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Design and fabrication of monowheel

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ABSTRACT

Mono wheel as the name indicates consists of a single wheel .Driver of the monowheel sits inside the wheel. The main principle involved is application of Gyroscope. The main discipline of engineering that is applied is mechanical engineering where we find applications of topics like stress calculation, trusses, gyroscopic couple, and concepts of a circle .It can be both human powered (by pedaling) or motor driven (by fixing motor with battery with required volt) type.

Keywords: Mono wheel, Carbon steel, Compound Gear, gyroscopic couple.

INTRODUCTION

Today, mono wheels are generally built and used for fun and entertainment purposes, though from the 1860 to 1930, they were proposed for use as serious transportation. In a two-wheel mode of transportation, two wheels systems affect motion. In two wheels systems, one wheel provides the force to control speed, while the other handles changes in direction by using steering. For a mono wheel, both direction and speed are controlled through the physical or manual control apparatus this generally makes steering more difficult. A monowheel is a one-wheeled vehicle which is similar to a unicycle. However, instead of sitting above the wheel, the rider sits with in the wheel. The wheel is move manually by pedaling. The man inside the wheel is stable during motion by using of rolling wheel (ball bearing) connected at edge of sitting and supporting frame in contact with wheel. The overall research must be constantly update because worldwide community interested in this vehicle is developing the idea every month. Naturally enough, there are others who have taken the concept of the monowheel, applied the latest technologies to design and drive the wheel [1-4].

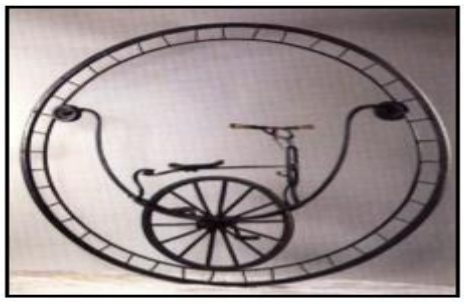

Fig.1 First Monowheel Model

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MONOWHEEL

A monowheel is the one-wheeled single-track vehicle similar to a unicycle. Instead of sitting above the wheel in bicycle as in a unicycle, the rider sits either within the wheel or next to it. The wheel is frame like a ring, usually driven by smaller wheels pressing against its inner frame

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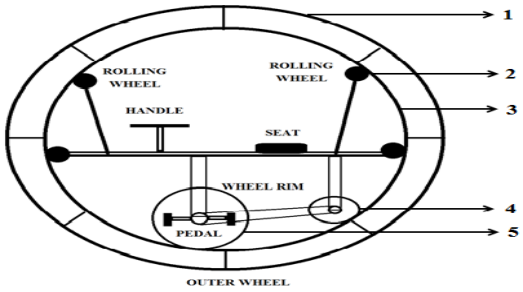

Fig.2 Drawing For Monowheel

SPECIFICATION

- Outer diameter of frame - 1826.4 mm
- Pulley diameter - 60 mm
- Inner diameter of frame - 1524 mm
- Small pulley diameter - 51 mm
- Large pulley diameter - 79 mm
- Driver pulley teeth - 42
- Driven pulley teeth - 32

COMPONENTS

- Driven shaft
- Chain drive
- Bearing
- Sprocket
- Pedal

BEARING

A bearing is a device to permit relative motion between two parts, typically rotational or linear movement. Bearings may be classified many types according to the motions they allow and according to their principle of operation. Low friction bearings are important for efficiency, to reduce wear and to facilitate high speeds. Essentially, a bearing can reduce friction by virtue of its shape, by its material, or by introducing and containing a fluid between surfaces. By shape, using spheres or rollers type gains advantage. By material, exploits the nature of the bearing material used. Sliding bearings, usually called as bushes bushings journal bearings, sleeve bearings, rifle bearings or plain bearings. Rolling-element bearings such as ball bearings and roller bearings.

The moving parts there is considerable overlap between capabilities, but plain bearings can generally handle the lowest speeds while rolling element bearings are faster, hydrostatic bearings faster still, followed by gas bearings and finally magnetic bearings which have no known upper speed limit.

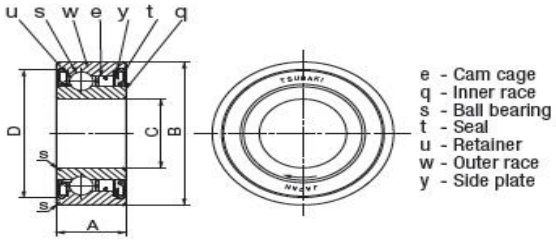

Fig.3 2D Diagram of Ball Bearing

Fig.4 Ball Bearing

SPROCKET

Sprocket is a profiled wheel with teeth that meshes with a chain to transmit power to driver sprocket to driven sprocket. It is intended material. It is distinguished from a gear in the sprockets are never meshed together directly. The drive sprocket positioned at the front or back of the vehicle. Sprockets are never meshed together directly, driver sprocket placed in front and driven sprocket placed in back to transmit power to wheel. Transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track.

CALCULATION

- Outer diameter of frame (d_o) - 1826.4 mm
- Pulley diameter - 60 mm
- Inner diameter of frame(d_i) - 1524 mm
- Small pulley diameter(d_s) - 51 mm
- Large pulley diameter (d_l) - 79 mm
- Driver pulley teeth (N) - 42
- Driven pulley teeth (n) - 32

Gear ratio i $= \frac{no\ of\ teeth\ in\ driver\ pulley}{no\ of\ teeth\ in\ driven\ pulley} = \frac{N}{n}$

$= \frac{42}{32} = 1.31$

Normal pitch in bicycle chain P = ½ inch (or) 12.7 mm.

Chain stay length (C) = 16.375 inch

Chain length (L) $= \frac{2C}{P} + \frac{N+n}{2} + \frac{P\left(\frac{N-n}{2\pi}\right)^2}{C}$

L = 60 inch (or) 1524 mm

WORKING PRINCIPLE

Mono wheel works on a principle of gyroscopic effect. A gyroscope is a device that can be used to maintain orientation based on the principles of angular momentum. It is a mechanism by means of which a Rotor is Journal to spin around an axis. If a spinning gyroscope is placed such that its axis is horizontal and loosely supported from one end, the gyroscope does not fall. It rather maintains its horizontal axis and the unsupported end starts moving in a circular manner about the horizontal axis. The resultant rotation is perpendicular to the gravitational torque and the axis of rotation. The speed of precession of a gyroscope inversely varies with its angular momentum.

Fig.5 Fabrication of Monowheel

CONCLUSION

The project carried out by us made an impressing task in the field of automobile and automobile workshops. It is very usefully for the workers to work in the automobile workshop are in the service station. This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement task which has also been provided.

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