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AUTOMATIC AIR INFLATION IN TYRES DURING MOTION

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***Abstract*— Now-a-days inflation in tyres is done once in a month or twice. This leads to decrease in efficiency. Hence to maintain good efficiency and avoid wear in tyres automatic inflation during motion is required. As and when the tyre pressure decreases the Tyre Pressure Monitoring System gives the signal through a display screen and the rider has to switch on power button. The air passage takes place with the same mechanism as that in compressor which has single slider crank chain mechanism which runs on the engine energy itself in turn is used for inflation of tyres within a short duration. Bearing-O ring-Check mechanism acts as a passage for air. The Bearing-O ring-Check mechanism rotates simultaneously with the wheel. After complete inflation switch off signal is given to the rider.**

Keywords—Sprocket mechanism; piston cylinder; Bearing- O ring –Check Mechanism

I. INTRODUCTION

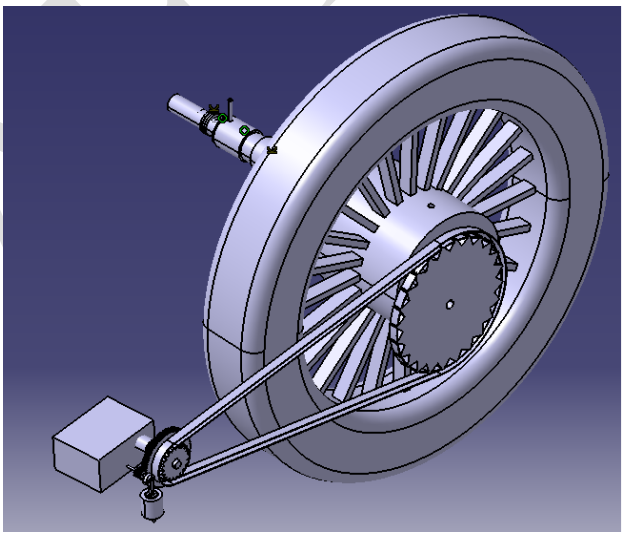

Fig 1. COMPLETE ASSEMBLY REAR VIEW

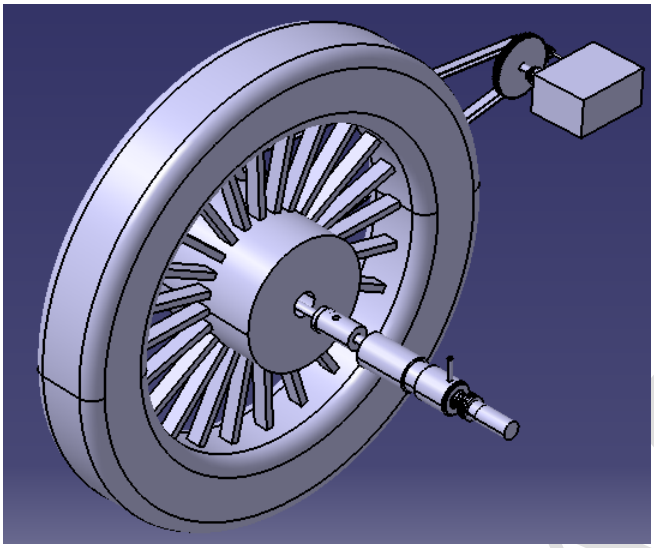

Fig 2. COMPLETE ASSEMBLY FRONT VIEW

Nowadays inflation in tyres is done in stationary condition of vehicle this leads to many problems like time consumption, if air is not filled with in estimated time it may lead to wear of tyres, decrease in efficiency which ultimately leads to many losses and badly affects many situations like on highways where there are no garages, time management of ambulances, fire brigades, police cars

Our idea is to inflate the tyres in running condition.

What do you think? If automatic air ;inflation in tyres in running condition without approaching any garage.

This paper publishes and reveals concepts of automatic air inflation in tyres during running condition.

II.SCOPE

In future, this mechanism has lot of scope.it can be implemented in any type of vehicles. It can even be used to avoid puncture of tyres.it will be helpful in emergency on highways also, where there are no garages till long distances. And there can be many more advancements such as usage of nitrogen instead of air.

With these ideas, in future people will not face difficulty of air filling at garages and puncture related problems can be avoided and repaired on the spot anywhere, anytime anyhow .this will help in emergency cases such as for ambulances to save human lives, etcetera.

This mechanism helps a lot especially in emergency cases; it will be very beneficial for coming generations as it can be implemented in any corner of the world and at any time.

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III.PROPOSED METHODOLOGY

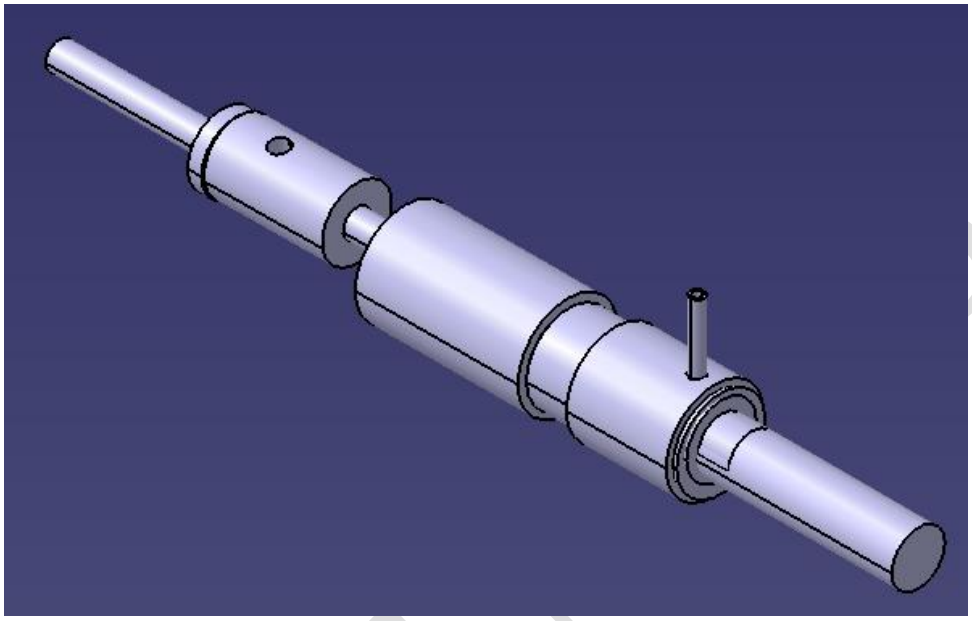

Fig 3. BOC MECHANISM

Our main idea was to utilize single slider crank chain mechanism which could inflate the vehicle during motion and the compressed air which is required to inflate the tyre is produced by the engine energy itself.

A portable compressor kit is mounted inside the engine which is further connected to the main shaft of the engine. As and when the tyre pressure decreases the signal is sent to display screen through Tyre Pressure Monitoring System. In above mechanism rotating motion is converted into reciprocating motion which generates the compressed air, this compressed air is passed through BOC mechanism which rotates simultaneously with respect to brake drum. Further the compressed air is passed to the tyre and tyre gets inflated. When tyre is completely inflated the signal is sent to back to display screen then the power button is switched off and the vehicle can move without any interruption in speed.

We have used CATIA V5 R21 software for designing of these parts.

IV.DETAILED DESCRIPTION ABOUT THE PROJECT

A. Mock Piston

This piston which is stationary along its axis which has two O-ring seals on the groove surface that has throughout hole.

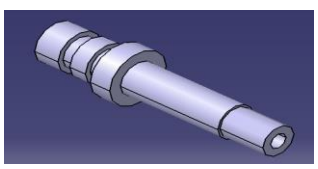

Fig.4 mock piston

B. Casing I

This casing has a throughout hole with three O-Ring seals which is attached to one end of check valve. It is a casing for mock piston and rotates on its own axis irrespective of piston.

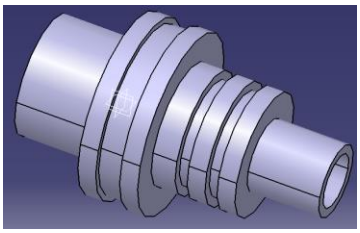

Fig.5 casing 1

C. Check Valve

Check Valve or non-return valve is a unidirectional valve for fluids.

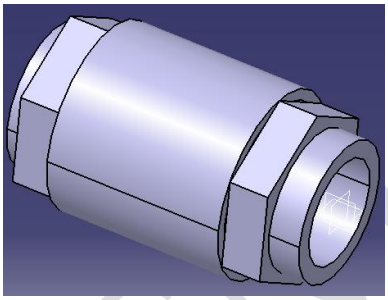

Fig.6 check valve

D. Collared Shaft I

Even this has a throughout hole along its length and an O-ring seal which is attached to the other end of check valve and rotates simultaneously with the check valve.

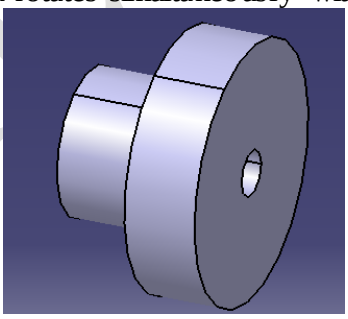

Fig7.collared shaft I

E. Casing II

This casing is stationary which acts as a casing to Casing I and Casing I rotates inside this part with the help of a bearing support.

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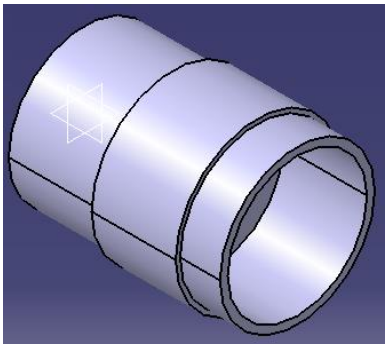

Fig8.casing II

F. Casing III

This is attached to casing II. It is a complete casing for check valve and collared shaft. This helps to rotate the check valve and collared shaft I.

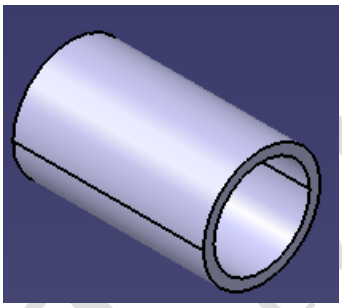

Fig9.casing III

G. Casing IV

This is a hollow casing one of its side is attached to casing II and the other end is connected to another collar shaft I.

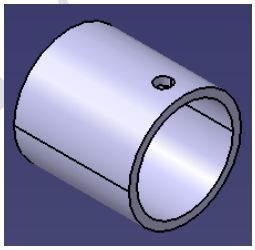

Fig10. Casing IV

H. Collared Shaft II

It has horizontal hole up to $1/8^{th}$ of its length and a vertical hole on the collar surface up to the centre of the horizontal hole.

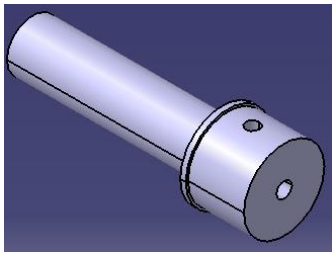

Fig11. Collared shaft II

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I. Hollow pipe I

This is a hollow pipe with outer diameter 6mm and length 30mm.This pipe is fixed vertically on one end of casing IV which merges with the vertical hole of the collar shaft II.

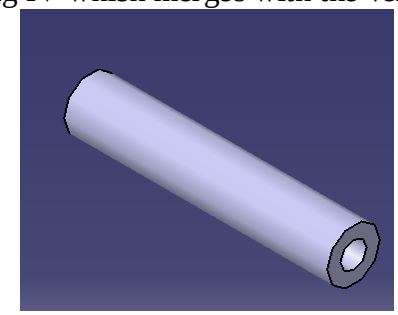

Fig12.hollow pipe I

J. Bearing Carrier

This part is mounted at the centre of the brake drum cylindrical slot. One end of this part carries a bearing and the other end has horizontal hole up to 30mm along with a vertical hole of diameter 6mm that touches horizontal.

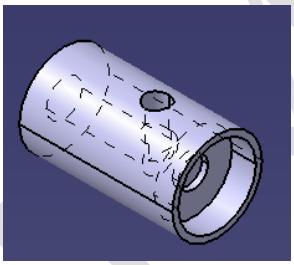

Fig13. Bearing carrier

K. Hollow pipe II

It is a with 6mm diameter and length 400mm. One of its end is attached to bearing carrier and the other end is attached to the tyre valve where the Tyre Pressure Monitoring System is located.

L. Compressor Kit

It consists of single slider crank chain mechanism.

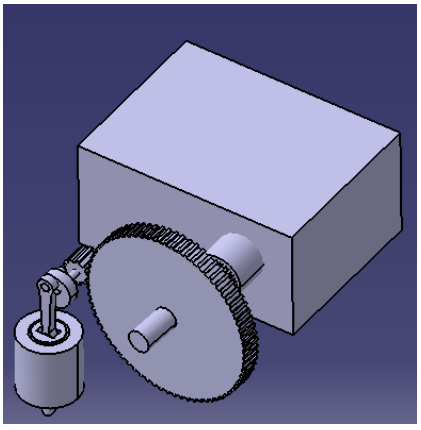

Fig14. Compressor kit

M. SSS Clutch

It is connected between main engine shaft and compressor kit. This is used for engaging and disengaging of compressor kit.sss clutch within compressor kit in fig 11

V.CALCULATION

Number of teeths on the pinion Z_1=80
Number of teeths on the gear Z_2=20
Assuming module m=0.7
Diameter of pinion $d_1 = m*Z_1 = 0.7*80$
=52mm
Diameter of gear $d_2 = m*Z_2 = 0.7*20$
=14mm
Gear ratio i=4:1
Speed in RPM of pinion=1000
Speed in RPM of gear =4000

Comparing it with a compressor of 3600 rpm which generates a pressure of 260psi
Then, we are using a gear whose speed is 4000rpm then it would generates a pressure of 288.88psi

VI.Conclusion

Based on our research and theoretical working on this project several months of collection of data about this project in the world of mechanical designing and started to construct. We have designed this mechanism for the automatic air inflation of a tyres in running condition without approaching any garages and also designed a compressor kit which has single slider crank chain mechanism which generates compressed air by engine energy itself.

Hence we conclude that inflation of tyres occurs within short duration while in running condition.

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