

Inbuilt Motor Operated Screw Jack and Automatic Tyre Inflation System

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Abstract - In side road emergences like tyre puncture or vehicle maintenance and repair, conventional car jacks used mechanical advantage to allow human power to raise the vehicle by manual force. This project shows modification of current mechanical manual jack with the use of an electric DC motor in the screw in order to make load lifting easier. as we know reduction in mileage is due to drop of few pressure units in vehicle, tyre life, safety and performance. This system can be placed in every in automobile under any operating condition, this will not only maintain the correct tyre pressure but also increase tyre life, mileage and safety. so to inflate and deflate the tyre automatically by using control unit we have fabricated system.

Keywords: Base and frame, Compressor, DC motor, Hoses, Rotary Joint, Scissor jack.

1. INTRODUCTION

As per record of 2014, 9748 accident occurred in India due to tyre burst and about 3371 people were killed and 9081 people were injured.

The main purpose of this project is to avoid tyre failure due to over inflation or under inflation condition and even in case of puncture large amount of human effort is required for placing jack at its proper position and applying effort which is impossible for most of female drivers, senior citizen and also places like where land conditions are continuously changing and Vehicles which are supposed to be operated in worst conditions such as heavy rainfall, snowfall & deserts.

Hence to reduce human effort and avoid accident risk this system is developed, that will reduce chances of tyre failure mainly during running condition by continuously maintaining the pressure in each tyre as per its standards and monitoring the pressure in each tyre means satisfying all condition such as supplying air if it is under inflated and stop access of air if tyre is over inflated and giving indication to driver when compressor is on or off.

When tyre is puncture; to repair or replacing tyre jack is required especially at rear wheels it is difficult to operate jack. Because on front side it easy to remove tyre by adjusting steering. Also at rear wheels lot of human effort is required to operate jack and remove the tyre so to reduce human effort the motorised operated jack is placed at rear end of car chassis. In case of puncture once driver knows tyre is puncture a switch is provided. When driver switch on

button motor start running and shaft of jack is connected to motor. Hence by employing a motor jack is operate and lift the vehicle from rare end and this is easy to remove tyres of rare end.

2. LITERATURE REVIEW

The aim of this study is to design and fabricate a system which works on filling of air into a tyre automatically that is in running condition with a low cost device. With the help of pressure gauge It automatically checks the pressure inside the tyre and ON the compressor which takes air from atmosphere, compresses it and then delivers the compressed air to tyre and ensures that tyres are always properly inflated to improve tyre life, human safety, reduction of gas mileage and vehicle performance. While filling of air into wheel the wheel is in rotory condition, rotary joint is fixed between wheel spindle and wheel hub at each wheel so that there is no tangling of hoses.

Our survey in the regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in lifting the vehicles for reconditioning.

Now the research paper has mainly concentrated on this difficulty, and hence a suitable device has been designed, such that the vehicle can be lifted from the floor land without application of any impact force. To the needs of small and medium automobile garages the motorized screw jack has been developed, which are normally man powered with minimum skilled labour. In most of the vehicles are lifted by using screw jack. This needs high man power and skilled labour.

3. NEED OF PROJECT

In the world, the fact that 'Necessity is the mother of invention' and necessity condition is that for manual operation of jack large effort is required. In the maintenance and repair of automobiles it is often necessary to raise an automobile from ground surface. The jack are categorized as standard jack, Farm jack, Hydraulic jack, Pneumatic jack. Normally power screw as standard jack uses for lifting. But Standard jack has limited degree of freedom with corresponding link. In hydraulic jack instead of screw incompressible fluid is used for lifting. The lifting is achieved by increasing fluid pressure in cylinder. Available jacks are typically difficult to storage, large and heavy due to these it may give back problem while continuous working with same. So engineering preferred for making things improving,

simpler and effective for that car jacks must easy to use for pregnant women and senior citizen. The main purpose of the project is to minimize the human effort while operating the jack.

Distribution of air in tyre helps the weight of vehicle evenly across the tire's tread pattern. When the tyre is under inflated or over inflated it loses stopping, stability, negatively, affecting handling. Unevenly the tyre will also starts to wear. On the outside edge of the tread under inflated tyres tends to show wear. At middle of the tread over inflated tyres show wear down. Hence incorrect inflation pressure more tyre wear and thread there is a need to change tyre quickly. The main motivation to maintain pressure inside the tyre there by providing good contact with road, passenger comfort responsive handling and uniform tyre wear. It should be remembered that it is the air pressure inside the tyre that support weight of vehicle.



Fig. 1. Effect of tyre pressure

4. CONSTRUCTION

The components of system which is mounted on car frame which consist of compressor, pressure sensor, pressure gauge, 4 rotary joint, pneumatic hoses, T-joints, Arduino board and IC, power supply, scissor jack, motor, chain drive.

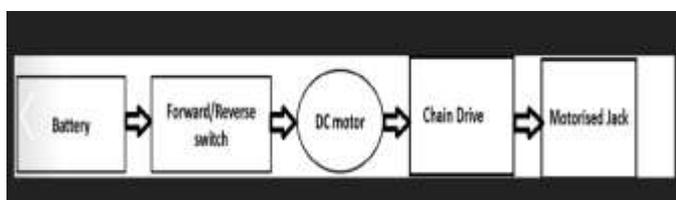


Fig.2 Construction of motorized screw jack

One end of rotary joint is connected to the tyre with hoses and other end is connected to T joint. T joints helps to provide pressure in two ways. One port of T joint is connected pressure sensor and other port is connects two compressor. Arduino is used to maintain the pressure. On other hand scissor jack is welded to back side of frame. The one end of jack is connected to chain drive and other end is free. Chain drive is operated by using DC motor.

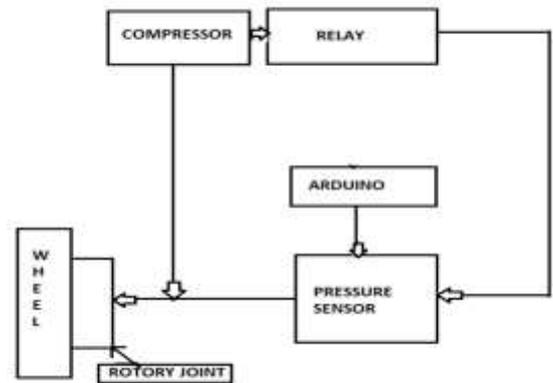


Fig.3 Construction of automatic tyre inflation system

5. WORKING

The working of automatic tyre inflation system is in this system a rotary joint is attached to wheel axle either from inside or outside. The one end of hose is connected to tyre valve and other end of hose is connected to rotary joint and other hole of rotary joint is connected to T-joint from which one end connected to compressor and other end connected to pressure sensor. Arduino is use to set required pressure for each wheel.

When pressure reduce it is sensed by pressure sensor and it send signal to arduino to start compressor and send compressed air to particular wheel through proper joint and the pressure is brought to required pressure.

In case of Inbuilt motorized jack is connected to rear end of chassis. The shaft of scissor jack is connected to chain drive. The chain drive is used increase torque. One end of chain drive is connected to jack and other end is connected motor. Motor drives the chain drive which revolves shaft of jack which results in lifting of vehicle from rear end.



Fig. 6. : Scssor jack

6. CONCLUSION

Object lifting jacks are the ideal product to push, pull, lift, lower and position loads of anything from a couple of kilograms to hundreds of tones. For automotive vehicles the need has long existed for an improved portable jack. Alternatively from inside the vehicle or from a location of safety off the road on which the vehicle is located It is highly desirable that a jack become available that can be operated. Such a jack should be light enough and be compact enough so that it can be stored in an automobile trunk, can be lifted up and carried by most adults to its position of use. Further, it should be easily and stable controllable by a switch so that jacking can be done from a position of safety. It should be easily movable either some other reinforced support surface designed to be engaged by a jack or to a position underneath the axle of the vehicle. Thus, considering all the above requirements the product has been developed. This particular design of motorized automated object lifting jack will be beneficial in lifting and lowering of heavy loads.

We can conclude that this system ensures us that each and every tyre is properly inflated to the proper tyre pressure throughout the journey and it also improves tyre life, increases fuel efficiency, reduces tyre wear and also increases the overall safety of the vehicle, it also monitors the tyre pressure constantly, provide us the proper inflation and deflation of the tyre, and helps in providing a comfortable ride with better mileage.

7. REFERENCES

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