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90 Degree Steering System

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Abstract: *The increase of the maneuverability when parking the vehicle is achieved by means of 4-wheel steering, meanwhile the increase of the driving stability at higher speeds is achieved through concordant steering front wheels. A disadvantage of this so-called passive steering system is that it operates even when driving in a straight direction when a single wheel of an axle hits surface irregularity. In this project we made a frame from a square bar. Arrange steering system at front and rear side. When the steering wheel is rotated, the bevel gear will be rotated. Bevel gear is used to transmit vertical motion into horizontal rotating motion. Bevel gear drive shaft provides the same rpm to pinion. Pinion will rotate the rack at the both end of the rack two pinion is meshed due to linear motion of the rack direct angular motion given to the end racks each of the end rack have the steering linkages are provided.*

Keywords: Bevel Gear, Pinion, Drive Shaft, etc.

I. INTRODUCTION

The increase of the maneuverability when parking the vehicle is achieved by means of 4- wheel steering, meanwhile the increase of the driving stability at higher speeds is achieved through concordant steering front wheels. A disadvantage of this so-called passive steering system is that it operates even when driving in straight direct.

II. LITERATURE SURVEY

1. "The Influence of a Four-Wheel Drive of a Working Machine on Some of Its Traction Properties" Author: Gustaw Tyroa, Lech Knapb, Zbigniew Zebrowskib and Jerzy Zebrowski Publication Year - 1995 This paper presents the results of theoretical analysis of all-wheel drive kinematic discrepancy influence on drawbar pull for wheeled working machines. The research project was undertaken to verify and confirm theoretical solutions. Presented analysis shows possibilities for improvement of wheeled machines in dynamic and energetic as well as exploitation way (e.g., lowering of tires wearing). Author concludes that, 1. For k# 1 engaging of front axle should takes place after achieving by vehicle appropriately high drawbar force Pu for which front wheels (k 1) are not braking a vehicle. 2. While driving with k # 1 circulating power appears in drive line. Circulating power to input power ratio is highest for Pu=O. 3. Considering the drawbar pull force acting on a vehicle, the transmission ratio between driving axles should be matched to let the kinematic discrepancy coefficient reach the value close to 1 while machine reaches the rated drawbar force. This assures operation of wheels with equal slippage and tractive adhesion factor μ which assures full load utilisation for all vehicle wheels.

2. "Zero Turn Vehicle" Author: Bansode S. P., Gaikwad A. A., Salgude P. S., Tiwari T. D., Prof. Avhad N.V. and Prof. Bhane A.B. Publication Year: 2019 The aim of this paper is the alternative solution on the Zero Turn Vehicle. If we only changing the wheel system instead of total steering system, that is more convenient for the vehicle. Actually, Zero Turn Vehicle system used in Jeep Hurricane. In that the wheel positioning

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system was directly connected to the steering system, due to that reason steering system was more complicated. So, we try to solve that problem by new concept of Zero Turn Vehicle with pneumatic operated system. Means in that positioning of the wheel will be directly depends on the compressor. And due to that concept, it is easy to changing position of wheel. The vehicle can rotate at their center position in 360 degrees. And if any vehicle rotates in at 360 degrees, then it will easy to solve the parking problems in at public places, malls, multiplexes etc. New technologies or systems are developed in automobile that are related to safety, ergonomics and efficient drive.

III. IMPLEMENTATION

1. **Rack and Pinion** - A rack and pinion is a type of linear actuator that comprises a pair of gears which convert rotational motion into linear motion. A circular gear called "the pinion" engages teeth on a linear gear bar called the rack"; rotational motion applied to the pinion causes the rack to move relative to the pinion, thereby translating the rotational motion of the pinion into linear motion. Rack and pinion gears are used to convert rotation into linear motion. The flat, toothed part is the rack and the gear is the pinion. A piston coaxial to the rack provides hydraulic assistance force, and an open centered rotary valve controls the assist level. A rack and pinion gears system are composed of two gears. The normal round gear is the pinion gear and the straight or flat gear is the rack. The rack has teeth cut into it and they mesh with the teeth of the pinion gear.
2. **Straight tooth** Straight teeth have the tooth axis parallel to the axis of rotation. Straight teeth that run parallel to the axis of the gear. Load movement or transfer is manual or walk-behind.
3. **Roller pinion** Roller pinion drives use bearing supported rollers that mesh with the teeth of that rack in order to provide minimal to no backlash.
4. **Bevel gear** Two important concepts in gearing are pitch surface and pitch angle. The pitch surface of a gear is the imaginary toothless surface that you would have by averaging out the peaks and valleys of the individual teeth. The pitch surface of an ordinary gear is the shape of a cylinder. The pitch angle of a gear is the angle between the face of the pitch surface and the axis. The most familiar kinds of bevel gears have pitch angles of less than 90 degrees and therefore are cone-shaped. This type of bevel gear is called external because the gear teeth point outward. The pitch surfaces of meshed external bevel gears are coaxial with the gear shafts; the apexes of the two surfaces are at the point of intersection of the shaft axes.
5. **Dummy wheels** A wheel is a circular component that is intended to rotate on an axle bearing. The wheel is one of the main components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labor in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel and flywheel.
6. **Shaft** is a common and important machine element. It is a rotating member, in general, has a circular cross-section and is used to transmit power. The shaft may be hollow or solid. The shaft is supported on bearings and it rotates a set of gears or pulleys for the purpose of power transmission. The shaft is generally acted upon by bending moment, torsion and axial force. Design of shaft primarily involves in determining stresses at critical point in the shaft that is arising due to a forementioned loading. Other two similar forms of a shaft are axle and spindle. Axle is a non-rotating member used for supporting rotating wheels etc. and do not transmit any torque. Spindle is simply defined as a short shaft. However, design method remains the same for axle and spindle as that for a shaft.
7. **Steering wheel** A steering wheel (also called a driving wheel or a hand wheel) is a type of steering control in vehicles and vessels (ships and boats). Steering wheels are used in most modern land vehicles, including all mass production automobiles, as well as buses, light and heavy trucks, and tractors. The steering wheel

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is the part of the steering system that is manipulated by the driver; the rest of the steering system responds to such driver inputs. This can be through direct mechanical contact as in recirculating ball or rack and pinion steering gears, without or with the assistance of hydraulic power steering, HPS, or as in some modern production cars with the assistance of computer-controlled motors, known as Electric Power Steering.

IV. CONCLUSION AND DISCUSSION

A vehicle featuring low cost and user-friendly steering mechanism has been introduced.

1. This project focused on a steering mechanism which offers feasible solutions to a number of current maneuvering limitations.
2. A prototype for the proposed approach was developed by introducing separate mechanism for normal steering purpose and 90-degree steering purpose. This prototype was found to be able to be maneuvered very easily in tight spaces, also making 90° steering possible.
3. The purpose of developing this project is to avoid Parking Problem, minimize the space between two parked cars, to minimize the time required for parking, reduces the problem of accidents during parking and to improve the design of existing vehicle.

REFERENCES

[1] Gustaw Tyroa, Lech Knapb, Zbigniew Zebrowskib and Jerzy Zebrowski "The Influence of a Four-Wheel Drive of a Working Machine on Some of Its Traction Properties".
[2] Bansode S. P., Gaikwad A. A., Salgude P. S., Tiwari T. D., Prof. Avhad N.V. and Prof. Bhane A.B. "Zero Turn Vehicle".
[3] Er. Amitesh Kumar and Dr. Dinesh. N. Kamble "Zero Turn Four Wheel Steering System".
[4] Colin Varghese, David Babu, Delwin Kuriyakose, Harikrishnan.
[5] S, Irshad M. and Arun Raj "Different Modes in Four Wheel Steered Multi-Utility Vehicles".
[6] IJSRD - International Journal for Scientific Research & Development, Vol. 3, Issue 01, ISSN (noline): 2321-0613.
[7] International journal of research in aeronautical and mechanical engineering Vol.2, Issue.3, March 2014.
[8] Project done by our seniors Akhiilesh Sagar, Mandeep Bhndari, Manoj Kumar Joshi, Pankaj Bisht and Vikas Prasad during year 2015.
[9] R. S Khurmi, J.K Gupta, Theory of machine, S. Chand publication (page no-174-257).
[10] R. S Khurmi, J.K Gupta, A text book machine design, S. Chand publication (page no 1021- 1124)
[11] Dr. Saket Bhiskar and Vatsal Ghudka, Design and simulation of four-wheel steering system.
[12] Anil Kumar, G., Arun, K.T., Bharath, I.G., Kartik Patil., Pruthvi, V.J., Raj Bharath, M., Santosh, S. (2014). Design and Fabrication of an All-Wheel Steer (AWS) Platform Capable of Zero Turn Radius, Book of abstract, 2014, Pp.319.
[13] Lohith, K., Shankapal, S.R., Monish Gowda, M.H. (2013). Development of four-wheel steering system for a car. SASTECH Journal 1(1): 90-97.
[14] Saket Bhishikar., Vatsal Gudhka., Neel Dalal., Paarth Mehta., Sunil Bhil, A.C., Mehta (2014). Design and Simulation of 4 Wheel Steering System. International Journal of Engineering and Innovative Technology 3(12): 351-367.
[15] Varun Gopinath., Shankapal, S.R., Prakash Unakal, (2009). Design, simulation and demonstration of a parallel parking mechanism for a city car. SASTECH Journal 8(1): 25-30.