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# RESEARCH PAPER ON DESIGN AND FABRICATION OF REVERSE GEAR MECHANISM

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**ABSTRACT-** *This Research paper aims at designing and fabrication a reverse gear mechanism, which will be modification of the existing mechanism. It deals with the design of such a gear box and the assembly process of the gear box. The design deals with the conditions of the gear box operation, and the design of gear box based on easy assembly and easy manufacturing at low cost. Gear shifting mechanism was designed & applied to make the shifting process faster and easier. The new device must be reliable with small dimensions and maintenance cost. This mechanism requires the motor vehicle, lever, reverse gear box, pedestal bearing and other necessary parts. When need to reverse the vehicles they can engage the hand lever for reverse gear, the wheel moves backwards.*

***Key words :--*** *Gear, Shaft, Wheel, Dc motor, leaver.*

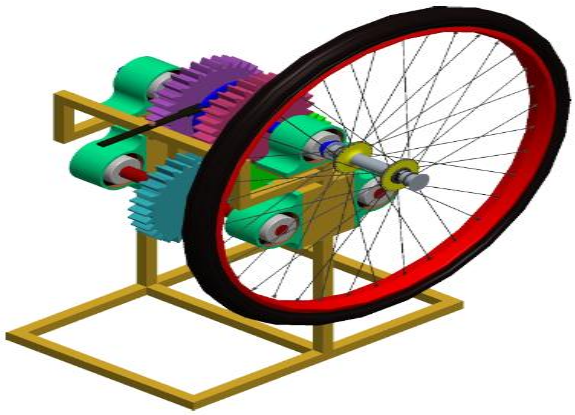
## INTRODUCTION

Transmission may be Directional i.e. Forward and Reverse control may be provided. Reverse gear mechanism is used to transmit the power in reverse direction. It consists of three shafts with a keyway cutting and four spur gears. Driver shaft consists of compound gear arrangement. Gear 1 and Gear 2 are main gears, Gear 3 is idler gear which is to transmit power from gear 2 to gear 4 for forward motion and gear 4 is a driven gear that is mounted with driven shaft. Lever is used in gear setup to change the gear in forward and reverse motion while supporting plate is used for mounting three shafts.

Shifting of gears arrangement is provided to change the gear in forward and reverse motion. When the gear is shifted from right to left, it makes the wheel move forward. When the gear is shifted from left to right it moves the wheel in a reverse direction. It is normally based on messing of gears. In most cases, the design is based on an evaluation of the ratio required for the gear set, the overall envelope geome-try, and the calculation of bending and contact stresses for the gear set to determine its load capacity. There are, however, a great many other parameters which must be addressed if the resultant gear system is to be truly optimum. In the manufacture of mechanical parts, knowledge of material properties, cost, design concepts and their interac-tions is required. The large number of available materials, to-gether with the complex relationships between the various selection parameters, often makes the selection process a diffi-cult task. When selecting materials, a large number of factors must be taken into account. These factors are mechanical properties, physical and electrical properties, corrosion resistance , environmental friendliness and economy. In mechanical design, however, mechanical properties are the most important.

The most important mechanical material properties usually encountered in material selection process are fatigue strength, tensile strength, yield point, hardness, stiffness, toughness, creep resistance and density.

## WORKING PROCEDURE

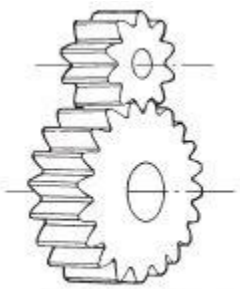


It mainly consist of power sources, motor, gear assembly and gear shift liver. In the gearingsystem, it hoses gears spur and bevel. In this systemmotor is connected with main shaft where one of thespur and bevel is fixed. During forward motion spurgear on main shaft meshed with the correspondingspur gear on another shaft. Hence the power transmitted to drivingwheels through second shaft, so the wheels moveforward. In the case of revers motion, using shiftlever bevel gears are get engaged with thecorresponding bevel gear on the second shaft andhere also the power is transmitted to driving wheels.

- **Component detail :-** For the reverse gear mechanism we use different components . Following essential components are described below.

- **Spur gear :-**A gear is a rotating machine part havingcut teethes, which mesh with another toothed part to transmit torque planet gear.



**Materials used for gears**
Mild steel is a poor material for gears as it has poor resistance to surface loading. The carbon content for unhardened gears is generally 0.4 % (min) with 0.55 % (min) carbon for the pinions. Dissimilar materials should be used for the meshing gears - this particularly applies to alloy steels. Alloy steels have superior fatigue properties compared to carbon steels for comparable strengths. For extremely high gear loading case hardened steels are used the surface hardening method employed should be such to provide sufficient case depth for the final grinding process used.

**Ferrous metals**
Cast Iron :-Low Cost easy to machine with high damping Large moderate power, commercial gears
Cast Steels:-Low cost, reasonable strength Power gears with medium rating to commercial quality
Plain-Carbon Steels:-Good machining, can be heat treated Power gears with medium rating to commercial/medium quality

Alloy Steels:-Heat Treatable to provide highest strength and durability Highest power requirement. For precision and high precision

Stainless Steels:-Good corrosion resistance. Non-magnetic Corrosion resistance with low power ratings. Up to precision quality

Stainless Steels:-Hardenable, Reasonable corrosion resistance, magnetic Low to medium power ratings Up to high precision levels of quality

**Non-Ferrous metals**
Aluminum alloys:-Light weight, non-corrosive and good machineability Light duty instrument gears up to high precision quality

Brass alloys:-Low cost, non-corrosive, excellent machinability low cost commercial quality gears. Quality up to medium precision

Bronze alloys:-Excellent machinability, low friction and good compatibility with steel For use with steel power gears. Quality up to high precision

Magnesium alloys:-Light weight with poor corrosion resistance Light weight low load gears. Quality up to medium precision
Nickel alloys:-Low coefficient of thermal expansion. Poor machinability Special gears for thermal applications to commercial quality

Titanium alloys:-High strength, for low weight, good corrosion resistance Special light weight high strength gears to medium precision

- **Ball bearing:-**A ball bearing is a type of balling element bearing that uses balls to maintain the separation between the bearing races.

- **Stepped shaft :-**Stepped shaft carrying the power transmission from engine motor to the wheels through spur gears.

- **DC MOTOR**

DC Motor

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal

motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

- **Lever**

-The lever is used for engaging or disengaging of the gear mechanism. It is manually operated by the hand of driver.

## Conclusion

By doing this we recognize that this mechanism will be very much helpful. Wehave completed the design and fabrication of reverse gear mechanism. Designed gear box is portable and easy to fix. Mechanism is simple and constructed according to design .in our projectLever is used in gear setup to change the gear in forward and reverse motion while supporting plate is used for mounting three shafts. Shifting of gears arrangement is provided to change the gear in forward and reverse motion

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