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Electricity Generation from Footsteps; A Regenerative Energy Resource

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***Abstract*—** A slab of concrete harnesses kinetic energy whenever it is stepped on. This energy, created by 5 millimeters of flex in the material, is then either stored by lithium polymer batteries contained within the slabs or transmitted immediately to streetlights or other electronics located close by. The current model, made from stainless steel, recycled car tires and recycled aluminum, also includes a lamp embedded in the pavement that lights up every time a step is converted into energy (using only 5 percent of the generated energy).

***Index Terms*-** Accidents, Companies, Production, Safety

I. INTRODUCTION

Due to a need to reduce carbon emissions and keep costs down, producing renewable energy is increasingly important for most governments and the tech industry at the moment. With that in mind investments are being made in the popular green energy sectors such as wind, solar, and wave energy. However, people's steps (thousands upon thousands a day) utilize and channel kinetic energy too [1]. An emerging startup called Pavegen has installed such squares of energy-generating pavement in London.

In an effort to keep the production of the pavement as green and sustainable as possible, Pavegen partnered with Ryburn Rubber Limited and Advanced LEDs (which has also invested in the idea) to make sure that its components create as small an environmental impact as possible [4]. The average square of pavement produces about 2.1 watts of electricity. And according to Pavegen, any one square of pavement in a high-foot traffic area can see 50,000 steps a day. Based on this data, only five units of Pavegen pavement can be enough to keep the lights on at a bus stop all night [2]. The company, led by 24-year old founder Laurence Kemball-Cook, says it eventually wants its slabs to power automatic doors, ticket machines, neon signs, and even computers and major appliances.

Pavegen isn't targeting its product exclusively at municipalities. One of its big ideas is to have stores located on busy sidewalks install them in front of their locations to power their signage or any internal electronics. To encourage this adoption, the company says it will brand its slabs for its commercial customers. The slabs installed in East London happen to be green (thus suggesting its clean-tech solution) but they come in a variety of colors [3]. The company believes the embedded lamp is important to inform passersby of their contribution to the clean energy movement.

The startup plans to roll out more Pagevgen units in the United Kingdom in the next year, but it envisions installing them one day in Times Square in New York — think of all the electronic displays it could help power there — and other frequented locations in the U.S. One of the ideas pitched on its web site is to install slabs in subway turnstiles where thousands of people — about 36,000 per hour — walk a day to power station electronics.

The system from Pavegen makes a lot of sense in very busy public areas as it will constantly be generating energy which will no doubt mean the system pays for itself very quickly and then continues to cut energy costs, the need for extended power wires and carbon emissions. It also helps that they are self-contained units meaning no expensive digging up of the ground surrounding them, thus making them easy to install [5]. Pavegen is not the only company thinking this way and along their direct competition, we're bound to see many other companies trying to develop their energy harvesting products for all the other activities we carry out regularly.

II. WORKING MECHANISM

As per our reference we are using same technique in our work as shown below. We use one rick and pinion gear system with dynamo fixing with its gear mechanism.

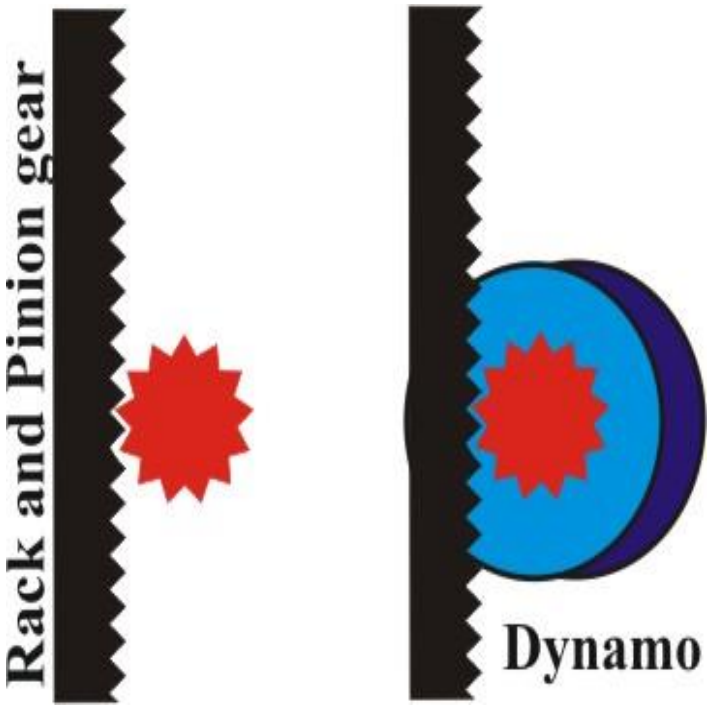

Fig.1

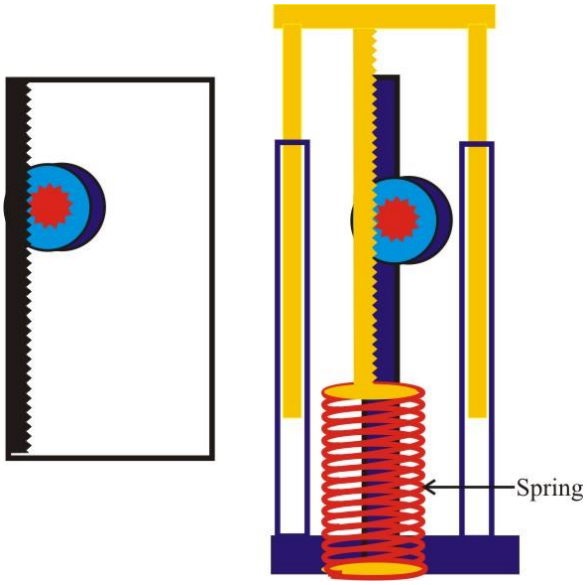

Fig.2

When we press that slider while walking attach spring push back that slider attach dynamo with slider rack and pinion generate current.

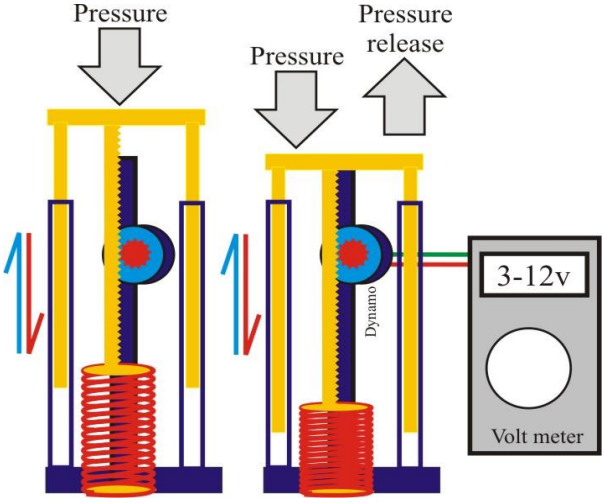

Fig.3

Placement of our project in daily life as a footstep

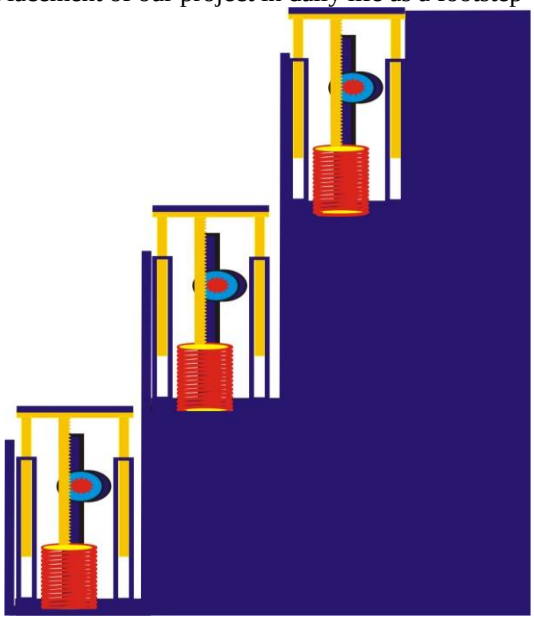

Fig.4

III. COMPONENTS REQUIRED

Dynamo: A dynamo, originally another name for an electrical generator, now means a 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. They are rarely used for power generation now because of the dominance of alternating current, the disadvantages of the commutator, and the ease of converting alternating to direct current using solid state methods.

The word still has some regional usage as a replacement for the word generator. A small electrical generator built into the hub of a bicycle wheel to power lights is called a Hub dynamo.

Rotary Converter Development: After dynamos were found to allow easy conversion back and forth between mechanical or electrical power, the new discovery was used to develop complex multi-field single-rotor devices with two or more commutators. These were known as a rotary converter. These devices were usually not burdened by mechanical loads, but watched just spinning on their own. The rotary converter can directly convert, internally, any power source into any other. This includes direct current (DC) into alternating current (AC), 25 cycle AC into 60 cycle AC, or many different output currents at the same time [7]. The size and mass of these was very large so that the rotor would act as a flywheel to help smooth out any sudden surges or dropouts. The technology of rotary converters ruled until the development of vacuum tubes allowed for electronic oscillators. This eliminated the need for physically spinning rotors and commutators.

Rack and pinion system: 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. For example, in a rack railway, the rotation of a pinion mounted on a locomotive or a railcar engages a rack between the rails and pulls a train along a steep slope.

The rack and pinion arrangement is commonly found in the steering mechanism of cars or other wheeled, steered vehicles. This arrangement provides a lesser mechanical advantage than other mechanisms such as recirculating ball, but much less backlash and greater feedback, or steering "feel". The use of a variable rack (still using a normal pinion) was invented by Arthur E Bishop, so as to improve vehicle response and steering "feel" especially at high speeds, and that has been fitted to many new vehicles, after he created a specialised version of a net-shape warm press forging process to manufacture the racks to their final form, thus eliminating any subsequent need to machine the gear teeth. For every pair of conjugate involute profile, there is a basic rack. This basic rack is the profile of the conjugate gear of infinite pitch radius.A generating rack is a rack outline used to indicate tooth details and dimensions for the design of a generating tool, such as a hob or a gear shaper cutter.

IV. DESIGN OF MECHANISM

Board (base):- length=56 cm
width=40 cm
thickness=1cm

First stair block:- length=33cm
width=21cm

height=9cm
Second stair:- length=23cm
Third stair:-13cm
Foot space:- length=11cm
width=21cm
Gap from working stair to plate =3cm
Tension spring =1
LED (light emitting diode) =5
Dc dynamo (3-volt) =1
Wires =2mtr.
Slider block: - width=13cm
height=18ccm
Rack: length=7cm
length of teeth cut=5cm
Gear :- teeth=40
pinion :- teeth =12
height = 9cm
slider :- width = 12.5cm
height = 15cm
Black tape=10meters
White ply board = 100cmX50cm
Femi coal= 0.250 kg

V. FUTURE ASPECTS

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 project at very busy stairs palace then we produce efficient useful electrical for large purposes

VI. ADVANTAGES

- To store the electricity in battery.
- It can be use at any time when it necessary.
- Easy construction.
- Less number of parts required.
- Electricity can used for many purposes

VII. APPLICATIONS

- In street light.
- In LED light for specific purposes.
- In air circulation system for room by the small fans.
- For used in security alarm.

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