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Design and Fabrication of Automated Scissor Jack

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***Abstract;*--Now-A-Days, everybody is aware of the several complications and anomalies that may or may not occur in a simple LMV. These complications include unanticipated breakdown, flat tire, etc. or any such complication that renders the vehicle to a halt and unusable. These days several types of either manually operated or automatic jacks whether lightweight/portable or heavy are widely used to fulfill their purposes in lifting heavy as well as light equipment. There are only a few types of jacks that are consistently used for lifting a vehicle during its repair work or any such purpose viz. manually operated scissor jacks, manually operated screw jacks, manually operated hydraulic jacks etc. Even though they fulfill their purpose there is a huge drawback to these kinds of jack i.e. they are manually operated and consume a substantial amount of time and energy for their operation. In this project an attempt has been made to design and fabricate a power scissor jack to lift and support a load of 4.5kN, for typical use in four wheeler. This jack can be operated using an android mobile. Bluetooth module is connected to the controller to take the commands from the mobile so that the motor can be rotated to lift the jack. Here we are using AT89S52 as our controller.**

Keywords- Light moving vehicles, Integrated automated jack, Scissor Jack, Chassis.

1. INTRODUCTION

Jack is a mechanical device used to lift heavy loads or apply great forces. Available jacks present difficulties for the elderly people and women and are especially disadvantageous under adverse weather conditions. Presently available jacks further require the operator to remain in prolonged bent or squatting position to operate the jack which is not ergonomic to human body. It will give physical problems in course of time. Moreover, the safety features are also not enough for operator to operate the present jack. Furthermore, available jacks are typically large, heavy and also difficult to store, transport, carry or move into the proper position under an automobile. The purpose of this project is to overcome these problems. An electric car jack which has a frame type of design by using electricity from the car will be developed. Operator only needs to press the button from the controller without working in a bent or squatting position for a long period of time to change the tire.

OBJECTIVE –

- To design a power scissor jack which is safe and reliable to raise and lower the load easily.
- Use of double start square thread in power screw.
- Pins in bearings.
- To fabricate the prototype of a scissor jack. To

- achieve mass production
- To reduce the production cost and time.
- To achieve good product quality.

2. COMPONENTS USED:

Power Screws-A power screw is a mechanical device used for converting rotary motion into linear motion and transmitting power. A power screw is also called translation screw. It uses helical translator motion of the screw thread in transmitting power rather than clamping the machine components.

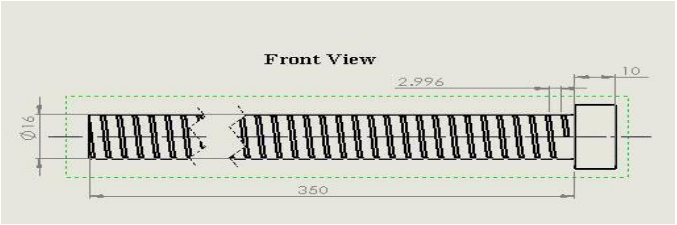

Fig. 2.1 Power Screw

Geared DC Motor

A DC motors and gear motors with permanent magnets are also known as Brushed Electrical Motors. The rotor, winded in a copper wire connected to a collector, constitutes the rotating part which transmits the mechanical power. The tension in DC motors is transmitted to the rotor through the sliding contact between brushes and collector.

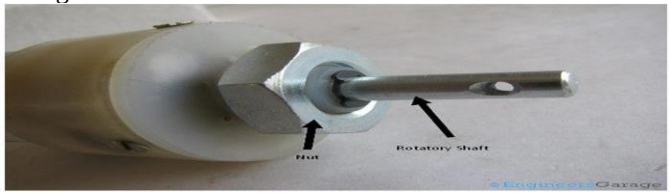

Fig.2.2 Battery

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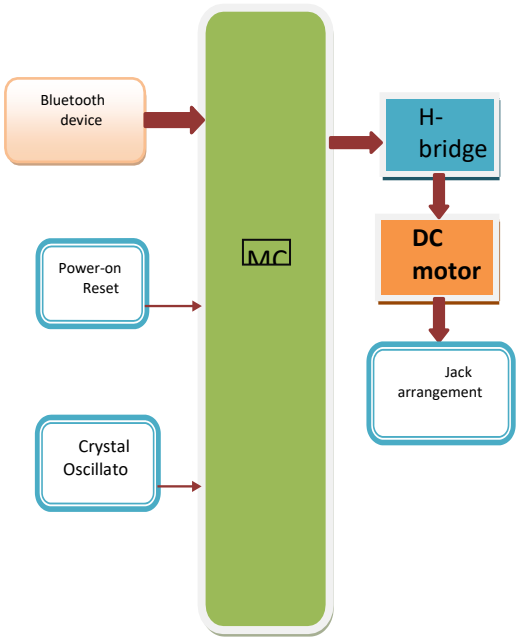
- Bluetooth

A 12v 40w 60rpm DC motors to drive the gear drive to operate the bucket conveyor and to slide the sand sieve box on guide ways. An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a magnetic force whose direction is given by Fleming's left hand rule.

Among the four popular wireless connections that often implemented in HAS project, Bluetooth is being chosen with its suitable capability. Bluetooth with globally available frequencies of 2400Hz is able to provide connectivity up to 100 meters at speed of up to 3Mbps depending on the Bluetooth device Prior to implementation of Bluetooth-based application on the phone, several software packages are required which include Java Development Kit (JDK), the Eclipse software environment, Android Development Tools ADT) and Android SDK (Software Development Kit).

Fig.3 Bluetooth device

Microcontrollers-Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical The spur gears, 8052 is an 8-bit processor, meaning that the CPU can work on only 8 bits of data at a time. Data larger than 8 bits has to be broken into 8-bit pieces to be processed by the CPU.



FINAL VIEW OF SCISSOR JACK

4.ADVANTAGES

Checking and cleaning are easy, because the main parts are screwed.

- Handling is easy
- The loaded light vehicles can be easily lifted.
- No Manual power required.
- Easy to Repair.
- Replacement of parts are easy

5.DISADVANTAGES

- Cost of the equipment is high when compared to ordinary hand jack.
- Care must be taken for the handling the equipment such as proper wiring connection, battery charging checkup, etc.

6.CONCLUSION

In this project a prototype of power scissor jack which can be operated by a power gun has been designed and fabricated. The jack has been designed to a pay load of 4.5kN. The salient features of the present fabrication are elimination of human effort to operate the jack, through a simple electrical device which can be actuated by a 12 V battery and provision of a light source to facilitate convenient operation during night time. All the elements of the jack are fabricated in the machine shop. The assembly of the component can be achieved in 100 minutes. Another feature of the unit is provision of two trunions on both the sides of the jack to ensure jerk free operation. The elements which are useful are readily available commercially for each and early replacement of failed components if required. Screw Jacks are the ideal product to push, pull, lift, lower and position loads of anything from a couple of

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kilograms to hundreds of tonnes.The need has long existed for an improved portable jack for automotive vehicles. It is highly desirable that a jack become available that can be operated alternatively from inside the vehicle or from a location of safety off the road on which the vehicle is located. Such a jack should desirably 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, and yet be capable of lifting a wheel of a 4,000-5,000 pound vehicle off the ground. Further, it should be stable and easily controllable by a switch so that jacking can be done from a position of safety. It should be easily movable either to a position underneath the axle of the vehicle or some other reinforced support surface designed to be engaged by a jack

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