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Automated Jacky for Four Wheeler for Replacement of Tyres

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Abstract: This paper is all about installing a device to the vehicle which will be helpful for the replacement of tyres and also useful to take the vehicle out when stuck in mud. With the increasing levels of technology, the efforts are being put to produce any kind of work that has been continuously decreasing. The efforts required in achieving the desired output can be effectively and economically decreased by the implementation of better designs. Power screws are used to convert rotary motion into reciprocating motion. An object lifting jack is an example of a power screw in which a small force applied in a horizontal plane is used to raise or lower a large load. In this fabricated model, an electric motor will be integrated with the object lifting jack and the electricity needed for the operation will be taken from the d.c battery and thereby the mechanical advantage will be increased.

Keywords: Motorized screw jack, battery, lead screw and D C motor.

I. INTRODUCTION

A jack is a mechanical device used as a lifting device to lift heavy loads or apply greater forces. In order to perform maintenance process in automobiles, jacks are commonly used. The most common type is car jack, floor jack or gauge jack. Basically it is very difficult to operate a mechanical jack. Only skilled labours are able to operate it. Expecting skilled labour all the time is not possible .The main objective of this project is to minimize the manual effort during the jack operation. A mechanical jack is a mobile device which provides mechanical advantage to allow a human to lift heavy equipment.

Thus implementing the idea of integrated automated jacks for 4 wheelers in which the system can be operated by the button in the dashboard so need of automatic inbuilt jack in the automobiles is inescapable and can be vastly used in light weight to medium weight cars. It can also be used in maintenance purpose. The project can be made feasible if considered while designing the vehicles. Various innovations have been made done in the jack with different electronic devices. The available jacks in market consume more time and use more efforts by the person to operate it. Thus implementing the idea of integrated automated jacks for 4 wheelers in which the system can be operated by the button in the dashboard so need of automatic inbuilt jack in the automobiles is inescapable and can be vastly used in light weight to medium weight cars. It can also be used in maintenance purpose.

The D.C motor is coupled with the screw jack by gear arrangement. The screw jack shaft'srotation depends upon the rotation of D.C motor. This is a simple type of automation project. This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains to be an essential part of the system although with changing demands on physical input, the degree of mechanization is increased.

II. LITERATURE SURVEY

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Mohammed Abuzaid et al. [2], In this research paper they have focused on an inbuilt hydraulic jack system which is attached to automobile vehicle on front and rear part of the chassis. There is a front suspension hydraulic jack that is mounted centrally to the front suspension of an automobile between its front wheels. There is also a rear suspension hydraulic jack that is mounted centrally to the rear suspension of the automobile

between its rear wheels. The system operates from a compressed fluid reservoir tank that has connections for the front and rear car jack outlets.

Mayank Agrawal et al. [3], This paper represents a study over in- built hydraulic jack system and shows its benefits over traditional mechanical jack system. The design of inbuilt hydraulic jack is also studied and modified to require extent which can be seen by analyzing design of prototype. An Inbuilt hydraulic jack system can be easily operated by buttons provided on the dash board of the vehicle. The jack will be installed on chassis of the vehicle. The motive behind using this system instead of a conventional mechanical system is the more power produced by the system and simple in design as compared to a conventional design. As the hydraulic oil is incompressible so the lifting capacity is more in comparison with the pneumatic system which operates on air which is compressible.

Parth M. Patel et al. [4], This paper describes Implementation of Automatic hydraulic jack Mechanism in a four wheeler itself. The jack will be powered by the battery. So at a time of puncture to replace the wheel one has to just press the button and the jack which is fitted in the car itself will lift the car.

Kamalakkannan. A and etc[5], here they say that they e are introducing the motorized screw jack. Weight after certain limits cannot be lifted by a person, in such cases we are in need of jack. When it is motorized it becomes more convenient. In order to implement this idea, we have designed and developed a system called motorized jack operating through switch by having full control of the jack, we can easily lift it up and down by using the on/off .this helps to reduce the burden of the worker. The main reason to fabricate the motorized screw jack is to avoid the fatigue of human during lifting of the load.

III. OBJECTIVES AND METHODOLOGY

3.1 Objectives

The main objective of this proposed work are as follows:

1. To design a power scissor jack which is safe and reliable to raise and lower the load easily.
2. To develop a car jack that is powered by internal car power and fully automated with a button System.
3. To reduce man power in replacing of tires.

3.2 Methodology

The Fig. 1 Shows the Flowchart of Methodology

- At first the frame is made according to the dimensions. Then the markings are made to fix the wheel bearings. The bearings along with the tyres are fixed so that the prototype of the model is ready.
- The centre of the frame is marked on the parallel sides to fix the lead screw bearings and the bearings are fixed accordingly with the lead screw.
- The motorized jack along with the support is inserted to the lead screw.
- The electrical connections are made according to the requirement and the switches are fixed near the dashboard of the car. The mains are connected to the battery.

IV. WORKING PRINCIPLE

The motorized jack is shown in Fig. 2. The car battery is used to drive the D.C motor. The D.C motor shaft is connected to the screw through coupling. If the power is driven to the D.C motor, it will run so that the screw also runs and converts rotary to translator motion. The arms of the jack move upwards, so that the vehicle lifts from the ground as shown in Fig. 3. The vehicle is lifted by using the lifting platform at the top of the jack. The motor draws the power from the battery. After pressing the switch, power from the battery is connected to the screw. Now the screw starts moving which is connected to the motor at the base and the set-up is adjusted below the body which is being lifted.

When taping the switch to the positive pole, positive voltage is supplied to the dc motor in clock wise direction and the lead screw moves in downward direction. Similarly when tapping the switch to the negative pole, negative voltage is supplied to the DC motor which moves in anticlockwise direction and the lead screw moves in upward direction. In this way the directions can be controlled which in turn regulates the lift load direction either upward or downward as per the requirements.

When the jack is to be moved towards either one of the sides, the lead screw which fixed to the chassis can be turned by using a D.C motor. The jack will be attached to the ball bearing which will be mounted on the lead screw. When the lead screw rotates the jack is made to move towards the required position. The lead-acid battery is used to drive the D.C motor. The D.C motor shaft is connected to the spur gear. If power is given to the D.C motor, it will run so that the spur gear also runs to slow down the speed of the D.C motor. The screw jack moves the screw upward, so that the vehicle lifts from ground. The vehicle is lifted by using the lifting

platform at the top of the screw jack. The motor draws power supply from the battery. The lifting and uplifting is done by changing the battery supply to the motor.

V. FIGURES AND TABLES

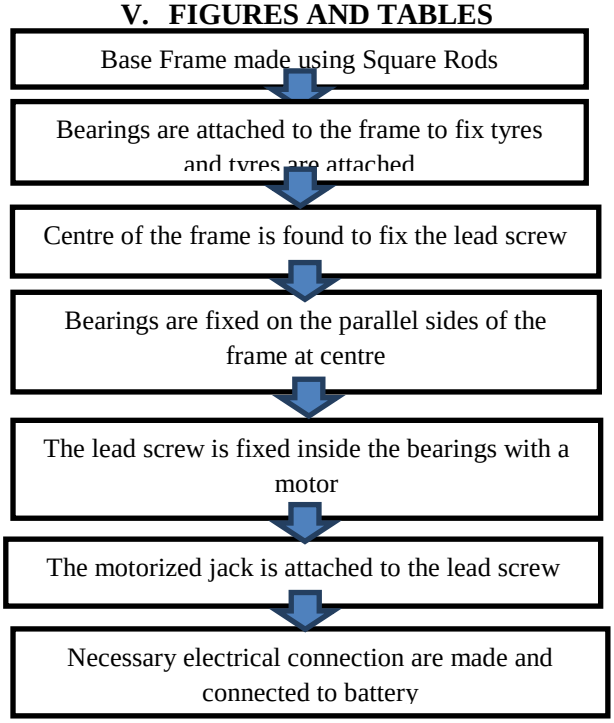

Fig. 1 Flowchart of Methodology

Fig. 2motorized jack

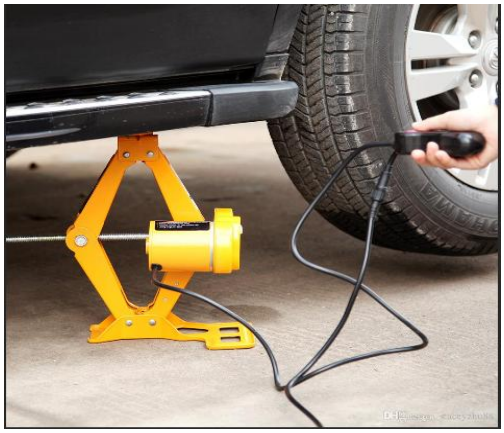

Fig. 3 working of motorized jack

Table. 1 Specifications of Jack

Discription	Details
Collapsed Height	4.0 inches
Depth	16.25 inches
Height	8 inches
Width	4.25 inches
Material	Metal
Max. lift height	14 inches
Min. lift height	5 inches
Weight	5 kg
Lift Capacity	1 ton aprx.

VI. CONCLUSION

An inbuilt jack system can be easily attached to all currently manufacture automobile chassis and frames. The system operates on the motor power present in the jack. This arrangement has many advantages such as maintenance and servicing of vehicle. With the help of this system the driving of vehicles will be easy especially for ladies. Arrangement is also very useful for heavy loading vehicles and a single person can go on a long drive. Whole system is operated by 12 volt DC battery; hence jacks will also work, when vehicle will not in starting condition

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