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DESIGN AND FABRICATION OF HUBLESS BIKE

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Abstract - *The cycle is one of simplest mode of transportation. Bicycle can be driven by all kind of people like children and senior citizen. But this bicycle facing some issues like old design, balancing, high weight and size. There is possibility to overcome these problems by designing the hubless wheel or Centerless wheel. It will improve the aesthetics of the cycle, increased riding properties. The rear wheel design consists of inner rim and outer rim linked with a independently moving nylon rollers. The input power is given to the rear gear meshed with the internal teeth rack welded with the outer rim.*

Key Words: **conventionl wheel, hubless wheel, aesthetic, nylon rollers, bearings, etc**

1.INTRODUCTION

The bicycle is one of the most common medium of transport used in our daily aspect of life. Bicycle can be driven by all age groups of people from children to senior citizens. The old school type of wheel which is being used for centuries has been given a new design which improves the aesthetics of the cycle. The increased chain length in conventional cycle is the problem for which the driver has to put in more effort for propelling the cycle. The effort put by the driver is high in conventional cycle. There is possibility to overcome these problems by designing the hubless wheel or Centerless wheel. Also the development of hubless crank reduces the effort put by the driver. For development of this hubless bicycle, hubless wheel or Centerless wheel is devoloped. In normal cycle, the steering (i.e) the handle bar is attached to the hub of wheel. But in hubless wheel, the handle bar is attached to the wheel rim which increases steering efficiency.

The cycle with conventional look (i.e) cycle with spoked wheel (hub wheels) is always being used everywhere and an alternate for the look is not considered in design. Only the frames and chassis of the cycle has been altered throughout the ages. The wheel has stayed the same. So considering it as the main objective of our project, the hubless cycle is designed.

1.1 Problem identification

The old school type of wheel which is being used for centuries has been given a new design which improves the aesthetics of the cycle. The increased chain length in conventional cycle is the problem for which the driver has to put in more effort for propelling the cycle. This is decreased in hubless cycle. In normal cycle, the steering (i.e) the handle bar is attached to the hub of wheel. But in hubless wheel, the handle bar is attached to the wheel rim which increases steering efficiency.

1.2 Literature collection

Algat V.V. et al, discussed about the construction of Hubless wheel bicycle with gear train drive mechanism is designed to convert the human muscle power through pedaling work in to the mechanical work The system is assembled with the combination of pedals, shafts, one small size alloy wheel and one large size Hubless wheel which is function as driving wheel. The pedal and shaft are receiving the human effort and convert in to rotational mechanical motion. This rotational motion is transmit up to the driving wheel via the spur gear drive train. The gear drive train is the combination of four stages of gear pair. These gear pairs not only transmit the power but also improve the gear ratio step by step. The gears and pinions of drive train are fixing with the bicycle body by using deep groove ball bearings. The last spur gear in the gear train is coupled with the driving wheel through the Hubless mechanism which also performs the holding function of driving wheel. The front wheel is small in size as compared to drive wheel and it only perform the system balancing function without actually participate in driving and driven mechanism. This system has ability to reduce the fatigue on bicycle rider by improving the power transmission efficiency and by extending the maximum limit of bicycle speed."

Bannetross said that the inventive device includes a frame having a seat structure and handle bar, rear bracket having rear bearings within that rotatably engages a rear wheel, a front bracket having front bearings within that rotatably engages a front wheel, and a drive train that engages the rear wheel for driving the rear wheel. The rear rim of the rear wheel includes a rear groove that recieves the plurality of rear bearings. The rear rim of the rear wheel includes a rear gear that is engaged by a drive sprocket from the drive train.

Franco sbarrohad discussed earlier that the present invention relates to a cycle or an engine driven vehicle which moves on a bearing surface and more particularly on a road. In the case of a motor cycle, the front steering wheel is fitted with a first crown shaped roler bearing being comprised of an outer annular element which supports the wheel and an

interior annular which is connected to an arm. The device allows to transmit the steering forces at a point located as close as possible to the contact area between the tyre and the road.

Andrew J. Horst said that the seat is disposed on the frame. The Hubless Wheels are disposed on the frame. The Hubless Wheel includes a rim, an internal sliding structure and at least one bridging component. A tire is disposed on the Hubless Wheel. The rim has an external sliding structure on an inner surface of the rim. The internal sliding structure is disposed inside the external sliding structure. The bridging component is disposed between the external sliding structure and the internal sliding structure. The bridging component revolves on its own axis.

Arthur Lidov said that arotor is rotatable disposed and lateral bearings to laterally stabilize the rotor within the shround. A series of resiliently mounted bearings are spaced about the shround for rotatable retaining the rotor within the shround and for transmitting load and for absorbing any impact forces imparted to the rotors as it rolls over the ground.

Mohan Radhesh Mallaya et al, discussed thatin this design, hubless wheel comprises of gear drive to transmit power from the motor to the wheel. this work focuses on using nylon MC 901 gears which is much lighter than their metal counter parts. The sun gear meshes with the internal gear ring made up of nylon MC 901 material. The power from the inner gear ring is transmitted to the rim by the bearings. The bearing are held on a bolt whose ends are connected to the stationary plates.

1.3 Literature summary

- The increase in steering efficiency compared to the conventional bicycle is observed in hubless bike through survey.
- The efforts put to propel this hubless cycle comparatively less than conventional bicycle.
- The chain drive mechanism is chosen after observation of various experimental studies on possible drive train layouts.

2. COMPONENTS

2.1 Frame

Conventional cycle was picked up for the project. Hercules turbodrive is the cycle selected. The carrier is taken so that the cycle gets a good look. The cycle frame is made up of steel. The cycle consists of a single speed chain drive mechanism. The cycle frame is not modified, only the rear wheel is converted into hubless and certain modifications are done for mounting the gear for providing drive input.

Fig-1 Frame

2.2 Rollers

Rollers are the components holding the inner and outer rim together. The rollers are nylon rollers which has a hole at the centre. Nylon is a wear resistive material and also cost effective. So nylon rollers were chosen. The hole is filled with a ball bearing so that rollers can be operated smoothely.

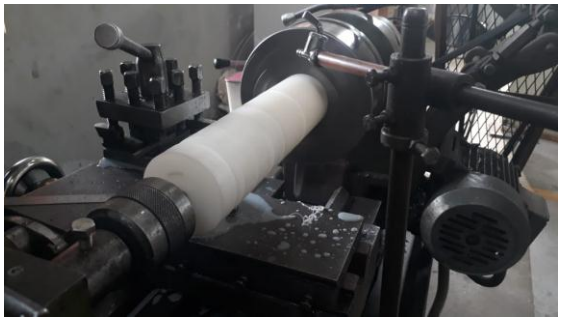

Fig-2 Rollers in lathe machine

2.3 Drive assembly

A chain type drive is used in the cycle. The chain length of the existing conventional cycle is reduced. This drive is coupled with a gear that engages with the rack which is bent and fitted with the outer rim.

2.4 Wheel Assembly

The wheel assembly consist of inner rim and the outer rim. The outer rim has the rack which is bent and welded to it. This rack engages with the gear attached to the chain drive.

Fig-3 Outer rim

The gear is the member which engages with the rack that is bent and welded to the outer rim. The gear member is ten attached to the chain drive with a rod placed between them.

Fig-4 Output gear

The outer rim is fitted with a tubeless tyre. The tyre is radial ply tyre. Tubeless tyre offers long life as compared to tube tyres because the tubeless tyre gets easily damaged.

Fig-5 Wheel assembly

Rack is the member which engages with the gear to transfer the drive. It is bent as per shape of the outer rim. Rack is made of mild steel material which can be easily transformed to necessary shapes for providing power transfer to the wheel. The individual parts like rack, outer rim, inner rim nylon rollers and bearings are assembly.

Fig-5 Project overview

3. METHODOLOGY

First and foremost is the ideology of the project. Improved aesthetics of the cycle was kept as the vision of the project. As per that, the design conception was framed. The design conception involved the process of welding to be done in areas of joints which kept the wheel assembly firm. Wheel was the main aspect to be considered in the project. The reduction in chain length enhanced the fact of less loss of energy. It will also reduce the fatigue encountered by the driver. The cycle was a conventional cycle. It was amended as per the needs. Then the wheel was separately welded with the rollers placed in he required areas. Next was to weld the

wheel with the frame. After welding process of wheel and frame, the cycle was fabricated successfully.

4. CONCLUSION

Thus the project enhances the aesthetics of the conventional cycle by giving it a good look. The reduction in chain length reduces the fatigue of the rider. The steering has been enhanced. Use of rollers makes the motion of the bicycle more facilitated.

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