**CHAPTER 1**

**1.INTRODUCTION**

For the past decades, world’s main concerns are energy and environment. Demands in finding alternative source of energy as an answer to the dwindling energy sources has become one of the top priorities in the field of science and technology. Majority of the world’s generated power uses electromagnets, which is based on faraday’s law of electro-magnetic induction. Thus, interests in free electricity generation become popular.

The concept of free electricity is a misconception, energy cannot be created. However, generating power thru the means of readily available resources such as the Sun, Wind, Tidal, Hydro-electric, and Geothermal becomes free after the initial capital cost. The energy generated is free after the point that we don’t have to pay for the generation of the electric power produced by these non-conventional methods of generating electrical power.

Hence, the concept of generating electricity using magnets has been around us for some time. Their magnetic fields that move electrons are used to produce electrical power. These magnets are placed in the cores of motors and generators. Power generation’s basic principle lies on the magnetic effect. It states that “when a conductor is rotated in a magnetic field, a voltage is induced in the conductor”. This study will be dealing with such conductors.

**1.1 Rotating gate.**

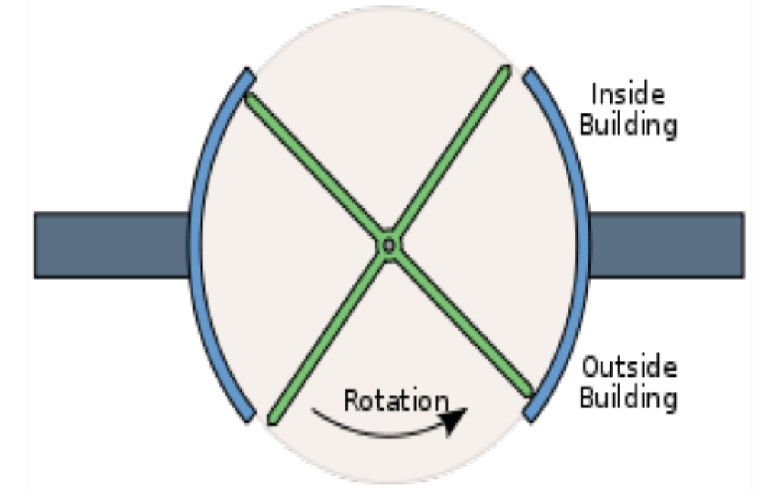
Normally rotating gates are fixed at various places where one by one persons are moving inside, to avoid the entry by domestic animals like premises, in garden.

Nowadays such rotating gates are fixed to many places like metros, air ports, shopping malls, cinema halls etc, the gate will open by swiping the card or ticket and counting is done.

Here we are concentrating to utilize such energy which is rotating the gate for moving in, such actions getting wasted now, we want to utilize such waste energy to generate electricity which is a scarce in our country.



**Fig 1.1(a)** Revolving Door (Side view)



**Fig 1.1(b)** Revolving Door (Top view)



**Fig 1.1(c)** Revolving Door

**1.2 Mechanical power converted into electrical energy by rotating gate.**

* Rotating gates in the shopping mall, gardens, and other places which are normally pushed to rotate to move inside or outside. The gate made in partition to accommodate one person at a slot. This activity of opening clockwise or anti clockwise to rotate a axle on which the gate is fixed, the drive spur gear fixed on the shaft turns which in turn rotates the smaller gear which is held aside, a big drive pulley mounted on that small gear axle, rotates the driven pulley of the generator.
* The rotating gate when rotated to make provision to move one person inside will rotate 90 to 120 degree by which the person is moved in
* This activity of opening or rotating the gate for the entrance is some operation or action which we intend to convert into rotary and convert the energy to generate power to give the power supply to the surroundings.
* Since this energy is wasted right now we want to tap it for energy generation.
* We are making the mechanism for the rotating gate made in actual size.
* Water sprinklers in the garden provides irrigation for the plants and widely used in sandy areas as it checks the wastage of water through seepage and evaporation. Sprinkler is a method of applying water which is similar to natural rainfall. Water is distributed through a system of pipes usually by pumping or by other means. It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground.



**Fig 1.2** Sprinkler

**1.3 Working principle**

We are making the rotating gate which is held on the vertical stand which is welded to the base frame, the vertical stand holding the center axle which is holding the gate flap made of mild steel tube of width 750mm and height of 1060mm, such four gate flaps being fixed on the center axle at four equi spaced all around, fixing on the center axle on the flats held by fasteners. The center axle base is being inserted and supported within the ball bearings and housings which are supported and welded on the vertical stand. The axle is holding the drive gear at the base and the crank flat being welded on the axle. The drive gear is driving a driven gear which is held on the driven axle aside supported on the ball bearings and housings and that axle is holding the drive pulley which drives another driven pulley held on the axle of the generator which is fixed aside. When the gate rotates, the driven gear of 56 number of teeth drives the driven gear with 16 number of teeth, the ratio by this will be 1 : 3.5

The drive pulley of diameter 70mm will drive the driven pulley of diameter 12mm, so the ratio by this will be 1 : 5.83

The total ratio achieved by both will be = 3.5 x 5.83 = 20.41.

So when the gate is rotated for full one rotation, we get a rotation at the generator as 20.41, but for getting inside, we are not rotating the gate for full rotation, may be approximately 200 degree or 220 degree, so lets us consider the 220/360 = 0.61 rotation, so the final rotations per stroke achieved at the generator will be 20.4 x 0.61 = 12.45, rounded off to 12.5 rotations which is taken for generator output calculation.

Next the air pumping is done by the crank provided at the end of the axle which is having 50mm center distance. The air pump is of 70mm diameter cylinder which is operated for pumping by the crank of 70mm distance, that means the stroke length of the pump will be 50 x 2 = 100mm.

Considering the diameter as 70mm and stroke length as 100mm, the volume of air pumped into the tank per stroke will be = 49 x 0.7854 x 10 = 384.84cc.

The tank taken here is of 220mm diameter with 400mm length, so the volume of that tank will be = 22x22x0.7854 x 40 = 15205.3cc.

We have placed the tank in taper so that the water being filled into the tank is sliding towards the outlet port and the air is filled at the top to increase the pressure in the tank to pressurize the outgoing water to work for sprinkling.

We are filling 70 % of the tank with the water and the rest of the area is getting filled by the air so the air volume required to be filled will be 15205 x 0.3 = 4561cc. number of strokes required to fill the air into the water tank will be = 4561/384 = 11.87 strokes.

The drive gear fixed which drives the driven gear of the pump cranking is of ratio 56/16 = 3.5, so in one rotation of the gate we get 3.5times the cranking mechanism working which makes the tank to be filled within 17.93/3.5 = 5.12 full gate rotations.

Now once it fills the volume, then pressure starts increasing in the tank which will be used for the sprinkling speed control.

To control the outlet, we are providing the control valve at the outlet port with a ball valve.

The sprinkler is held on the stand at the elevated height and is connected from the tank through the outlet port by the valve.

In this compressed air is stored in a potential state. Working energy results in this system when the compressed air is creating pressure within the tank alongwith the water. When the valve at the tank outlet is opened, the water which is at the mouth of the outlet valve rushes out through the pipeline and out through the sprinkler assembly to sprinkle the water with pressure in the surrounding.

**1.4 Advantages & Disadvantages**

**Advantages**

1. Power generated by rotating gate, while rotating clockwise or anti clockwise during the people movement from inside to outside or vice-versa. For doing this no recurring expenses, comparatively for other type of energy generations recurring expenses are incurred per unit.
2. No effect on the moving people.
3. Such tiny units for electricity producing will cater the individual electricity needs which makes them self reliant and not depending on the government electricity board.
4. This type of individual electricity generation will make the less burden on the state electricity board, reducing the power cuts.
5. The normal gate rotations clockwise or anti clockwise will rotate the generator to produce the electricity which is charging the battery which can be used when required. This action is done normally without adding any extra effort for the present system.
6. Maintenance is negligible, since only lubrication is required for the gears.
7. More electricity can be generated by the proper designing of generator and storage capacity of the battery.
8. Free energy which is converted by no added effort.
9. Free energy for sprinkling the water avoiding the electric power wastage for the water pumping.
10. Maintenance will be negligible, only lubricating the piston rod and the turbine rotating parts.

**Disadvantage**

1. Pressure leakage will drain the air being produced.
2. More storage area is required to stock the pressurized air.

**CHAPTER 2**

**2.LITERATURE SURVEY**

Electricity generation is the process of generating electric power from other sources of primary energy. The fundamental principles of electricity generation were discovered during 1820s to 1830s by the British scientist Michael Faraday. His basic method is still used today. Electricity is generated by movement of a loop of wire or disc of copper between the poles of magnet.

A generator produce electrical power based on principle of FARADAYS LAW OF ELECTROMAGNETIC INDUSTION, according to these law, when an conductor moves in a magnetic field it cuts magnetic lines force, due to which an electromagnetic force is induced in the conductor. The magnitude of this induced emf depends upon the rate of change of flux(magnetic line force) linkage with the conductor. This emf will cause an CURRENT to flow if the conductor circuit is closed.

**CHAPTER 3**

**3. The Principle of Electrical Generator Is A Machine Which Converts Mechanical Energy (Or Power) Into Electrical Energy (Or Power).**

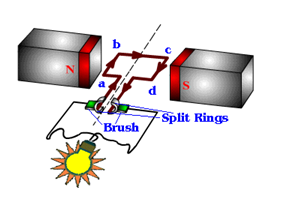
   It is based on the principle of production of dynamically (or motionally) induced e.m.f (Electromotive Force). Whenever a conductor cuts magnetic flux, dynamically induced e.m.f. is produced in it according to [Faraday's Laws of Electromagnetic Induction](http://www.ncert.nic.in/html/learning_basket/electricity/electricity/electrostatics/faraday_law.htm). This e.m.f. causes a current to flow if the conductor circuit is closed.

Hence, the basic essential parts of an electric generator are :

red1  A magnetic field and

red1  A conductor or conductors which can so move as to cut the flux.

**3.1 DESIGN OF DYNAMO**



**Fig 3.1** Dynamo

The emf induced in the armature of an alternator is similar to that of DC Generator. EMF induced / Ph,

e = ZNØP/60 Volts

Where Z = no. of conductor in series / phase

N = Rotation of armature in revolution / min (rpm)

i.e. N/60 = rps

Ø = Flux produced per pole

P = no. of poles

According to Specification of Dynamo

No. of turns = 1000 Winding material = Copper Winding = 4

Z = 4 Conductors in series / phase

Assuming when

N = 12rpm of magnet = N / 60 rps

Assume Ø 3.6 web/Second per pole P = 3 no. of Poles

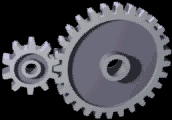
EMF induced = e = ZNØP/60

= 3 x 12x 3.6 x 4 / 60

e = 8.64volts

**3.2 Mechanical advantage**

Gear teeth are designed so that the number of teeth on a gear is proportional to the radius of its pitch circle, and so that the pitch circles of meshing gears roll on each other without slipping. The [speed ratio](http://en.wikipedia.org/wiki/Gear_ratio) for a pair of meshing gears can be computed from ratio of the radii of the pitch circles and the ratio of the number of teeth on each gear.

[](http://en.wikipedia.org/wiki/File:Gears_animation.gif)

**Fig 3.2** Spur Gear

Two meshing gears transmit rotational motion.

The velocity *v* of the point of contact on the pitch circles is the same on both gears, and is given by

 v = r_A \omega_A = r_B \omega_B, \!

Where input gear A has radius rA and meshes with output gear B of radius rB, therefore,

 \frac{\omega_A}{\omega_B} = \frac{r_B}{r_A} = \frac{N_B}{N_A}.

where *NA* is the number of teeth on the input gear and *NB* is the number of teeth on the output gear.

The [mechanical advantage](http://en.wikipedia.org/wiki/Mechanical_advantage) of a pair of meshing gears for which the input gear has *NA* teeth and the output gear has *NB* teeth is given by

 MA = \frac{T_B}{T_A}  = \frac{N_B}{N_A}.

This shows that if the output gear *G*B has more teeth than the input gear *G*A, then the gear train *amplifies*the input torque. And, if the output gear has fewer teeth than the input gear, then the gear train *reduces* the input torque.

If the output gear of a gear train rotates more slowly than the input gear, then the gear train is called a *speed reducer*. In this case, because the output gear must have more teeth than the input gear, the speed reducer amplifies the input torque.

**CHAPTER 4**

**4.Manufacturing process of various parts involved in this project.**

**4.1 Base frame**

This is made out of mild steel angle being cut from the size of 25mm x 25mm x 5mm of lengths 770mm---6nos, hammered for flattening and ground to remove the cutting burr and corner cutting and then joined to make the rectangular frame with outer size of 770mm x 770mm. then partition angle are welded at the center gap of 300mm between them to provide the base for the vertical legs for vertical stand and welded by arc welding and then ground to remove the welding burr and on this the vertical stand is rested and welded.

**4.2 Vertical stand**

This is made out of mild steel angle being cut from the size of 25mm x 25mm x 5mm being cut for the lengths of 300mm---4nos, 225mm----4nos. all are hammered for flattening and then corner cutting is done and joined to make the rectangular frame with outer size of 300mm x 300mm and welded properly by arc welding and legs of 225mm are joined at four corners to make the vertical stand. Pipe of 40mm x 20mm are taken of length 295mm----2nos, ground to remove the cutting burr and then joined to this vertical stand to hold the ball bearing housings to hold the center axle in it.

**4.3 20mm dia ball bearing housings**

These are made out of mild steel round bar cut from the diameter of 55mm for the length of 20mm and then turned on lathe machine to make the diameter as 50mm and drilled for the diameter of 22mm and counter bore for the diameter of 42mm to suit the ball bearing outer diameter for the depth of 10mm and faced from the other side to make the total length as 15mm. such two number of ball bearing housings are made for this project.

**4.4 20mm dia ball bearings**

These are the standard roller type ball bearings with inner diameter as 20mm, outer diameter as 42mm and thickness as 10mm being bought from the market and used in this project. Such two number of ball bearings are used in this project.

**4.5 15mm dia ball bearing housings**

These are made out of mild steel round bar cut from the diameter of 50mm for the length of 20mm and then turned on lathe machine to make the diameter as 45mm and drilled for the diameter of 16mm and counter bore for the diameter of 35mm to suit the ball bearing outer diameter for the depth of 10mm and faced from the other side to make the total length as 15mm. such four number of ball bearing housings are made for this project.

**4.6 15mm dia ball bearings**

These are the standard roller type ball bearing of outer diameter 35mm inner diameter 15mm and thickness 10mm, bought from the market and used in this project. Such four number of ball bearings are used in this project.

**4.7 Drive gear**

This is made out of C30 steel which is a standard spur gear which is used in the automobile gear box which is of diameter 116mm with inner diameter a 44mm and thickness of 12mm with 56 number of teeths. This is then press fitted with the mild steel bush and welded

**4.8 Drive gear bush**

This is made out of mild steel round bar being cut from eh diameter of 50mm of length 15mm and then step turned on lathe machine to make the diameter as 44mm to suit the drive gear inner diameter for the length of 6mm and center drilled to have the hole diameter as 20mm to suit the axle diameter and then faced from the other side to make the collar length as 2mm and total length as 8mm keeping the collar length as 2mm and then this bush is welded on the drive gear as required and used in this project.

**4.9 Air pump**

This is a standard air pump which is used as foot pump for bicycle or motorcycle air filling, which is made of C30 steel cylinder with inner diameter as 70mm which is having 150mm length with both side capped with the proper threading, which is having non return valve inbuilt, which will be of rubber, which has inbuilt pressure guage mounted at the outlet port. Here we are using the stroke length of 140mm as required during speed breaker hump pressing.

**4.10 Pump base support**

This is made out of mild steel pipe of outer size 40mm x 20mm cut for the length of 260mm, ground to remove the cutting burr and then welded on the base frame to be able to hold the air pump on it as required.

**4.11 Gate partitions holders**

These are made out of mild steel flat being cut from the size of 25mm x 6mm of length 200mm---4set, 100mm---8set and hammered for flattening and then ground to remove the cutting burr and then marked for the holes to drill the holes of 6mm diameter as required. 200mm length flats are marked for the holes at 10mm side reference from to the ends and second hole at the distance of 50mm from first hole at both the ends. Such four flats are drilled. Flat of 100mm is taken and marked for the holes at the distance of 25mm from one side and 50mm for the second hole from first hole and then drilled. All are then aligned and welded by arc welding as per the sketch. such four partition holders are made for this project. These assemblies are then welded on the center axle to be able to hold the gate partitions at top and bottom.

**4.12 Driven gear**

This is made out of C30 steel a standard automobile gear box gear which is bought from market of outer diameter as 29mm with hole bored to make it as 15mm and thickness as 12mm with 16 number of teeths. Such two set of driven gear are used in this project.

**4.13 Crank**

This is made out of mild steel flat of outer size 25mm x 5mm of length 90mm and hammered for flattening and ground to remove the cutting burr and to make right angle and then marked for the holes at the distance of 10mm from one side and 70mm distance from first hole to second hole and drilled to have 6mm holes and ground to remove the drilling burr and used.

**4.14 Center axle**

This is made out of C30 steel round bar being cut from the diameter of 25mm of length 1510mm and then turned on lathe machine to make the diameter as 20mm to suit the ball bearing inner diameter for the entire length and faced from both the sides to make the total length as 1500mm as required and used in this project.

**4.15 Gate partitions**

This is made out of mild steel pipe with outer size of 20mm x 20mm cut for the length of 600mm----8nos, 1220mm----4nos, 1180mm---4nos, all are ground at the ends to remove the cutting burr and then joined to make the C frames to have the outer size as 600mm x 1220mm. another center support is welded to this C frame at the distance of 280mm for all the four partitions. Such four partitions are made which are then drilled to suit the partition holder holes as required and fastened to the holders by M6 nuts and bolts as required.

**4.16 Driven axle**

This is made out of C30 steel round bar being cut from the size of 20mm of length 210mm and then turned to make the diameter as 15mm to suit the ball bearing inner diameter for the entire length and faced to make the total length as 200mm. such two number driven axles are made for this project.

**4.17 Pulley**

This is made out of mild steel round bar being cut from the diameter of 80mm of length 12mm and turned to make the diameter as 75mm and center drilled to have the diameter as 15mm to suit the axle diameter and then grove is made on the circumference to make 6mm width grove of 70 mm diameter is made to be able to suit the belt fixing in it and used.

**4.18 Driven axle support**

This is made out of mild steel flat being cut from the size of 25mm x 6mm of length 100mm, hammered for flattening and then ground to remove the cutting burr and used in this project.

**4.19 Tank leg LH (left hand side)**

This is made out of mild steel pipe of outer size 20mm x 20mm of length 420mm---1nos, 360mm—1nos, ground at the ends to remove the cutting burr and then joined together as T to make the long leg for tank base.

**4.20 Tank leg RH (right hand side)**

This is made out of mild steel pipe of outer size 20mm x 20mm of length 320mm---1nos, 360mm—1nos, ground at the ends to remove the cutting burr and then joined together as T to make the short leg for the tank base.

**4.21 Air tank**

This is a standard air tank which is made of mild steel sheet of 3mm thick being used in the Leyland truck for air filling, which can withstand a air pressure of 10kg.cm2, here it is operative at the pressure of maximum 3kg/cm2. This tank is of diameter 320mm with length of 400mm and both the ends welded with the threaded bush to be able to couple this with the connectors to connect the ball valves as required.

**4.22 Threaded bush for air tank**

These are made out of mild steel round bar being cut from the diameter of 30mm of length 30mm and then turned on lathe machine to make the diameter of 25mm and drilled to have the hole diameter of 11mm and faced and then internal threading is done to suit 1/4inch pipe threading. This bush is then faced from the other side to make the total length of 25mm. such two bushes are made and are welded on the hole of the air tank as required.

**4.23 Sprinkler holder vertical**

This is made out of mild steel pipe of outer size 20mm x 20mm of length 600mm and ground at both the ends to remove the cutting burr and joined to the base to make as sprinkler holder vertical.

**4.24 Sprinkler base**

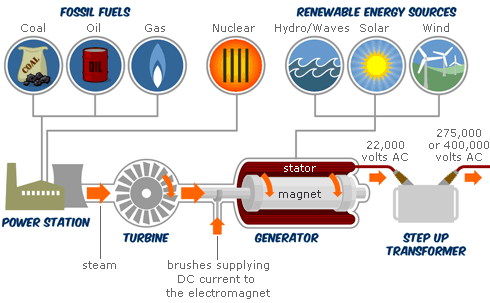
This is made out of mild steel square pipe of outer size 20mm x 20mm of lengths 160mm---1nos, 70mm---2nos, all are ground at the edges to remove the cutting burr and then joined by arc welding to make the sprinkler base as required.

**4.25 Sprinkler holder**

This is made out of mild steel flat cut for the size of 25mm x 5mm of length 60mm and a round plate of 40mm diameter is taken, center hole is drilled to have 18mm hole and then this is welded to the flat to make it as sprinkler holder and welded to the sprinkler holder vertical.

## CHAPTER 5

## 5.Renewable Energy in India



**Fig 5.1** Fossil Fuels & Renewable Energy Sources

India’s economy is growing and the country is developing into an economic power. But energy consumption is increasing too. Experts assume that between he Himalayas and Cape Comorin energy requirements will double over the next ten years. And over the next decade India has the aim of providing electricity to every household even in the remotest areas comprising a colossal output of around 100,000 MW. That is the equivalent of about 100 atomic power stations. But the strategies of the energy policies in India envisage at least 10 percent of energy production from renewable sources.

Infact, the importance of renewable energy was recognized in the country in the early 1970s. India has today one of the largest programmers for renewable energy. The activities cover all major renewable sources, such as biogas, biomass, solar energy, wind energy, small hydropower and other remerging technologies. The Ministry of Non-Conventional Energy Resources (MNES) created in 1992 is the nodal agency of the Government for all matters relating to new and renewable energies.

Having access to energy is just as basic a prerequisite for fighting underdevelopment as access to a safe water supply. The United Nations aims to halve the number of people living in poverty by 2015. Two billion people have no access to modern energy and access to energy is crucial to reduce poverty. This can be achieved only with renewable energy, as it is virtually impossible for many countries to finance an energy system of these two billion people based on coal and oil; it would also give a mortal blow to the world climate. It is imperative that the climate does not heat up by more than two degrees as otherwise the ecosystems will no longer be able to adjust. Thus, access o sustainable generated energy is “active climate policy and energy policy; at the same time it is also peace policy.” For example, solar power plants that simultaneously desalinate water could prevent regional armed conflicts over the limited supplies of drinking water around Earth’s Sunbelt.

Renewable energy thus brings together both high-tech innovations and opportunities for sustainable development.

**5.1 Irrigation Sprinklers**

**Irrigation sprinklers** are sprinklers used on farms, golf courses, and yards, to provide water to vegetation and plants in the event of [drought](http://en.wikipedia.org/wiki/Drought). They may also be used for recreation, as a cooling system, or to keep down the amount of airborne dust.

Home lawn sprinklers vary widely in their size, cost, and complexity. They include [impact sprinklers](http://en.wikipedia.org/wiki/Impact_sprinkler), [oscillating sprinklers](http://en.wikipedia.org/w/index.php?title=Oscillating_sprinklers&action=edit&redlink=1), [drip sprinklers](http://en.wikipedia.org/w/index.php?title=Drip_sprinklers&action=edit&redlink=1), and [underground sprinkler](http://en.wikipedia.org/wiki/Underground_sprinkler) systems. Small sprinklers are available at home and garden stores or hardware stores for small costs. These are often attached to an outdoor water faucet and are placed only temporarily. Other systems may be professionally installed permanently in the ground and are attached permanently to a home's [plumbing](http://en.wikipedia.org/wiki/Plumbing) system. An ingenious domestic sprinkler made by Nomad called a 'set-and-forget tractor sprinkler' was used in Australia in the 1950s. Water pressure ensured that the sprinkler slowly moved across a lawn.[[1]](http://en.wikipedia.org/wiki/Irrigation_sprinkler#cite_note-0)

Permanently installed systems may often operate on timers or other automated processes. They are occasionally installed with retractable heads for aesthetic and practical reasons (making damage during [lawn mowing](http://en.wikipedia.org/wiki/Lawn_mowing) or other maintenance less likely). These often are programmed to operate at certain times of day or on some other schedule.

### 5.2 Underground sprinklers

Underground sprinklers function through means of basic electronic and hydraulic technology. This valve and all of the sprinklers that will be activated by this valve are known as a zone. Upon activation, the solenoid, which sits on top of the valve is magnetized lifting a small stainless steel plunger in its center. By doing this, the activated (or raised) plunger allows air to escape from the top of a rubber diaphragm located in the center of the valve. Water that has been charged and waiting on the bottom of this same diaphragm now has the higher pressure and lifts the diaphragm. This pressurized water is then allowed to escape down stream of the valve through a series of pipes, usually made of PVC. At the end of these pipes and flush to ground level (typically) are pre measured and spaced out sprinklers. These sprinklers can be fixed spray heads that have a set pattern and generally spray between 1.5-2m (7–15 ft.), full rotating sprinklers that can spray a broken stream of water from 6-12m (20–40 ft.), or small drip emitters that release a slow, steady drip of water on more delicate plants such as flowers and shrubs.

Farm sprinklers

The first use of sprinklers by farmers was some form of home and golf course type sprinklers. These ad hoc systems, while doing the job of the buried pipes and fixed sprinkler heads, interfered with cultivation and were expensive to maintain. In the 1950s a firm based in Portland, Oregon *Stout-Wyss Irrigation System*, developed the rolling pipe type irrigation system for farms that has become the most popular type for farmers irrigating large fields. With this system large wheels attached to the large pipes with sprinkler heads move slowly across the field.

## 5.3 Sprinkler use

Most irrigation sprinklers are used as part of a sprinkler system, consisting of various plumbing parts, piping and control equipment. Piping is connected to the water source via plumbing fittings and the control system opens and closes valves to provide water on a schedule. The control provided varies depending on the equipment used; some systems are fully automated and even compensate for rain, runoff and evaporation, while others require much more user attention for the same effectiveness.

Outdoor sprinkler systems are sometimes used as a deterrent against [homeless people](http://en.wikipedia.org/wiki/Homelessness). For example, the city of [Los Angeles](http://en.wikipedia.org/wiki/Los_Angeles) installed an elaborate overhead sprinkler system in a downtown park along lower Fifth Street. This sprinkler system was programmed to drench unsuspecting sleepers at random times during the night. Local businessmen soon copied this system in an effort to drive homeless people away from public sidewalks adjacent to their businesses.

Precision Agriculture Research and Education Group’s sensors and controls lab test technologies available to farmers today and develop technologies for the future. The work done by these robots with artificial intelligence, to help farmers better know their field condition and crop condition. The lab has developed prototypes of a technology that measures the wavelengths of light reflecting off a plant to ‘learn’ how much fertilizer particular plants need, such as health or sick varieties. The farmer first introduces the device to different types of plants, inputting information about the plants and how much fertilizer should be dispensed in each case on a palm-type device.

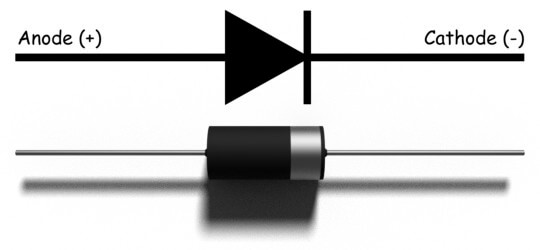
****

**Fig 5.2** Typical Electric Power Supply Systems

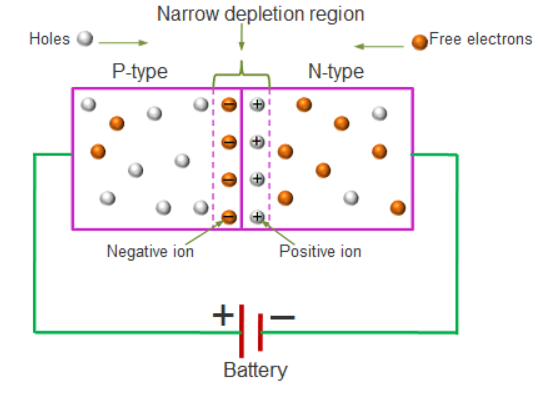
**5.4 Compressed air energy storage**

**Compressed Air Energy Storage** (CAES) refers to the [compression of air](http://en.wikipedia.org/wiki/Air_compressor) to be used later as energy source. At utility scale, it can be stored during periods of low energy demand (off-peak), for use in meeting periods of higher demand ([peak load](http://en.wikipedia.org/wiki/Peak_load)). Alternatively it can be used to power tools, or even vehicles. Conceptual representation of the compressed air energy storage concept. Off peak (low cost) electrical power is used to compress air into an underground air storage” vessel” (the Norton mine), and later the air is used to feed a gas-fired turbine generator complex to generate electricity during on-peak (high price) times. A similar concept uses wind powered air compressors.

**5.5 Diode**



**Fig 5.3(a)** Diode



**Fig 5.3(b)** p-n junction

It is a combination of P-type and n-type semiconductors. Or a P-n junction is called a crystal diode or a semiconductor diode. Symbolically it has shown above fig 4.3(b).

Note: Arrow indicates the direction of conventional current

i.e., hole current

In p type semiconductor Holes are the majority charge carriers and electrons minority carriers.

In n type semiconductor electrons are the majority charge carriers and holes are the applied voltage opposes the junction p.d and for values of the applied voltage greater than the junction p.d. the charge carries easily cross the junction from either side. The motion of the majority carries constitutes a current in the external circuit. This current rises sharply with the applied voltage. Thus a forward based p-n junction offers a small resistance.

**5.6 Switches**

A **switch** is an [electrical component](http://en.wikipedia.org/wiki/Electrical_component) that can break an [electrical circuit](http://en.wikipedia.org/wiki/Electrical_circuit), interrupting the [current](http://en.wikipedia.org/wiki/Electric_current) or diverting it from one conductor to another. The most familiar form of switch is a manually operated [electromechanical](http://en.wikipedia.org/wiki/Electromechanical) device with one or more sets of [electrical contacts](http://en.wikipedia.org/wiki/Electrical_contact). Each set of contacts can be in one of two states: either 'closed' meaning the contacts are touching and electricity can flow between them, or 'open', meaning the contacts are separated and non-conducting.

Since the advent of [digital logic](http://en.wikipedia.org/wiki/Digital_logic) in the 1900s, the term has spread to a variety of digital [active devices](http://en.wikipedia.org/wiki/Active_device) such as [transistors](http://en.wikipedia.org/wiki/Transistor) and [logic gates](http://en.wikipedia.org/wiki/Logic_gate) whose function is to change their output state between two [logic levels](http://en.wikipedia.org/wiki/Logic_level) or connect different [signal](http://en.wikipedia.org/wiki/Digital_signal) lines, and even computers, [network switches](http://en.wikipedia.org/wiki/Network_switch), whose function is to provide connections between different [ports](http://en.wikipedia.org/wiki/Computer_port_(hardware)) in a [computer network](http://en.wikipedia.org/wiki/Computer_network). The term 'switched' is also applied to [telecommunications networks](http://en.wikipedia.org/wiki/Telecommunications_network), and signifies a network that is [circuit switched](http://en.wikipedia.org/wiki/Circuit_switched), providing dedicated circuits for communication between end nodes, such as the [public switched telephone network](http://en.wikipedia.org/wiki/Public_switched_telephone_network). The common feature of all these usages is they refer to devices that control a [binary](http://en.wikipedia.org/wiki/Binary_numeral_system) [state](http://en.wikipedia.org/wiki/State_(computing)): they are either on or off, closed or open, connected or not connected.

### 5.6.1 Selecting a Switch

There are three important features to consider when selecting a switch:

* **Contacts** (e.g. single pole, double throw)
* **Ratings** (maximum voltage and current)
* **Method of Operation** (toggle, slide, key etc.)

**5.6.2 Switch Contacts**

Several terms are used to describe switch contacts:

* **Pole** - number of switch contact sets.
* **Throw** - number of conducting positions, single or double.
* **Way** - number of conducting positions, three or more.
* **Momentary** - switch returns to its normal position when released.
* **Open** - off position, contacts not conducting.
* **Closed** - on position, contacts conducting, there may be several on positions.

**For example:-** the simplest on-off switch has one set of contacts (single pole) and one switching position which conducts (single throw). The switch mechanism has two positions: open (off) and closed (on), but it is called 'single throw' because only one position conducts.

#### 5.6.3 Switch Contact Ratings

Switch contacts are rated with a maximum voltage and current, and there may be different ratings for AC and DC. The AC values are higher because the current falls to zero many times each second and an arc is less likely to form across the switch contacts.

For low voltage electronics projects the voltage rating will not matter, but you may need to check the current rating. The maximum current is less for inductive loads (coils and motors) because they cause more sparking at the contacts when switched off.

**5.6.4 Toggle switch**

[](http://en.wikipedia.org/wiki/File:On-Off_Switch.jpg)

**Fig 5.4** Toggle switch

A toggle switch in the "on" position.

In the simplest case, a switch has two pieces of [metal](http://en.wikipedia.org/wiki/Metal) called *contacts* that touch to make a circuit, and separate to break the circuit. The contact material is chosen for its resistance to [corrosion](http://en.wikipedia.org/wiki/Corrosion), because most metals form [insulating](http://en.wikipedia.org/wiki/Electrical_insulation) [oxides](http://en.wikipedia.org/wiki/Oxide) that would prevent the switch from working. Contact materials are also chosen on the basis of [electrical conductivity](http://en.wikipedia.org/wiki/Electrical_conductivity), [hardness](http://en.wikipedia.org/wiki/Hardness_(materials_science)) (resistance to [abrasive wear](http://en.wikipedia.org/wiki/Wear#Abrasive_wear)), [mechanical strength](http://en.wikipedia.org/wiki/Strength_of_materials), low cost and low [toxicity](http://en.wikipedia.org/wiki/Toxicity).

Sometimes the contacts are [plated](http://en.wikipedia.org/wiki/Electroplating) with [noble metals](http://en.wikipedia.org/wiki/Noble_metal). They may be [designed](http://en.wikipedia.org/wiki/Design) to wipe against each other to clean off any contamination. Nonmetallic [conductors](http://en.wikipedia.org/wiki/Electrical_conductor), such as conductive [plastic](http://en.wikipedia.org/wiki/Plastic), are sometimes used.

**5.7 Main Parts With Cost List**

1. Base frame--------mild steel angle- 25x25x5mm------------1set----Rs 1000
2. Vertical stand-mild steel angle 25x25x5mm and pipe------1set----Rs 800
3. 20mm dia ball bearing housings---mild steel dia55x20-----2set----Rs 700
4. 20mm dia ball bearings-----ID20/OD42/thk10---------------2set----Rs 300
5. 15mm dia ball bearing housings--mild steel dia50x20------4set----Rs 1200
6. 15mm dia ball bearings-----ID15/OD35/thk10--------------4set----Rs 600
7. Drive gear------------C30 steel dia116x12---------------------1set----Rs 900
8. Drive gear bush-----mild steel dia50x15-----------------------1set----Rs 400
9. Driven gear------------C30 steel dia 30x15--------------------1set----Rs 500
10. Crank-------mild steel flat 25x5mm----------------------------1set----Rs 300
11. Center axle-----------C30 steel dia25x1500-------------------1set----Rs 900
12. Gate partitions-------mild steel pipe 20x20mm---------------4set----Rs 1500
13. Driven axle----------C30 steel dia20x200mm-----------------2set----Rs 800
14. Driven axle support----------mild steel flat--------------------2set----Rs 400
15. Air tank----------------------------mild steel--------------------1set----Rs 900
16. Air pump-------------------------standard-----------------------1set----Rs 600
17. Threaded bush for air tank------------mild steel round-------2set----Rs 150
18. Hex connector for air tank-------mild steel--------------------2set----Rs 200
19. Polyurethane connector for tank --------standard-------------2nos----Rs 100
20. Tank leg LH----------------------------mild steel---------------1set----Rs 100
21. Tank leg RH---------------------------mild steel----------------1set----Rs 100
22. Sprinkler holder ---------------------mild steel-----------------1set----Rs 300
23. Sprinkler--------------------------------standard-----------------1set----Rs 100
24. Ball valve---------------------------1/4inch threading----------2set----Rs 300
25. Generator------------------------12VDC, standard-------------1set----Rs 600
26. LEds tube----------------------standard, ------------------------1set----Rs 300
27. Battery--------------------------------6VDC, 4.5ah-------------1set----Rs 300

The total cost is rounded off to Rs 14550 as discussed.

**CHAPTER 6**

**6.RESULT AND DISCUSSION**

As energy is an important factor to sustain industrial growth and standard of living of a country and is relatable to the per-capita energy consumption. The conventional energy sources are diminishing vigorously and in nearby coming era the world will have to depend on non-conventional sources for generation of power. Various types of non-conventional sources are available like solar energy, wind energy, biogas etc. In this method the energy is harvested from human without effecting ecosystem and convert electrical energy with the help of shaft. This shaft is connected to the electric dynamo and it produces electrical energy proportional to persons, more will the people more will be the energy produced.

**CHAPTER 7**

**7.CONCLUSION**

This is a free energy generating project which uses the normal physical actions in our life for getting energy which is a scarce in these days. Energy efficiency is improving day by day and we are coming out with various energy convertion for our utilization which we are simply spending without our knowledge which can be reused and our project becomes best example of that theory. In our project we have used the rotary gate movement for power generation and also to irrigate the garden by powering the sprinklers in the garden by the air pressure generated by this rotary gate action. Our project has been successful in practical and we have achieved the power generation and also the air sprinkler working. In making of the project we have come across various design aspects and practical workshop practices, welding and fabrication practices and have gained knowledge in all these alongwith the generator working, light glowing etc.

**REFERENCES**

[1]Bisoyi B, Das B. Adapting Green Technology for Optimal Deployment of Renewable Energy Resources and to Generate Power for Future Sustainability. Indian Journal of Science and Technology. 2015; 8(28).

[2]Jacobson MZ, Delucchi MA. Providing all global energy with wind, water, and solar power. Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials. Energy Policy. 2011; 39(3):1154–69.

[3]Fridleifsson IB. Status of geothermal energy amongst the world’s energy sources. Geothermics. 2003; 32(4):379–88.

[4]Reddy KP, Rao MVG. Modelling and simulation of hybrid wind solar energy system using MPPT. Indian Journal of Science and Technology. 2015; 8(23):71–7.

[5]Jacobson MZ, Delucchi MA. A path to sustainable energy by 2030. Scientific American. 2009; 301(5):58–65.

[6]Nikkhoo A, Amankhani M, Ghafari H. Vibration suppression in smart thin beams with piezoelectric actuators under a moving load/mass accounting for large deflections of the base structure. Indian Journal of Science and Technology. 2014; 7(2):211–20.