FABRICATION OF MOTORIZED SCREW JACK

R.DIVYA BHARATHI 1, P.RUTH PRIYANKA 2

1 Assistant professor, Department of Automobile Engineering, PACE Institute of Technology & Sciences, Ongole, Andhra Pradesh, India.

2 Assistant professor, Department of Automobile Engineering, PACE Institute of Technology & Sciences, Ongole, Andhra Pradesh, India.

Abstract

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 project 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. The fabrication part of it has been considered with almost ease for its simplicity and economy, such that this can be accommodated as one of the essential tools on automobile garages. The subsequent chapters indicate all the essential features of its fabrication, application and its cost analysis.

Key words: Automobile, Motorized Screw Jack, Cost Analysis.

INTRODUCTION

This device the motorized screw jack for automobile garages has been developed to later the needs of small and medium automobile garages, who are normally man powered with very minimum of skilled labours. In most of the garages the vehicles are lifted by using screw jack. This needs high man power and skilled labours. In order to avoid all such disadvantages. This, motorized screw jack has been designed in such a way that it can be used to lift the vehicle very smoothly without any impact force. The operation is made be simple that even an unskilled labour can handled, by just demonstrating the working of the motorized screw jack once. The D.C motor is coupled with the screw jack by spur gear mechanism. 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 an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

Degrees of automation are of two types, viz.

- Full automation.
- Semi automation.

In semi automation a combination of manual effort and mechanical power is required whereas in full automation human participation is very negligible.

NEED FOR AUTOMATION

Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, mechanical form an attractive medium for low cost automation. The main advantages of all pneumatic systems are economy and simplicity. Automation plays an important role in mass production.

- To achieve mass production
- To reduce man power
- To increase the efficiency of the plant
- To reduce the work load
- To reduce the production cost

LITERATURE SURVEY

Abhishek Madhukar Barewar 1, Abhishek Ashok Padole 2 et al has presented “Fabrication of automatic screw jack”. In this paper the lead screw is used to convert rotary motion into translation motion. The screw jack is a device used for lifting the load with the application of small force. The mechanical advantage of screw jack is the ratio of the load applied to the effort applied. The screw jack is operated by turning a lead screw of jack. The effort required to operate the screw is eliminated by using...
12 V DC Motor. The motor operates by 12V DC power supply which is drawn from the vehicle battery itself. The rotary motion transfer from the motor to lead screw through worm gear drive. The driver gear (pinion) located on the motor shaft and the driven gear located on the lead screw causes to transfer rotary motion.

PAWAR .R .R¹ Shinde m S² Et al has presented “Recent technologies in automobiles: need of motorized screw jack” The purpose of this paper is to design a screw jack which is easy for operating, safe and able to lift and lowering the car without spending much effort. Available car jacks are typically manually operated and therefore require more physical effort on the part of the user. Such jacks create difficulties for the elderly, handicapped, and women’s. Disadvantageous in bad weather conditions. And this is a waste of time and even will endanger if jacking and changing the tire is in hurry. So, for that reason electrical-powered jacks not only remove the task of lifting an Automobile via manually operated jacks, but also decrease the time needed to repair the automobile. This is a review of one type of automation project.

COMPONENTS AND DESCRIPTION

The main components of a project is
- Screw jack
- D.C motor
- Battery
- Spur Gear Arrangement

SCREW JACK:

Screw jack consists of piston and piston rod with plate. The Plate is fixed at the end of the piston rod, which is used to lift the vehicle from the ground level.

DC MOTOR

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. When a motor is in operation, it develops torque. This torque can produce mechanical rotation. DC motors are also like generators classified into shunt wound or series wound or compound wound motors.

BATTERY

In isolated systems away from the grid, batteries are used for storage of excess solar energy converted into electrical energy. The only exceptions are isolated sunshine load such as irrigation pumps or drinking water supplies for storage. In fact for small units with output less than one kilowatt. Batteries seem to be the only technically and economically available storage means. Since both the photo-voltaic system and batteries are high in capital costs.

FIG: 1. Lead Acid Battery

SPUR GEAR ARRANGEMENT:

The spur gears, which are designed to transmit motion and power between parallel shafts, are the most economical gears in the power transmission industry. In our project, spur gear transmits the power from motor to the screw jack.

WORKING PRINCIPLE

The lead-acid battery is used to drive the D.C Motor. The D.C Motor shaft is connected to the spur gear. If the power is given to the D.C Motor, it will run so that the spur gear also runs to the slow speed of the D.C Motor. The screw jack and moves the piston upward, so that the vehicle lifts from ground. The vehicle is lifted by using the lifting flat form in the top of the screw jack. The motor is drawn supply from the battery. The lifting and uplifting is done by
changing the battery supply to the motor simple.

Fig: 2. Motorized screw jack

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- The loaded light vehicles can be easily.
- Checking and cleaning are easy, because of the main parts are screwed.
- Handling is easy
- No Manual power
- Easy to Repair.
- Replacement of parts are easy

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.

APPLICATIONS

1. It is very much useful in auto-garage. This motorized screw jack is used for lifting the vehicles.
2. Thus it can be useful for the following types of vehicles in future;
   - Maruti,
   - Ambassador,

LIST OF MATERIALS

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>NAME OF THE PARTS</th>
<th>MATERIAL</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Screw jack</td>
<td>Aluminium</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Spur Gear</td>
<td>M.S</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Battery</td>
<td>Lead-Acid</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Stand</td>
<td>M.S</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>D.C motor</td>
<td>Aluminium</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Connecting Wire</td>
<td>Cu</td>
<td>2 Metres</td>
</tr>
</tbody>
</table>

Table: list of materials

COST ESTIMATION

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>NAME OF THE PARTS</th>
<th>MATERIAL</th>
<th>QUANTITY</th>
<th>AMOUNT(Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Screw jack</td>
<td>Aluminium</td>
<td>1</td>
<td>2000</td>
</tr>
<tr>
<td>2</td>
<td>Spur Gear</td>
<td>M.S</td>
<td>3</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>Battery</td>
<td>Lead-Acid</td>
<td>1</td>
<td>1400</td>
</tr>
<tr>
<td>4</td>
<td>Stand</td>
<td>M.S</td>
<td>1</td>
<td>2000</td>
</tr>
<tr>
<td>5</td>
<td>D.C motor</td>
<td>Aluminium</td>
<td>1</td>
<td>2200</td>
</tr>
<tr>
<td>6</td>
<td>Connecting Wire</td>
<td>Cu</td>
<td>2 Metres</td>
<td>50</td>
</tr>
</tbody>
</table>
Table: material cost

| TOTAL COST | =8150 |

OVERHEAD CHARGES

The overhead charges are arrived by “Manufacturing cost”

Manufacturing Cost=Material Cost + Labour cost

\[ \text{Manufacturing Cost} = 8150 + 1300 \]

\[ = 9450 \]

Total cost for this project = 9450

CONCLUSION

The fabrication of motorized screw jack was successfully completed as per the designed specification. The trial performance of this device provides to be successful, with case of operation and safety, hence the results has given a clear indication of its commercial viability. The cost analysis has shown its economic feasibility and we are under the impression that it can be further reduced, when produced on a mass scale.

REFERENCES


2. Pawar ,r r1 Shinde m S2 et al “Recent technologies in automobiles: need of motorized screw jack” International Journal of Recent Development in Engineering and Technology Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 4, Issue 4, April 2015)


4. Kamalakkannan.A1, Kalaiselvan.p2 et al “automatic motorized scerw jack to reduced man power” international journal of scientific & engineering research, volume 7, issue 5, may-2016 21 issn 2229-5518