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DESIGN AND DEVELOPMENT OF TRICYCLE FOR HANDICAPS BY USING STEERING PROPULSION

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ABSTRACT: *Mobility of physically disabled persons could be a regarding social issue these days. Numerous hand driven tricycles, wheelchairs, retrofitted vehicles etc. are normally available for disabled individuals as a mode of transportation. The essential wheeled vehicle could be a simple machine style, pedaled by disabled persons at intervals the side and seat at intervals the center for sitting arrangement. They use only 1 hand to steer the handle as a result of different hand is employed to rotate the pedal. Our aim is to style and fabricate an occasional worth wheeled vehicle for the handicap people to be propelled by the novel link mechanism hooked up to the steering column changing into cranking, victimization the advantage of leverage, with correct balance and distribution of mass and centre of gravity to crank the wheel shaft for propellant. As he can use each the hands on the steering, higher management of the vehicle is ensured.*

Keywords: Tricycle, Steering Propulsion, Slider crank mechanism

INTRODUCTION

In the World, There area unit entirely 100-130 million folks want wheelchairs, however but 100 percent either own or have means that of getting one as a result of most of those folks sleep in developing countries wherever wheelchairs aren't out there. it's foretold that these figures can rise by twenty second over consequent 10 years for variety of reasons, as well as however not restricted to the aging baby-boomer generation, current wars, re-habitation of areas plagued with land mines from previous conflicts, and alternative injuries and diseases.

Disability can be caused by birth, by injuries sustained principally from motor accidents or throughout peace officer project work or in producing industries likewise those caused naturally. because of the big variety of disabled folks within the society, a wheel chair trike has been fancied and designed to specification. In response to demand of chair user for equal access, hand-propelled chair, electrically controlled chair, and automatic target-hunting chair are developed. However, as a result of higher body strength is needed, a hand propelled chair doesn't allow Associate in Nursing older or severely disable person on in depth vary of travel.

PROJECT OBJECTIVE

The main objective was to style and manufacture a value effective chairtrike attachment for easier accessibility and accrued performance to the wheel chair user.

The specific objective was to research the present driving systems for each wheelchairs and tricycles. style and manufacture a chair trike attachment for higher accessibility and performance of a chair user. This trike is incredibly with efficiency designed and might be proven as a stronger replacement for the autochthonal models employed by the incapacitated keeping in mind the factors like safety, value & performance.

Our aim is to style and fabricate a coffee value trike for the handicap folks to be propelled by the novel link mechanism hooked up to the steering column changing into cranking, victimisation the advantage of leverage, with correct balance and distribution of mass and centre of gravity to crank the wheel shaft for dynamical. As he will use each the hands on the steering, higher management of the vehicle is ensured.

- The user will go quicker and farther (in out of doors use).Levers area unit ergonomically higher for the user (less body stress induced by propulsion forces then for push rim)
- The chair is troublesome to take care of balance once the casters get caught in drains and potholes. dominant manual trike wheel chairs speed up and down inclines or fast speed changes on level surfaces may be safety issue.
- The mechanism being operated and thru links dominant the front wheel to result the correct steering PRN and controlled by hand-held wheel.

SCOPE

- This trike is appropriate for each reasonably folks those 10 years previous and on top of.
- Two manufacture this simple assembles trike victimisation material that out there in laboratory.
- This trike is detached elements by elements and might assembly simply.
- Size of the cycle is replaced from one place to a different place.

LITERATURE REVIEW

One of straight forward the most effective simple methodology for the handicap folks to maneuver from one place to a different place

This type of project is operated by hand with the assistance of a slider crank mechanism by swinging the steering column; thence it's low value (affordable) and having smart management. The mechanism reduces the hassle needed high propel the vehicle and additionally will increase the management as a result of the motive force are going to be holding the steering handle with each the arms. consult with Islamist Nawawi on Kitab Sahih, the most effective work or effort for the individual

Mobility of physically disabled persons is regarding social issue today. varied hand driven tricycles, wheelchairs, retrofitted vehicles etc. area unit ordinarily out there for disabled folks as a mode of transportation. the fundamental trike may be a 3 wheeled style, pedaled by disabled persons within the aspect and seat within the middle of sitting arrangement. They use only 1 hand to steer the handle as a result of alternative hand is employed to rotate the pedal. Our aim is to style and fabricate a coffee value trike for the handicap folks to be propelled by the novel link mechanism hooked up to the steering column changing into cranking, victimisation the benefits of leverage, with correct balance and distribution of mass and centre of gravity to crank the wheel. Shaft for dynamical. As he will use each the hands on the steering, higher management of the vehicle is ensured.

This is one seater 3 container for handicap person with front wheels being steered by the steering column. The steering column has the outer tube that is hinged at the bottom and also the alternative aspect extension of the steering column is propulsion and pushing the cranking mechanism of the rear wheel. the interior rod of the steering column is hinged to the link mechanism to the front wheel to steer the wheel as a steering handle is being turned that is control at the highest aspect of the steering column. The steering column is holding the steering rod among the bearings. The cranking mechanism is one among the rear wheel shaft.

HISTORY AND EVOLUTION

The earliest records of wheeled article of furniture was Associate in Nursing inscription found on a stone slate in China and a child's bed represented in on a Greek jar, each qualitative analysis back to the sixth century. the primary records of wheeled seats getting used for transporting the disabled date to 3 centuries later in China; the Chinese used their fabricated handcart to maneuver folks likewise as significant objects. A distinction between the 2 functions wasn't created for an additional many hundred years, once pictures of wheeled chairs created specifically to hold folks begin to occur in Chinese art. Later dates relate to Europeans victimisation this technology throughout the Renaissance. The invalid carriage appears up to now from around 1760.

Hary Jenning and his disabled friend Herbet Mount Everest each mechanical engineers, fabricated the primary light-weight, steel, telescopic chair in 1933. Mount Everest had broken his back during a mining accident. Manual wheelchairs area unit those who need human power to maneuver them. several manual wheelchairs is collapsable for storage or placement into a vehicle, though trendy wheelchairs area unit even as doubtless to be rigid framed.

Manual or self-propelled wheelchairs area unit propelled by the resident, typically by turning the massive rear wheels, from 20-24 inches (51–61 cm) in average diameter, and resembling bicycle wheels. The user moves the chair by pushing on the handrims, that area unit fabricated from circular conduit hooked up to the surface of the massive wheels. The handrims have a diameter that's slightly but that of the rear wheels.

METHODOLOGY

When we apply the force on steering in forward and backward direction liver and crank give the motion to wheel chair by changing the slippy motion into movement. The motion of direction of chair is controlled by steering. The device is operated by to and fro motion of steering that facilitate to rotate the wheel , the turning action takes place by tilting the steering forward and

backward direction. It give a way of dynamical a chair victimisation only 1 hand. This mechanism should permit the chair to maneuver each forward and backward, and per se have a way of change between the 2 directions. so as to propel the chair during a line, it should additionally move 3 wheels at the same time. the subsequent description define many doable ways that of accomplishing these goals.

OBJECTIVES

- Decrease the operational value by victimization newmechanism.
- Work faithfully below completely different operatingconditions.
- Decrease the value of trike.
- Decrease labour value by assembly the cycle
- Machine is operated by abnormal person simply
- Making such a machine which may be able to perform in good shape

PROBLEM STATEMENT

The requirements of the 2 completely different environments exert reciprocally exclusive purposeful demands on the chair systems.

- Crucial points being delineate area unit like unable to use for each indoor/ out of doors activities
- Some of the styles area unit advanced and high-ticket
- Performance is low for manual chair
- They need massive usage of human energy (increase tiredness) and coverage of distance.

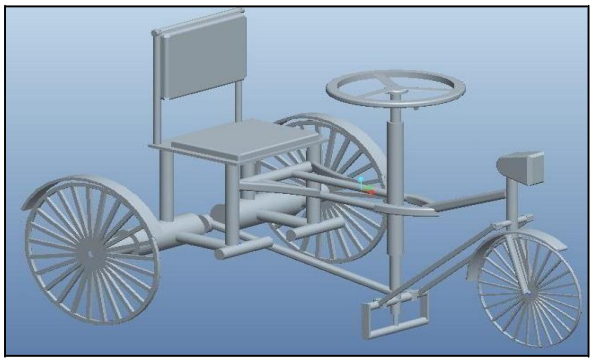
SPECIFIC OBJECTIVES

The specific objective was to:

- Investigate the present driving systems for each wheelchairs and tricycles.
- Design and manufacture a chair trike attachment for higher accessibility and performance of a chair user.
- Test and assess the developed chair trike attachment.

WORKING

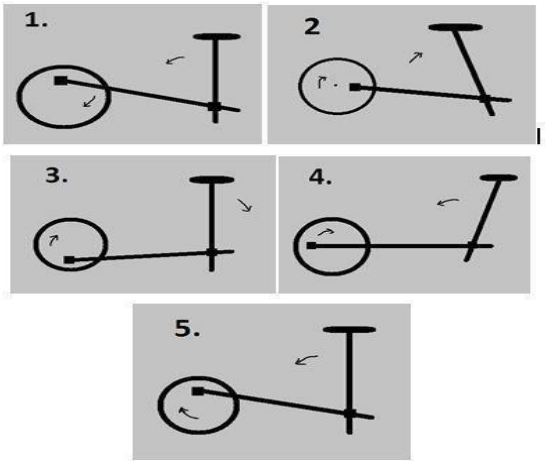
- The tricycle wheelchair is work on the only slider mechanism which is operated by steering.
- On comparison with recent traditional hand pedal chair that have of chain mechanism, instead that we have a tendency to use single slider mechanism. several modes of manual chair propulsion may be found in the literature.
- These include the conventional hand - rim technique, lever-propelled, hub- crank and others. Systematic analysis has played an important role in the development and design of wheelchairs,
- In the studies concerning vehicle mechanics and its interactions with the human movement system to higher understand the wheelchair'sprogramme.
- A amendment in propulsion mechanisms has been used and non- typical techniques have been planned to reduce the impact of the standard chair propulsion technique on the standard of life of unfit persons.



OVERALL VIEW OF TRICYCLE

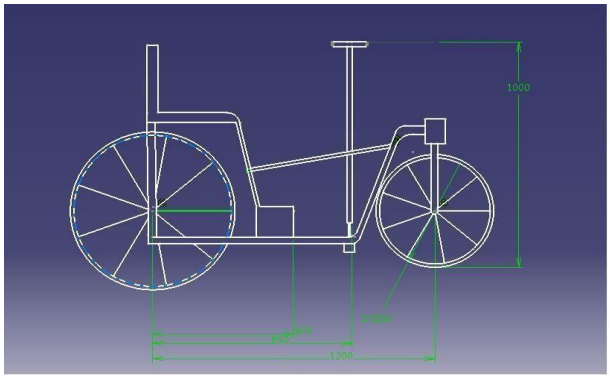
WORKING OF SINGLE SLIDER MECHANISM

When we have to go into forward in direction then just move steering from backward to forward with little effort which move the tricycle in forward direction and when we have o go in reverse direction then we have to first stable the tricycle and then move steering from forward to backward in direction that move tricycle in reverse direction. The steering is provided for giving direction and for too & flow motion that move wheeled vehicle in forward & reverse direction. a whole mechanical system during which the single slider mechanism is that the main part. on that single slider mechanism a steering is mounted for operating the wheeled vehicle, which outline the direction to tricycle and used to take turning to the left or right.



DIFFERENT POSITION OF SLIDER CRANK MECHANISM

DESIGN



LAYOUT OF HANDICAP TRICYCLE

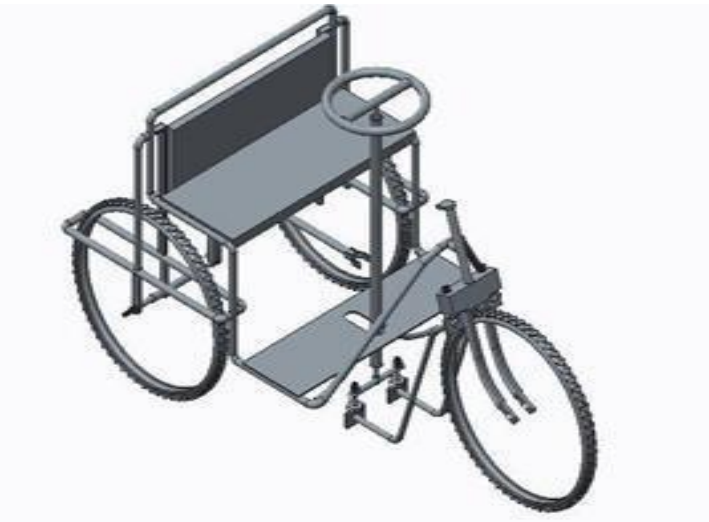
PARTS OF HANDICAP TRICYCLE

STEERING SYSTEM

The user should be able to steer the chair at all times, unless associate degree attendant is pushing the Chair. Maintaining control of the direction of the chair at all times is essential not only for user safety, but additionally to maximize the independence of the individual. once there is not an attendant pushing the chair, the user should have full management to be able to safely maneuver it.

The modification accent cannot interfere with an attendant's ability to push/control the chair. this can be accomplished by providing a means of disengaging the steering to allow free motion of the casters.

Some current models of one-hand propelled manual wheelchairs have steering mechanisms which management the position of the front casters.



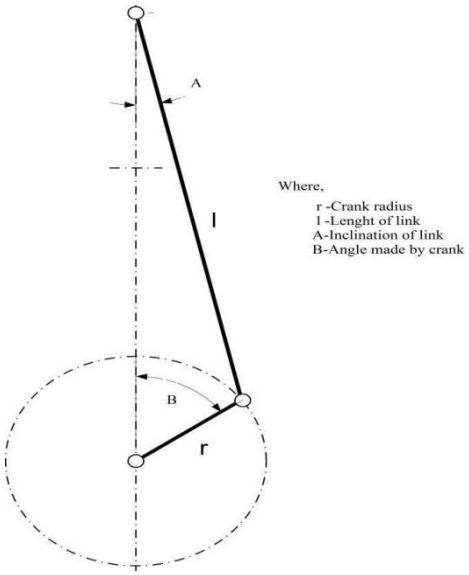
STEERING SYSTEM

STEERING SYSTEM

CRANK MECHANISM

A crank is an arm connected at the right angles to the rotating shaft by the reciprocating motion is a imparted to or received from shaft. it's used to convert circular motion into reciprocating motion, or vice-versa. The arm may be a bent portion of the shaft, or a separate arm or disk connected to it. connected to the end of the crank by a pivot is a rod, usually known as a connecting rod. the top of the rod attached to the crank moves in a circular motion, while the opposite end is typically constrained to maneuver in a linear slippery motion

CRANK MECHANISM



The term often refers to a human-powered crank that is used to manually flip an shaft, as in a bicycle crank set or a brace and bit drill. during this case a person's arm or leg serves as the connecting rod, applying reciprocating force to the crank.

The displacement of the top of the rod is around proportional to the function of the angle of rotation of the crank, once it's measured from high dead center (TDC). therefore the mutual motion created by a steady rotating crank and rod is around straightforward periodic movement.

Technically, the mutual motion of the rod departs slightly from curved motion due to the dynamic angle of the rod throughout the cycle. This distinction becomes vital in high-speed engines, which may would really like balance shafts to scale back the vibration due to this "secondary harmonic imbalance".

The magnitude relation of a crank, the magnitude relation between the force on the rod and thus the force on the shaft, varies throughout the crank's cycle. the link between the 2 is about.

SPOKES

A spoke is one of almost some kind of connecting rods diverging from the center of the wheel (the hub wherever shaft connects), connecting the hub with the spherical traction surface.

The term originally stated parts of a log that had been split lengthwise into four or six sections. The radial members of a wheel were created by carving a spoke (from a log) into their finished type.

A spokes have could be a tool originally developed for this purpose. Eventually, the term spoke was a lot of normally applied to the finished product of the wheelwright's work, than to the materials he used

CONNECTING RODS

In a mutual piston engine, the rod or connection connects the piston to the crank or rod. in conjunction with the crank, they type a straightforward mechanism that converts mutual motion into rotating motion.

Connecting rods might also convert rotating motion into mutual motion. Historically, before the event of engines, they were first used during this fashion.

Connecting rods ar sometimes made from solid metal alloy and ar designed to face to dynamic stresses from combustion and piston movement. the little end of the rod connects to the piston with a piston pin. The piston pin, or pin, provides a pivot purpose between the piston and rod. Spring clips, or piston pin locks, ar wont to hold the piston pin in place.

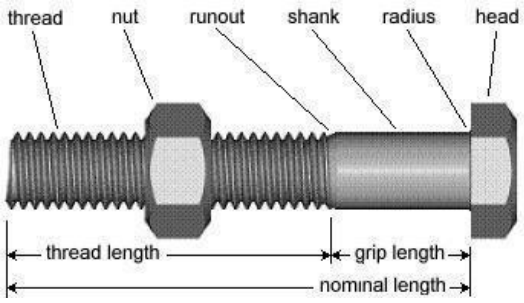
NUTS AND BOLTS

As balmy and bolts don't seem to be utterly rigid, but stretch just below load, the distribution of stress on the threads is not uniform. In fact, on a on paper infinitely long bolt, the first thread takes a 3rd of the load, the first 3 threads take three-quarters of the load, and thus the first six threads take basically the complete load. on the so much facet the primary six threads, the remaining threads ar below basically no load in any respect. Therefore, a nut or bolt with six threads acts an excellent deal like associate infinitely long nut or bolt

Bolts ar wont to be a part of things on either for good or in brief. many steel structures, additionally as buildings, ar simply locked on. for instance, the tower in Paris was originally a short lived structure and when twenty years it

was to be demolished. For this reason most of the steel elements were barred along. However, the tower has lasted run over 100 years. a lot of of the structure of the New York Building within the USA is additionally barred along. around the bend and bolts can even be accustomed fix along tiny structures like furnishings. around the bend and bolts are available in many alternative varieties and sizes and a few ar shown below.

It is usually aforesaid that 2 threads should be exposed higher than a nut. the rationale for {this is|this is usually|this can be} that the primary 2 threads of a bolt ar often poorly shaped, and will not interact the nut properly. If they don't seem to be doing their share, the opposite threads within the nut are full, and therefore the nut could strip.



NUT AND BOLT

CALIPER MECHANISM BRAKING

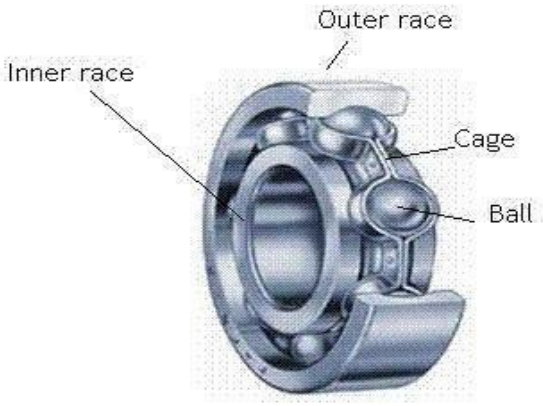
This is a rim brake during which friction pads ar compressed against the wheel rims, hand operated brake lever, force is applied to brake levers mounted on the wheel, and transmitted via Bowden cables, that apply pressure to the braking surface, inflicting friction that slows the bicycle down.

CALIPER MECHANISM BRAKING

BEARING

A bearing may be a machine component that constrains relative motion and reduces friction between moving elements to solely the specified motion. the look of the bearing could for instance offer for free of charge linear movement of the moving half or for free of charge rotation around a hard and fast axis or it should stop a motion by dominant the vectors of traditional forces that bear on the moving elements.

Many bearings additionally facilitate the specified motion the maximum amount as doable, like by minimizing friction. Bearings ar classified broadly speaking in line with the sort of operation, the motions allowed, or to the directions of the masses (forces) applied to the elements.



TYPES OF BEARING

- Plain bearing bearing, composite bearing.
- Rolling-element bearing
- Ball bearing,
- Roller bearing
- Jewel bearing
- Fluid bearing,
- Magnetic bearing
- Flexure bearing

RIM

The rim is usually a metal extrusion that's butted into itself to create a hoop, although may additionally be a structure of carbon fiber composite, and was traditionally made from wood. Some wheels use each associate mechanics carbon hoop secure to associate aluminium rim on that to mount typical bicycle tires. metallic bicycle rims ar currently usually made from atomic number 13 alloy. Rims designed to be used with rim brakes offer a sleek parallel braking surface, whereas rims meant to be used with disc brakes or hub brakes typically lack this surface.

BRAKE

A bicycle brake reduces speed of bicycle to prevents it from the moving. The 3 main varieties ar rim brakes, the caliper brake proprietary by Browed and Harrison in 1887. This early version of caliper braking used a rubber block to contact the surface of the tiny

The spoon brake, or the plunger brake was in all the probability the primary kind of bicycle brake and the precedes the tyres.[6] Spoon brakes were used on penny farthings with solid rubber tyres within the 1800s and continuing to be used when the introduction of the pneumatic-tyred bicycle.

The spoon brake is consists of a pad (often leather) or the metal shoes (possibly rubber faced), that is ironed into the highest of the front tires. That were nearly always rod-operated at the right-hand levers.

In developing countries, a foot-operated variety of the spoon brake typically is retrofitted to recent rod brake roadsters. It consists of elastic device flap connected at the rear fork crown. This can be depressed against the front tyre by the rider's foot.

BRAKE

Perhaps a lot of thus than the other variety of bicycle brake, the spoon brake is sensitive to road conditions and will increase tyre wear dramatically. Though created obsolete by the introduction of the duck brake, brake, and rod brake, spoon brakes continuing to be employed in the West supplementally on adult bicycles

BICYCLE TYRE

A bicycle tyre is one which inserts on the wheel of the bicycle. they'll even be used on wheelchairs and hand cycles, particularly for sport. Bicycle tyres offer a very important supply of suspension, generate the lateral forces necessary for reconciliation and turning, and generate the longitudinal forces necessary for propulsion and braking. they're the second largest supply, when air drag, of power consumption on grade road.

ADVANTAGES

- Lightweight
- Compact
- Directly responsive to user force on push rims and supply most precise feedback
- Provides propulsion options for their users: push the tire, the rim, tire and rim, or one arm drive technology
- Easily understood and adaptable
- Mechanically simple
- Wide acceptance from users
- Least expensive
- Rim can have many different types of coating (changes look and feel)
- Provides that the used as a mechanical advantage (through gearing or equivalent)

- Provides less tiresome way of dynamical
- The user can also go faster and the farther (in outdoor use)
- Levers are ergonomically better for the user (less body stress elicited by propulsion forces then for push rim)
- The user stays cleaner when using a lever system
- Steering (for some individuals) can be easier

APPLICATION

- It are often used in the field for the drive for the normal persons, to move within the campus in the smooth road.
- It is best helpful for the small town drive for anybody together with the handicap.
- It are often used for material transportation without mistreatment fuel propulsion.
- It can be used by the handicap for the normal transport and even for the self utilized handicap persons for their daily resource.

LIMITATIONS

- Requires good hand grip
- Pushing the rim creates the hygiene issues for the user
- Pushing rims have some safety issues
- Requires use of both upper extremities
- May not be the foremost bio-mechanically efficient propulsion mechanism
- Can cause over-use of muscles
- Larger wheels get in the way of user transfers
- Limits wheel size choice
- Material of the rim becomes cold in the winter, and also which increase numbness and affects arthritis

CONCLUSION

In our project we utilized single slider mechanisms for operating tricycle hence it is most useful and economical as compared to the other tricycle. This tricycle is made of material which is available easily in market. This tricycle is mostly useful for elder and handicapped people. It is simple in design and easy to operate. The efforts made for operating tricycle is less this is an advantages of this tricycle. The tricycle cost is less as compare to other tricycle. Even in rehabilitation, hand cycling is being advocated as a good training alternative in early rehabilitation of also frail individuals. Within that context there is a need for further research into optimal hand cycle design and fitting for different user groups. Apart from optimizing the wheelchair- user interface, one needs to carefully consider maximizing overall work capacity of users and further reduction of the vehicle mechanical losses to ensure a real optimum level of mobility. It is expected that the current booming development of crank propelled tricycles in the industrialized countries serves not only the young and active wheelchair user, but also the less well-trained individual or those with more extensive limitations. In the end, the frequent active use of other than hand rim propelled wheelchairs may help prevent some of the secondary complications among the wheelchair user population today.

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