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Design and Fabricaion of Hand Powered Tricycle for Handicapped People

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Abstract:

Transportation is extremely important in our daily lives. Transportation is required for the movement of goods, and transportation networks have evolved over time. Individuals, corporations, and governments all rely on transportation, demonstrating its importance. A community that does not have a strong transit infrastructure cannot operate properly. The most important thing that regulates transportation is time.

Keywords: board, methodical, oscillating motion , rotating motion

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I. INTRODUCTION

Trike is another name for a three-wheeled tricycle. Hand-operated tricycles are used for leisure in developed countries, mostly in Africa. As opposed to unconventional tricycles, traditional tricycles used by disabled persons are less stable. The traditional tricycle has a high centre of gravity and is more prone to tipping over.

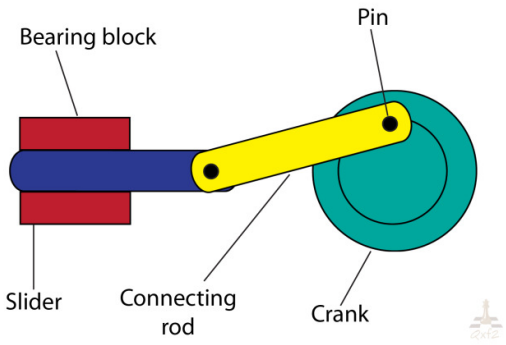
About 160 to 170 million people live in our country.

II. METHODOLOGY

If the design is complete, there is a logo that ensures all laws and guidelines are followed. This includes responses to why a tricycle, the significance of the slider-crank mechanism, and what distinguishes it from the still current chain drive mechanism. Because of this quandary, the journal is gaining a lot of traction. In 1789, two French explorers

3.1 Slider-crank mechanism

If you're wondering what a slider-crank system is, it's essentially a set of mechanical parts built to convert straight-line motion to rotary motion, as in a reciprocating piston engine, or to covert rotary motion to straight line motion, as in a reciprocating piston pump. With the help of diagrams, the basic nature of the mechanism and the relative motion of the pieces can be represented.



3.2Chain-drive mechanism

On a bicycle, tricycle, or other related mode of transportation, the chain drive mechanism is the fundamental operating mechanism. The diameter of the sprocket will both increase and decrease the efficiency of the bike. It's a method of transferring mechanical energy from one location to another. It's commonly used to transmit power to a vehicle's wheels, particularly on bicycles and motorcycles.. Aside from automobiles, it's used in a wide range of computers. The control is generally transmitted by a roller chain, also known as a drive chain or transmission chain, running over a sprocket gear, with the teeth of the gear meshing with the holes in the chain ties, the gear is rotated, and the chain is pushed, bringing mechanical energy into the machine. The Mor is a different kind of drive chain.

The power is often produced simply by spinning the chain, which can be used to lift or drag objects. In some instances, a second gear is mounted, and the power is recovered by connecting shafts or hubs to it. Though drive chains are mostly simple oval loops, they can also go around corners if more than two gears are placed along the chain, gears that do not draw power into the mechanism or transmission.When a bicycle racer pedals the gear ratio once, the gear that powers the wheels rotates more than one rotation. A sprocket is a toothed or cogged wheel that meshes with a chain, track, or other perforated or indented material. Any wheel with radial projections that engage a chain running over it is referred to as a sprocket. It's not the same as a gear.

Fig3.5 Chain drive mechanism.

The chain drive mechanism is still adopted in bicycles and tricycle irrespective of age and gender. They have the technique of force input in one sprocket and the force output on the other one.

3.3.Power out on slider-crank mechanism

Consider a single slider system having crank radius 0.15m, length of connecting rod as 0.80m and N= 90rpm. These values are taken by the most used average conditions

Velocity= V= rω[sinθ+sin2θ/2n]

ω= 2*π*90/60 = 9.42rad/sec.

V= 0.15*9.42[sin60+sin260/2*5.33]

0.15*9.42[Γ3/2*0.75/10.66]

0.15*9.42[18.463+1.5/21.32]

1.413*0.9362= 1.32m/s

Acceleration= rω²[cosθ+cos2θ/n]

0.15*(9.42)²[cos60+cos120/5.33]

13.310[0.5-0.5/5.33]

13.31[0.5-0.093]

13.31[0.407]=5.41m/s²

Turning moment, T= p*r{sinθ+sin2θ/2*5.33]

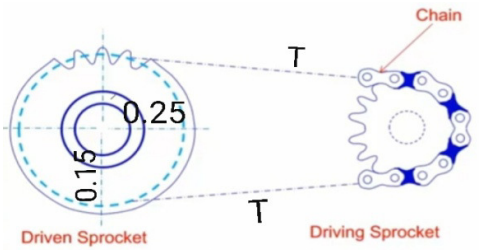
Where, P= 300N

(since weight= 700N) 300*0.15{sin60+sin120/10.66}

300*0.15(0.9471) 45*0.9471=42.61kg²/s²

So, Power Output= T*ω 42.61*9.42=401.47N=0.4KW

3.4Power output on chain drive mechanism



Designing of a chain drive with the same data

N=0.5W at 250rpm

100rpm=5W

Maximum centre distance=500mm

1. Transmission ratio, i = N1/N2= 250/100= 2.5 pg.7.74
   Z1= 26 and Z2= i*Z1= 26*2.5= 6.5
2. Range of chain pitch, a= (30 to 50)p pg 7.74
3. Pmax=500/30= 16.66
   Pmin= 500/50= 10 choosing max value P= 15.875
4. Selecting simplex, duplex or triplex Select 10A2DR50 pg 7.71 4.
5. Evaluating total load pg.7.78
6. £p= P1+P2+P3 P1= 1020N/V, where V= 2pn/60000= 26*15.875*250/60000=1.72
7. So, P1= 0.5*1020/1.72= 296.51N
8. P2= ωV²/g= mV² pg 7.72 = 1.78*(1.72)² = 5.26N
9. P3= Kωa= 6*mg*a= 6*1.78*10*0.5= 53.4N
   £p= 355.17N
   K= table of coefficient,
   So, 35 K=6,horizontal
   Service factors pg 7.77

Ks= 1.25*1*1*1*1*1.25= 1.5625= 1.6 6.

Calculating design load, Load= Pt*Ks= 355.17*1.6= 570N

FOS (FACTOR OF SAFETY)= breaking load/ design load= 44400/570= 77.8

Allowable breaking stress= σ= pt*Ks/A= 296.51*1.6/140= 3.3N/mm²

No. of chains in terms of number of lines,

Lp= Zap+ Z1-Z2/2+(Z1-Z2/2π)²/Ap*Ap = a/p= 500/15.8= 31.4 62.8+45.5+1.23= 109.53=112

Total length= 112*15.875= 1.778m

Exact center distance= a=p(e+(e²-8m)½/4)= 32.65*15.875= 518.31m

E=Lp-Z1-Z2/2= 112-(26+65/2)= 66.5 M= (Z2-Z1/2π)²= 38.56

Pitch circle diameter pg 7.75

Smaller sprocket= P/Sin180/Z1= 15.875/Sin(180/26)= 129.13mm

Diameter of larger sprocket= P/Sin(180/Z2)= 322.372mm

Pitch circle diameter with maximum roller diameter, pg 7.72

Diameter of smaller sprocket= D1+0.8D1= 129.213+0.8*10.16= 137.341mm

Larger sprocket= D2+0.8*D2= 322.374+0.8*10.1= 330.5mm

0. Comparative study on slider-crank and chain drive mechanism.

- For a handicapped person, slider crank is more effortless than chain drive. Especially in uneven roads.
- Power output is more in slider crank.
- Economical when compared.
- Reverse direction motion is available.
- Steering mechanism is more acceptable in the case of handicapped as the angle of deviation is easier.
- Power output is less when compared to slider crank
- Reverse direction is not available technically.
- Slider crank requires less maintenance, whereas the chain drive require periodic lubrication.
- Slider crank is noise proof compared to that chain drive.
- Slider crank is a simple system as compared to that of chain drive.
- Technically the chain drive efficiency totally depend on the user as weight is directly involved, as in slider crank, weight of the user is secondary.

It's generally used to look at computer kinematics and the forces that result. Analytical calculations may be made to evaluate the piston, velocity, acceleration, and shaking forces produced by the slider crank mechanism during operation. Certain variables are often ignored in empirical calculations, resulting in findings that are inconsistent with experimental evidence. It's a common misconception that the crankshaft's

III. MODELING AND ANALYSIS

IV. CONCLUSIONS

In lieu of the chain drive mechanism, a single slider mechanism is used to transfer power for moving the tricycle, which is more effortless than the chain drive tricycle. This tricycle is ideal for seniors and individuals with disabilities. The tricycle is basic in nature, easy to ride, and needs

minimal maintenance. As a result of the reduced operating commitment, the single slider system has an advantage over the co The new booming production of crank propelled tricycles is intended to accommodate not only the young and healthy wheelchair user, but also the less well-trained person or those with more comprehensive disabilities. The aim of the single slider linkage mounted on the tricycle's rear wheel is to accelerate with appropriate comfortable motion. The tricycle's architecture is ideal because of its compactness.

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