- 3) Power transmission capacity is high
- 2) Gear drives are positive drives.
- 1) These are compact and occupies less space.

Advantages

Advantages and limitations of Gear Drives

and pulley contact surface.
 Power transmitted due to friction between belt
 pulley through belt.
 Working \Leftrightarrow Belt enables driving and driven pulley
 Elements of belt drives. ① Driving pulley
 ② Driven pulley
 ③ Belt

Belt drives = These are drives used to transmit power from one shaft to another shaft which are at considerable distance.

Belt and pulley (Belt drives)

$$n_g = \text{Speed of gear in rpm}$$

$$n_p = \text{Speed of pinion (rpm)}$$

$$T_p/T_g = \text{Torque of pinion over gear (N-m)}$$

$$P = \text{Power transmitted (Watt)}$$

where,

$$P = \frac{2\pi n_p T_p}{60}$$

$$P = \frac{2\pi n_g T_g}{60} \Leftrightarrow$$

Power transmitted by gear can be calculated by

Power transmission capacity of gear

- (1) Slip is more.
- (2) Can not transmit high power.
- (3) If requires more space.
- (4) These are larger in size.
- (5) Not useful in short centre distance.

Dis-advantages (flat belt drive)

- Slippage.
- Difficult to obtain by different speeds.
- Easy to maintain and cheap.
- If can transmit power at long distance.

Advantages (flat belt drive)

belt thickness

In flat belt drive belt width is higher than flat belt drives = are rectangular in cross section

(3) Timing belt drive.

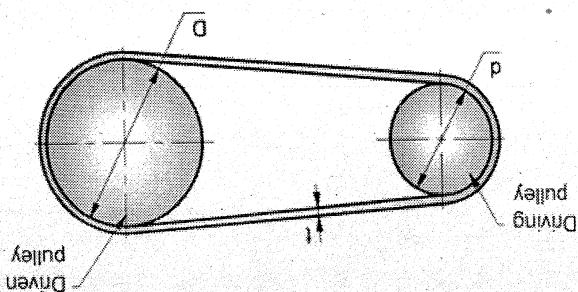
(2) V-Belt drive.

(1) Flat belt drive.

Types of Belts

**

Flat belt open belt drive



diagram

If has construction as shown in following

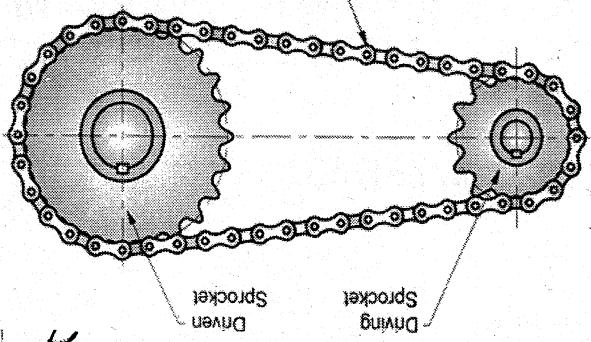
There is small amount of slip

⇒ Belt & pulley are not positive drives as

- V-belt drives
- ④ To drive accessories on automobile engine.
 - ③ Lacks the mechanism of pulleys.
 - ② Complicates the machine.
 - ① Electric motors drive accessories on automobile.
- Advantages
- ⑧ Not suitable for long distance power transmission.
 - ⑦ Cast iron flat belt drive.
 - ⑥ Efficiency is lower than gear drives.
 - ⑤ Isadvantages
 - ④ These are endless therefore smooth operation can be obtained.
 - ③ Slip is negligible in V-belt drive.
 - ② If requires less space
 - ① V-belt drives can transmit larger power.

- Pulleys
- ⑧ If has construction as shown below.
 - ⑦ These are available in number of standard cross sections.
 - ⑥ If needs specially designed pulleys called grooved pulleys.
 - ⑤ These are trapezoidal in cross section.

V = Belt Drive.



as shown in following diagram
 Chain wrapped around sprocket in polygon form
 Two sprocket.
 It consists of endless chain running around

Chain Sprocket (Chain drive)

⑩ Not used at high speed

Flat belts are cheaper ⑨ V-belts are costlier

⑧ Smooth operation

⑦ Slip is less.

Also.

Not useful on high speed ⑥ Useful on high speed

more power

Flat belt can't transmit ⑤ V-belts can transmit

These are not compact. ④ These are compact.

~~Cross section construction in less section construction~~

Pulleys are simple in ③ pulleys are complicated

Flat belt has joints ② V-belts are jointless.

In cross section ① These are trapezoidal in

These are rectangular

V-belt drive

- (1) Bicycles
- (2) Automobiles. Motor cycles
- (3) Agricultural machinery.
- (4) Rolling mills
- (5) Conveyors.

Applications (Chain drives)

- (1) Not suitable for precise motion transfer
- (2) More maintenance required than belt drive.
- (3) Noisy operation
- (4) Lubrication required

Dis-advantages (chain drive)

- (1) If does not have slip
- (2) These are passive drive.
- (3) Useful in long as well as small distance.
- (4) Compact as compared with belt drive.
- (5) Can operate at high temperatures also than belt drive
- (6) less expensive than gear drive.
- (7) Highly efficient

Advantages of (Chain drive)

- Chain sprocket works on polygon effect
- Chain drive needs lubrication

$$\eta = \frac{\text{Output Work}}{\text{Input Energy}}$$

If it is denoted by η ,
output work to the input energy supplied.
It can be defined as ratio of
Efficiency

- ① Traction effort
- ② Raising or lifting load
- ③ Cooling effect
- ④ Heating effect
- ⑤ Pressurization

Forms of output

Output can be defined as the work done by equipment (or machine)

Output (Output of machine or equipment)

- ① Electric energy.
- ② Chemical energy.
- ③ Solar energy
- ④ Human power

Forms of input (Types of input)

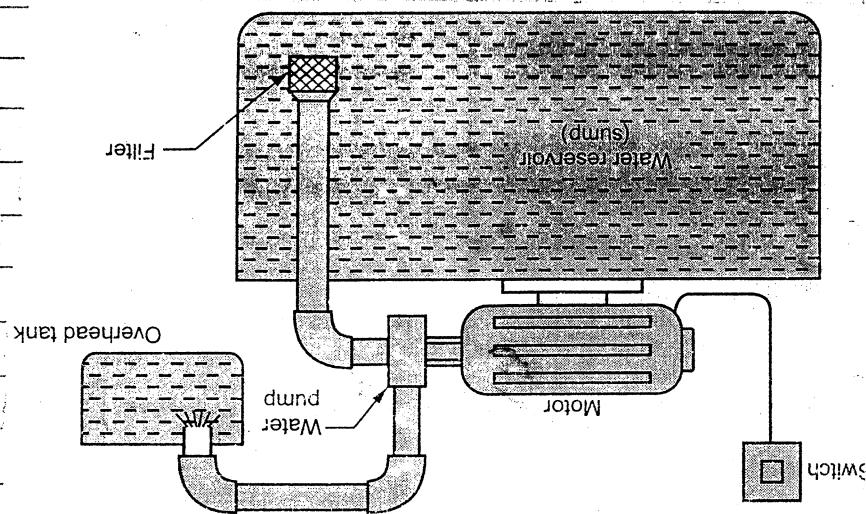
Input can be defined as an energy supplied to machine or equipment

Input (Input of machine or equipment)

When overhead tank gets empty then water pump will turn off. When overhead tank reaches a certain level the ground tank pump control system comes into play & water pump connected starts to stop.

When the water level inside the tank reaches a certain level pump turns off. The overhead tank reaches a certain level, the pump will turn off.

Water pump overground tanks get empty, then pump will turn on, when overhead tank gets full or underground tanks get empty, then pump will turn off.



Pumps -

If it is a mechanical device which converts the mechanical energy & transfers it to liquid. While versa to turbine, pump converts fluid from low pressure to high pressure.

Water pump overhead tank.

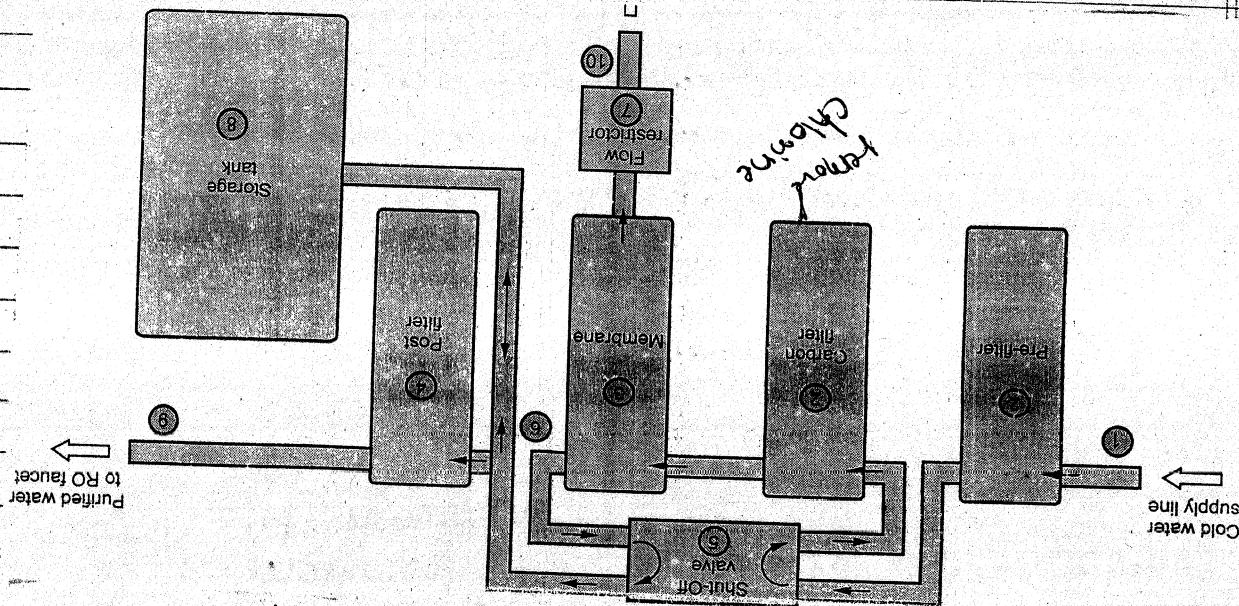
Engineering Mechanism -

If it is a device that transforms input forces & movement into a desired set of output forces

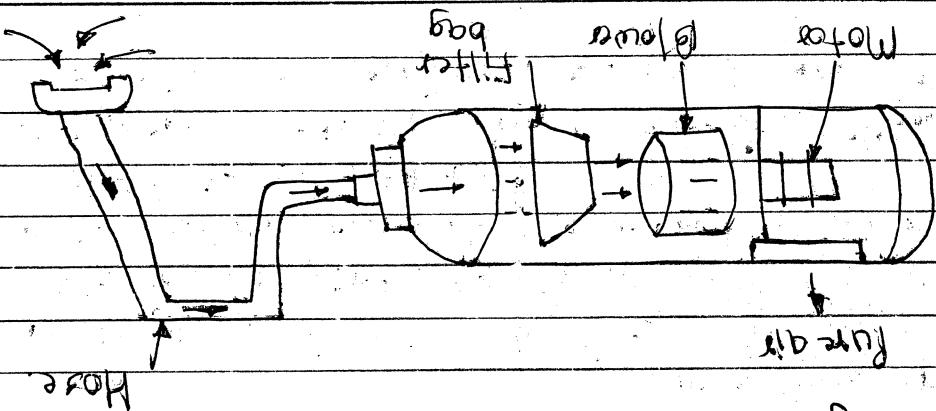
Machines includes various mechanisms used to accomplish tasks & movement.

Engineering Mechanisms & their Applications in Domestic Applications

- 3) Water Filter / Purifier Unit
- Water purification is the process of removing undesirable chemicals, biologicals and suspended solids & gases from water.
- Pure water line → Purified water to RO Inlet.
- Cold water line → Supply line.
- Sediment filter → Suspended solids & particles.
- Carbon filter → Biologicals & dissolved solids.
- Membrane → Suspended solids & dissolved solids.
- Storage tank → Storage tank.
- RO Filter → Removes contaminants by reverse osmosis.
- RO Membrane → Removes contaminants by reverse osmosis.
- RO Filters → These are used to protect the RO system.
- The cold water supply line - It is a valve that has into the cold water line valve. It is a valve that has into the cold water line valve.
- RO Filters - These are used to protect the RO system.
- RO Membrane removal membrane - This membrane could remove the system. So it that could damage the system.
- RO Membrane removal membrane - This membrane could remove the system. So it that could damage the system.
- First Filter - It is carbon filter mainly to remove odors.
- Supply filter - When water is drawn from this RO filter, the pressure in the tank drops, hence open valve is supplied.
- Storage tank is full, so it goes to stop water storage tank.
- When valve opens & water is supplied, flow of treated water - from the backwash flow of RO membrane is regulated by a flow regulator.
- To RO membrane is regulated by a flow regulator.
- To RO membrane is regulated by a flow regulator.



Water purification is the process of removing undesirable chemicals, biologicals and suspended solids & gases from water.



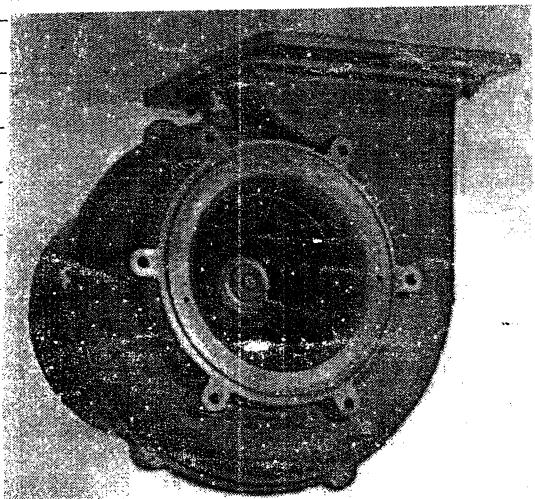
Washing -

It is a combination of fan and motor.
Combination = If combination of two factors.

Principle - It works on the principle of pressure difference between the two factors.

2) Vacuum cleaner -

Applications -



4) Blower only Fan or blower area.
Fan circulates air around an entire room.
Flow of air out toward the edge.
It draws particle. & a centrifugal to direct the
air coming out of a wheel with small blade, so
within the fluid such as air.

If it is a machine that is used to create flow
of air -

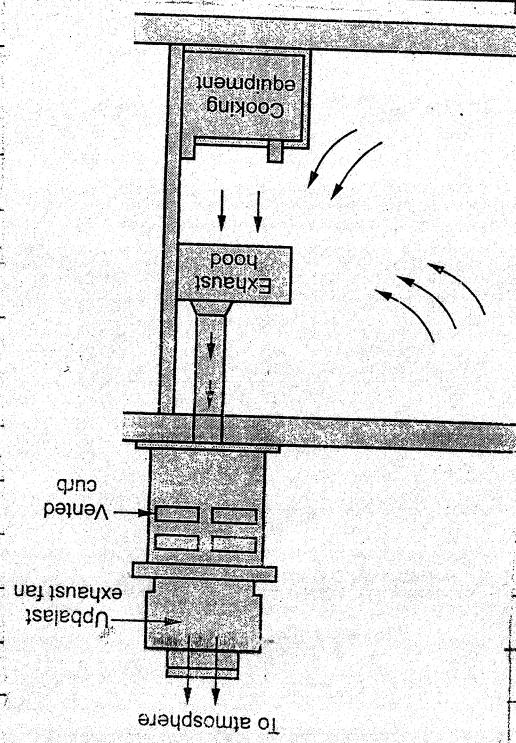
3) Blowers -

5) Train line - It runs from the outlet of reverse
osmosis membrane housing to the driver.

6) Holes form 2.4 gallons of water.

7) Storage tank - The standard PC storage tanks

eliminates smoke + humid air. The recycled
 ducts to be laid out.
 In ducted chimneys have carbon filter which
 moisture are channelled out through the duct
 while the smoke +
 trapped in the filter.
 These paths do not
 the chimney.
 at draw out from
 cooking process which
 emitted during the
 + smoke is been
 Wooding - oil droplets.
 pipe, hood etc.
 of motor, filters, hood
 generation - it consists
 after vapour, oil flame.
 like smoke substrates
 to remove odours
 principle - it is used



to tighten chimney
 air is pushed out from the ducting.
 particles to the suction filter. + drift free
 form the suction side which can be done.
 which rotates the blower + air is sucked
 when electric power is given to the motor.
 pull the filter open to the atmosphere.
 collect the dirt + the debris. How air
 on suction side, filter bag is fitted to
 to a motor.

Air is then released back into the house

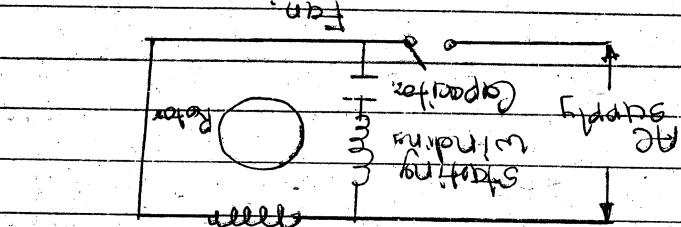
* Motor Fans

Principle - If a current carrying conductor is placed in a magnetic field it experiences a force & starts to rotate

Working - The shaft

consists of motor arms, flywheel, rotor, motor housing, paddles, metal arms, capacitor, blades are made from iron and the motor. The blades are connected to the shaft of the motor.

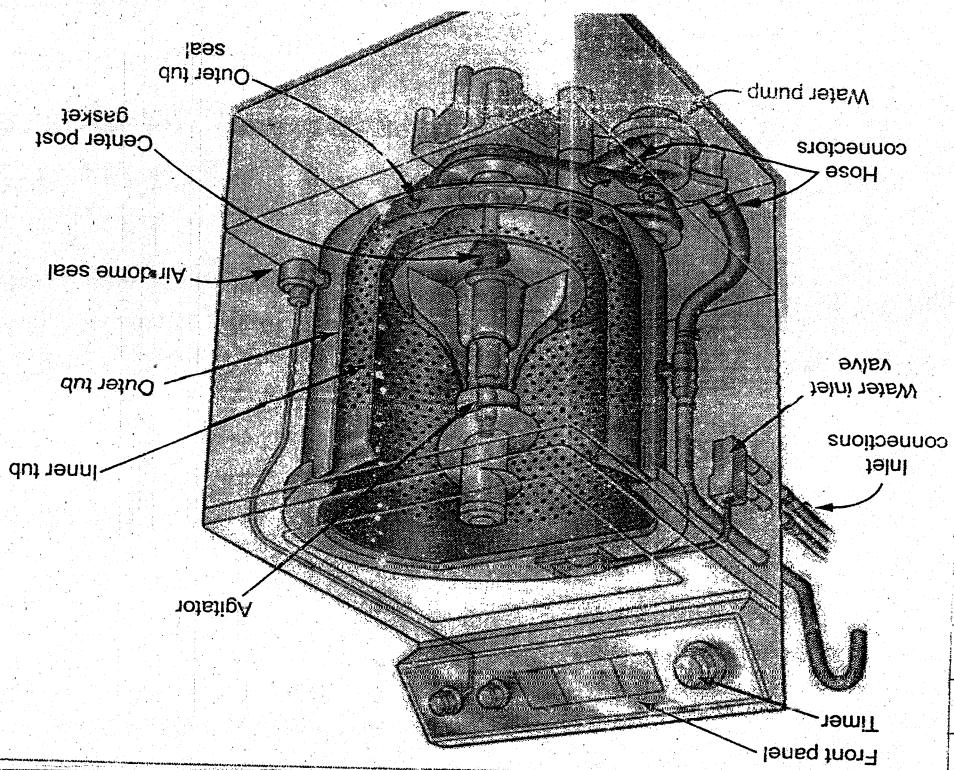
Construction.



The capacitor of the fan connects up the electric motor which starts it. When the electric current reaches the motor, it turns. Cells of wire which are wrapped around the metal base, a magnetism field is produced. That energy & causes the motor to rotate in a clockwise motion. This converts the electrical energy into mechanical energy. Thus blades attached to the motor also rotates.

3) Air Ventilation system after drying Application.

3) Construction Industry.

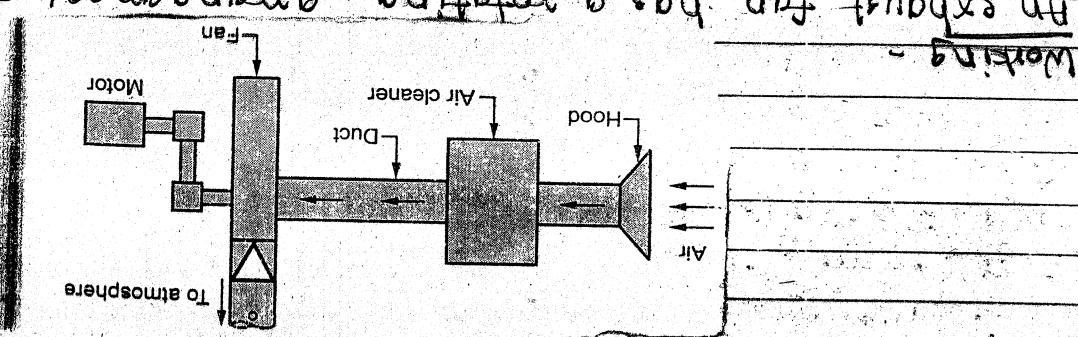


* Washing Machine - Principle - It works on Archimedes principle. When the center of gravity of the body while moving in circular path.

Archimedes principle - If you push an object under water that pushes out

The blades take the humid air & pushes out blades which are driven by a motor.

In exhaust fan has a rotating arrangement of



Exhaust fan - It consists of blades, electric motor, capacitor, resistor etc.

Principle - It is a ventilation device which draws out the polluted air from the room & replaces it with fresh air.

* Exhaust fans -

- 1) If consists of a large metal drum with paddles around it is inside it.
- The washing machine uses the universal motor which controls the current through each winding which passes the current through each winding which causes it to rotate. This is been attached to the drum which + speed. The permanent magnet on the poles winding around the iron core which controls the speed + direction.
- 2) These motors have permanent magnet field that are controlled by the universal motor.
- If can be operated on AC or DC power.
- The washing machine uses the universal motor around it is inside it.
- 3) The poles winding around the iron core which controls the speed + direction.
- 4) These motors have permanent magnet field that are controlled by the universal motor.
- 5) The poles winding around the iron core which controls the speed + direction.
- 6) Used to absorb shocks + vibrations -
- e.g. Vechicle suspension springs, buffer spring in e.g. vehicles.
- 7) Used to maintain constant between two elements e.g. springs, pins, slots.
- 8) Used to store energy.
- e.g. springing infantry, pens, solenoids.
- 9) Used to absorb shocks + vibrations -
- e.g. vehicle suspension springs, buffer spring in e.g. vehicles.
- 10) Used to provide operating force.
- e.g. Jigs + fixtures, cam + follower mechanism.
- 11) Mechanical transmission springs.
- External force tends to elongate the spring.

Spring which is there in sealed tube

pulls the door & closes it because of this.

When the door is opened, the door closure

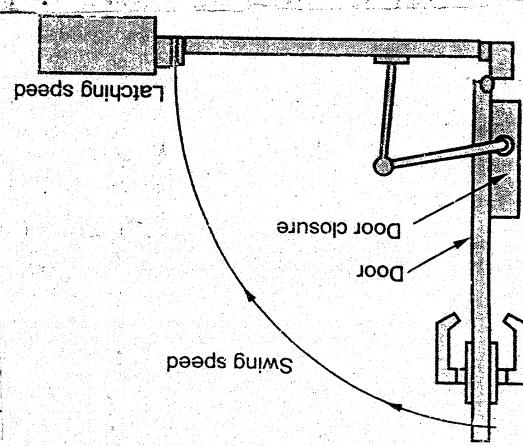
attached to the door frame.

In door closure one end of hydraulic arm is

attached to the door & the other end is

connected to the door closure.

Working -



Principle - The door should be closed automatically.

→ **Door closure**.

* **Applications -**

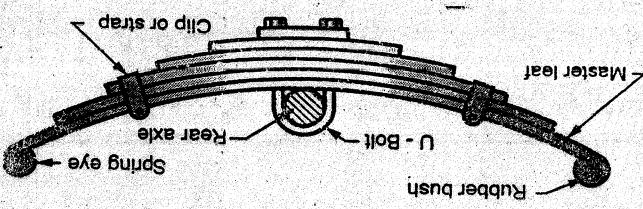
These springs are used in automobiles & railroads.

These are spring products tensile & compressive.

held together by using clamps & bolts.

of semi-elliptical shape & different lengths.

If consists of number of flat plates (leaves)



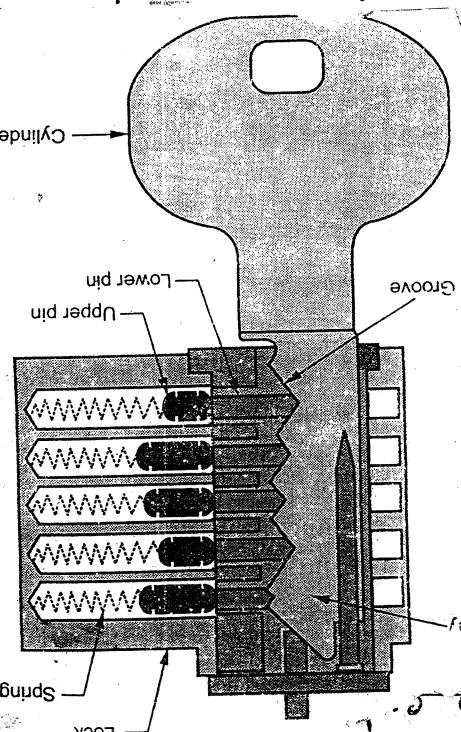
* **Leaf or laminated springs -**

Gear which are engaged. always rotate in opposite direction.
 of teeth.

another shaft by means of successive engagement of gears & power & motion from one shaft to another shaft is defined as toothed wheels which can be distinguished between the driver & follower is very small gear drive is a positive drive & it is provided when # gears.

- at equal level.
- the load we need to align all. The pins are varying length thus to open spring force
- pieces of metal together. with the help of two
- when the lock is loaded it holds the two
- Each pin has its own cylinder arrangement.
- It consists of row of pins, normally 4 numbers
- + keys + locks

Working -



pin, lower pin.

body is hollow. The basic components of the door construction. The basic components of the door lock is to create a tension.

Principle - The principle of the spring in the door lock is to create a tension.

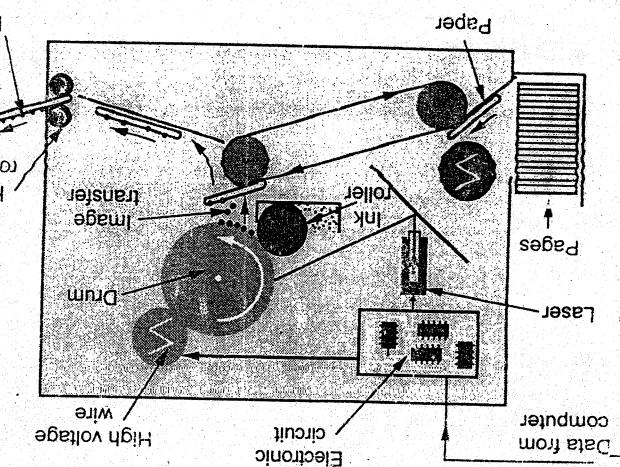
Door lock -

What all the different parts do in the printer finds out.

The electronic circuit laser printer.

The electronic data to the computer ends if it is stored by transmission in electronic form.

The information stored in the computer is in electronic format.



* Printers.

minute + hour hand in various ratio.

drives the gear wheel that spins the second.

These pulses are given to stepping motor which them to generate electric pulses.

The circuit counts the number of vibrations used crystal, when oscillates at a precise frequency.

The battery sends an electrical signal of the quartz working.

place.

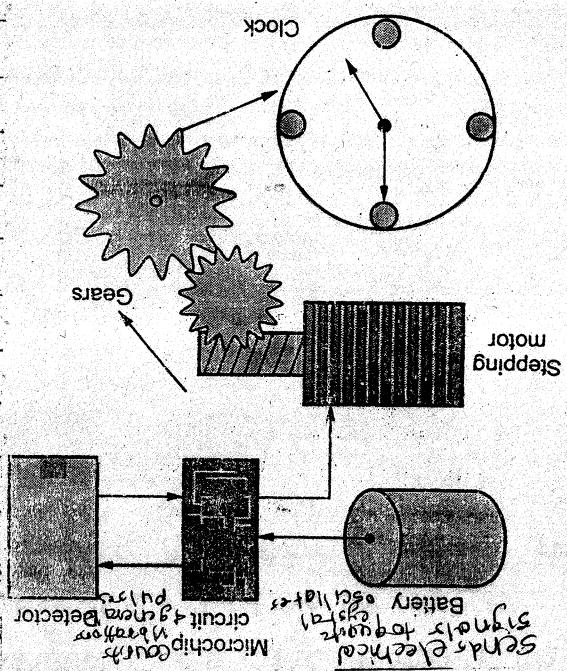
to hold the hands in different speeds, so that second hands at need to turn hour, minute crystal oscillators gears battery, microchip, quartz electric stepping motor.

of the world clock are components.

~~parts of this~~

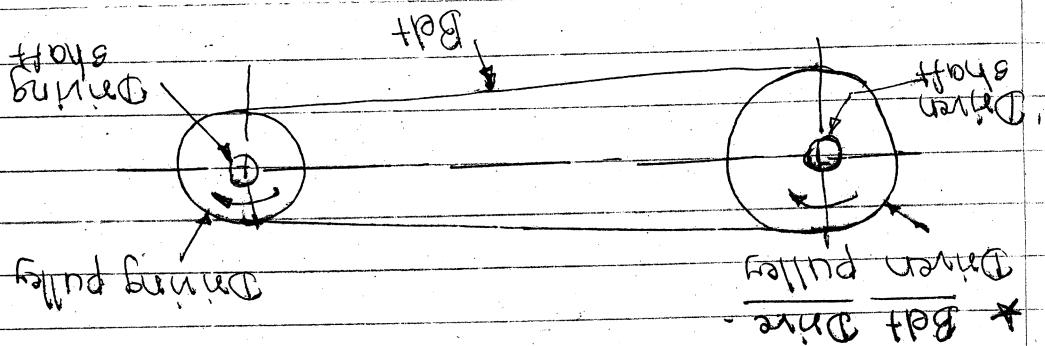
that performs regular

The gear drive has two wheels, smaller wheel is called as pinion & larger wheel is called as gear.



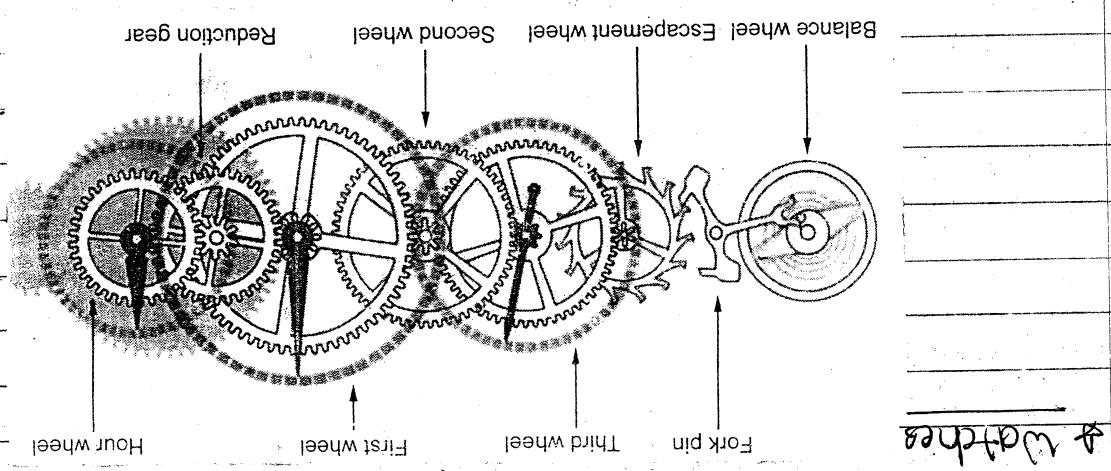
* Wall Clocks

The belt drives are used to transmit power from one shaft to another shaft by using pulleys which rotate at the same speed or at different speeds.



Watch uses a deadbeat mechanism to measure passage of time. (mechanical watch)

The force is transmitted through a series of gears to power the balance wheel, a weighted wheel which oscillates back & forth at a constant rate. In deadbeat escapement release starts to move forward a small amount with each hand, to wind at a constant rate. Swinging of the balance wheel, moving the watch ahead to more forward a small amount with each swing of the balance wheel, moving the watch ahead to more forward a small amount with each hand.



What it needs to look like on the page: It makes a larger unit bonds the toner to the paper.

If it reads onto a page of powdered ink called toner. Finally the printer, building up a pattern of static electricity. A laser beam scan back & forth across a drum inside a laser printer, it needs to look like on the page.

out of channel
 the heat after can be taken out by the
 The heater coil which is automatically
 Once the temperature of water is obtained.
 by the thermometer
 of the water rises to the set temperature
 turn the heater gets heated into the water
 As the water gets heated into the water
 of water.
 heating element to raise the temperature
 In the heat by using
 electrical energy
 principle of conduction
 It works on the
 material of thermometer
 heater, liquid air,
 tank, inlet & outlet pipe,
 + cooling of water
 conduction + convection
 Energy into the heat Energy
 principle - easier conveys the electrical
 + electric energy
 Application of Electric Power

$E = \frac{Q}{t}$ Joule/Sec
 $E = \text{Watt}$ $\text{Watt} = \frac{\text{Joule}}{\text{Sec}}$
 $E = \text{Watt} \times \text{Time}$
 $E = P \times t$
 $E = \text{Watt} \times \text{Sec}$
 $E = \text{Joule}$
 If is the relation given as
 Speed ratio of belt drive (velocity ratio)
 \Rightarrow Driver pulley or belt pulley
 \Rightarrow Driving pulley or head pulley
 # Consists of following elements

ii) Refrigenerator effect (Q₁)

To find i) Condenser temp T₁ (Q₁)

$$W = f \cdot \Delta T_{\text{cond}}$$

$$Q_2 = -3^{\circ}\text{C} = -3 + 273 = 270\text{K}$$

Given. COP = 6.

Required to run the refrigeration system + refrigerating effect if the power input + in evaporator is 6. When it maintains -3°C in evaporator. Therefore the condenser temp is 6. When it maintains

$$Q_1 = 10\text{Kw}$$

$$Q_1 = 4 + 6$$

$$Q_1 = W + Q_2$$

$$W = Q_1 - Q_2$$

ii) Heat reflected to surroundings (Q₁)

$$W = 4\text{Kw}$$

$$\therefore L.S. = \frac{W}{m}$$

$$\begin{aligned} T_3 &= \text{Ambient} \\ T_3 &> T_2 \end{aligned}$$

$$\text{COP} = \frac{W}{Q_2} = \frac{W}{Q_1 - Q_2}$$

i) Power consumed by Refrigerator

$$Q_2 = 6\text{Kw}$$

$$Q_2 = 360\text{ KJ/min}$$

$$\text{Given. } \text{COP} = 1.5$$

ii) Amount of heat reflected to surroundings

iii) Power consumed by the refrigeration system

iv) Power consumed by the system + find

v) refrigerant with COP of 1.5 absorbs heat

vi) An effective motor running at 1000 rpm to a

$$P = 32.95 \text{ kN}$$

$$P = 32.95 \text{ kN}$$

0.7

$$P = 1000 \times 9.8 \times 30 \times 10^{-3} \times 4.7$$

20

$$P = 8.9 \cdot H$$

Solution.

$$P = Q$$

$$H = 72.7$$

$$H = 47.0$$

$$\text{Given } Q = 50 \text{ litres} = 50 \times 10^{-3} \text{ m}^3/\text{s}$$

A centrifugal pump is required to deliver 50 L/s of water/s to the height of 47 m. If the overall efficiency of pump is 70%, calculate the power required to drive the pump

$$Q_0 = 45 \text{ L/s}$$

$$G = \frac{Q_0}{T}$$

$$(GDP)_m = \frac{Q_0}{m}$$

ii) To find regeneration effect.

$$Q_1 = 81.5 \text{ L}$$

$$Q_1 - 270 = 45$$

$$Q_1 - Q_2 = 270 - 45$$

$$Q_1 - Q_2$$

$$\therefore G = 270$$