

12V DC Electric Car Jack

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Abstract -Humans have always been fascinated by the new technologies and developments in the field of science. The need to develop something better in order to fulfill the drawbacks of what the previous version had paved a way to ever increasing demands in the technology. Automobile industry is also one such sector where everyday there are new proposals of designs coming up or some kind of invention to help the industry grow in all economical ways. With the new developments also comes the responsibility to continually monitor the changes for improvements. Like any other equipment the vehicles are also continually assessed for the various repairs that need to be made in them during their use. One such possible area of development is the repairing of vehicle at time of failure when in use. The bursting of tyre or any similar condition while we are driving the vehicle can lead to a very dangerous situation risking our lives. So in this century of drastic developments we give a new way in which the repairing of vehicle can be done by the facilitation of an electric car jack using the infrared sensor for avoiding any mishaps during driving. The infrared sensor helps to detect any change in the positions of all the tyres. Upon the detection of change the vehicle can be repaired using the electric car jack which consists of a D.C. motor to automatically lift up the vehicle by gaining electrical supply from the car battery. This system will help the driver in acknowledging the damage in any of the tyres and repairing it with least human effort.

I. INTRODUCTION

Automobile industry is one such sector of economy where a constant need in the technology is observed. The new developments to increase the ergonomics of the vehicles and their efficiency are paving a way towards automation with minimum human efforts. As important as it is to increase the overall performance of the vehicle making them economically and environmentally acceptable by users, it is also important that the vehicle demands less maintenance of which some could be done by

the users themselves. The complete maintenance of the vehicle however cannot be done by the user alone but situations like flat tyre in middle of journey or repairing and changing of parts cannot be left for the mechanic to get done. This will not only consume time but at places not easily accessible for the mechanic will prove dangerous to the user. A flat tyre at middle of a journey can also lead to dangerous accidents.

A flat tyre can be easily changed with the help of jacks. These jacks are carried in the car during journey and when required can be used. In market there are various jacks available for aiding in conditions of vehicle repairing at bottom such as scissors jack or the toggle jack, floor jack, pneumatic jack, bottle jack, H lift jack and so on. Of all these jacks the most common used in the light motor vehicles say cars is the scissors jack or the toggle jack. These jacks were widely used during the World War 2 in the Ford GPW and Willys MB with the capacity of 1.5 tons having the ordinance part no 61-J-66 of the screw type jack. These jacks were used manually by the user and were carried in the jeeps. The use of screws as machine is dated back to 200 BC by Archimedes for pumping water. The similar was also used by the Romans in ancient time. However the first use of screws as jacks to lift the vehicle is said to be given in 1600's by the great Leonardo da Vinci.

All these studies and developments thus need to be automated so that the user can use it with minimum efforts. The electric car jack is one such solution which will allow the repairing of vehicle at any place with ease and thereby saving time and energy. This system consists of a screw jack whose screw is connected to DC motor. The motor gets the supply from the car battery and lifts the vehicle when switched on. The switch is also used to stop the lifting of vehicle at required height. Also infrared sensors installed at each tyre will help determine any pressure change due to puncture or wobbling of any the tyres due to loose parts and convey the same output by an LED in the module so that the required action can be taken.

1.1 Problem statement

Frequent problem occur with scissor jack is instability. The problem just because the small lower plate of the jack is not able to provide appropriate support on bumpy surfaces and the other is to reduce human effort by mounting the 12v DC power engine to change the pneumatic pressure which provides the required torque to lift the jack. To reduce the time the manual jack takes to lift the vehicle.

1.2 Objective

The purpose of the 12V DC ELECTRIC CAR JACK is:

1. The aim of the project is to design a simple scissor jacket that is stable even on uneven surfaces with a structural improvement.
2. To make it convenient economically.
3. Create Jack without welding, so that it can have such a long life and be operated roughly.
4. Trying to reduce human effort.
5. To that the lifting time of the car.

II. COMPONENTS USED;

2.1 Frame

A base that sits on the ground, four metal arms connected with each other and rotate at points generating a 6-bar linkage and a top metal plate that connects to the car axle comprises frame of a Jack. The frame is formed by low-medium carbon steel.

2.2 Power screw thread JACK

To which frame is connected with left and right pin that allows the top of the frame to rise and lower car by a small force. It converts rotary motion of motor in to translational motion. They can be of two type left and right. It is called a right-hand thread if it is tightened by clockwise rotation, and the contrary is left-hand thread. Fig 1, shows frame and screw thread of a scissor car jack.

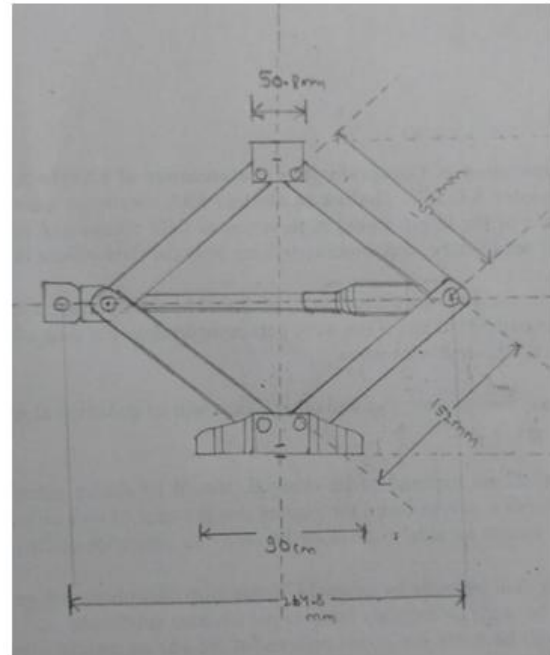


Fig. 1: Frame and Screw thread of a scissor car jack

Power screw are usually made of stainless, alloy or carbon steel, which is used with bronze , steel or plastic mating nut.

2.3 Thrust bearing:

This allows the screw thread to rotate under force.

2.4 DC Motor

The DC motor is the mechanism that provides direct current into mechanical action. It is based on the Lorentz rule , which states that "the current transportation conductor in an electrical and magnetic field observations force."Fig.2, shows Motor attached to the frame.



Fig. 2: MOTOR

Technical Specification-

- Rated Torque-53in-lb
- Motor noise- <65dB
- Weight of the motor is 1.2 kg
- Size of the motor is 7.25" x 6" x 3.5"

Table 1: Specification and speed of motor (Approx.)

Input power	Terminal	RPMs
12v DC 5 Ampere	Low	35 RPM
5v DC 5Ampere	Low	15 RPM
5v DC 5Ampere	High	20 RPM
12v DC 5Ampere	High	50 RPM

2.5 6.0 Push Switch:

12V Push switch is used with AC voltage 250V/10A and 125V/15A, which is compatible with both DC and AC. Switch has 3 position control and ideal for DC motors and linear actuators. Three position control switch shown in Fig 3.



Fig.3: Three Position Control Switch

2.6 5m wire:

5 meter for all the wiring.

2.7 12V DC Car Charger:



Fig. 4 : 12V DC CAR CHARGER

2.6 12V battery:

This is a rechargeable battery, which provides a electric current to a motor vehicle. The major objective is to feed the engine starter.

Table1: Specification of components

S. no.	Components	Make	Model no.
1	Motor	12V DC	HA159100-6332
2	6.0 Push Switch	Rocket switch	BST006
3	Coupling Nut	RC	8561676613
6	5m Wire	-	-
5	Supporting Battery Clamp	RB Kumar and Sons	-
6	12V Battery		
7	Dc Charger		

III. METHODOLOGY

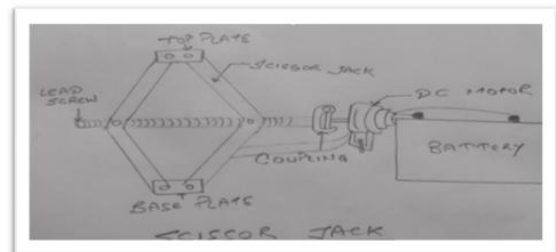
3.1 Product description

- Voltage 12V
- Input power 50 watts
- No load speed 45-60 rpm (approx.)
- Maximum displacement 192 mm
- Lifting time (approx.) 62
- Torque 32 N-mm
- Length (fully lowered condition) 200mm

3.2 Working

Automatic jack is generally used to lift cars by converting DC battery electrical energy to Jack mechanical energy. This follows the same principle of "Lifting something using crossed arms." To ensure equal distribution of the weight, the jack frame is made symmetrical, just as the distance from the loading point to the crossing point must be the same as the distance from the crossing point to the ground.

WORKING OF SCISSOR CAR JACK:



Using arms and screw mechanism, this 12V DC ELECTRIC CAR JACK uses battery power to lift a vehicle by motor and by screw. As the screw turned clockwise, this drives arms through the screw through the central pivot points of the scissor mechanism, working the jack and thus lifting the vehicle and unthreading the screw, shortening

the jack and, in turn, lowering the vehicle to the ground when the screw rotates counter-clockwise.

Since the screw is pushing up the arms, it has multiplied the force being applied and while the force is not applied directly to it, it takes very little force.

IV. PROJECT SCOPE

1. Add a light source, may be LED's which will be helpful at night.
2. Designing of additional alignment device to help secure frame easier

4.1 Applications

1. Tyre changing.
2. For repairing works.

4.2 ADVANTAGES

1. It reduces human efforts in changing the tyre.
2. less time taken in changing the tyre.
3. Easily accessible.
4. compact design.
5. less physical strain.

4.3 DISADVANTAGES

1. little expensive than manual jack.
2. Cannot guarantee longevity.

V. CONCLUSIONS

The jack has successfully lift up the car with the help of an 12v DC electric motor. And thus, eventually leads to reduce human efforts in changing the tire. Also, it made electric jack cheaper so that most of us can buy it at cheap rates. It also took very less time in lifting up the car so that one can easily change it whenever and wherever we want to change.

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