Design and Fabrication of Overload Indicator for Automobile

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Abstract -In day-to-days life automobile play major aspects. Trucks, Lorries are the most used vehicles that are used to transport goods from one place to another. Now a day's trucks, lorries etc.. Carries heavy goods which in turns causes road damage causes road accidents, road degradation and reduces the mileage, which increases in fuel usage. Therefore, the overload indicator indicates when a vehicle is fully loaded with materials beyond its maximum limit. The weight alarm in the vehicle alerts the driver when it is overloaded and it helps the driver to optimize the overload in the vehicle. The detecting device is mounted on the load carriers such as truck and Lorries indicate when the carrier overloaded above the maximum licensed limit. This project is used to detect and indicate the overload in automobile.

Key Words: **Overload indicator, Good mileage, Road and driver safety**

1. INTRODUCTION

Overloading is a major problem in transportation. There is a relatively major number of problems is related to over weighing of heavy goods vehicles. In today's life on a average one in three trucks checked is overloaded. These Trucks exceed the maximum authorized weight by 10% to 15%. Overloaded vehicles lead to all kinds of negative problems like road damage, driver safety and road safety. The weight and overload indicator is designed for easy weighing for avoiding the over loading in trucks and other loaded vehicles. In order to reduce and to control the weight and to improve the mileage over load indicator is used. When the vehicle is overloaded above the licensed limit the spring compresses to its maximum limit so, the two screws which are electrical conducting material comes into contact with each other and the circuit closes so it is indicated by a buzzer. This will help the drivers to reduce the overload and also to provide good mileage.

2. METHODOLOGY

2.1 Material purchase

- ✓ Spring : Stainless steel
- ✓ Bolt : cast iron
- ✓ Nut : cast iron
- ✓ Board : ply wood
- ✓ Electronic buzzer
- ✓ Screw

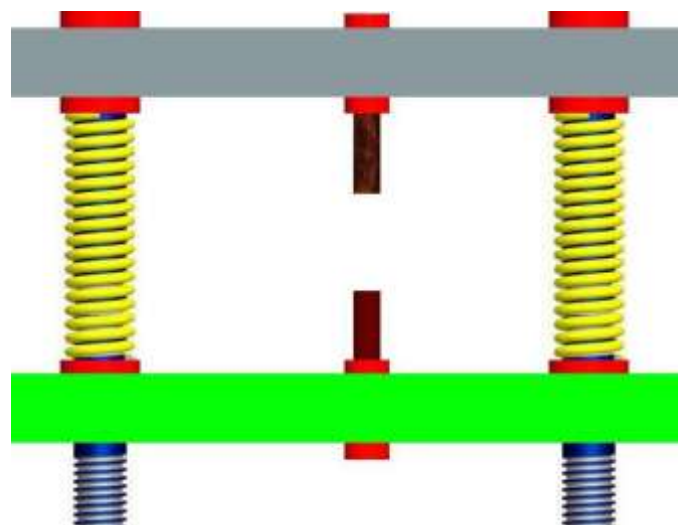**Fig-1:** Material Used

2.2 Design Of Prototype

Fig-2: Design of prototype

2.3 Specification And Dimensions

✧ Plywood - 30*30 cm(2 No's)
✧ Bold - Diameter 12mm(4 No's)
✧ Screw - Diameter 5mm(2 No's)

2.4 Spring Specifications

✧ Inner diameter(d) = 25mm
✧ Outer diameter(D) = 30mm
✧ Number of coils(n) = 5mm
✧ Coil diameter　　= 2.5mm

2.5 Calculation and calibration

As per the compression test we got the below data
　　Inner diameter = 25mm
　　Outer diameter = 30mm
　　Coil diameter = 2.5mm
　　Length of the spring = 50mm

Table - 1: Compression test

Si. no	Load In (kg)	Load In (N)	Scale Reading	Deflection In (mm)	Rigidity Modulus $*10^5$ (N\mm²)	Young's modulus $*10^5$ (N/mm²)	Stiffness (N/mm)
1	0	0	10	0	0	0	0
2	2	19.62	11	10	185.1	49.23	0.2
3	4	39.24	12	10	92.5	24.65	0.4
4	6	58.86	12.5	5	61.72	16.41	1.2
5	8	78.48	13	5	23.14	6.15	1.4

2.6 Formula used for calculation

1. Rigidity modulus(N)= $8/d(w/\delta)(d/D)^{3n}$ in (N/mm²)
2. Young's modulus(E)= $2N(1+\mu)$ in (N/mm²)
3. Stiffness(K)= w/δ in (N/mm)

Where,

　　w= Load in N

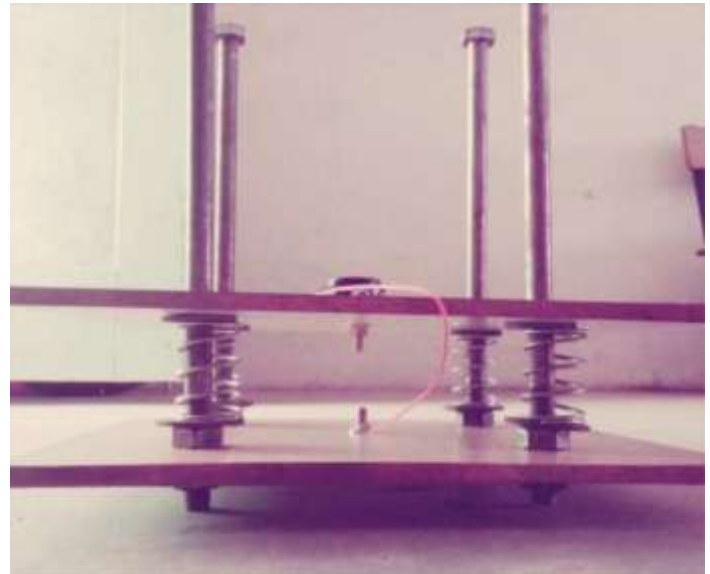　　δ= Deflection in mm

　　N= Rigidity modulus in N/mm²

　　E= Young's modulus in N/mm²
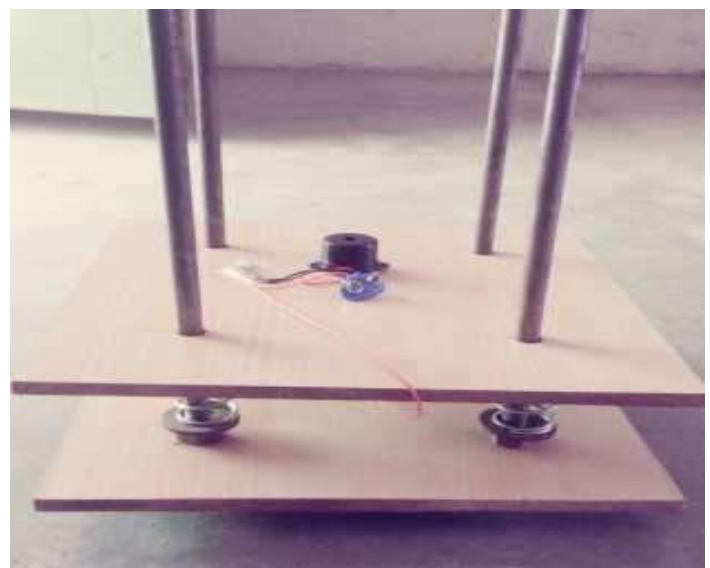
　　μ= Poisons ratio (Assume μ=0.33)

　　K= Stiffness in N/mm

　　d= Coil diameter in mm

2.7 Assembly Diagram

Fig-3: Spring with Wooden Board

Fig-4: Buzzer Assembly

2.8 Working Principle

✓ The overload indicator is used for indicating overload in automobile
✓ This is mainly based on principle of spring
✓ Two wooden board or plywood are used
✓ Four springs are used between two wooden boards
✓ The four springs placed must have same inner diameter, outer diameter and height respectively
✓ Hole is drilled in the centre of the two wooden boards, so as to insert a screw which is acts as a conducting material
✓ In this electronic buzzer is used as a overload indicator which alerts when it is overloaded

- Battery is used as a power source
- The positive terminal of the battery is connected to the positive end of the buzzer through screw which is fitted to the upper end of the board
- The negative terminal is connected to the negative end of buzzer through the screw which is fitted to bottom board
- When it is loaded the spring is compressed and when the spring reaches the maximum permissible limit and the two screw which is fitted to the upper end and lower end comes into contact with each other
- After this the circuit is closed and it is indicated by the buzzer and this is used to optimize the weight in the vehicle

3. Advantages

- Easy to use
- Robust construction with long life
- Suitable for all types chassis and suspension
- Low investment
- Weighs the payload directly on the vehicle
- It increases the efficiency and mileage in vehicle
- Avoids load damage and accident
- Improves driver safety

4. Conclusion

The current situation for controlling overloading passenger in public buses and load in trucks need to be improved. As the manual check and weigh bridge is difficult during the bad weather such as rain, difficult at night, can increase the possibilities of bribe its costs to operate and it need immense labor power. Apart from that it is not accurate as the checks are done at random not all the buses, trucks and Lorries are checked. There is a need to device a new system which can overcome all these difficulties. The new technology that we are done is overload indicator. If we opt for the new system we will benefit from the following. Solve the Problems of dealing with excessive passengers, load in trucks, Lorries and buses. It will reduce cost and labor power. It will reduce deaths and severe injuries in accidents involving buses and trucks with excessive passengers and load.

5. Future work

The setup that is done in this project is just a prototype and also it shows how it is works in practice. This can be implemented in day to day's life for every vehicle, so has to increase the road safety, driver safety and to provide efficiency and mileage.

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