International Journal of Latest Engineering Research and Applications (IJLERA) ISSN: 2455-7137

Volume – 03, Issue – 05, May 2018, PP – 67-70

Power Generation by Operating Closing and Opening of Door

V K Ravi[1], Noble Dhas [2]

[1]*AssociateProfessor, Mechanical Engineering, Bangalore Technological Institute, India-35*
[2]*UG Student, Mechanical Engineering, Bangalore Technological Institute, India-35*

Abstract: Comfort coupled with safety and simplicity is what man strives for. Our idea has been to bring about both. The culmination of our effort has resulted in development of a new "POWER GENERATION ON DOOR OPENING AND CLOSING." As today's world requires a lot of energy in different phases to run their livelihood, so this idea describes about the conversion of muscular energy into mechanical energy which can be again converted into useful electrical energy. This conversion can be carried out using a simple belt drive and a generator (dynamo). So the energy which is going unutilized one or the other way can be used for many applications where doors are frequently opened and closed such as shopping malls, ATMs, hospitals, etc. so energy can be utilized properly.

Keywords: Door opening, Generator, Energy Conversion, Electricity, Free Energy.

I. INTRODUCTION

Man has needed and used energy at an increasing rate for his sustenance and wellbeing ever since he came on the earth a few million years ago. Primitive man required energy primarily in the form of food. He derived this by eating plants or animals, which he hunted. Subsequently he discovered fire and his energy needs increased as he started to make use of wood and other bio mass to supply the energy needs for cooking as well as for keeping himself warm. With the passage of time, man started to cultivate land for agriculture. He added a new dimension to the use of energy by domesticating and training animals to work for him. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water for sailing ships and for driving windmills, and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy.

Although in all aspects of life are surrounded by energy, the ability to harness it and use it for constructive ends as economically as possible is the challenge before mankind. Energy produced from the conventional sources like coal, natural gas, furnace oil, high speed diesel, etc., are responsible for producing gases like CO_2, NOX, SOX, etc. that causes global warming. Also, its sources are consumed much faster than nature can create them. Beside conventional sources of energy, there exist many alternative renewable energy sources. The interest in this field of study comes from the undesirable effects of pollution, both from burning fossil fuels and from nuclear waste byproducts. This means of harnessing energy, which have less damaging impacts on our environment. The possible renewable energy sources are solar, wind power, geothermal, tidal and hydroelectric. The world energy consumption will be quadrillion. It is a challenge to meet up such huge amount. Also environmental pollution creates problems because of the excessive use of fossil fuel. Renewable energy such as solar energy, wind energy, energy generation from vibration by using piezoelectric materials are the best solution for overcome.

However, revolving door can be used as new energy sources of energy. Boon Edam developed an energy generated revolving door for the "Driebergen-Zeist" railway station in Netherlands. That not only saves energy, but also generates energy with every person passing the doors. The station has a daily capacity of commuters and a calculation for this particular situation that indicated an energy saving of around 4600 kWh per year, a considerable saving compared to a conventional sliding entrance. The door uses a generator that harvests the kinetic energy when the door spins and a super capacitor to store the energy. The generator controls the rotating speed of the door for safety. The ceiling of the revolving door is made of safety glass and gives a clear view of the technology.

Doors are repeatedly opened and closed a countless number of times each day, for example, at busy shopping malls, at mass transportation stations such as subway stations and train stations and in office buildings. Harnessing all that mechanical energy would be highly advantageous. Converting all that kinetic energy to electrical energy would be an extremely efficient and cost effective way of generating electricity.

II. SELECTION OF COMPONENTS

The Power generated by opening and closing of door is composed of many components so the selection of right components plays efficient role to produce a finished product. The main components used are:

- Gear train
- DC Generator
- Bearing
- Shaft or Rotating rod
- Pulley
- Light
- Belt

- **Gear Train** A gear train is a mechanical system formed by mounting gears on a frame so the teeth of the gears engage. Gear teeth are designed to ensure the pitch circles of engaging gears roll on each other without slipping, providing a smooth transmission of rotation from one gear to the next. Gear teeth are designed so the number of teeth on a gear is proportional to the radius of its pitch circle, and so the pitch circles of meshing gears roll on each other without slipping. The speed 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.
- **Bearing:** A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may *prevent* a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.
- **Pulley:** A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell that does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave. A pulley may have a groove or grooves between flanges around its circumference to locate the cable or belt. The drive element of a pulley system can be a rope, cable, belt, or chain.
- **Light:** A LED lamp or LED light bulb is an electric light for use in light fixtures that produces light using light-emitting diode (LED). LED lamps have a lifespan and electrical efficiency which are several times greater than incandescent lamps and are significantly more efficient than most fluorescent lamps,[1][2][3] with some chips able to emit more than 300 lumens per watt. As of 2016, LEDs use only about 10% of the energy an incandescent lamp requires. Similar to incandescent lamps and unlike most fluorescent lamps (e.g. tubes and compact fluorescent lamps or CFLs), LEDs come to full brightness without need for a warm-up time; the life of fluorescent lighting is also reduced by frequent switching on and off. The initial cost of LED is usually higher. Degradation of LED dye and packaging materials reduces light output to some extent over time. Some LED lamps are made to be a directly compatible drop-in replacement for incandescent or fluorescent lamps. An LED lamp packaging may show the lumen output, power consumption in watts, color temperature in kelvins or description (e.g. "warm white", "cool white" or "daylight"), operating temperature range, and sometimes the equivalent wattage of an incandescent lamp of similar luminous output.
- **Belt:** A belt is a loop of flexible material used to link two or more rotating shafts mechanically, most often parallel. Belts may be used as a source of motion, to transmit power efficiently or to track relative movement. Belts are looped over pulleys and may have a twist between the pulleys, and the shafts need not be parallel. In a two pulley system, the belt can either drive the pulleys normally in one direction (the same if on parallel shafts), or the belt may be crossed, so that the direction of the driven shaft is reversed (the opposite direction to the driver if on parallel shafts). As a source of motion, a conveyor belt is one application where the belt is adapted to carry a load continuously between two points. Belts are the cheapest utility for power transmission between shafts that may not be axially aligned. Power transmission is achieved by specially designed belts and pulleys. The demands on a belt-drive transmission system are huge, and this has led to many variations on the theme. They run smoothly and with little noise, and cushion motor and bearings against load changes, albeit with less strength than gears or chains.
- **Dynamo:** A dynamo is an electrical generator that produces direct current with the use of a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter. Today, the simpler alternator dominates large scale power generation, for efficiency, reliability and cost reasons. A dynamo has the disadvantages of a mechanical

commutator. Also, converting alternating to direct current using power rectification devices (vacuum tube or more recently solid state) is effective and usually economical. The "dynamo-electric machine" employed self-powering electromagnetic field coils rather than permanent magnets to create the stator field. Wheatstone's design was similar to Siemens', with the difference that in the Siemens design the stator electromagnets were in series with the rotor, but in Wheatstone's design they were in parallel. The use of electromagnets rather than permanent magnets greatly increased the power output of a dynamo and enabled high power generation for the first time. This invention led directly to the first major industrial uses of electricity. For example, in the 1870s Siemens used electromagnetic dynamos to power electric arc furnaces for the production of metals and other materials.

➢

III. WORKING PROCESS

This is made up of mild steel, the complete set up is fixed in this model of DOOR MECHANISM. The two L-shape frames are fixed in the two ends of the track. Bellow this shapes open and closing door and covered all sides by same mild steel, the actual power generation arrangement is constructed above the door. This L-shape door window pushes the spur gear when the time of train wheel moving on these arrangement.

Fig. 3.1 Door with Power Generating Arrangement

The Fig. 3.1 represents the real model of the project. Many design procedures have been followed for making the project. This project can produce power by opening and closing of door. Some of the design procedures and modification are as described below which helped in making the project successful.

The complete diagram of the power generation using DOOR MECHANISM is given below. L-shapes window is inclined in certain small angle which is used to generate the power. The pushing power is converted into electrical energy by proper driving arrangement. The gear train and pulley arrangement is fixed at the door end, which is mounded above the L-shapes window. The swing action is used to return the inclined L shapes window in same position by releasing the load. The gear shaft is connected to the supporter by end bearings as shown in fig. The larger gear also coupled with the small gear shaft, so that it is running the same speed of gear. The larger gear is coupled to the small gear with the help of other gear. This larger gear is used to transfer the rotation force to the smaller gear. The smaller gear is running same direction for the forward and reverse direction of rotational movement of the larger gear. This action locks like a rotary action in too and fro sides.

The gear wheel is also coupled to the smaller gear. The final gear is used to increase the rpm of the smaller gear shaft. The gear wheel is coupled to the generator shaft with the help of another gear wheel. The generator is used here, is permanent magnet D.C generator. The generated voltage is 12Volt D.C. This D.C voltage is stored to the Lead-acid 12 Volt battery. If we connect battery and it connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. This working principle is already explained the above chapter. This 230 Volt A.C voltage is used to activate the light, fan and etc. By increasing the capacity of battery and inverter circuit, the power rating is increased. This arrangement is fitted in all door mechanisms, the complete arrangement is kept inside the floor level except the pushing arrangement.

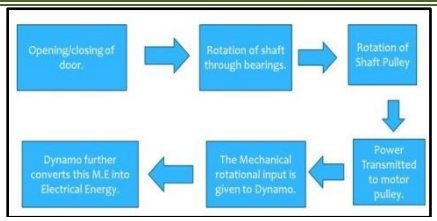

Fig. 3.2 Working Principle

IV. CONCLUSIONS

The need of designing and manufacturing such a system, which will make the Door operation somewhat flexible, also the energy being absorbed by the generation system will be utilized to convert it in to electricity. We conclude that the energy which is going waste one or the other way can be utilized to generate power using simple mechanism. As today's world is completely dependent on different types of energies and these energies are going to disappear or exhaust one or the other day so we need to use free energy in order to run our basic appliances which require electricity for its working.

Acknowledgements

The successful completion of any task would be incomplete without mentioning the people who made it possible with constant guidance and encouragement leading to success. Guidance and deadlines play a very important role in successful completion of the project on time. The gratitude of our project conveyed to Dr. R Bala Sundar Rao, H O D, Department of Mechanical Engineering and Dr. H S Nanda, Principal of Bangalore Technological Institute for their unfailing encouragement and suggestions given to us, constantly monitoring the development of the project and setting up of precise deadlines Finally a note of thanks to the Department of Mechanical Engineering, both teaching and non-teaching staffs for their cooperation extended to us.

REFERENCES

[1]. Rai. G.D. "Non-conventional Energy Sources", Khanna Publishers, International Journal of Engineering Trends and Technology (IJETT) – Vol-2, 2011, Pp 245-252

[2]. Ramesh. R, Udayakumar, K Ananda Krishnan "Renewable Energy Technologies", Narosa Publisher, International Journal of Renewable Energy, vol-1, 2001, Pp 58-65

[3]. Luciano Vasija, (May 22, 2001), Method of Generating Electricity, US-6236118.

[4]. BB. Bryan, (April 12, 1927), Utilization of Surplus Energy Using Revolving Doors, US-1624656.

