FRONT WHEEL STEERING SYSTEM WITH MOVABLE HEADLIGHTS

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ABSTRACT

The project here is all about Front wheel stearing system with moveable headlights with latest electronics technology.The most conventional steering arrangement is to turn the front wheels using a hand–operated steering wheel which is positioned in front of the driver, via thesteering column, which may contain universal joints toallow it to deviate some what from a straight line. Other arrangements are sometimes found on different types of vehicles, for example, a tiller or rear–wheel steering. Tracked vehicles such as tanks usually employ differential steering — that is, the tracks are made to move at different speeds or even in opposite directions to bring about a change of course.

Keyword: -*Rack & pinion,Head light,front wheel steering with ackermans principle..*

1. INTRODUCTION

Car safety is the avoidance of automobile accidents or the minimization of harmful effects of accidents, in particular as pertaining to human life and health. Special safety features have been built into cars for years, some for the safety of car's occupants only, and some of the safety of others. One of the choices available is Design and fabrication of steering controlled head light system. This device relates to a headlight arrangement for vehicles, and, more particularly, to a head light arrangement operably connected to the steering mechanism of the vehicle for illuminating the proposed path of travel including support brackets operable to support head light members thereon connectable to a frame portion of the vehicle, linkage means interconnecting the brackets for conjoint movement thereof, and means interconnecting one of the brackets to the connector rod of the vehicle whereupon the brackets and headlight members are moved in relation to the direction of vehicle travel. Still, more specifically, this device relates to a headlight arrangement operably connected to the steering and front wheel assembly of an automobile operable to maintain headlight members and front wheels pointed in the same direction at all times.

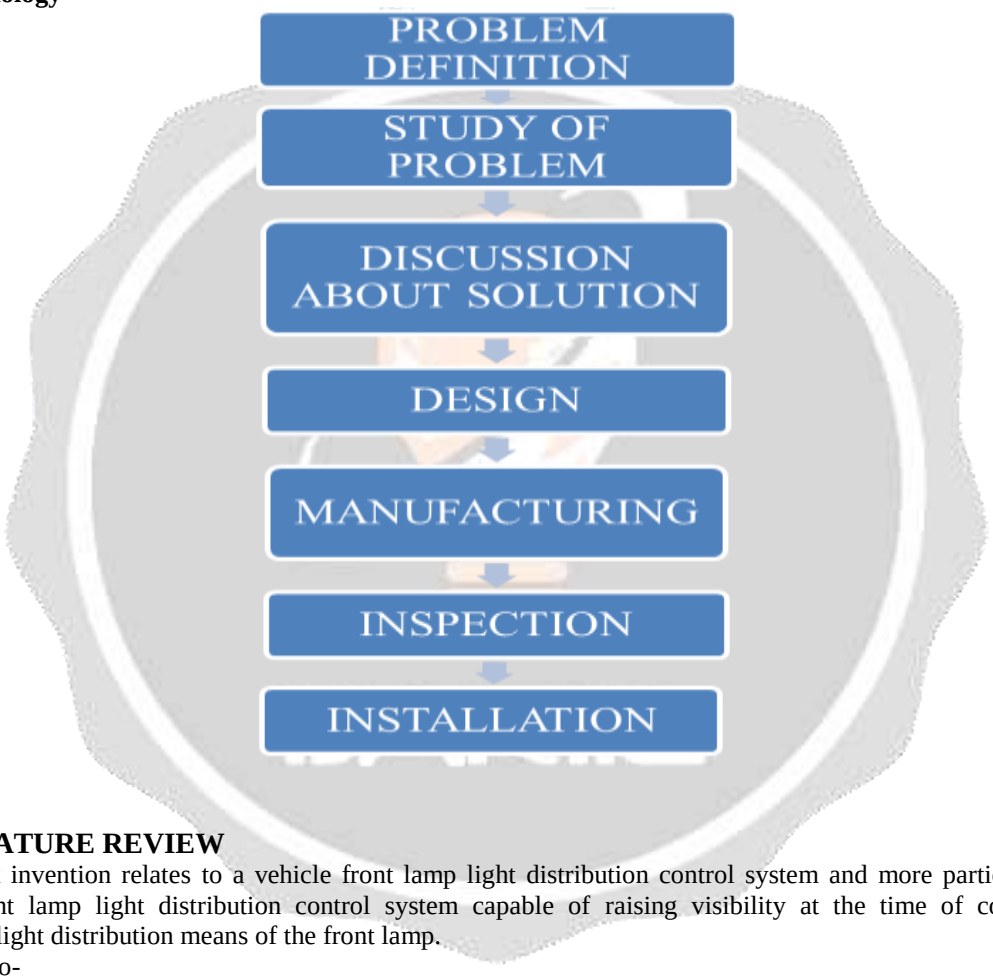
Year	Number of accidents		Number of persons		Accident severity*
	Total	Fatal	Killed	Injured	
2002	40,7497	73,650 (18.1)	84,674	4,08,711	20.8
2003	406726	73,589 (18.1)	85,998	4,35,122	21.1
2004	429910	79,357 (18.5)	92,618	4,64,521	21.5
2005	439255	83,491 (19.0)	94,968	4,65,282	21.6
2006	460920	93,917 (20.4)	1,05,749	4,96,481	22.9
2007	479216	1,01,161 (21.1)	1,14,444	5,13,340	23.9
2008	484704	1,06,591 (22.0)	1,19,860	5,23,193	24.7
2009	486384	1,10,993 (22.8)	1,25,660	5,15,458	25.8
2010	499628	1,19,558 (23.9)	1,34,513	5,27,512	26.9
2011(P)	497686	1,21,618 (24.4)	1,42,485	5,11,394	28.6

1.2 Objectives

The main objective of this system is to apply automotive vehicle.

- To move the headlight along with steering on sharp turning.
- To keep the headlight beam parallel to road turning as possible as can.
- To change the place of area illuminated by headlight and direct illumination area of headlight in useful direction.
- To improve the visibility area of driver at night so that driver can judge road turning well.
- To prevent road accidents on sharp turning at night specially in hilly areas.
- To increase safety at night.

1.3 Methodology



2. LITERATURE REVIEW

The present invention relates to a vehicle front lamp light distribution control system and more particularly to a vehicle front lamp light distribution control system capable of raising visibility at the time of cornering by controlling light distribution means of the front lamp.

According to-

1. Japanese Patent Publication No. H5-23216,
2. Japanese Patent Application Laid-Open No. H8-183385,
3. Japanese Patent Application Laid-Open No. H11-78675, and
4. Japanese Patent Application Laid-Open No. H8-192674

Laxmi et al. [1] Design & Fabrication of steering controlled headlights in automobile states, A vehicle head lamp including a fog lamp is provided with a movable reflector and by turning the movable reflector in the steering direction by an amount corresponding to a steering angle of the steering wheel, the light distribution pattern of the front lamp is changed in the direction of vehicle's turn so as to raise visibility at the time of cornering However, according to the aforementioned earlier art, the light distribution pattern of the front lamp is changed in the steering direction of the steering wheel by an amount corresponding to the steering angle when the vehicle turns on an intersection or the like, cornering destination cannot be beamed brightly enough before operating the steering wheel.

Therefore, an t capable of beaming the cornering destination prior to operation of the steering wheel has been demanded.

Czech Tetra and 1920s Ca dills were early implementer of such a technique, producing in the 1930s a vehicle with a central directional headlamp. The American 1948 Tucker Sera was likewise equipped with a third central headlamp connected mechanically to the steering system. The 1967 French Citroën DS and 1970 Citroën SM were equipped with an elaborate dynamic headlamp positioning system that adjusted positioning in response inputs from vehicle steering and suspension systems, though US regulations required this system to be deleted from those models when sold in the USA. Presently, studied changes are unfolding in automotive lighting technology. Automobile manufacturers - together with suppliers and representatives - currently aspire to develop the headlights of tomorrow. Freeform headlamp is one of the popular design which offers great flexibility and compactness. They suggested that the apparatus for automatically adjusting a direction of a light axis of a vehicle headlight includes a steering angle sensor detecting a steering angle of a steering wheel of a vehicle and a swivel control unit performing swivel control by which the direction of the light axis of the vehicle headlight is adjusted to the target direction in accordance with the steering angle detected by the steering angle sensor. Proposed automatic optical-axis adjusting device for automatically adjusting direction of optical axes of front lights with respect to steering angle of steering wheel An electronic control for automobile headlight utilizing a spherical sensor comprised of a metal ball surrounding by a fluid encapsulated in a spherical sensor which is connected to the spherical sensor system. The automatic optical axis adjusting device for automatically adjusting direction of optical axis of from lights headlight control apparatus and method controls an irradiation direction of a headlight. This apparatus uses a navigation based swivel angle calculated based upon the shape of a road in a navigation based control period and a steering based swivel angle calculated based upon a steering angle in a steering based control period [2]

The optical design, fabrication and the measurement of the freeform reflector headlamps are investigated by Shinde G. et al. [3] proposed the new standard for cornering light system allows not only the conventionally approved ON-OFF control mode interlocked with the operation of the turn signal switch but also an automatic ON-OFF control according to the steering wheel angle. The active cornering light system (ACL system) on the new DELICA D: 5 have a dedicated ECU to control the operation of the lamps. On-dong line investigated by car light piloting system objective of the present invention is to provide a steering wheel controlled car light pointing system which automatically turns the lights of the motor car to coincide the projection of the lights with the steering direction of the motor car

3.WORKING

Steering system is to achieve angular motion of the front wheels to negotiate a turn. This is done through linkage and steering gear which convert the rotary motion of the steering wheel into angular motion of the front road wheels. The parts of steering system are consisting of Steering linkage and Steering gear. Steering Linkage-it depend upon the type of vehicle, wither it is a car which has independent front suspension. Steering linkage for vehicle is defining two types like as Steering Linkage for Vehicle with Rigid Axle Front Suspension and Steering Linkage for Vehicle with Independent Front System.

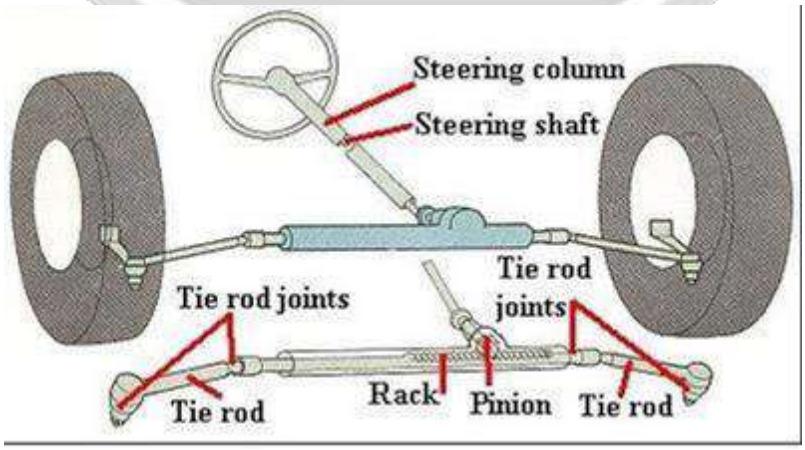
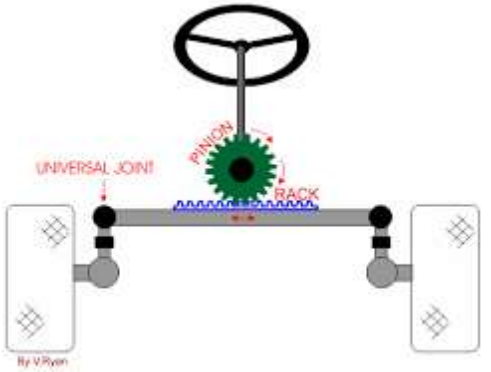


Fig.-Steering Mechanism System

3.1 Rack and Pinion Steering Gear:

The rotary motion of the steering wheel is transmitted to the pinion of the steering gear through universal joints. The pinion is in mesh with a rack. The circular motion of the pinion is transferred into the linear rack movement which is further relayed through the ball joints and tie rods to the stub axles for the wheel to be steered. In the figure shows the schematic and actual modal of steering gear mechanism.



3.2Ackermann Steering Principle

To achieve true rolling for a four wheeled vehicle moving on a curved track, the lines drawn through each of the four wheel axes must intersect at the instantaneous centre. The actual position the instantaneous centre constantly changes due to the alternation of the front wheel angular positions to correct the steered vehicle's path. Since both rear wheels are fixed on the same axis but the front wheel axles are independent of each other, the instantaneous centers lies somewhere along an imaginary extended. The Ackermann principle is based on the two front steered wheels being pivoted at the ends of an axle-beam. The original Ackermann linkage has parallel set track-rodarms, so that both steered wheels swivel at equal angles. Consequently, the intersecting projection lines do not meet at one point. If both front wheels are free to follow their own natural paths, they would converge and eventually cross each other.Since the vehicle moves along a single mean path, both wheel tracks conflict continuously with each other causing tier slip and tread scrub. Subsequent modified linkage uses inclined track-rod arms so that the inner wheel swivels about its king-pin slightly more than the outer wheel. Hence the lines drawn through the stub-axles converge at a single point somewhere along the rear-axle projection.

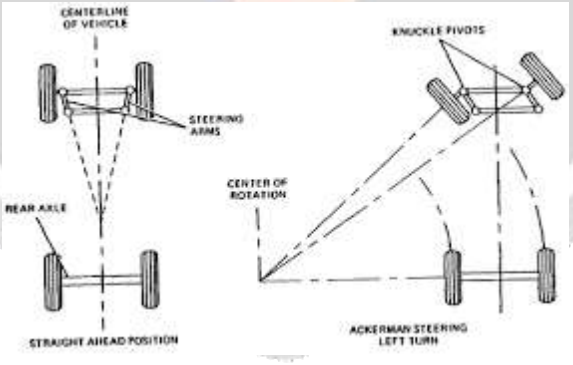


Fig 7 - Ackermann Steering Principle

4. CALCULATIONS:

4.1 DESIGN OF FRAME

Let,

Rs = Radius of steering wheel,

Rp = Radius of pinion pitch circle,

T = No. of teeth on pinion,

P = Circular pitch of the pinion

For one revolution of the steering wheel, the input movement at the steering wheel,

Xo = 2 * (22/7) * Rs

Therefore,

And the output movement at the rack, Xi = 2×π× Rp =T×P

Movement ratio = MR = Xi/Xo

= (2×π ×Rp) / (2×π×Rs)

= Rs/Rp

Also, MR= 2 ×π× Rs / T× P

If there is no friction in the gears,

MR= output load at the rack / input effort at the steering wheel

= W/E

4.2.DETERMINATION OF PITCH CIRCLE DIAMETER OF THE PINION:

Let,

Radius of pinion pitch circle = Rp

Rs = Radius of the steering wheel = 150 mm

Movement ratio = MR = Rs / Rp

= 150 / Rp

Also,

Output Resistance of the rack, W = 1000 N

And Input Effort of steering wheel, E= 50N

Therefore, MR = 150 / Rp = 1000 / 50

Hence, Rp = 7.5 mm

i.e. Pitch circle diameter of pinion = Rp = 15 mm

As induced stress is less than allowable stress the design of hollow cylinder is safe.

5.SUMMARY

We observed that when the steering wheel is rotated through a certain angle towards right side of the driver, the head lights are tilted through certain angle between 0-20 degrees to the right with the help of different linkages arranged with respect to the steering wheel which were discussed earlier. The same features are observed when the steering wheel is turned to the left side. The results that we have achieve with mechanically actuated steering controlled head lights is pictorially represented as shown in figures. The representation of the mechanism when installed in a vehicle can be observed in motion as follows:

Fig : Representation of a Vehicle in Motion with Mechanism Installed

In the view of forgoing disadvantages inherent in the known types of road tracking headlamps now present in the prior art, the present invention provides a new movable vehicle head light construction wherein the same can be utilized for automatically aiming the head lamps in the same direction of the travel regardless of the terrain of the road. The further object of the system is, this is susceptible of a low cost of manufacturing with regard to both cost and labor and which accordingly is then susceptible of low prices of sale to the public.

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