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Fabrication of Tricycle for Handicapped People

Prof.M.P.Sathe[1], Shubham V. Dhomane[2], Rahul S. Vaidhye[3]
1Department of Mechanical Engineering Smt.Radhikatai Pandav college of Engineering Nagpur Maharashtra India
2Department of Mechanical Engineering Smt.Radhikatai Pandav college of Engineering Nagpur Maharashtra India

Abstract: *Now a day, there is a problem concerning with mobility of physically handicapped people. Different hand operated tricycle and other vehicles are mostly available for the transportation of disabled people. It is the paper based on development of manually operated tricycle in which single slider drive mechanism is used without using the chain drive mechanism. The design concept is taken to design it from manually pedal operated sewing machine. This tricycle is mostly useful for handicapped people. This modified tricycle is very effective because it makes the role of wheelchair as well as the tricycle in one machine. The power is transmitted and motion is takes place by using the steering bar to the rear wheel with the help of linkage. This tricycle dose not used clutch assembly to operate it. It is very convenient for the handicapped people as well as inexpensive to a poor person as the cost is a major issue for them.*

Keywords: *handicapped person, crank, connecting rod, direction rod, lever.*

I. Introduction

Tricycle means a vehicle that has three wheels. Generally it is human powered. Now days Motorised cycles are also available. Tricycle is used by children, younger and elder peoples for our Personal uses. It is a transport vehicle for a handicapped people. Because of three wheels the stability of vehicle is more than the two wheels vehicle; it is good for handicapped peoples for handling.

In the developing countries such as Africa and Asia, some tricycles, such as cycle rickshaws are used for commercial purpose for handicapped people. In the West, adult-sized tricycles are used primarily to recreation, shopping, and exercise. Tricycles are used by children and adults for their apparent stability versus a bicycle; however a conventional trike has poor dynamic lateral stability.

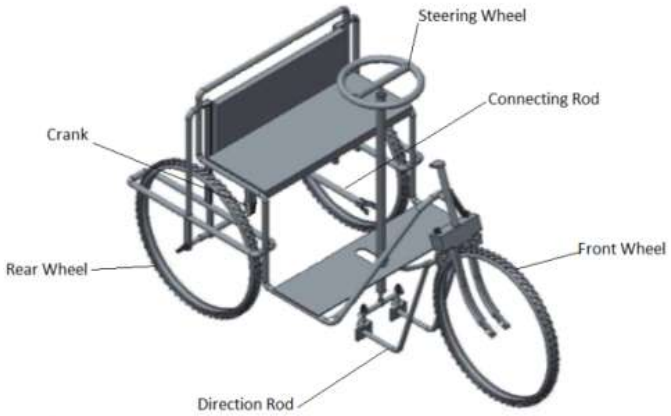

Fig. 1: CAD MODEL OF TRICYCLE

A three-wheeled wheelchair was built in 1655 or 1680 by a disabled German man, Stephan Farffler, who wanted to be able to maintain his mobility. Since he was a watch-maker, he was able to create a vehicle that was powered by hand cranks. In 1789, two French inventors developed a three-wheeled vehicle, powered by pedals, they called it the tricycle.

II. Aim And Objectives

1. To provide a more stable and efficient arm propelled and arm steerable tricycle that can be safely be used by any person.
2. To make tricycle in which the steering as well as the accelerating function is done with the help of only one handlebar.

3. To design and fabricate a low cost tricycle which is suitable for all type of handicapped person.
4. To design and fabricate the three wheel base tricycle for the handicap people to be using by the link mechanism.

III. Literature Review

Mrs. Swati Dhamale, Rahul Jaiswal, Mayur Jadhav, Anvay Pathak (Design and Fabrication of Eco-friendly Vehicle for Physically Handicapped Person)

For A normal human being have number of resources available for mobility but when it comes to the physically handicapped person options are limited as very few form automobile industries put the focus on them. Mechanical tricycle requires more human effort and it is a tedious task. Modified scooter is one of the best option which is powered by IC engine but cost of such vehicle high and requires maintenance. So considering limitations of above options this project aims at design an ecofriendly tricycle powered by steering.This tricycle is convenient to a handicapped person as well as affordable to a poor person, as cost is major problem for them.

V. B. Vaidya(Design and Fabrication of Wheelchair cum Tricycle for Physically Challenged and Elder People)

This paper is about the development of traditional manual operated wheelchair cum tricycle is rear wheel drive in which chain drive mechanism replaced with single slider drive mechanism. The design concept of this model is taken from manually operated tricycle and railroad car. This wheelchair cum tricycle is useful for handicapped person. This modified tricycle gives the both advantages of wheelchair (for short distance or in-door use) as well as tricycle (for long distance use) in one machine. The transmission power and motion takes place from steering bar to rear wheel through linkages and rotating disc. Modification of this tricycle by single slider drive mechanism is used to transmit power that make the tricycle faster at fewer efforts as compared to existing tricycle. This paper provides the details of components used & designing parameters takes in consideration while designing tricycle. This wheelchair cum tricycle is very efficiently design and can be proved as better replacement for tricycle having chain drive mechanism.

Chetan A. Samarth, A. K. Mahalle [Design Optimization of Speed Ratio for Conventional Chain drive used in Tricycle]

This paper represents how to optimize the speed ratio so that the efficiency of cycling increases. It analyse the crank length, pedalling rate, pedal speed

Matt Brower [Advancements in Materials Used in Bicycle Frames]

These paper represents a require property of material used in cycle and material used in the manufacturer of the frame.

Alex Clark Hunt [Steerable bicycle with handlebar propulsion]

Driving rod is extended up to the rear axle. Forward and backward moment given to the handlebar is transmitted to the rear wheel.

Tatyaso Garande [Design analysis of various modes of transportation for handicapped persons]

This paper represents various modes of transport available and suitable for physically handicapped persons for long and short distance travel. The modes are classified as per the main verity, ease, automation and comfort.

IV. Construction

The various components used in tricycle are-

1) Chassis

Chassis or frame is the basic metallic structure on which various other components or assemblies are mounted.

2) Pedestal bearing

Pedestal bearing is also known as Plummer block bearing. Pedestal bearing is used to support the rotating shaft, and internal part is rotated with shaft rotation.

Fig. 2: PEDESTAL BEARING

The fundamental application of pedestal bearing is to mount an impression safely its outer ring to be stationary whereas permitting rotation of the inner ring.

3) Internal hub

A hub is that the center a part of a wheel. It consists of associate degree shaft, bearings and a hub shell. The hub shell usually has 2 machined metal flanges to that spokes will be hooked up.

Fig. 3:*-INTERNAL HUB*

4) Ball joint

Ball joints are spherical bearing that connect control arms to the steering rod. A ball joint is used for allowing free rotation in two planes at the same time while preventing translation in any direction, including rotating in those planes.

Fig. 4:- BALL JOINT

5) Brake

A bicycle brake reduces the speed of a bicycle or prevents it from moving. Three main types of brake are rim brakes, disc brakes, and drum brakes, but we are using rim brake.

Fig. 5:- brake

V. Kinamatic Measurment System

An OPTOTRAK 3020 3D motion analysis system (Northern Digital, Inc., Waterloo, Ontario, Canada) was used to collect position data of infrared-emitting diode markers placed on the wheelchair user‘s body. The markers were attached with double-sided sticky tabs to the bony landmarks on the arm most lateral part of the acromion process, lateral epicondyle, colcannon, third and fifth metacarpalphalangealjoints, and radial and ulnar styloids.

Fig. 6:- KINAMATIC MEASURMENT SYSTEM

This system was configured to collect the real-time movement patterns of the entire arm, head, and torsion during propulsion. Two cameras were positioned, facing each other on either side of the subjects to capture movement patterns bilaterally. A synchronization pulse from the OPTOTRAK was used to trigger the start of kinetic and kinematic data collection. Kinematic data were collected at a 60 Hz sampling frequency and filtered with a 4th order Butterworth low-pass filter, zero lag, and a 7 Hz cut-off frequency.

VI. Resistance To The Motion Of Vehicle

Resistance to the motion of vehicle consisting following 3 resistances
1) Aerodynamic resistance (Ra)
2) Rolling resistance (Rr)
3) Gradient resistance (Rg)
When vehicle is moving on gradient
Total resistance R = Ra + Rr +Rg
When vehicle is moving on flat level road then Rg =0
Total resistance = Ra + Rr

1) Air resistance/Aerodynamic resistance:

Ra= KAV^2

Where,
K- Coefficient of aerodynamic resistance (k=0.023 for stream line vehicle)
A – Frontal c/s area
V- Velocity

2) Rolling Resistance:

Rr = Kr *W

Where,
Kr- rolling resistance constant which depends on type of road surface and tyre (Kr= 0.0059 for good road &0.18 for sandy roads)
W- Weight of vehicle with driver

3) **Gradient resistance:**

Rg= Wsinø

Where,
Ø=angle of grade

VII. Conclusions

.Slider crank mechanism needed less effort than chain and sprocket mechanism. When we apply the force on the steering then some torque is required. The torque requires is less than the chain drive vehicles. Also, in this tricycle seating arrangement is very well. The rotation of handle is also very well, because we are using here two ball joints that provide very good movement. Every person can drive it at very simple way. Not only handicap, it is suitable for all people ,which can able to drive.

Hence it is conclude that all the objectives are achieved for this tricycle model. Tricycle model fabricated and tested successfully. In this tricycle the problems are solved that was in one hand driven tricycle.

References

[1]. Erickson, William, Camille G. Lee, and Sarah von Schrader. "2008 Disability Status Reports: United States."
[2]. Lesley, Samuel, and Lucy A. Porter. "An ergonomic wheelchair for hemiplegics." Technology and Disability 14.4 (2002).
[3]. Cyders, Timothy J. Design of a Human-Powered Utility Vehicle for Developing Communities. Diss.
[4]. Fries, Richard C. Reliable design of medical devicesCRCPress,2012. [5]La Plante, Mitchell P., and Disability Statistics Center. "Demo-graphics of wheeled mobility device users." Conference on space requirements for wheeled mobility. Buffalo, New York: Center for Inclusive Design and Environmental Access, 2003.
[5]. Marlowe, Christie. Car Mechanic. Mason Crest, 2014.
[6]. Panero, Julius, and Martin Zelnik. Human dimension and interior space: a source book of design reference standards. Watson-Guptill, 2014.
[7]. Panero, J., and M. Zelnik. "HUMAN DIMENSION AND INTERIOR SPACE: A SOURCEBOOK OF DESIGN REFERENCE STANDARDS." (1979).
[8]. Cooper, Rory A., Rosemarie Cooper, and Michael L. Boninger. "Trends and issues in wheelchair technologies." Assistive Technology 20.2 (2008).