

Power Generation using Foot Step

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Abstract— In this project we are generating electrical power as non-conventional method by simply running on the train in the foot step. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step needs no fuel input power to generate the output of the electrical power. This project using simple drive mechanism such as rack and pinion assemble and chain drive mechanism. For this project the conversion of the force energy in to electrical energy. The control mechanism carries the rack & pinion, D.C generator, battery and inverter control. We have discussed the various applications and further extension also. So this project is implemented to all foot step, the power generation is very high. The initial cost of this arrangement is high. In this Electrical Power Generation Using Foot Steps Project, we are generating electrical power as non-conventional method by simply walking or running on the footstep. Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step needs no input power to generate the output of the electrical power. This project using a simple drive mechanism such as rack and pinion assembles and chain drive mechanism. For this project- Electrical Power Generation Using Foot Step the conversion of the force energy into electrical energy. The control mechanism carries the rack & pinion, D.C generator, battery and inverter control. We have discussed the various applications and further extension also.

Key words: Power Generation, Foot Step

I. INTRODUCTION TO THE PROJECT

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. 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.

Other people have developed piezo-electric (mechanical-to electrical) surfaces in the past, but the Crowd Farm has the potential to redefine urban space by adding a sense of fluidity and encouraging people to activate spaces with their movement. The Crowd Farm floor is composed of standard parts that are easily replicated but it is expensive to produce at this stage. This technology would facilitate the future creation of new urban landscapes athletic fields with a spectator area, music halls, theatres, nightclubs and a large gathering space for rallies, demonstrations and celebrations, railway stations, bus stands, subways, airports etc. like

capable of harnessing human locomotion for electricity generation. With further demand for energy, man began to use the wind for sailing ships for driving windmills, 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 supplying solar energy needs of man either directly or indirectly and that man was using only renewable sources of energy.

II. SYNOPSIS

A. Project Description

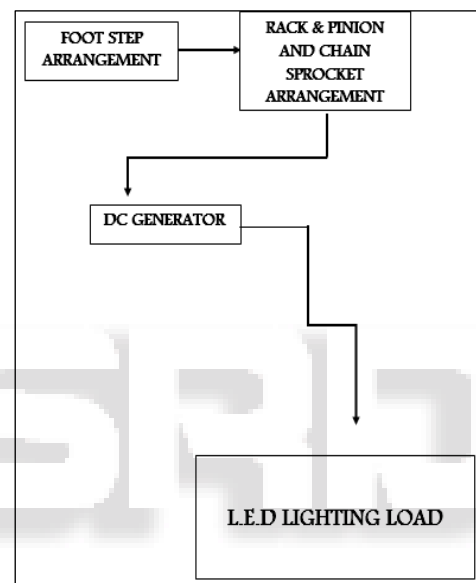


Fig. : Block Diagram

B. Working Principle

The pushing power is converted into electrical energy by proper driving arrangement. The rack & pinion, spring arrangement is fixed at the inclined step. The spring is used to return the inclined step in same position by releasing the load. The pinion shaft is connected to the supporter by end bearings as shown in fig. The larger sprocket also coupled with the pinion shaft, so that it is running the same speed of pinion. The larger sprocket is coupled to the small cycle sprocket with the help of chain (cycle). This larger sprocket is used to transfer the rotation force to the smaller sprocket. The smaller sprocket is running same direction for the forward and reverse direction of rotational movement of the larger sprocket. This action locks like a cycle pedalling action. The fly wheel and gear wheel is also coupled to the smaller sprocket shaft. The flywheel is used to increase the rpm of the smaller sprocket 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 can be stored to the Lead-acid 12 Volt battery. Then battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 230 Volt A.C. That 230 Volt A.C voltage

is used to activate the light, fan and etc. Here we are using L.E.D lights as load to our systems. By increasing the capacity of battery and inverter circuit, the power rating is increased. This arrangement is fitted in shopping complex, college and wherever the large people walking on the footsteps simultaneously.

III. DESCRIPTION OF COMPONENTS

A. Foot Step Platform

This is made up of mild steel sheet. It is 2.5mm steel sheet fabricated steel structures of size 991mm x 305mm x 2.5mm. This section is mainly placed in the crowded areas. This footstep arrangement is attached with spring section.

B. Rack And Pinion

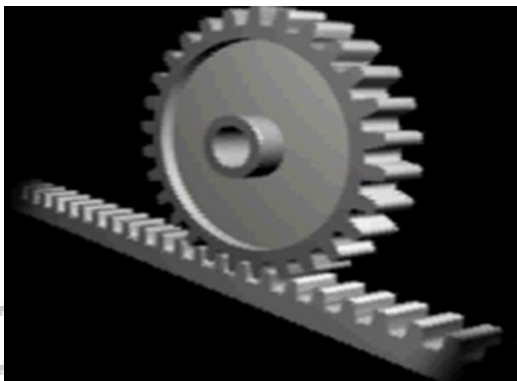


Fig. : Rack And Pinion

Rack and pinion gears are used to convert rotation (From the pinion) into linear motion (of the rack). A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. The circular pinion engages teeth on a linear "gear" bar—the rack. Rotational motion applied to the pinion will cause the rack to move to the side, up to the limit of its travel.

C. Chain and Sprocket

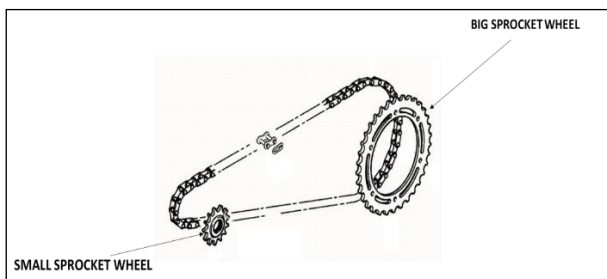


Fig. : Chain and Sprocket

A sprocket is a profiled wheel with teeth that meshes with a chain, track or other perforated or indented material. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth. The spring is used to return the inclined step in same position by releasing the load. The pinion shaft is connected to the supported by end bearings as shown in fig. The larger sprocket also coupled with the pinion shaft, so that it is running the same speed of pinion. The larger sprocket is coupled to the small cycle sprocket with the help of chain (cycle). This larger sprocket is used to transfer the rotation force to the smaller sprocket. The smaller sprocket is running same direction for the forward and reverse direction

of rotational movement of the larger sprocket. This action locks like a cycle pedaling action. The fly wheel and gear wheel is also coupled to the smaller sprocket shaft.

IV. GENERAL CONSIDERATIONS

A. Foot step Plat form



Fig. : Foot Step Plat From

Ørsted's discovery in 1821 that a magnetic field existed around all sides of a wire carrying an electric current indicated that there was a direct relationship between electricity and magnetism. Moreover, the interaction seemed different from gravitational and electrostatic forces, the two forces of nature then known. The force on the compass needle did not direct it to or away from the current-carrying wire, but acted at right angles to it. Ørsted's slightly obscure words were that "the electric conflict acts in a revolving manner." The force also depended on the direction of the current, for if the flow was reversed, then the force did too.

Ørsted did not fully understand his discovery, but he observed the effect was reciprocal: a current exerts a force on a magnet, and a magnetic field exerts a force on a current. The phenomenon was further investigated by Ampère, who discovered that two parallel current-carrying wires exerted a force upon each other: two wires conducting currents in the same direction are attracted to each other, while wires containing currents in opposite directions are forced apart. The interaction is mediated by the magnetic field each current produces and forms the basis for the international definition of the ampere. He electric motor exploits an important effect of electromagnetism: a current through a magnetic field experiences a force at right angles to both the field and current

This relationship between magnetic fields and currents is extremely important, for it led to Michael Faraday's invention of the electric motor in 1821. Faraday's homopolar motor consisted of a permanent magnet sitting in a pool of mercury. A current was allowed through a wire suspended from a pivot above the magnet and dipped into the mercury. The magnet exerted a tangential force on the wire, making it circle around the magnet for as long as the current was maintained. Experimentation by Faraday in 1831 revealed that a wire moving perpendicular to a magnetic field developed a potential difference between its ends. Further analysis of this process, known as electromagnetic induction, enabled him to state the principle, now known as Faraday's law of induction, that the potential difference induced in a

closed circuit is proportional to the rate of change of magnetic flux through the loop. Exploitation of this discovery enabled him to invent the first electrical generator in 1831, in which he converted the mechanical energy of a rotating copper disc to electrical energy. Faraday's disc was inefficient and of no use as a practical generator, but it showed the possibility of generating electric power using magnetism, a possibility that would be taken up by those that followed on from his work.

Faraday's and Ampère's work showed that a time-varying magnetic field acted as a source of an electric field, and a time-varying electric field was a source of a magnetic field. Thus, when either field is changing in time, then a field of the other is necessarily induced.

Such a phenomenon has the properties of a wave, and is naturally referred to as an electromagnetic wave. Electromagnetic waves were analysed theoretically by James Clerk Maxwell in 1864. Maxwell discovered a set of equations that could unambiguously describe the interrelationship between electric field, magnetic field, electric charge, and electric current. He could moreover prove that such a wave would necessarily travel at the speed of light, and thus light itself was a form of electromagnetic radiation. Maxwell's Laws, which unify light, fields, and charge are one of the great milestones of theoretical physics.

V. APPLICATIONS

This technology would facilitate the future creation of new urban landscapes, athletic fields with a spectator area, music halls, theatres, nightclubs and a large gathering space for rallies, demonstrations and celebrations, railway stations, bus stands, subways, airports etc. like capable of harnessing human locomotion for electricity generation. Power generation using foot step can be used in most of the places such as,

- colleges,
- schools,
- cinema theatres,
- Shopping complex and
- Many other buildings.

VI. ADVANTAGES AND DISADVANTAGES

A. Advantages

- Power generation is simply walking on the step
- Power also generated by running or exercising on the step.
- No need to fuel input
- This is a Non-conventional system
- The battery is used to store the generated power
- The advantages of Footstep Power Generation System project are:
- echo-friendly
- waste of energy reduction
- less maintenance cost
- ultra low noise
- wide dynamic and temperature range etc.

B. Disadvantages

- Only applicable for the particular place.

- Mechanical moving parts is high.
- Initial cost of this arrangement is high.
- Care should be taken for batteries.

VII. CONCLUSION

Thus this is a promising technology to provide efficient solution to power crisis to affordable extent. This will be the most acceptable means of providing power to the places that involves difficulties in transmission. Moreover jumping across a power producing platform, then will be fun for idle people. They can also improve their health by exercising in such platforms with earning. This can be used for many applications in rural areas where power availability is less or totally absence. As India is a developing country where energy management is a big challenge for huge population. By using this project we can drive D.C Loads according to the force. Hence we have completed the project successfully.

In concluding the words of our project, since the power generation using foot step get its energy requirements from the Non-renewable source of energy. There is no need of power from the mains and there is less pollution in this source of energy. It is very useful to the places all roads and as well as all kind of foot step which is used to generate the non-conventional energy like electricity. It is able to extend this project by using same arrangement and construct in the footsteps/speed breaker so that increase the power production rate by fixing school and colleges, highways etc.

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In future aspects we can use this principal in the speed breakers at high ways where are rushes of the vehicles too much thus increase input torque and ultimate output of generator. If we are used this principle at very busy stairs palace then we produce efficient useful electrical for large purposes.

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