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## AN REVIEW PAPER ON STEERING COLUMN DRIVE TRICYCLE

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### ABSTRACT

‘Steering column drive vehicle’ is the modification of ‘three wheel handicap tricycle’. The chain driven mechanism is replaced by a crank and connecting rod mechanism with addition of ball joint and the movement of steering in forward and backward direction. In short, modifying dead axle into live axle. It is case which consists of total replacement of chassis design. This mechanism works more efficiently than chain and sprocket mechanism with minimum utilization of force. There is a greater need for more output on the highs and slopes of the road or way of path of travelling in turn requires efficient and high-capacity torque rather than speed. The general objective of the study was to design a steering column machine device that is affordable as compared to currently available handicap cycle, simple and thus can be fabricated in a local machine shop, light in weight and thus can be manipulated by men, and is adaptable to normally not so good conditions of road.

*Keywords- Effortless Handicap Cycle Giving More Output etc.*

### I. INTRODUCTION

We observe in our day to day life many handicap persons along with us they drive their tricycle with huge efforts to overcome a very small obstacle so an idea expressed in our mind to work for them and to modify and improve an old mechanism with change a new one which needs minimum force to work. (Less in put = more output)

Steering column drive vehicle is a handicap vehicle which helps in the reducing all efforts of handicap in a desired condition hence assisting the handicaps in saving time, money, power, with occupying high comfort. Our mechanism deals on effort less provided motion to live rear axle by connection of connecting rod & shaft with fulcrum, driving mechanism provided from steering column & design mechanism on desired direction of vehicle in motion used.

It is concluded that, correct speed rate can be achieved with the selected forward and backward movements of steering column. This vehicle is made up of 3 wheels.

The front wheel is used to give direction to the vehicle on which external shoe brakes are mounted to stop the vehicle in emergency. The handle is mounted on the rod connecting the front wheel to give direction. The dead axle between the two wheels is replaced by the crankshaft.

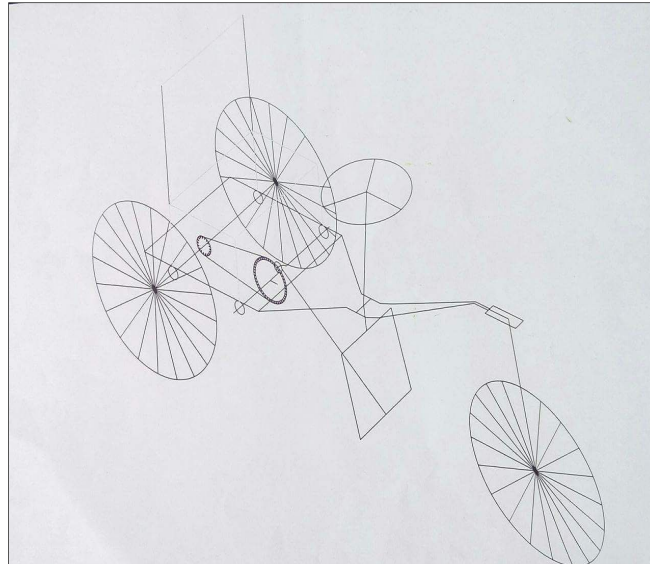
The length of the crankshaft is increased further in both directions by welding other metal connecting the both wheels rigidly without bearings. The connecting rod is extended further upto the front wheel by joining other metal rod at the end of that rod a fulcrum is connected by bush and ball mechanism. The other end of fulcrum is connected to the steering wheel with help of steering column on which the force is applied for the oscillating movement of fulcrum.

### II. LITERATURE REVIEW

**GREGO KELLY 2009** has studied Worked on development of wheel chair hand operated cycle which concept is to provide to be steering to rear wheel. The design drives the wheel of the wheel chair instead of wheel attachments. Our concept is of using sewing machine’s crank and connecting rod used foot operated in the machine.in this design we implemented that the method to be used hand operated movement in tricycle

### III. WORKING

When the steering is pushed in forward direction the steering end moves in backward direction thus the movement of the wheel occurs steering in backward direction thus cause movement of wheel. The basic objective of steering column operation is to put the less effort at desired condition of path and by providing high comfortable feeling to a driver. Increases the speed with less movements of steering column provides proper compaction over the cycle. The paper discusses different aspects of modification of general handicap’s cycle which will be helpful for the persons who are physically challenged with the help of modification in mechanization.



*Fig.1 Isometric view of tricycle*

As the steering column is given the oscillating motion with help of steering wheel connected to column, the motion is provided to the fulcrum and then from fulcrum to the connecting rod connected to fulcrum frame with help of ball joint at one end and other end extended towards crank mounted in between axle at front and inserted in the crank to join in. as connecting rod is connected to crank the crank gives one complete stroke as well as one complete stroke or rotation of larger sprocket as it is also mounted on the same axle. The chain drive is used to transmit power to rear axle on which free wheel sprocket is also situated. At one stroke of crank rear wheels get four rotations means 4 rpm/1 stroke of crank at less effort.

#### **IV. PROCESS CARRIED OUT**

##### **Manufacturing process carried out:-**

- **Cutting:** cutting the frame parts for mounting all the components of cycle together to withstand.
- **Facing:** facing is to be done on both the sides of axles.
- **Taper turning:** taper turning is done to both shafts.
- **Threading:** Threading is done to both ends of rear axle to mount wheels.
- **Drilling:** drilling operation is very necessary to drill holes for fittings of nut and bolts of the components.
- **Grinding:** hand grinder is very important to occupy smooth surface finish at welded joints.
- **Welding:** welding is the most important process carried to join to metal parts. Two types of welding used:  
1) Electric arc welding. 2) Gas welding.

#### **V. MAIN COMPONENTS IN MECHANISM**

##### **STEERING COLUMN:**

Steering column is a solid shaft to which at one end steering wheel is inserted and from other end shaft is inserted into fulcrum and then welded. It is placed in the cycle in vertical position. As it is fixed with fulcrum it is allowed to move in any direction freely while cycle in running condition. It is used to provide oscillating motion to the fulcrum and as well as for the turning moment of tricycle. Braking device is mounted on steering wheel.

*Fulcrum:*

Fulcrum is the heart of the tricycle. It is a special device which gives motion to connecting rod on oscillation of steering column, at same time it gives turning movement if necessary to the tricycle. Fulcrum is situated in between midpoint of axis of cycle in the frame of cycle with help of special frame produced for fulcrum adjustment.

***Ball joint:***

Ball joint is important part used in connection of fulcrum frame and connecting rod. It allows to keep continuous oscillations of steering and easily operating effortlessly while the turning moment action is played of the tricycle.

***Connecting rod:***

Connecting rod is backbone of the tricycle as it transmits the oscillations of steering column to the crank to convert in rotary motion. Connecting rod is threaded at one end and then inserted in to crank. One oscillation/stroke of crank completes one rotation of crank.

**CRANK:**

Crank is mounted in between the front axle as if when crank rotates axle also rotates with it. Crank converts the linear motion of connecting rod into rotary motion.

**FRONT AXLE:**

Front axle is solid shaft made up of pure iron having high strength and fixed on the square tube frame body of tricycle with help of bearings as free to rotate. On axle larger sprocket is mounted by welding on bush of sprocket. As crank and then axle rotates sprocket rotates and transmits power to free wheel mounted on rear axle.

**LARGER SPROCKET WHEEL:**

It is wheel with 44 teeth mounted on front axle on some specified distance from crank with help of bush fixing on shaft by welding. It gets rotations when crank and axle rotates. It transmits power to rear axle by means of chain drive used as transmission purpose.

**CHAIN SPROCKET:**

Chain drive is used to easy power transmission. Chain is wound to larger sprocket on front axle and on free wheel on rear axle. As larger sprocket wheel gets rotated once the free wheel rotates 4 times as per diameter specifications of sprocket and free wheel.

**REAR AXLE:**

Rear axle is situated on back side of cycle frame with nut bolt fittings and insertion of ball bearings as it should be free to rotate. It is also made up of same material as of front axle. The both ends of shaft are threaded for the wheels insertion.

**FREE WHEEL:**

Free wheel is small sprocket wheel having 18 teeth on it. As chain is wound from one side on it the power is transmitted to it and it rotates 4 times for one stroke of crank. Free wheel is mounted on rear axle with bush. When free wheel rotates the same no of rotations is carried out by rear axle and then by rear wheels.

**BALL BEARINGS:**

Ball bearing plays an important role in cycle for the free rotations of both axles at sufficient rate at its necessity.

**VI. FUTURE SCOPE**

***12 volts battery utilization:***

The cycle requires more initial torque to be in motion from steady state once it gets motion, no efforts are been used to waste for oscillations of steering wheel. As per the requirement if the person with less immunity strength wants to drive the cycle and is not able to give high initial torque at the starting point only we can use 12 volts battery to give

motion to crank for only fraction of seconds to just bring cycle in the motion, once cycle is in motion no need of battery power. In this way cycle can be used by persons having more weight.

***BRAKE APPLICATION ON REAR WHEELS:***

Due to all weight of person as per seating arrangement is bear by rear axle and then by rear wheels, if brake is applied to rear wheels then frictional losses will be produced, to prevent this friction we have applied brake on only front wheel. But if more effective braking torque is essential for the person to be felt safe we can apply on rear wheel to.

***HIGHLY COMFORTIBLE SEATS WITH SHADED COVER:***

High quality cushioning system can be provided as per requirement of user of cycle.

**VII. CONCLUSION**

1. Steering column drive vehicle is more effortlessly driven handicap cycle.
2. It requires high initial torque at starting point and once it comes in motion it requires effortless oscillations to be provided to steering wheel.
3. It gives output of 4 rpm for per stroke of crank.
4. It costs less comparatively to the original handicap cycle used now a day.
5. Steering column drive vehicle runs with greater efficiency at highly increasing speed rate with less effort torque provided while in motion and for starting high initial torque required.
6. Tricycles al operations is operated by the steering only no other device is used for different operations,
7. It includes:-1) turning movement of cycle.
  - a. 2) Linear motion of connecting rod.
  - b. 3) Braking system speed controls.

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