IJIREEICE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

NCIET - 2020

National Conference on Innovations in Engineering & Technology

Govt., Polytechnic College, Palakkad, Kerala

Vol. 8, Special Issue 1, February 2020

Trailer Tow-Bar with Tilting and Anti-Rolling Provision

A.V. Sivasubramaniyan

Student, Dept. of Automobile Engineering, Coimbatore, India

Abstract: In my project, the trailer tilting is controlled by the driver with respective to the front wheel turning, which in term trailer steering system is added and in additional Anti-Rolling provision is used to control the slippage and rolling of the trailer in this way the goods and driver are away from the danger of offset and loss of lives. It has a major scope of reducing the driver's strain with the help of trailer steering system that the trailer is under the control of vehicle steering system, which resists it from improper turning and increased bonding between the vehicle and the trailer, the trailer stability is increased. Nowadays, demand of skilled driver's is high by adding this feature it will reduce that demands and make an opportunity for unskilled drivers to drive easily without any restrictions or experience of driving towing vehicles. Mahindra & Mahindra is an India's largest manufacturer of tractors, who introduces the driver less tractors for ploughing with the help of AI (Artificial Intelligence). But they couldn't achieve it for towing in roads because of the difficulty in reverse, stability and braking. These difficulties can be rectified with the help of my project.

Keywords:

I. INTRODUCTION

The title of the project clearly defines the idea of the project, that is to give steering movement to the trailers and controlling the slippering of the trailers, this system is operated by Hydraulic operation. This can resist the accidents happen due to trailer slippering and reduces the driver's strain in taking long cuts in hills and reverse in narrow spaces.
It can be achieved by using Hydraulic cylinders and a power steering distributor pump, the provision is fixed to the back bumper and to the towing attachment of the vehicle. The power steering is connected with the steering rod, the oil is pumped with the oil feeding pump from the reservoir. This requires mechanical energy or electrical energy to operate the oil feeding pump. This system consumes the time and fuel spent during reversing the vehicle and also saves the strain of the driver, which the driver can work for a more time without any strain of back pain or neck pain, and also it needs a less maintenance only as like the steering system of the vehicle.
A minimal pressure is maintained in the cylinder to avoid the turning of trailer, when it is traveling in a muddy road without the turning of the steering wheel. It will avoid accidents happened due to sudden braking, when brake is applied suddenly the trailer wheels rotational force urges the trailer to slip in different directions or pushes the vehicle, this leads to accidents and damage trailer parts. This provision is easy to use and install in new vehicles and in old vehicles as an upgrading feature.
This technology can also be modified and used in towing Lorries. It can increase the driving standard of the towing vehicles and towing trucks and increases the stability of the trailer and also forms a bonded structure between the vehicle and the trailer. This can be used in Tractors, Mini truck, Construction Vehicles, Trucks, 2 in 1 carriage and passenger trucks.

II. PROBLEM IDENTIFICATION

Accident's caused due to towing vehicles, which don't have this mechanism are caused due to the less stability of the trailer that it is connected with a single point connection. The slippage is caused due to continuous rotating motion of the trailer even after the brake is applied in the towing vehicle. The trailers used today are not manufactured with all the required safety requirements that avoid them from accidents and provide safety to the goods and cargos carried in it. Trailers used for commercial purpose in tractors, mini-trucks and micro-trucks are designed without any safety measures like brakes, hand-brakes, stop lights, any parking brakes and turning indicator lights.
This indicates that most of the trailer's manufactured by local manufactures are manufactured without any of the government road safety rule standards, this unawareness leads to many road accidents and losses of many lives. This unawareness and irrespective behaviour can be controlled by using this project in the towing vehicles, which gives a minimum safety of Anti-rolling and effective sudden braking to the trailers attached to the towing vehicle.

IJIREEICE
ISSN (Online) 2278-1021
ISSN (Print) 2319-5940
International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering
NCIET - 2020
National Conference on Innovations in Engineering & Technology
Govt., Polytechnic College, Palakkad, Kerala
Vol. 8, Special Issue 1, February 2020

The problem is first identified by the "American and European Transport and Road Safety Corporation", they insisted many rules and forced the trailer and towing vehicle manufacturers to avoid the accidents caused due to less safety and old manufacturing concepts. This problem is later identified by the "Indian Transport and Road Safety Corporation" and "National Highways Authority of India", they too announced a new rule to avoid this type of accidents. After making rules and guidelines the accidents caused by trailers improper safety continues, due to lack of growth in new technologies to resist the accidents caused, this project will be a best solution for these problems.

III. PROBLEM DEFINITION

The motto of this concept is to control the trailer rolling, skirting and increasing stability, all these factors are caused due to single point attachment between vehicle and trailer, lack of emergency braking and safety systems in trailer. To avoid these problems the solution we found is increase the contact points, providing steering control and designing anti-rolling provisions. The Anti-Rolling provision is designed under the reference of PSG Design Data book to avoid rolling, Steering movement is provided by articulated steering method and finally, the contact points are increased as 1-3 to increase stability of the trailer.

IV. SOLUTION FINDING

The accidents caused due to rolling of trailer, trailer skirting, improper braking system in trailer and trailer rushing vehicles while braking will be avoided by implementing this project into the towing vehicles. This problem can be solved by attaching an Anti-rolling provision and hydraulic plunger pump to the connecting hook of the vehicle and tow-bar of the trailer respectively. The Anti-rolling provision provides resistances to rolling of the trailer during sudden braking and turning and the hydraulic plunger will support the vehicle by turning the trailer with respective to the turning of the vehicle, hydraulic plunger also helps while reversing the vehicle by acquiring the trailer turning control.
In this way, the solution provided will be more effective and avoid accidents. This not only a solution for the accidents and it also reduce the strain of the driver by helping in reducing the turning radius of the trailer when attached with vehicle, reducing driver effort in reversing and also increases the fuel efficiency by reducing the time spent for reversing the vehicle with the trailer, that it will increases the fuel economy of the vehicle. This idea and concept are specially designed to make solution this problem and I hope that this will be a better solution for this problem.

V. WORKING OF ATTACHMENTS

This system needs Hydraulic cylinders, Anti-rolling provision, and Power steering distributor, oil pressurizing pump, and oil reservoir and pressure relief valve to control the oil flow. The steering controls the power steering distributor, the oil is pressurized and fed to it, and the pressurized oil flow from the pump is controlled by the power steering pump with an operating pressure of 7 bar with according to the turning of steering wheel.

The oil is then supplied to the hydraulic cylinders with the help of nylon hoses, the excess of oil is supplied back to the oil reservoir through the pressure relief attachment in the steering pump. The one side of the cylinder is connected to the provision and the other is connected to the trailer. The plunger pump compresses and retracts simultaneously with according to the power steering plungers to control the turning movement of the trailer.

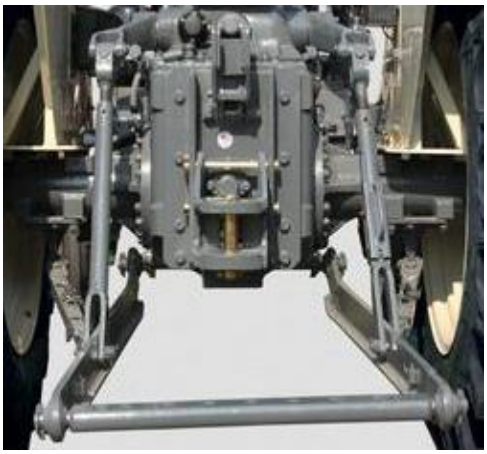

Fig 1 Existing Trailer Connecting Bed in Tractors

IJIREEICE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

NCIET - 2020

National Conference on Innovations in Engineering & Technology

Govt., Polytechnic College, Palakkad, Kerala

Vol. 8, Special Issue 1, February 2020

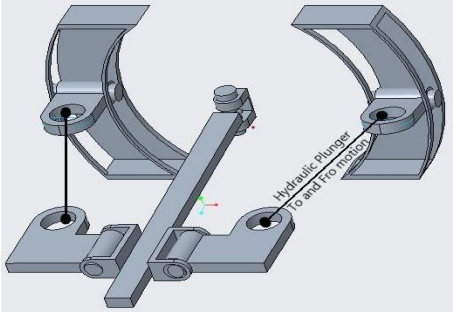

Fig 2 Design of Anti-rolling Provision (ARP)

VI. DESIGN AND FABRICATION

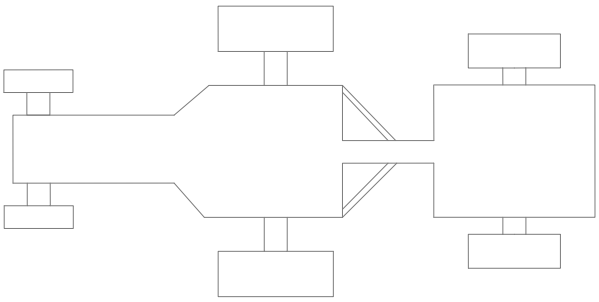

Fig 3 Line diagram of tractor and trailer with ARP

Fig 4 Fabrication of Anti-rolling Provision (ARP)

VII. RESULT

After attaching these attachments to the Existing Tractor. We have achieved 95% of the project motto, the stability of trailer increased, the trailer tilting came into control of vehicle steering system, effective braking of trailers.

VIII. CONCLUSION

I hope my project and idea will be a better rectification for these difficulties in towing vehicles. This is a Universal and advanced concept, which can be used in all AI improved towing vehicles in future to make a driver less future. This project has many benefits and future scopes,

- Primary factor for Driver less concept.
- Increased trailer stability.
- Reduced fuel consumption.
- Reduced strain of driver and vehicle.
- Advancement in Driving Standards.
- User-friendly, no special training needed to operate.
- Suitable for both new and old vehicles.
- Less maintenance.

IJIREEICE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Innovative Research in
Electrical, Electronics, Instrumentation and Control Engineering

NCIET - 2020

National Conference on Innovations in Engineering & Technology

Govt., Polytechnic College, Palakkad, Kerala

Vol. 8, Special Issue 1, February 2020

- Easy availability of raw material in market, cost-efficient.
- Trailer safety systems are installed.

REFERENCES

[1]. Trailer trucks safety laws enforced by U.S Road Safety Rules and Regulation -https://www.hg.org/trucking-accidents.html-

BIOGRAPHY

Name: A. V. Sivasubramaniyan
Area of Interest: Simplification in Agriculture and Agriculture components.
Awards: Best Mechanic
Contact: sivavenkatesan2002@gmail.com