Electricity Generation by using Conventional Ceiling Fan

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Abstract— There are various ways to generate electricity in large manner like hydro, solar, nuclear, thermal, and tidal and wind etc. whose initial cost and the maintenance cost is high. In domestic as well as in Industries we are going to use many electronic devices which consume electrical energy. In those appliances fans are the most widely used items rather than air conditioners and coolers. Fans also consumes electricity as a input and it produces mechanical energy as output by using that output rotating mechanical energy as input to the power generating assembly again we can generate electrical energy as output. So this paper presents the method of generating power from a ceiling fan. The generated power can either used directly or stored in a battery for powering other devices.
Keywords: Conventional Ceiling Fan, Induction Motor

I. INTRODUCTION

Now-a-days there is more demand for electricity we can't match the power generated and consumer's demand. Due to that number of problems is arising, like load shedding and we are not able to supply sufficient amount of supply required for agricultural sector and also for residential, commercial and domestic fields. These problems can be solved by applying various techniques like DSM (demand side management) which is one of the effective methods of energy saving by reducing the amount of consumption of energy.

As fans are the most using items which is used to increase our comfortless can also be used for electricity generation by connecting a simple power generating assembly in series with the existing ceiling fan through a extended shaft. This works like a wind turbine which converts rotating mechanical energy produced by the ceiling fan and converts it into electrical energy. The main aim of this paper is to give a new technique to generate electrical power from fan very efficiently and effectively.[1]

II. OBJECTIVES

The objective of this project work that is using a power generative assembly and connecting it in series with the ceiling fan through extended shaft.

- We can create generate electricity without releasing any pollutants to the environment.
- The main aim is to produce electricity at the time of fans working period and stored into battery this stored power is used in the load shedding period.

III. BLOCK DIAGRAM

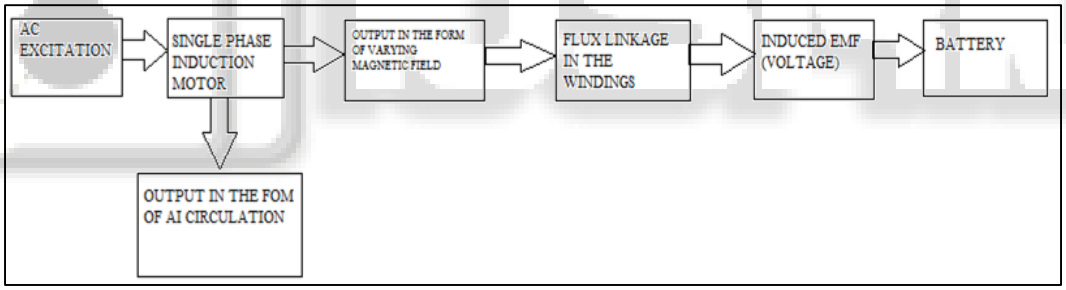


Fig. 1: Block Diagram [2]

IV. WORKING PRINCIPLE

A. *Working Principle of Induction Motor:*

An Induction machine if it has to work as induction motor means it needs two fluxes produced by it's stator and rotor which interact with each other to produce torque. When the stator edge of induction motor get excited by the AC supply current starts flowing through the stator winding due to which flux is produced in the stator winding which is alternating in nature.

This flux sweeps on the rotor bars due to this current starts to flow through the rotor conductors which in turns produces rotor flux. According to Lorentz law, this law states that 'whenever a charged moving particle is placed in a strong magnetic field it experiences a force which is proportional to the product of velocity of that charged particle and magnetic flux density' The rotor starts to rotate in anticlockwise direction.

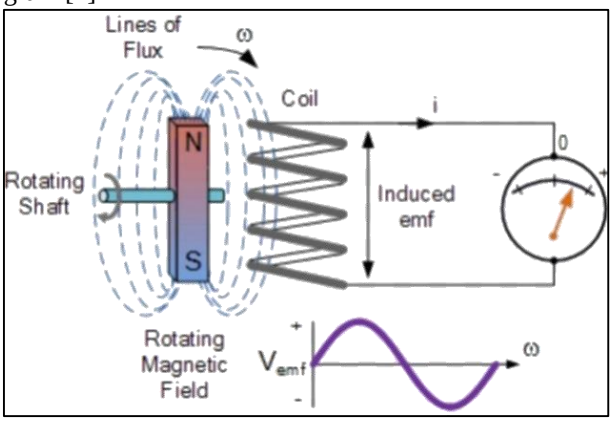


Fig. 2: Schematic Diagram of faradays law of electromagnetic Induction [3]

B. *Working Principle of Power Generating Assembly:*

The Power Fan works on the principle of generator. It works on the faraday's law of electromagnetic induction. The law states that, "When a electrical conductor placed in the strong

magnetic field and when the magnetic lines of force cuts the conductor then EMF is induced on the surface of the conductor.

The copper winding has been assembled on the shaft of the fan which is connected to the ceiling. This copper winding is act as a conductor. The copper winding is placed in a circular way and around which strong magnets are place in circular way as like winding. These strong magnets are connected to the rotating disc of the fan (the disc to which blades of the fan are connected). As this disc rotates magnets also rotates and rotating magnetic field (RMF) is produced. This RMF cuts the copper winding and EMF is induced on the surface of conductor by the principle of induction.

V. CONSTRUCTION

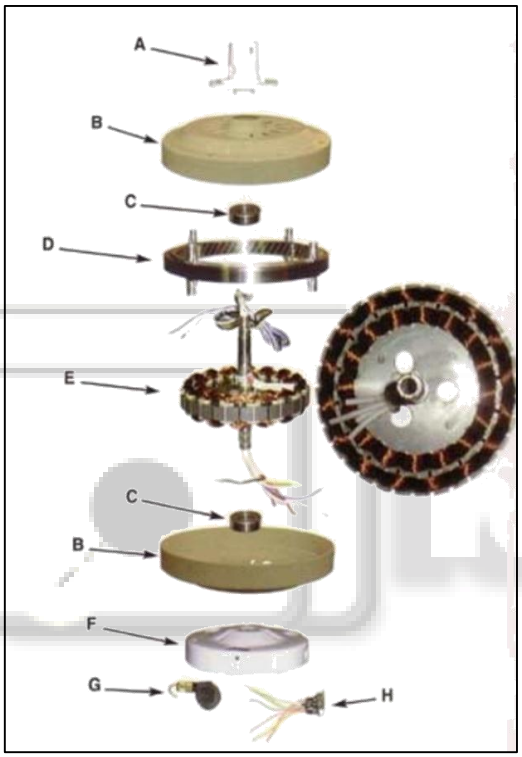


Fig. 3: Overview of construction of ceiling fan [4]

A. Construction of Single Phase Induction motor

A Single phase induction motor mainly consist of two parts one is stator which is stationary and another one is rotor which is rotating the stator consists of stamping which are blotted on its periphery and they are laminated to reduce iron losses. This assembly is known as stator winding or main winding.

It also consist of one auxiliary winding is wounded perpendicular to the main winding to which a capacitor bank is connected. The stampings are made up of silicon steel to minimize the hysteresis loss.

The rotor construction is of squirrel cage type. The rotor consists of uninsulated copper or aluminium bars, placed in the slots. The bars are permanently shorted at both the ends with the help of conducting rings called end rings. The entire structures looks like cage hence it is called a squirrel cage rotor.

As the bars are permanently shorted to each other, the resistance of the entire rotor is too small. The air gap between stator and rotor is kept uniform and as small as possible. The main feature of this rotor is that it automatically adjusts itself for the same the number of poles as that of the stator.

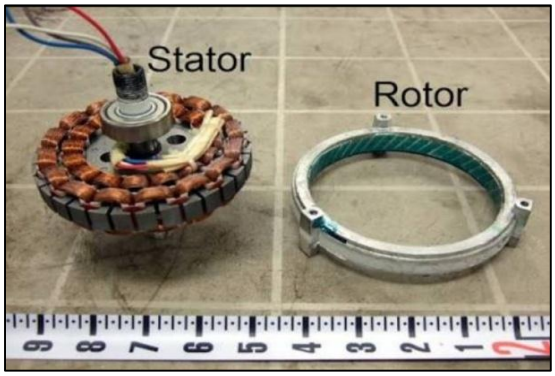


Fig. 4: Main parts of Induction Motor [3]

B. Construction of Power Generative Assembly:

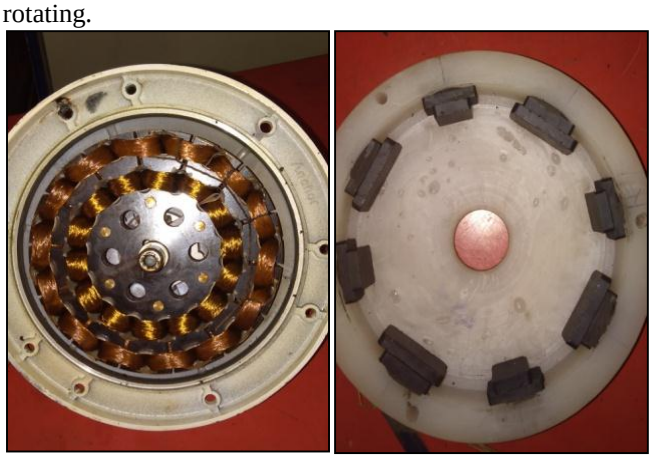
The power generative assembly also consist of two main parts one is stator which is stationary and another on is rotor which is rotating. The construction of stator is same as that of construction of stator in the induction motor but the construction of rotor part differs.

The rotor is made up of permanent magnets. Rotor is placed in such a way that the magnets present in the rotor should be placed around the periphery of the stator windings with a minimum air gap to produce required amount of flux required to produce emf.

VI. METHODOLOGY

A. Working of Induction Motor

Any induction machine to works as motor it needs AC supply as input when AC supply is applied to the induction motor the stator winding get excited and alternating current start flowing through the stator winding as a result of this an alternating flux is produced in the main windings of the stator called as main flux. This main flux sweeps on the rotor conductors and cuts the rotor conductors. Hence current starts to flow through the rotor winding and due to this flux is produced by the rotor conductors by the principle of mutual induction. According to Lorentz law the desired torque is produced by the induction motor to rotate hence rotor start rotating.



Stator Rotor

Fig. 5: Overview of power generative assembly [5]

B. Working of Power Generative Assembly:

The rotor of the induction motor and rotor of the power generative assemble are connected to each other. As the rotor of the induction motor rotates the rotor of the power generative assembly also rotates which is made up of permanent magnets with suitable spacing. As the rotor starts to rotate means a rotating magnetic field is produced by the permanent magnet which produces flux which is alternating in nature.

This alternating flux sweeps on the stator conductors and they get excited and the current starts to flow through the stator windings which in turn produce stator flux.

According to the Faraday's law of electromagnetic induction this law states that whenever a flux linking with the conductor an emf will be induced, if the circuit is closed means current starts flowing through it. Hence according to this law an emf is induced in the stator winding.

VII. ADVANTAGES AND DISADVANTAGES

A. Advantages

- Do not affect the main working of fan.
- Simple in construction.
- Electricity can be generated by conventional ceiling fans.
- The cost of manufacturing is cheap.
- Do not require any external excitation.
- Generation of electricity is free from pollution it doesn't affect any surrounding environment.

B. Disadvantages

- Speed of ceiling fan is slightly reduced.
- Electricity cannot be generated while fan is at off condition.

C. Applications

- It can beused in ceiling fan, table fan, and coolers.
- It can be implement to Motors, blowers and exhaust fans.
- It can be used in the field of robotics and industrial areas.

VIII. CONCLUSION

By constructing simple power generative assembly and connecting it in series with the ceiling fan we can produce electricity effectively and efficiently.[2]

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