

# Review Paper on Power Generation by Staircase

**Shubham M. Kadu**

*UG Student*

*Department of Mechanical Engineering  
JDCOEM, Nagpur*

**Chhagan P. Satpute**

*UG Student*

*Department of Mechanical Engineering  
JDCOEM, Nagpur*

**Shubham M. Bhoyar**

*UG Student*

*Department of Mechanical Engineering  
JDCOEM, Nagpur*

**Sourabh U. Motghare**

*UG Student*

*Department of Mechanical Engineering  
JDCOEM, Nagpur*

## Abstract

Global environmental issues and shortage of fossil fuel available are major concerned in today's world. Due to this focus has been turned to renewable energy sources like wind energy solar energy & tidal energy. They are becoming more and more popular all over the world due to many advantages associated with them. Our project concentrates on generation of electricity through a very cheap source i.e. air by a sophisticated mechanism. The objective of this project is to convert potential energy of human footsteps into electrical energy. The project consists of a setup consisting of mechanism to compressed air in foot pumps through human footsteps energy thus converting it into compressed air. This compressed air is then stored in the air tank of sufficient pressure, then this compressed air gets impacted on turbine coupled with D.C. generator through a high pressure nozzle. The D.C. generator generates D.C. voltage which gets stored in battery. This D.C. voltage gets converted into A.C. voltage by an inverter circuit.

**Keywords: Compressed air, D.C. Generator, footsteps, foot pump**

## I. INTRODUCTION

A recent survey on the energy consumption in India had published a pathetic report that 85,000 villages in India do not still have electricity. Supply of power in most part of the country is poor. Hence more research and development and commercialization of technologies are needed in this field. In India, unlike the developed countries we do not have elevators or lifts in the buildings of rural area. There are still conventional steps are used for steps on the floor. From our point, the energy can be utilized by just placing a unit "Staircase Power Generation system". By placing this system in a rural building or in places like railway stations, so much of energy can be tapped. This consumed energy can be used for the lights on the rural area or the crowded places like railway stations, colleges etc. The usage of steps in every building is increasing day by day, since even every small building has some floors. A large amount of energy is wasted when we are stepping on the floors by the dissipation of heat and friction, every time a man steps up using stairs. There is great possibility of tapping this energy and generating power by making every staircase as a power generation unit. The generated power can be stored by batteries, and it will be used for lighting the building [1]. In this project we are using a plate beneath the footsteps which is connected with the piston-cylinder arrangement through a compressive spring. We will accumulate the compressed air in the tank. And this compressed air will have used to rotate the blades of fan by using high velocity nozzle as result electricity will generate. This electricity is stored in a battery. Then the output of the battery is used to lighten the lamps in the room. Now during daytime, we don't need electricity for lightening the lamps so we are using a control switch which is manually operated. The control switch is connected by wire to the output of the battery. The control switch has ON/OFF mechanism which allows the current to flow when needed.

## II. WORKING PRINCIPLE

### A. Components:

This method consists of different equipment's of instrumentation that are used to work as per system diagram to generate power. The block diagram comprises of spring, Piston, Cylinder, Non return valve, Common tube, Air tank, Solenoid valve, Pressure gauge, Air turbine, D.C. generator, Battery.

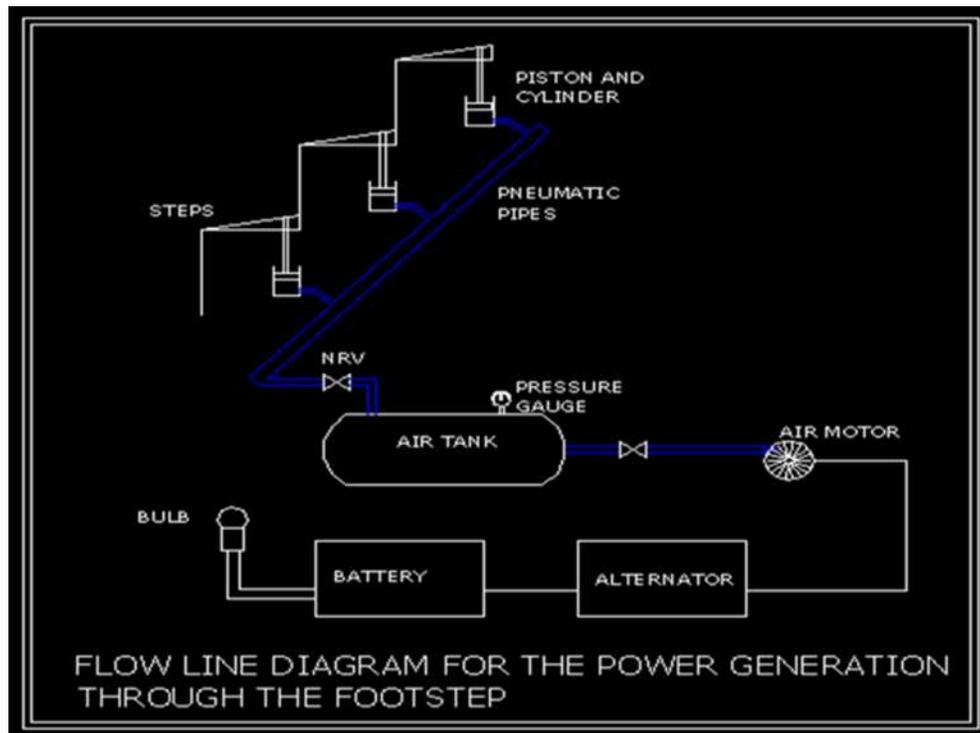


Fig. 1: Flow line diagram of generation of power through footsteps.

### **B. Generation Of Compressed Air:**

It consists of staircase which is supplied with inclined stairs which are inclined at an angle of  $90^\circ$ . The foot pumps are attached below the stairs by spring arrangement so that when a person climbs on the stairs the stair gets pressed and thus the foot pump gets pressed which creates compressed air. This compressed air gets stored in air tank through a series of non-return valves attached to bottom of foot pumps and before the air tank.

### **C. Impact Of Compressed Air On Fan:**

The piston-cylinder is placed under the footsteps to create the appropriate pressure at regular intervals. The high pressure air in air tank then impacted on a fan which is connected to D.C. generator by a high velocity nozzle.

### **D. Generation of electricity:**

Due to impact of compressed air on fan causes the fan to rotate at high speeds. As the fan rotates the D.C. generator coupled to fan also starts rotating. This rotation of generator produces D.C. voltage which gets stored in the battery for further uses. This D.C. voltage can be converted into A.C. voltage by connecting an inverter circuit to battery before connecting battery to output. Then the output of the battery is used to lighten the lamps. Now during daytime, we don't need electricity for lightening the building lamps so we are using a control switch which is manually operated. The control switch is connected by wire to the output of the battery. The control switch has ON/OFF mechanism which allows the current to flow when needed.

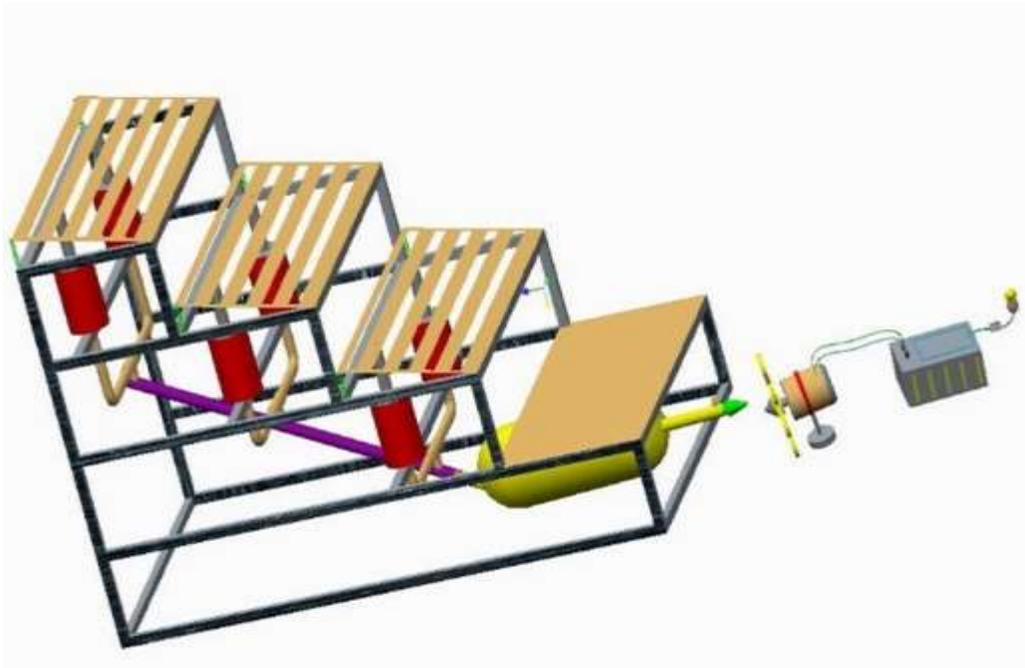


Fig. 2: Proposed Project Model

### III. CONCLUSION

This method has many advantages such as power generation does not require any fuel input, running cost is very less. This is a non-conventional form of energy and therefore very useful in the present scenario of energy crisis. As coin has two faces in the same way there are also some disadvantages such as Mechanical moving parts is high and therefore there are very large frictional losses and therefore require more maintenance, Initial cost of this arrangement is very high. The overall efficiency is quite low as compared to other techniques.

### REFERENCES

- [1] Ramesh Raja R, Sherin Mathew, "Power Generation from Staircase (Steps)", ICETS-2014.
- [2] Kiran Bobby, Aleena Paul K, Anumol.C.V, Josnie Ann Thomas, Nimisha K.K, "Footstep Power Generation Using Piezo Electric Transducers", International Journal of Engineering and Innovative Technology (IJEIT) Volume 3, Issue 10, April 2014, ISSN: 2277-3754.
- [3] SibaBrataMohanty, SasankShekhar Panda, "An Investigation of Generation of Electricity Using Foot Step", IJESRT-2013