

Development and Analysis of Modify Screw Jack

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Abstract- Side road emergency like tire puncher, is a problem commonly observed in cars. Conventional car jacks uses mechanical advantage to allow a human to lift a vehicle by manual force. This paper analyzes the modification of the current toggle jack by incorporating an handling mechanism in the screw in order to make load lifting easier for emergency use with using gears with handle Gear ratio is used to increase the lifting power. The significance and purpose of this work is to modify the existing car jack in order to make the operation easier, safer and more reliable in order to save individual internal energy and reduce health risks especially back ache problems associated with doing work in a bent or squatting position for a long period of time.

Keywords- Screw Jack, Steering Cross, Square pipe, Gears with Handle.

I. INTRODUCTION

Toggle jack is used to jack the car during side road emergency i.e. tire puncher. A mechanical jack is a device used to lift heavy equipment, all or part of a vehicle into the air in order to facilitate vehicle maintenances or breakdown repairs [1]. Changing a flat tire is not a very pleasant experience. Nowadays, a variety of car jacks have been developed for lifting an automobile from a ground surface. Available car jacks, however, are typically manually operated and therefore require substantial laborious physical effort on the part of the user. Such jacks present difficulties for the elderly and handicapped. It further requires the operator to remain in prolonged bent or squatting position to operate the jack. Doing work in a bent or squatting position for a period of time is not ergonomic to human body. It will give back ache problem in due of time. A toggle jack is operated by turning a lead screw. In this case of a jack, a small force applied in the horizontal plane is used to raise or lower large load [2]. A jackscrew's compressive force is obtained through the tension force applied by its lead screw.

An Acme thread is most often used, as this thread is very strong and can resist the large loads imposed on most jackscrews while not being weakened by wear over many rotations. An inherent advantage is that, if the tapered sides of the screw wear, the mating nut automatically comes into closer engagement, instead of allowing backlash to develop [3]. These type are self locking, which makes them safer than

other jack technologies like hydraulic actuators which requires continual pressure to remain in locked position The automobile service stations are commonly equipped with large and hi-tech car lift, wherein such lifts are raised and lowered via electrically-powered systems. However, due to their size and high costs of purchasing and maintaining, such lifts are not feasible to be placed in car and owned by car owner. Such electrical-powered portable jacks not only reduce the effort required for lifting an automobile via manually-operated jacks, but also decrease the time needed to repair the automobile. Such a feature can be especially advantageous when it is necessary to repair an automobile on the side of a roadway or under other hazardous conditions [4]. Tests have proven that the jack has the tendency to buckle under the weight it is subjected to withstand [5]. The purpose of this project is to develop a car jack which is easy to be operated, safe and able lift and lowering the car without involving much physical effort. This paper discussed the design and analysis of modified car jack.

II. WORKING OF HANDLE OPERATED JACK

Under working condition the jack will lift a vehicle chassis in contact with the top plate when the power screw is rotated through its connecting gear with the pinion when handle of gear is rotated by manually. And then main shaft of gears is rotated. Generally steering cross are used for the provide for turn. One steering cross is connected with the main shaft of gears and the second steering cross is connected to the input point of jack. Then after power screw will be turned so that the top plate makes contact with the car chassis and the clearance space is eliminated. As contact is made, load of car will be increasingly shifted to the top plate and cause forces to be developed in and transmitted through links and side member. The force transmitted through the middle link will be transferred on threads of screw.

COMPONENT

1. GEARS WITH HANDLE(HAND DRILL)
2. TWO STEERING CROSS
3. WOODN FRAME
4. TWO SQUARS PIPE
5. SCREW JACK

FUNCTION OF COMPONENT

1. **GEARS** : Gears are used for the give the power of screw jack by manually. And it is stand of right side of the frame by the proper setting arrangement in this case we are use the eight wooden plate. Gears have the three main rod first is main handle for given the power, second handle is used for the providing the stability of the gears and third is the output of the gears. Gears have the ratio of 1:3, And diameter of the bigger gears is 10 cm and smaller gears is 3.33 as shown in fig (1).



Fig (1)

2. **STEERING CROSS** : Generally function of the steering cross is to providing the turn of rotating shaft in this case when jack is in lifting condition it moves back as well as up so for v t he up and down motion of the jack is arranged by the steering cross. As shown in fig(2).



Fig (2)

3. **WOODN FRAME** : The function of wood frame is to provide the base of all other component and also provide the stability of the jack under working condition. In generally condition when we start the lifting the car or other thing it disturb it position due to the rotation of handle rod. it I also providing the stability in our case as shown in fig(3).



Fig (3)

4. **SQUARS PIPE** : We very well know when the two square pipe are fit together and have the some clearance it

transmit the rotation as well as it move in and out as per the requirement. In our case when the jack the working condition it move backward and forward so this pipe help to move the jack. Length of pipe are the 25cm this pipe are shown in fig(4).

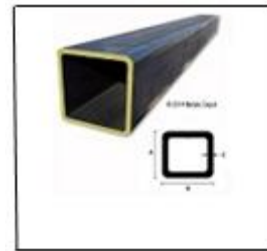


Fig (4)

5. **SCREW JACK** : A jack is a mechanical device used a as a lifting device to lift heavy loads or to apply great forces. A mechanical jack employs a screw thread for lifting heavy equipment. A hydraulic jack uses hydraulic power. The most common form is a car jack, floor jack or garage jack, which lifts vehicles so that maintenance can be performed. Jacks are usually rated for a maximum lifting capacity as shown in fig(5).



Fig(5)

ASSEMBLY LINE



Fig (6)

III. WORKING AND OPERATION

Working of modify jack is very simple first of all we select the suitable position for the modify jack this is the position in which the top surface of the jack just below the car or other thing and the other handle side of the modify jack are near to us. And start applied the force through the handle on jack. The power is transmitted through the handle to the steering cross and the steering cross provide the turn of thid force and then this force further is transmitted to the square rod, This rod are move forward and back ward according to required. And then at the last the force are transmitted through the steering cross to the jack. Te final assembly of the modify jack are shown in the fig (7).



Fig (7)

IV. CONCLUSION

The existing jack was modified by making small alteration and making use of an handle mechanism (handle drill) And with the help of two steering cross we are provide turn when jack move up and down under working condition And with the help of two square pipe we control the forward and backward motion of the jack. In the modify jack the capacity of the jack is low but at the 60 to 70 kg but working was easy. The power screw is rotated through its gear when force is applied by the manually.

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