

DESIGN OF MANUAL TREADMILL WITH ELECTRICITY GENERATOR FOR ENERGY SAVING

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ABSTRACT:

With global technological advancement energy demand is increasing and there is a strong dependence on unsustainable fossil fuels based power generation. The fossil fuels are burnt for power generation which causes pollution. Pollution is a crucial problem globally and there are so many adverse effects of pollution on living things as well as on environment.

Today in a polluted environment and changed life style it is very difficult to live healthy. In fact, regular physical activity can help to manage a wide range of health problems. Treadmill is one of the exercise machine in which someone walks/runs over a belt. This belt is wrapped around two rollers which are mounted on left and right uprights at one side and base frame on other side respectively.

The human effort during exercise goes waste in conventional manual treadmill. The author has designed a treadmill with Electricity Generator

to produce electricity during exercise. The generator is coupled with the roller Flywheel with help of a V-belt to generate electricity using human effort. The electricity generated during exercise may be used for charging a battery or for any other work. The design of this Treadmill has been presented in this paper.

Keywords: Generator, Treadmill, Energy Conservation, Exercise Machine.

INTRODUCTION

Every body knows that exercise is good for health. No one can ignore the health benefits of regular exercise and physical activity regardless of age, sex or physical ability. There are many advantages of exercise. Some benefits are as below [1]:

- (a) Exercise controls the weight.
- (b) Exercise decreases the risk of cardiovascular diseases.

- (c) Exercise stimulates various brain chemicals which can leave us feeling happier and relaxed. Exercise also makes our appearance better resulting boost in our confidence.
- (d) Regular exercise improves the strength of our muscles and boosts our endurance. Exercise also delivers oxygen and nutrients to the tissues and helps in efficient working of cardiovascular system.
- (e) Exercise is helpful in fall asleep faster and deeper the sleep.
- (f) Exercise helps in connecting with friends and family members in a fun social setting.

Most of the people do exercise worldwide. Different types of machines are used for exercise. Many exercise machines are operated manually. In manual exercise machines muscle power goes waste during exercise. The power which otherwise goes waste during exercise may be used by converting it into any other form of energy. With the technological advancement worldwide, demand of energy is continuously increasing. The power generation is also increasing and most of the energy generation plants are using fossil fuels which bring up many adverse effects which are as below:

- (i) The available quantity of fossil fuel is fixed and there depletion in their available quantity and they will be exhausted at sometime or other.
- (ii) The fossil fuels are burnt to produce electricity resulting environmental pollution and climate change.
- (iii) Global warming is occurring due to climate change.

In view of the above facts there is a need of alternative methods of power generation. Inventions are going on worldwide for generating power through alternative methods. Most of the people do exercise worldwide. The electricity may be produced by using manual exercise machines integrated with Electricity Generators. In this way manual power may be used to generate electricity during exercise and we can

overcome the above mentioned problems up to some extent.

Different types of exercise machines are used for exercise. In conventional manual treadmill human effort goes waste during the exercise. Many inventors invented treadmills with Electricity Generator. Douglas G. Bayerlein and et al. invented a treadmill in which a generator was coupled with a roller axle through a belt drive system. A separate pulley was mounted on roller axle to operate the generator [1]. The Aurel A. Astilean invented a treadmill having a concave shape of running surface of belt. In this treadmill drooping down of belt is prevented [2]. A treadmill manufacturing company wood way manufactured a treadmill which generates power for display and can even be used for charging a phone or MP3 player [3].

Author has designed a treadmill integrated with an Electricity Generator in which Generator is coupled with roller flywheel through a v-belt drive system. The leg power is used in this system to generate the electricity during exercise and this generated electricity may be used to charge the battery.

OBJECTIVE

- To provide a treadmill with Electricity Generator to save electrical energy.
- To provide a treadmill with Electricity Generator, as this may be useful for battery charging for such areas where electricity is not available.
- To provide a treadmill with Electricity Generator. this is simple in design.
- To provide a treadmill with Electricity Generator at low cost.
- To provide a treadmill with Electricity Generator to manufacture easily.
- To provide a treadmill with Electricity Generator to reduce the pollution upto some extent by saving energy.
- To provide a treadmill with Electricity Generator with simple design.

MAIN COMPONENTS OF TREADMILL WITH ELECTRICITY GENERATOR

The main components of the treadmill are as below:

- (i) Base frame

- (ii) Left upright
- (iii) Right upright
- (iv) Flywheel
- (v) Roller
- (vi) Working Belt
- (vii) Side Molding
- (viii) Adjustable Bracket
- (ix) Upright Support
- (x) U-shaped Handrail
- (xi) V-Grooved flywheel
- (xii) Electricity Generator
- (xiii) V-Pulley
- (xiv) V-Belt
- (xv) Generator Support
- (xvi)

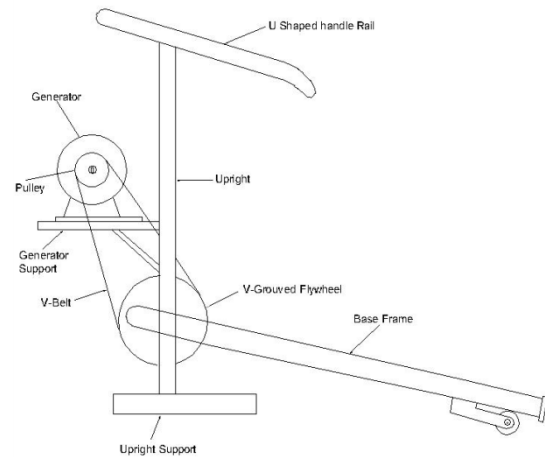


Fig. 2: Front View of Manual Treadmill With Generator

WORKING PRINCIPLE

The conventional manual treadmill without Electricity Generator is shown in Fig. 1.

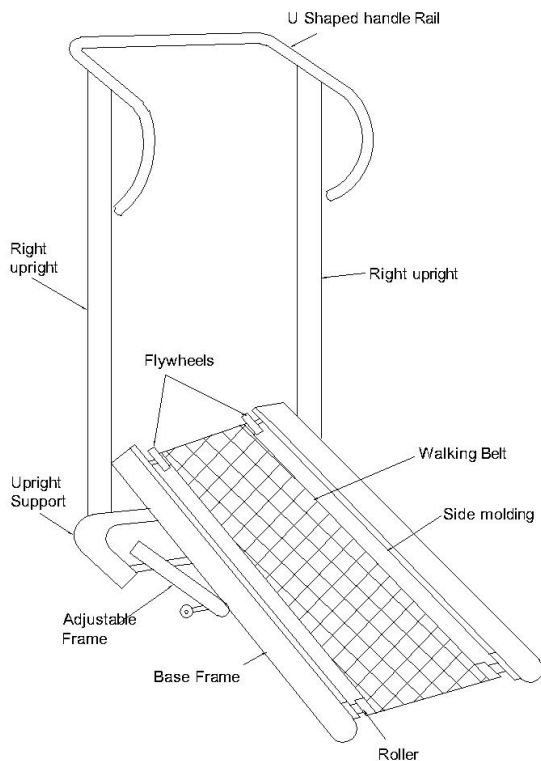


Fig. 1 conventional manual treadmill without Electricity Generator

When someone walks runs on the walking belt flywheels runs at 200 r.p.m. This flywheel rotation is used to generate the electricity. For mounting the Electricity Generator a support is welded on left upright as shown in Fig. 2.

An Electricity Generator is mounted on this support and a v-pulley is fixed on the generator shaft as shown in Fig. 2. A walking belt is wrapped around roller 1 and roller 2. Roller 1 is mounted on the left and right upright and roller 2 is mounted on lower end of the base frame. A V-grooved flywheel is mounted on the left side of the roller 1 and another flywheel is mounted on the right and of the roller 1 as shown in Fig 3.

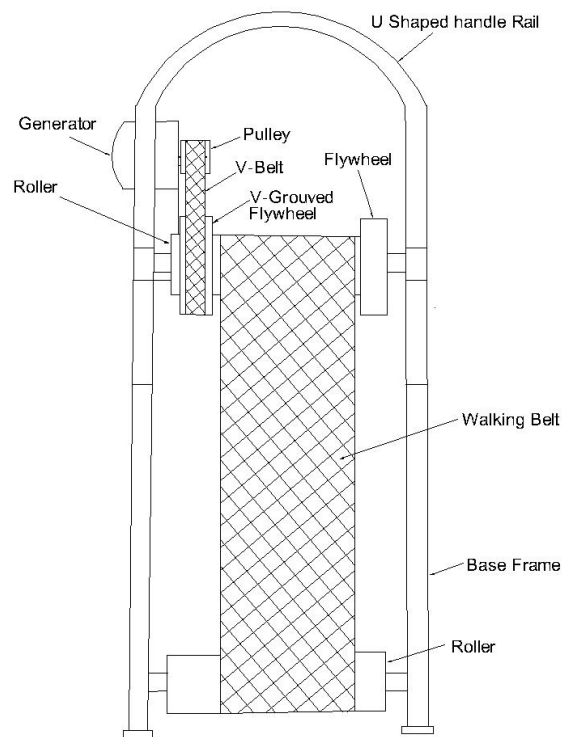


Fig. 3: Top View of Manual Treadmill with Generator

The V-Grooved Flywheel is connected with the V-Pulley mounted on Generator shaft through a V-belt. When someone walks / runs on the walking belt roller 1 and 2 rotate. As the V-

grooved flywheel is mounted on roller 1 and there is no relative motion between the flywheel and roller 1. Thus V-grooved flywheel rotates with roller 1. The diameter of V-grooved flywheel is kept 5 times more than the diameter of the v-pulley mounted on the shaft of the generator. If flywheel rotates at 200 r.p.m. the generator shaft will rotate at 1000 r.p.m. and electricity will be generated which may be used to charge the battery or it may be used to run the MP3 player, low voltage CFL etc.

DISCUSSION

The manual treadmill with Electricity Generator generates about 14- W max power per person while Pedal operated stationary bicycle based generator generates maximum power 100-244 watt.[4]

The treadmill generator can generate energy and this energy may be stored in the batteries and later it may be useful for different applications. This energy generation system is sustainable and free from adverse effects. The treadmill with Electricity Generator reduces the energy consumption resulting in money saving. This system may be used in gym environment and more energy may be produced which can be stored in batteries for operating different appliances.

CONCLUSION

- This manual treadmill with Electricity Generator is simple in design.
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- This manual treadmill with Electricity Generator is sustainable.
- A wide range of health problems can be managed using this manual treadmill.
- This treadmill with Electricity Generator is useful for such areas where electricity is not available.
- Electrical energy can be saved by using this manual treadmill with Electricity Generator.
- Green House Gases can be reduced up to some extent by this manual treadmill with Electricity Generator.
- Strength of muscles can be improved by using this manual treadmill with Electricity Generator.

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