Design and Fabrication of Vehicles Multi Wheel Nuts Tightner and Remover

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Abstract

We know the standard of living had been increased, most of the families have at least single vehicle, typically a car, to move around easily and quickly. So with the increment in the number of cars so do its tyre failure. Often, the car is provided with wheel nuts remover and jack for instant replacement of the spare tyre. But it is really a difficult process. Based on this we designed vehicle multi wheel nuts tighter and remover. The remover is designed to be of easy maintenance, easy storage, easy to handle and able to remove all nuts at once. It consists of 1 lever on which the pinion gear is fixed and it is driven by an electric motor. Pinion gear drives the 4 spur gears which has 4 shafts with box spanners at the end of each shaft. Thus the all four nuts are removed at once.

Key words: Nut tightener and remover, multiples nuts, electrical motor.

1. INTRODUCTION

An automobile is known to be one of the most basic and fascinating things that a person could own. The Cars have now become essential and it is not only the symbol of luxury anymore. Car maintenance, for example, is one of the key factors in determining its life span. This includes a basic knowledge of changing the car's tyre. But replacing a punctured tyre has always been a difficult task. Every car manufacturer provides tools such as L wrench and jack but easy and fast removal of nuts using these tools requires a skilled person. But vehicle all wheels nut remover and tightener allows driver to remove all nuts at once with less energy consumption and save time. In case of emergency puncture in the tires of the ambulance, it will be a time consuming process for removal of nuts. In those cases, it will be more useful in vehicle multi wheel nuts remover. The vehicle multi wheel nut remover and tightener remove all the nuts by torque, the gear system. The wheel will be replaced by low consumption of time. The fabrication of all wheel nut removers tool was completed by milling, welding and fitting process. So this design helps to avoid time wasting and a lot of energy used to change the tyre, it allows driver or mechanic to remove four wheel nuts at once with little energy consumption.

2. LITREATURE SURVEY

The vehicles multi wheel nuts remover and tightener are driven by electric motors which have a relatively high speed of rotation in order to obtain a shorts screwing in time. Since the maximum moment of tension for the screw to be screwed requires a determined torque, the driving power of the screw driver must likewise be made high in accordance with the relatively high speed of rotation, although a high torque is required for only a short time during the tightening of the screw, unless some shock action is utilized for the purpose of producing this peak degree. Car manufacturers specify a proper tightening level, a torque value expressed in foot-pounds, for every fastener on your car. Torque is a rotational force

applied around a point or, in this case, a nut. Put a 1-foot-long wrench on a nut and apply 10 pounds of force to the opposite end. You're now twisting that nut with 10 ft-lb (distance times force, or 1 foot times 10 pounds). Use a 2-foot-long wrench and apply 50 pounds of force, and you'll have 100 ft-lb, which, happily, is just about as long as most lug wrenches, and as much force as most elbows are happy cranking on.

3. PROBLEM STATEMENT

The existing wheel nuts remover which is a normal L wrench and nut spanners are really inconvenient and difficult to use. It can remove only a single nut at a time and it requires man power for removing and tightening of the nuts. Thus for old and weak peoples, the replacement of the tyre by this normal method is really inconvenient and difficult process. Not only for old people there are many examples like medical emergencies, job, and everyone in this world is really busy and in rush all the time. So in these cases where time is valuable this normal method becomes really inconvenient. Therefore, to overcome these problems we designed vehicles multi wheel nuts remover and tightener. This tool can be operated by anyone easily and it removes all the four nuts in a single process. Thus our projects saves time and man power and help everyone in their emergencies.

4. OBJECTIVE

The main objective of the project is to reduce the time consuming and the man power used for the wheel nuts removal and tightening processes by using L wrench and jack by replacing it with the vehicles multi wheel nuts and remover. In case of a flat tyre for tyre replacement, each wheel nut has to be individually removed and tightened using the tools by man power. But by the vehicles multi wheel nuts tightener and remover, instead of removing the nuts individually all the four nuts of the wheel can be removed at the same time. Thus the vehicles multi wheel nuts remover and tightener reduces the time consumed in the normal process and also the man power used. Considering all the advantages we recommend for the usage of this tool in every vehicle. This tool can be operated by anyone of different ages from young people to old people as it is easy to use and light in weight and its is automatically operated by using a electric motor. Thus the process includes only placing the setup over the nuts and turning on the switch.

5. MATERIALS

5.1 Gear and pinion

In this setup we are using a pinion gear and four spur gears .The pinion gear is connected to me motor and thus it is driven by the motor and the other four spur gears are meshed with the pinion gear. Thus the pinion gear drives the all four spur gears. The gear and pinion in this set up is made according to the pitch circle diameter of the wheel which is 100 mm. So the corresponding diameter for the pinion is taken 58 mm and that of the gear is taken as 63 mm with reference and the number of tooth for the both gears are 42.

5.2 driving motor

A driving motor is used in driving the pinion. The pinion gear needs to be driven so that the all four spur gears meshed with the pinion gear also rotates. Thus for automatic rotation for

the pinion gear a electric motor is connected with the pinion gear. A 12V DC motor of 60 RPM is used in this setup.

Figure 1: The spur gear

Figure 2: Electric motor

5.3 Shaft

A shaft for transferring torque is used to transfer the torque from the spur gear manually to the box spanner to remove the nuts. Four shafts are connected to the four spur gears individually and at the end of the each shaft the each shaft box spanners are attached to it. A hollow shaft is used to transfer the motion from the secondary gears to the removing tool.

Figure 3: Hollow shaft

5.4 Socket

A socket is a cylindrical type female hexagonal fit which is fitted over the common male hexagonal head of the nut. In this case the size of the socket is taken as 19 mm. The head of the socket wrench that is completely the same as the nut / bolt head cover and the sense of the handle is not fixed. The socket is a hexagonal shape or size estimate which itself is either a

square. This estimate, which fits into the appropriate size of the cavity or on handle, can be used to apply force.

Figure 4: socket

5.5 Base plate

In order to keep the forces and means of the gear base plate is used to withstand the gears and the shaft extension. To remove the weight and increases the stability of the device. This is a plate made of cast iron.

Figure 5: Base plate

5.6 Battery

For driving the electric motor batteries are used. As it is a compact in nature it needs to be taking anywhere and worked thus battery is used for running the motor. Two 12V batteries is used for running the motor. The battery is placed with the setup.

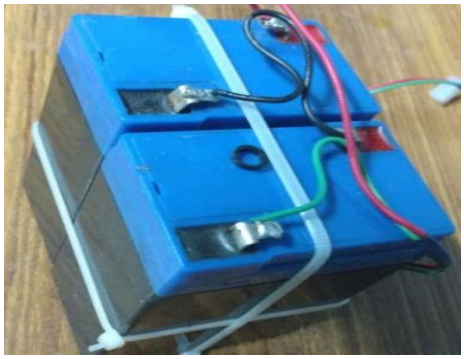

Figure 6: batteries

6. FABRICATION

The four spur gears and a pinion gears are made according to the reference diameters considering the pitch circle diameter of the wheel nuts. The gears are made with 58 mm diameter for pinion and 63 mm diameter for spur gears according to the reference. Then the base plate is made for holding these gears and the gears are fixed on to the base plate. The connecting shafts are then made out and are fixed on to the four spur gears individually. Thus when the spur gears rotate all the four shafts also rotates. At the end of each shaft box spanners are fixed. The pinion gear is then connected to an electric motor and it is run by using the power from two 12V batteries. Thus when the power is turned on the motor rotates the pinion gear which rotates the four meshed gears and thus the shafts connected to the meshed gears also rotates and the nuts which is fixed at the end of box spanners also rotates.

6.1 Working

The working of the vehicles multi wheel nuts remover and tightener is simple and can be performed by anyone. It does not require any skills or anything, just basic knowledge about the setup is required for operation. This works under the principle of removing all the wheel nuts at the same time by automatic process with the help of a electric motor. It consist of an electric motor, four spur gears, an pinion gear, four shafts which has been connected to the four spur gears, and box sockets at each end of the four shafts, the electric motor is run by two batteries.

- First the machine setup is placed with correct fitting of the box socket to the nuts of the vehicle.
- Then the motor regulator is turned on. The motor drives the pinion gear which drives the meshed spur gears.
- Each spur gear is connected with the shafts with the box socket at the end of the each shaft.
- As the shaft rotates the socket also turns and the nuts in the wheels are thus removed or tightened by the rotation of the socket.
- The tightening and removing process can be changed by changing the rotation of the motor.

Thus all the wheel nuts can be tightened and removed by this process. it is found to be a simple process and very much convenient for every one for the tyre removal and tightening process . Thus with this simple process we succeeded in making a convenient process in the tyre replacement technique. By this setup the tyre could be easily removed and tightened more efficiently with less wastage of time and energy used.

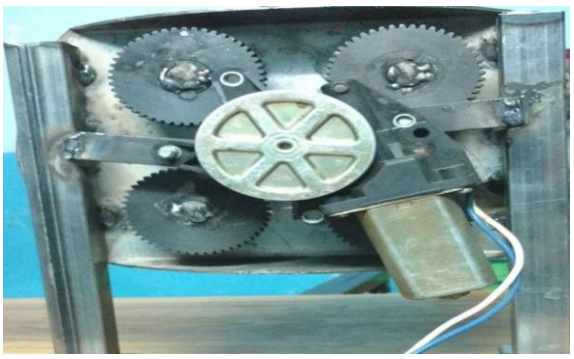

Figure 7: Assembled set up

7. FUTURE SCOPE

It act as a convenient and simple method for trye replacement process thus It is more suitable in using this setup for tyre removal in every vehicles for reducing the time consumed and for reducing the man power wasted for the tyre replacement and to overcome the emergency situations. Thus the vehicle multi wheel nuts remover and tightener can be used in all automobile shops and can be carried in each vehicle for instant tyre replacement which saves lot of time and energy for every persons.

8. CONCLUSION

Thus the design and fabrication of vehicle all wheels nut remover and tightener is successfully done. This project is practically implemented in a four wheeler and it found that the results are positive. The project is economical, and it sustains all the required feasibilities .vehicles all wheels nut remover and tightener is a perfect tool for assembling and dismantling a wheel in a four wheeler.

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