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MODIFICATION OF TREADMILL AS A TREADMILL BICYCLE

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ABSTRACT

This paper deals with the conversion of a normal paddle bicycle into treadmill bicycle. In this model, the frame of the bicycle changed completely. At the place of the paddle we use treadmill. The Treadmill is placed in between two wheels of the bicycle. As the user run or walk on the treadmill then the belt sliding with the help of rollers. The mechanism we are using in this model is that we can replace the paddles by treadmill. So we also named this model as "Paddleless bicycle". This is new theory of riding a cycle. The treadmill belt drives the cycle forward by introducing free wheels and shaft mechanism. The prototype design are required as Treadmill belt, Shaft, Frame of the treadmill, Bearings, Free wheels, Gears, Chain drives and Gear-chain. All the links are made of normal MS(Mild Steel) including the head with the direct contact belt.

Keywords: Bicycle axle, Chain drive, Chassis, Treadmill, Treadmill axle.

I. INTRODUCTION

The Treadmill bicycle is a new way of riding a cycle by human effort. It has a simple mechanism and it contain free wheels, gears, chain, bearing, shaft and links arrangement. This is work on the linear walking motion. The Treadmill frame is fitted at some slope so that force act on the belt horizontally backward direction, so by this force the roller tends to rotate. When we walks on treadmill belt which is tighten with the roller then the linear walking movement is converted into rotary motion. And so that by the use of gear chain mechanism the rotary motion is utilised to run the rear wheel of the bicycle. So in this way we can enjoy the walking as well as cycling. The operating speed of the bicycle differs on the amount of force applied by the user.

Component used in this model: Cycle, Treadmill, Bearings, Chain and sprockets, Free wheels, Shaft, Lathe operation (turning, threading and knurling). Our aim is to make a cycle which can be run by less effort and without external source.

II. LITERATURE REVIEW

There has been great deal of research on this treadmill bicycle fabrication. The origin and use of the treadmill bicycle system began from several years ago and develop throughout the new concept revolution. At the late first century AD Roman Empire introduce first treadmill, as they need to lift heavy weight they incorporate this

new invention. The workers walk within the treadmill having large diameter they could lift double the weight with half the crew. Nicholas potter also work in this field and invented a treadmill which is powered by animal and reduce human effort with more output. In 18's new concept of treadmill for prisoners as a punishment, this idea was brought in gaol by Sir William Cubitt. Before the development of Bruce protocol there was no safe, standardized protocol that could be used to monitor cardiac function in exercising patients. To address these problems Dr. Robert Bruce and Dr. Paul began to work on exercise testes.

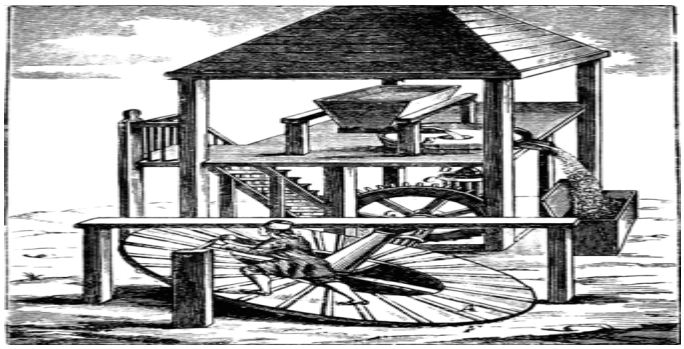

Fig 1. Human Powered Grinding Machine

Fig 2. Dog Power Treadmill

III. TREADMILL

Treadmill is a machine which is use for exercise purpose at a fix place. It contains frame and roller. The ends of the treadmill having main roller of big diameter and between them the smaller diameter roller are placed. The treadmill belt is mounted on rollers. This system provides a moving platform with a wide conveyor belt driven by Chain drive. The speed of the cycle is depend upon the movement of belt with the roller.

IV.WORKING OF TREADMILL BICYCLE

Treadmill cycle is driven manually by the human effort. In this model the power generating unit is treadmill. When someone walk on the treadmill then with the help of rollers and belt there is a rotary motion is produced. By the use of different gears and chain we can utilise this power to ride the cycle. The gears are arranged in systematic way and supported by the links and gears are connected by chain drive system. So that, This model works efficiently.

V. TREADMILL MECHANISM

Treadmill is used for producing the rotary motion. In this model the treadmill is fixed at some slope, not on the horizontal plane. In front side the treadmill fixed at some hight from the horizontal plane. So that, when the person walk on the treadmill then it tends to move in backward direction. This force produces torque to the rollers then the roller start rolling. In the backside of treadmill roller a gear is mounted and by this gear power is transmitted to the rear wheel. For reversing the direction of the motion we use another gear. By this arrangement the cycle runs in forward direction.

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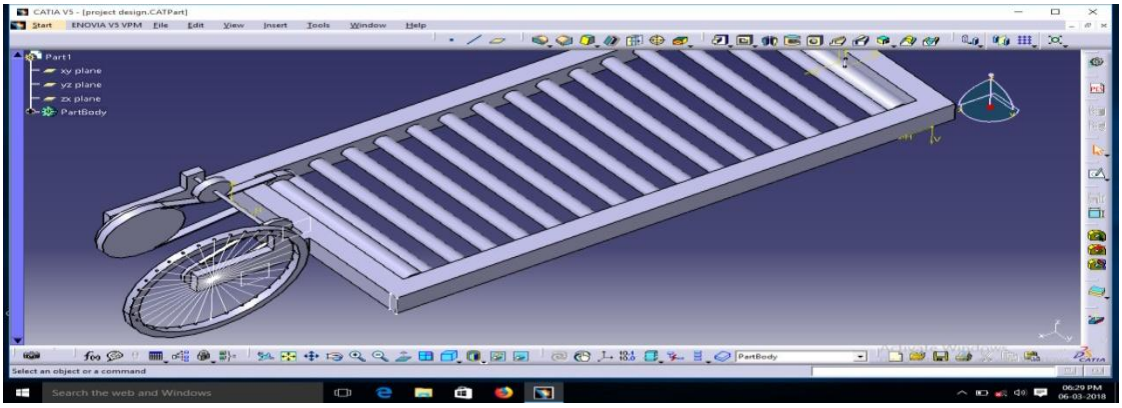

VI.CALCULATION

The average walking speed on treadmill is approximately 3.5 km/hr or 0.972m/s

Let, V1=Avg. Walking speed on treadmill (3.5 km/hr)

Diameter of roller = D1 (1.5cm)

V1 = D1 / 2 * 2π N1/60

Or 0.972=0.015/2*2πN1/60

N1 = 1237.87 rpm

Where N1 = rpm of roller

Let, N2 = rpm of small gear

D2 = dia. Of small gear (7.8cm)

T2 = number of teeth on small gear (18)

Hence, N1/N2 = D1/D2

Or N2 = D1/D2*N1

N2 = .015/.078*1237.87 = 238.05 rpm

Again let, T3,N3 = Number of teeth (44) & rpm of big gear

T4,N4 = Number of teeth (18) & rpm of sprocket

So, N3/N2 = T2/T3

N3 = T2/T3 * N2

N3 = 18/44 * 238.05 = 97.4 rpm

Similarly,

N4/N3 = T3/T4

N4 = T3/T4 * N3

= 44/18 * 97.4

N4 = 238.08 rpm

Let Diameter & Velocity of rear wheel = D & V

D = 36cm = .36m

So velocity of rear wheel V = D/2 * 2π N4/60

Or V = 0.36/2 * 2π * 238.08/60

Or V = 4.487 m/s = 16.15 km/hr

So that according to the calculation this is clear that the speed of the treadmill bicycle is generally more than the traditional bicycle.

6.1. Bearing

A bearing is a machine element that constrains relative motion to only the desired motion and to reduce the friction between the moving parts. The design of the bearing is in such a way that it may prevent a motion by controlling a vector by normal forces that bear on the moving parts. It is mostly used to minimizing the friction between the contact surface of the elements.

Most of the common motions permitted by the bearing are:

- Axial rotation
- Linear motion
- Spherical rotation
- Hinged
- Motion

6.2. Rollers

This roller serves the purpose of support to the tread belt. 15 supportive rollers are fitted in frame structure. They are made up of a PVC material. Due to these rollers there is a sliding force on the belt. So that Rollers are rolling with the belt. And hence with a less effort the rotary motion is produced. We made this by PVC material with is rigid and light in weight. The rollers are made with the help of PVC pipe, bearings and rod which support the rollers in the treadmill frame.

VII.CONCLUSION

In this study we have described a new way of travelling as well as exercise with the help of a new model of bicycle which is combination of treadmill and bicycle. It can be used in place of regular bicycle at cheaper cost and without use of fuel. The Treadmill Bicycle will proof to be a future vehicle as no fuel is used for travelling through this and it is pollution free. The treadmill which is used for walking helps to keep us fit as exercise is also one of the important task for a person to be fit and healthy for day to day life.

Paddle Less Bicycle serves the purpose of exercise and travelling and also reduce the use of non- renewable energy resources. The design of control architecture was an important aspect of study because a strong interaction between the many different parts was needed.

By this study we are creating a platform in which mechanical energy is converted into linear motion. By using our simple walking nature we are changing it to a good running speed by which we are not only saving energy but also recreating a formula of using small investment a big amount of achievement.

The speed of the Treadmill cycle is more than the traditional cycle. This is eco-friendly in nature because there is no any use of fossil fuel. This cycle also help in the exercise purpose like we ride in the park which is very good for health.

In the future, it can be used as an indoor locomotive device infrastructure with large roof span i.e. malls, warehouse, open markets, large office spaces, etc. This will proof to be a future vehicle as no fuel is used for travelling through this and it is pollution free.

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