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Magnetically Suspended Point Friction Coreless Generator

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***Abstract*—This presentation is an improvement of our earlier version of "the solar powered coreless generator". It represents the combination of solar and wind power along with magnetic suspension. The prime features are the structural and functional aspects of the new version. There is an enhancement in the functionality of the point friction coreless generator. The degrees of scalability and performance have been improved in the present form of device.**

Keywords—Coreless generator; neodymium magnets; solar power; wind power; point friction; rotor; stator

1- INTRODUCTION

We present a design that is in accordance with balance between the utility of energy and alternate natural resources. Solar and wind energies are among the major alternate energy sources. Ever intensifying pursuit for procuring energy from the expected alternative resources is forcing individuals to look for options of either improving the existing devices or finding new ones. Some of the devices are based on induction generator, doubly fed inductor generator, electrically excited synchronous generator, permanent magnet synchronous generator etc. Permanent magnet synchronous generators are among the most popular as these appear to be preferred for the reasons like higher power density, better controlling limits and reliabilities [1]. The distribution of power has been reported to be efficient in axial – flux permanent magnet devices because there is no direct attraction between stator and rotor but such devices have better efficiency in comparison to the conventional ones [2]. An appropriate solar panel is an option for maintaining continuous current supply and helps to maintain a set of battery. When additional buck converter is applied this connection can be interrupted but application of additional buck/booster battery charger is capable to restore stable operation. Since solar panel consists of many solar cells it provides wide range of voltage to meet the requirements [3]. In our earlier publication we have presented a device consisting of coreless generator along with solar panel [4] that exhibited highly reduced friction and elevated degree of energy production. In continuation with the earlier model we have made an effort to reduce friction further and eliminate the impact of gravity, thus, facilitating higher degree of ease in rotation of coreless generator.

2 - CONSTRUCTION

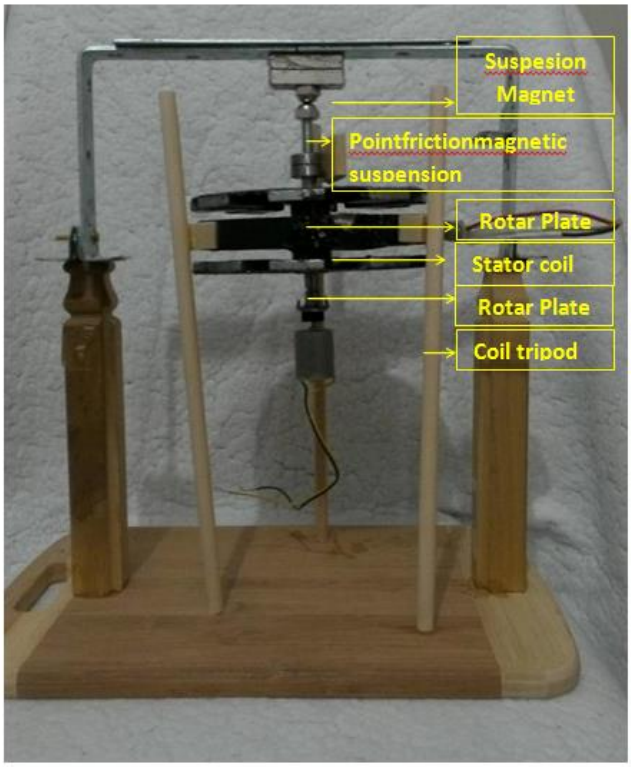

Figure 1

- In this model the coreless generator is suspended using magnetic attraction. There is non-magnetic copper pipe that maintains a fixed distance between the two rotor plates.
- The distance between the plates of rotor can be set by using different lengths. This parameter is essential to regulate the out-put as far as coreless generators are concerned.
- The coreless generator is suspended using 'tee nuts' along the shaft and the attractive forces of the suspension neodymium magnets.
- The other end of the shaft maintains its contact with an 'acorn nut'. This adjustment ensures point friction concept in functionality.
- Thus, the force of friction is reduced to minimum. The use of acorn nut brings out movement of shaft at one point only while it also serves as ball-bearing.
- This set-up involves a coreless generator that is suspended using magnetic attraction.
- The rotor plates are separated by a non-magnetic copper pipe. Different lengths can be used to adjust the distance between the rotor plates.

- This is an important parameter to control the output as this is one of the key factors in coreless generators. This is fastened using tee nuts along a shaft that is eventually suspended by attracting to a neodymium magnet.
- The end of the shaft that is in contact with the magnet has an acorn nut. This creates the point friction ability. The idea behind using the acorn nut is that it serves as a ball bearing and will have friction only at the point of contact.

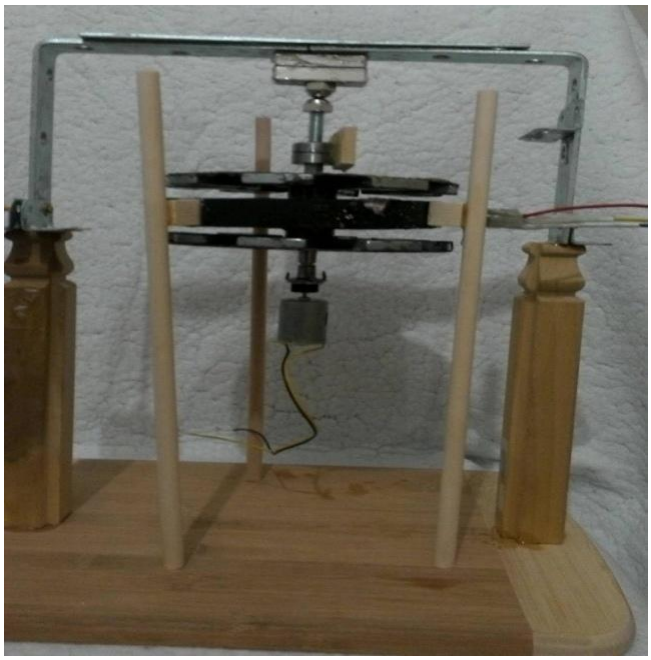

Fig-2 Constructed Model (Front view)

Fig-3 Top view

3 - WORKING

- This entire setup creates an effect similar to levitation using very low degree of energy. Once the plates are suspended the coil is then made to stand independently by fixing it to a tripod.
- In our model, the gap between the coil and rotor plates is approximately 0.5 cm each side.
- The rotor plates can be rotated using any of the alternative sources of energy i.e. wind, solar panels that connect via a high torque low input motor.
- As used in this model, a battery and DC motor has been exploited in combination of coreless generator.
- This keeps the coreless generator operational even in weak/ dim light.

Fig-3 Working View

The standard coreless generators available in the market are represented below (Fig-4) [5]. These generators are relatively much bulky and have capacity to produce 250 watts AC at 150 rpm. The outer shell weighs 7.25 Kg or 16.57 pounds. To demonstrate, a drill was used to rotate which has an input of 4 W DC at 5 W/ h and produced AC output of 84.1 amps. This had two ball bearings as depicted previously [4 and 5].

Fig-4

- The design we have presented retains the point friction concept. It is suspended magnetically which makes it easier to overcome the inertia and facilitate the rotation of the rotor plates.
- It is obvious that since the same rotor plates are almost seven times lighter than before and are magnetically suspended and require much lesser input to rotate.
- In this presentation AAA battery is used to produces the same rotation with a smaller capacity motor (without gears).
- This rotation can be brought about by using wind energy (by attaching blades), by solar (attaching a solar panel, buck converter, battery and a geared motor) or by using atmospheric energy (by using a DC rectifier and connecting an antenna and ground).

4 - CONCLUSION

The presentation of 'point friction coreless generator' represents an effort towards a genuine improvement to attain technological efficiency involving ambient energies available. This design facilitates elevated degree of efficacy and ability to continuous 'gird feeding' using green energy. Secondly this design is likely to act as an ambient energy step up transformers. Other aspects of this design include its plausible scalability to generate electricity so that some of the appliances can be charged and possibility to be used as AC transformer.

CONFLICT OF INTERERST: Authors declare no conflict of interest.

CONTRIBUTION: Both authors contributed equally.

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