

360° RECUMBENT TRIKE

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Abstract: Idea was to create a tricycle that would provide a unique mix of recreational and transporting benefits to the riders. Recumbent cycles began emerging in the early 90's as method of improving the rider's ability to transmit power ergonomically and with more maneuverability. Many different types of recumbent cycles were designed and developed with two wheeled and high centre of gravity which causes speed and stability problems. To improve the stability, control and maneuverability a third wheel became popular to distribute weight. The back wheels are dual inclined casters with full rotational movement. A drive train forward of the front wheels drives the front wheels while a rider is inclined in a seat in a recumbent orientation. The combination designed provides unlimited maneuverability and turning capabilities.

Keywords: 360° Rotation, Front and rear steering, Recumbent position, Locking mechanism

1. Background

Consumers are always looking for new and exciting vehicles to ride. Some vehicles are cycles, such as bicycles and tricycles, that operate and are driven by human power.

While modern cycles incorporate technological improvements such as lighter and stronger materials, and better performing components, the basic utility and operation of cycles has not changed.

Almost all cycles are directed by steering the front tire or tires. Further, cycles typically are driven in a very linear fashion, where quick turns, spinouts or Zig-Zag motions are impossible.

The present disclosure relates to a pedal-powered vehicle, and more particularly to a cycle having three or more wheels and including front and rear steering.

2. Brief Introduction

Tricycle is a vehicle with three wheels. Peoples are not using conventional bicycle in modern era because everyone loves sophistication and comfort.

Considering all the facts and need, one new advance design is developed having comfort, ease, stability, reliability, competence; all at once.

This document describes a cycle with front and rear steering, as well as a front wheel drive train, for enhanced manoeuvrability, speed and utility. In preferred exemplary implementations, the cycle is a recumbent tricycle with a single front wheel and two rear caster wheels. The front wheel is connected to a handlebar steering mechanism, and one rear caster wheel is coupled with a handle steering mechanism.

In accordance with one aspect, a cycle is disclosed. The cycle includes a main frame. The cycle further includes a front wheel assembly connected with a front portion of the

main frame. The front wheel assembly includes a front wheel and a drive train, the drive train being positioned forward of the front wheel by a forward tube and one or more chain stays connected with a wheel support that holds the front wheel.

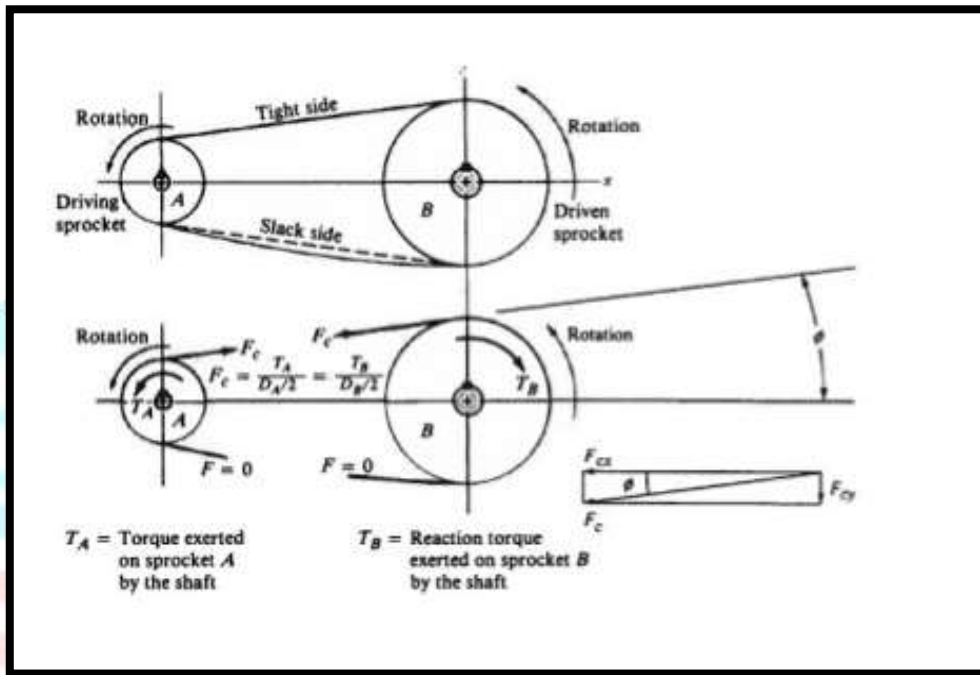
The drive train further includes a pedal-driven crank set for driving the front wheel. The front wheel assembly further includes a front hand-steering mechanism connected with the

wheel support and forward tube to steer the front wheel assembly and front wheel relative to the main frame.

The cycle further includes a seat coupled on a back portion of the main frame, and a rear wheel assembly connected with the back portion of the main frame. The rear wheel assembly includes a crossbar mounted laterally to the main frame and extending out opposite sides aft of the seat. The rear wheel assembly further includes a pair of rear swivel caster wheels, where each Swivel caster wheel is connected to an opposite distal end of the cross bar at an incline. The rear wheel assembly further includes a rear hand-steering mechanism connected with at least one of the rear swivel caster wheels.

3. Design Methodology and Analysis

Sprocket Design:



$$F_c = \frac{T}{D/2} = \frac{T_A}{D_A/2} = \frac{T_B}{D_B/2}$$

$$F_{cx} = F_c \cos \theta$$

$$F_{cy} = F_c \sin \theta$$

Fig. Force Due to Chain & Sprocket

General Design Parameters:

Design Calculations		
Design Parameter	Power	1000 W
	Efficiency	0.92
	Number of Sprocket	2
	(Sn) Number of Chain Strands	1
	Speed	6000 deg/s
	Service Factor	1

Sprocket Dimension	Number of Teeth on Sprocket	Sprocket 1: 25 Sprocket 2: 50
	Mounting Hole Diameter	Sprocket 1: 20 mm Sprocket 2: 30 mm
Sprocket Parameters	Torque	Sprocket 1 : 9.549 N-m Sprocket 2 : 19.099 N-m
	Sprocket Teeth	Sprocket 1 : 25 Sprocket 2 : 50
	Sprocket Pitch Circle Diameter	Sprocket 1 : 101.33 mm Sprocket 2 : 202.66 mm
	Angle of Contact	Sprocket 1 : 152° Sprocket 2 : 209°

Spring Locking Mechanism:

A wheel locking feature allows you to lock the rear wheels in a forward-facing position so you don't have to worry about spinning out at high speeds.



Assembly:

The Assembly describes a vehicle such as a recumbent tricycle. The Recumbent tricycle includes a main frame having a front portion and a rear portion and a rear crossbar to joint with each other.

The Vehicle includes a front wheel assembly and co-relation of rear wheel assemblies. The rear wheel assemblies may be co-relation attached to opposing end configured for independent rotation within the assemblies.

The Front assembly may be pivot ably associated with the front wheel. A drive train portion wherein the drive train portion drives the rotation of the front wheel.



4. Advantages & Disadvantages

- ❖ Advantages:
 - ✓ Short and quick motions at the ease.
 - ✓ Unlimited drifting and stunt vulnerabilities.
 - ✓ Rear wheel locks for straight motion (as regular trike) at high speeds.
 - ✓ Better control and balance over two-wheel cycle/trike.
 - ✓ No wirings for brake (using coaster brakes).
- ❖ Disadvantages:
 - ✓ Required proper controlling on front & rear steering.
 - ✓ Plain Surface road required.

5. Final Product & Application:

Final Miniature:



Fig. "360° Recumbent Trike"

Application:

- ❖ The major areas covering use of 360° Recumbent Trike are as follow:
 - ✓ Sports Parks
 - ✓ Drift & Stunt Stations
 - ✓ College Campus
 - ✓ Garden & Parks
 - ✓ Shopping Mall

6. Conclusion

At a time when there is conventional bicycle everywhere, one must investigate new advance design which has comfort, ease, stability, reliability, competence; all at once. One such alternate design is presented in this paper.

The full 360° motion of the trike is achieved with the help of front and rear steering. Complete analysis is carried out and fabrication is done accordingly.

Most of the youngsters and teenagers will enjoy this newly developed advanced trike as everybody wants thrill and challenges, and that is what 360° Recumbent Trike is made for.

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