EXPERIMENTAL INVESTIGATION OF PROPELLER SHAFT MECHANISM USED IN BICYCLES

M.Vikraman ME,

Prince dr.k.vasudevan college of engineering and technology

Chennai, Tamil Nadu 600127

***Abstract*-**Aim of the project is to replace the chain drive mechanism in bicycles then modify to using the shaft drive mechanism. The propeller shaft gets power the manual pedalling and it is connected to the rear axial. In chain drive the power is getting from crank to pre wheel via Chain. But shaft drive mechanism the bevel gear is meshing to transmit power to the rear gear arrangements. Which is connected to propeller shaft at both ends. Ultimate aim of this project is to abace losses. Now a days usually follow the chain drive on bicycles, why we are again and again using the chain drive mechanism on cycles. That reason we are to implement some new mechanism on Bicycles. The name of the mechanism is (propeller shaft mechanism).

I. INTRODUCTION

An improved three-speed or coaster bicycle having a driver bevel gear connected to the pedals, a driven bevel gear at the hub of the rear wheel, one or more drive shafts having bevel gears at each end and capable of transmitting the rotation of the driver gear to the driven gear. A shaft-driven bicycle is a bicycle that uses a drive shaft instead of a chain to transmit power from the pedals to the wheel. Shaft drives were introduced over a century ago, but were mostly supplanted by chain-driven bicycles due to the gear ranges possible with sprockets and derailleurs. Recently, due to advancements in internal gear technology, a small number of modern shaft-driven bicycles have been introduced. Shaft-driven bikes have a large bevel gear where a conventional bike would have its chain ring. This meshes with another bevel gear mounted on the drive shaft. The use of bevel gears allows the axis of the drive torque from the pedals to be turned through 90 degrees. The drive shaft then has another bevel gear near the rear wheel hub which meshes with a bevel gear on the hub where the rear sprocket would be on a conventional bike, and cancelling out the first drive torque change of axis. The 90-degree change of the drive plane that occurs at the bottom bracket and again at the rear hub uses bevel gears for the most efficient performance, though other mechanisms could be used Shaft drives operate at a very consistent rate of efficiency and performance, without adjustments or maintenance, though lower than that of a properly adjusted and lubricated chain. Shaft drives are typically more complex to disassemble when repairing flat rear tires, and the manufacturing cost is typically higher. A fundamental issue with bicycle shaft-drive systems is the requirement to transmit the torque of the rider through bevel gears with much smaller radii than typical bicycle sprockets. This requires both high quality gears and heavier frame construction. Since shaft-drives require gear hubs for shifting, they gain the benefit that gears can be shifted while the bicycle is at a complete stop or moving in reverse, but internal hub geared bikes typically have a more restricted gear range than comparable derailleur-equipped bikes. Most of the advantages claimed for a shaft drive can be realized by using a fully enclosed chain case. Some of the other issues addressed by the shaft drive, such as protection for clothing and from ingress of dirt, can be met through the use of chain guards. The reduced need for adjustment in shaft-drive bikes also applies to a similar extent to chain or belt-driven hub-geared bikes. Not all hub gear systems are shaft compatible.

II. COMPONENT SELECTION

(a). Solid Shaft.

(b). Straight Bevel Gears.

(c). Bearing and Its Housing.

(d). Pre-Wheel.

(A). SOILD SHAFT

Solid propeller shaft is used to transmit high speed and high torque. Then it is more rigid and more strength, it will be used in the high power transmission areas.

(B). STRAIGHT BEVEL GEARS

Figure1:Straight Bevel Gears

If the teeth on the bevel gears are parallel to the lines generating the pitch cones, then they are called straight bevel gears. The teeth are straight, radial to the point of intersection of the shaft axes and vary in cross section through out there length. Usually, they are used to connect shaft at right angles which run at low speeds as well as high-speeds.

(C). BEARING AND ITS HOUSING

Figure2:Bearing and Its Housing

A ball bearing is a type of rolling-element bearing that uses balls to maintain the separation between the bearing races. The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least two races to contain the balls and transmit the loads through the balls. In most applications, one race is stationary and the other is attached to the rotating assembly (e.g., a hub or shaft). As one of the bearing races rotates it causes the balls to rotate as well. Because the balls are rolling they have a much lower coefficient of friction than if two flat surfaces were sliding against each other. Ball bearings tend to have lower load capacity for their size than other kinds of rolling-element bearings due to the smaller contact area between the balls and races. However, they can tolerate some misalignment of the inner and outer races. A bearing is a machine element that constrains relative motion between moving parts to only the desired motion. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts. The term "bearing" is derived from the verb "to bear". A bearing being a machine element that allows one part to bear (i.e., to support) another. The simplest bearings are bearing surfaces, cut or formed into a part, with varying degrees of control over the form, size, roughness and location of the surface. Other bearings are separate devices installed into a machine or machine part. The most sophisticated bearings for the most demanding applications are very precise devices; their manufacture requires some of the highest standards of current technology.

(D). PRE-WHEEL

Figure3:Rre-Wheel

A fixed-gear bicycle (or fixed-wheel bicycle, commonly known as a fixit) is a bicycle that has a drive train with no freewheel mechanism. The freewheel was developed early in the history of bicycle design but the fixed-gear bicycle remained the standard track racing design. More recently the 'fixit' has become a popular alternative among mainly urban cyclists, offering the advantages of simplicity compared with the standard multi-geared bicycle. Most bicycles incorporate a freewheel to allow the pedals to remain stationary while the bicycle is in motion, so that the rider can coast, i.e., ride without pedaling using the forward or downhill momentum of bike and rider. A fixed-gear drive train has the drive sprocket (or cog) threaded or bolted directly to the hub of the back wheel, so that the rider cannot stop pedaling. When the rear wheel turns, the pedals turn in the same direction. This allows a cyclist to apply a weak braking force without using a brake, by resisting the rotation of the cranks. It also makes it possible to ride backwards although learning to do so is much more difficult than riding forwards.

III. BEVEL GEAR NOMENCLATURE

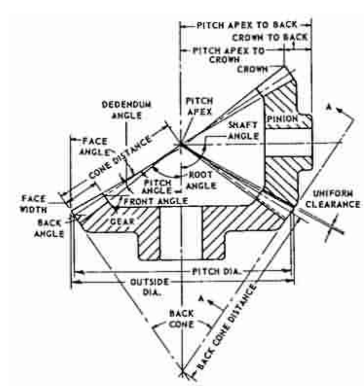

Figure4:Bevel Gear Nomenclature

GEAR TERMS & DEFINITIONS

Addendum: Height of tooth above pitch circle or the radial distance between the pitch circle and the top of the tooth.

Approach Ratio: The ratio of the arc of approach to the arc of action.

Arc of Action: Arc of the pitch circle through which a tooth travels from the first point of contact with the mating tooth to the point where contact ceases.

Arc of Approach: Arc of the pitch circle through which a tooth travels from the first point of contact with the mating tooth to the pitch point.

Arc of Recess: Arc of the pitch circle through which a tooth travels from its contact with the mating tooth at the pitch point to the point where its contact ceases.

Axial Plane: In a pair of gears it is the plane that contains the two axes. In a single gear, it may be any plane containing the axis and a given point.

Backlash: The amount by which the width of a tooth space exceeds the thickness of the engaging tooth on the pitch circles. As actually indicated by measuring devices, backlash may be determined variously in the transverse, normal, or axial planes, and wither in the direction of the pitch circles or on the line of action. Such measurements should be converted to corresponding values on transverse pitch circles for general comparison.

Base Circle: The circle from which an involute tooth curve is generated or developed.

Base Helix Angle: The angle, at the base cylinder of an involute gear that the tooth makes with the gear axis.

Base Pitch: In an involute gear it is the pitch on the base circle or along the line of action. Corresponding sides of involute teeth are parallel curves, and the base pitch is the constant and fundamental distance between them along a common normal in a plane of rotation. The Normal Base Pitch is the base pitch in the normal plane, and the Axial Base Pitch is the base pitch in the axial plane.

Center Distance: The distance between the parallel axes of spur gears and parallel helical gears, or between the crossed axes of crossed helical gears and worm gears. Also, it is the distance between the centers of the pitch circles.

Central Plane: In a worm gear this is the plane perpendicular to the gear axis and contains the common perpendicular of the gear and worm axes. In the usual case with the axes at right angles, it contains the worm axis

Chordal Addendum: The height from the top of the tooth to the chord subtending the circular-thickness arc.

Chordal Thickness: Length of the chord subtended by the circular thickness arc (the dimension obtained when a gear-tooth calliper is used to measure the thickness at the pitch circle).

Circular Pitch: Length of the arc of the pitch circle between the centers or other corresponding points of adjacent teeth. Normal Circular Pitch is the circular pitch in the normal plane.

Circular Thickness: The length of arc between the two sides of a gear tooth, on the pitch circle unless otherwise specified. Normal Circular Thickness is the circular thickness in the normal plane.

Clearance: The amount by which the dedendum in a given gear exceeds the addendum of its mating gear. It is also the radial distance between the top of a tooth and the bottom o the mating tooth space.

Contact Diameter: The smallest diameter on a gear tooth with which the mating gear makes contact.

Contact Ratio: The ratio of the arc of action to the circular pitch. It is sometimes thought of as the average number of teeth in contact. For involute gears, the contact ration is obtained most directly as the ration of the length of action to the base pitch.

Contact Stress: The maximum compressive stress within the contact area between mating gear tooth profiles. It is also called Hertz stress.

Cycloid: The curve formed by the path of a point on a circle as it rolls along a straight line. When this circle rolls along the outer side of another circle, the curve is called an Epicycloid; when it rolls along the inner side of another circle it is called a Hypocycloid. These curves are used in defining the former American Standard composite tooth form.

Dedendum: The depth of tooth space below the pitch circle or the radial dimension between the pitch circle and the bottom of the tooth space.

Diametral Pitch: The ratio of the number of teeth to the number of inches of pitch diameter-equals number of gear teeth to each inch of pitch diameter. Normal Diametral Pitch is the diametral pitch as calculated in the normal plane and is equal to the diametral pitch divided by the cosine of the helix angle.

Effective Face Width: That portion of the face width that actually comes into contact with mating teeth, as occasionally one member of a pair of gears may have a greater face width than the other.

Efficiency: The actual torque ratio of a gear set divided by its gear ratio.

External Gear: A gear with teeth on the outer cylindrical surface.

Face of Tooth: That surface of the tooth which is between the pitch circle and the top of the tooth.

Fillet Curve: The concave portion of the tooth profile where it joins the bottom of the tooth space. The approximate radius of this curve is called the Fillet Radius.

Fillet Stress: The maximum tensile stress in the gear tooth fillet.

Flank of Tooth: That surface which is between the pitch circle and the bottom land. The flank includes the fillet.

Helical Overlap: The effective face width of a helical gear divided by the gear axial pitch; also called the Face Overlap.

Helix Angle: The angle that a helical gear tooth makes with the gear axis at the pitch circle unless otherwise specified.

Hertz Stress: See Contact Stress.

Highest Point of Single Tooth Contact: The largest diameter on a spur gear at which a single tooth is in contact with the mating gear. Often referred to as HPSTC.

Internal Diameter: The diameter of a circle coinciding with the topes of the teeth of an internal gear.

Internal Gear: A gear with teeth on the inner cylindrical surface.

Involute: The curve formed by the path of a point on a straight line, called the generatrix, as it rolls along a convex base curve. (The base curve is usually a circle.) This curve is generally used as the profile of gear teeth.

Land: The Top Land is the top surface of a tooth, and the Bottom Land is the surface of the gear between the fillets of adjacent teeth.

Lead: The distance a helical gear or worm would thread along its axis in one revolution if it were free to move axially.

Length of Action: The distance on an involute line of action through which the point of contact moves during the action of the tooth profile.

Line of Action: The path of contact in involute gears. It is the straight line passing through the pitch point and tangent to the base circles.

Lowest Point of Single Tooth Contact: The smallest diameter on a spur gear at which a single tooth of one gear is in contact with its mating gear. Often referred to as LPSTC. Gear set contact stress is determined with a load placed at this point on the pinion.

Module: Ration of the pitch diameter to the number of teeth. Ordinarily, module is understood to mean ration of pitch diameter in millimetres to the number of teeth. The English Module is a ratio of the pitch diameter in inches to the number of teeth.

Normal Plane: A plane normal to the tooth surfaces at a point of contact, and perpendicular to the pitch plane.

Pitch: The distance between similar, equally-spaced tooth surfaces, in a given direction and along a given curve or line. The single word "pitch" without qualification has been used to designate circular pitch, axial pitch, and diametric pitch, but such confusing usage should be avoided.

Pitch Circle: A circle the radius of which is equal to the distance from the gear axis to the pitch point.

Pitch Diameter: The diameter of the pitch circle. In parallel shaft gears the pitch diameters can be determined directly from the center distance and the numbers of teeth by proportionality. Operating Pitch Diameter is the pitch diameter at which the gears operate. Generating Pitch Diameter is the pitch diameter at which the gear is generated. In a bevel gear the pitch diameter is understood to be at the outer ends of the teeth unless otherwise specified. (See also reference to standard pitch diameter under Pressure Angle.)

Pitch Plane: In a pair of gears it is the plane perpendicular to the axial plane and tangent to the pitch surfaces. In a single gear it may be any plane tangent to its pitch surface.

Pitch Point: This is the point of tangency of two pitch circles (or of a pitch circle and a pitch line) and is on the line of centers. The pitch point of a tooth profile is at its intersection with the pitch circle.

Plane of Rotation: Any plane perpendicular to a gear axis.

Pressure Angle: The angle between a tooth profile and a radial line at its pitch point. In involute teeth, pressure angle is often described as the angle between the line of action and the line tangent to the pitch circle. Standard Pressure Angles are established in connection with standard gear-tooth proportions. A given pair of involute profiles will transmit smooth motion at the same velocity ratio even when the center distance is changed. Changes in center distance, however, in gear design and gear manufacturing operations, are accompanied by changes in pitch diameter, pitch, and pressure angle. Different values of pitch diameter and pressure angle therefore may occur in the same gear under different conditions. Usually in a gear design, and unless otherwise specified, the pressure angle is the standard pressure angle at the standard pitch diameter, and is standard for the hob or cutter used to generate teeth. The Operating Pressure Angle is determined by the center distance at which a pair of gears operates. The Generating Pressure Angle is the angle at the pitch diameter in effect when the gear is generated. Other pressure angles may be considered in gear calculations. In gear cutting tools and cutters, the pressure angle indicates the direction of the cutting edge as referred to some principal direction. In oblique teeth, that is helical, spiral, etc., the pressure angle may be specified in the transverse, normal, or axial plane. For a spur gear or a straight bevel gear, in which only one direction of cross-section needs to be considered, the general term pressure angle may be used without qualification to indicate transverse pressure angel. In spiral bevel gears, unless otherwise specified, pressure angle means normal pressure angle at the mean cone distance.

Principle Reference Planes: These are a pitch plane, axial plane, and transverse plane, all intersecting at a point and mutually perpendicular.

Rack: A gear with teeth spaced along a straight line, and suitable for straight-line motion. A Basic Rack is one that is adopted as the basis of a system of interchangeable gears. Standard gear-tooth proportions are often illustrated on an outline of the basic rack. A Generating Rack is a rack outline used to indicate tooth details and dimensions for the design of a required generating tool, such as a hob or gear-shaper cutter.

Ratio of Gearing: Ratio of the numbers of teeth on mating gear. Ordinarily the ratio is found by dividing the number of teeth on the larger gear by the number of teeth on the smaller gear or pinion. For example, if the ratio is 2 or “2 to 1,” this usually means that the smaller gear or pinion makes two revolutions to one revolution of the larger mating gear.

Roll Angle: The angle subtended at the center of a base circle from the origin of an involute to the point of tangency of the generatrix from any point on the same involute. The radian measure of this angle is the tangent of the pressure angle of the point on the involute.

Root Circle: A circle coinciding with or tangent to the bottoms of the tooth spaces.

Root Diameter: Diameter of the root circle.

Tangent Plane: A plane tangent to the tooth surfaces at a point or line of contact.

Tip Relief: An arbitrary modification of a tooth profile whereby a small amount of material is removed near the tip of the gear tooth.

Total Face Width: The actual width dimension of a gear blank. It may exceed the effective face width, as in the case of double-helical gears where the total face width includes any distance separating the right-hand and left-hand helical teeth.

Transverse Plane: A plane perpendicular to the axial plane and to the pitch plane. In gears with parallel axes, the transverse plane and the plane of rotation coincide.

Trochoid: The curve formed by the path of a point on the extension of a radius of a circle as it rolls along a curve or line. It is also the curve formed by the path of a point on a perpendicular to a straight line as the straight line rolls along the convex side of a base curve. By the first definition the trochoid is derived from the cycloid; by the second definition it is derived from the involute.

True Involute Form Diameter: The smallest diameter on the tooth at which the involute exists. Usually this is the point of tangency of the involute tooth profile and the fillet curve. This is usually referred to as the TIF diameter.

Undercut: A condition in generated gear teeth when any part of the fillet curve lies inside of a line drawn tangent to the working profile at its lowest point. Undercut may be deliberately introduced to facilitate finishing operations, as in preshaving.

Whole Depth: The total depth of a tooth space, equal to addendum plus dedendum, also equal to working depth plus clearance.

Working Depth: The depth of engagement of two gears, that is, the sum of their addendums. The standard working distance is the depth to which a tooth extends into the tooth space of a mating gear when the center distance is standard.

IV. MATERIAL SELECTION

4.1 EN8 Mild Steel

The term mild steel applies to all low carbon steel that does not contain any alloying elements in its makeup and has a carbon content that does not exceed 0.25%. The term “mild” is used to cover a wide range of specifications and forms for a variety of steel. Mild steel is used in mechanical engineering applications for parts that will not be subject to high stress. When in its bright cold drawn condition the steel is able to endure higher levels of stress, particularly on smaller diameters. Compared to normal mild steel, bright mild steel provides tighter sectional tolerances, increased straightness, and a much cleaner surface. The main advantage of cold drawn steel is that steel can be bought closer to the finished machine size, providing reduces machining costs. Another benefit of bright steel bars is a marked increase in physical strength over hot rolled bars of the same section.EN8: unalloyed medium carbon steel (BS 970 080m40) has high strength levels compared to normal bright mild steel, due to thermo mechanical rolling. EN8 is suitable for all round engineering purposes that may require a steel of greater strength.

4.2 Heat Treatment

EN8 or 080m40 can be tempered at a heat of between 550°C to 660°C (1022°F-1220°F), heating for about 1 hour for every inch of thickness, then cool in oil or water. Normalising of EN8 bright mild steel takes place at 830-860°C (1526°F-1580°F) then it is cooled in air. Quenching in oil or water after heating to this temperature will harden the steel.

4.3 Chemical Composition of En8 Steel

Range	C	Mn	Si	P	S	Cr	Mo	Ni	N
Min	0.35	0.60	0.05	0.015	0.015				
Max	0.45	1.00	0.35	0.06	0.6				

Welding En8 Steel Modern EN8 bright mild steel contains a lot less carbon then it use to, this mean that it is possible to weld pieces up to 18mm thick without preheating using MIG wire (SG2) or a 7018 electrode. Over

18mm would require a pre-heat of 100°C (212°F) in order to prevent cracking. Anneal afterward is recommended to prevent breaking.

4.4 Mechanical Properties of EN8 Steel

Condition	Yield Stress x 106 Pa	Tensile Stress MPa	Elongation %
Normalised	280	550	16
Cold drawn (thin)	530	660	7

V. LUBRICATION SELECTION

Semi Solid Lubrication

Figure5:Semi Solid Lubrication

Chemical Composition of Grease

Grease is a semisolid lubricant. It generally consists of a soap emulsified with mineral or vegetable oil. The characteristic feature of greases is that they possess a high initial viscosity, which upon the application of shear, drops to give the effect of an oil-lubricated bearing of approximately the same viscosity as the base oil used in the grease. This change in viscosity is called thixotropy. Grease is sometimes used to describe lubricating materials that are simply soft solids or high viscosity liquids, but these materials do not exhibit the shear-thinning (thixotropic) properties characteristic of the classical grease. For example, petroleum jellies such as Vaseline are not generally classified as greases. Greases are applied to mechanisms that can only be lubricated infrequently and where a lubricating oil would not stay in position. They also act as sealants to prevent ingress of water and incompressible materials. Grease-lubricated bearings have greater frictional characteristics due to their high viscosity. A true grease consists of an oil and/or other fluid lubricant that is mixed with a thickener, typically a soap, to form a solid or semisolid. Greases are a type of shear-thinning or pseudo-plastic fluid, which means that the viscosity of the fluid is reduced under shear. After sufficient force to shear the grease has been applied, the viscosity drops and approaches that of the base lubricant, such as the mineral oil. This sudden drop in shear force means that grease is considered a plastic fluid, and the reduction of shear force with time makes it thixotropic. It is often applied using a grease gun, which applies the grease to the part being lubricated under pressure, forcing the solid grease into the spaces in the part.

VI. WELDING METHOD SELECTION

Arc welding is a type of welding that uses a welding power supply to create an electric arc between an electrode and the base material to melt the metals at the welding point. They can use either direct (DC) or alternating (AC) current, and consumable or non-consumable electrodes. The welding region is usually protected by some type of shielding gas, vapor, or slag. Arc welding processes may be manual, semi-automatic, or fully automated. First developed in the early part of the 20th century, arc welding became commercially important in shipbuilding during the Second World War. Today it remains an important process for the fabrication of steel structures and vehicles.

Figure6:Welding method selection

To supply the electrical energy necessary for arc welding processes, a number of different power supplies can be used. The most common classification is constant current power supplies and constant voltage power supplies. In arc welding, the voltage is directly related to the length of the arc, and the current is related to the amount of heat input. Constant current power supplies are most often used for manual welding processes such as gas tungsten arc welding and shielded metal arc welding, because they maintain a relatively constant current even as the voltage varies. This is important because in manual welding, it can be difficult to hold the electrode perfectly steady, and as a result, the arc length and thus voltage tend to fluctuate. Constant voltage power supplies hold the voltage constant and vary the current, and as a result, are most often used for automated welding processes such as gas metal arc welding, flux cored arc welding, and submerged arc welding. In these processes, arc length is kept constant, since any fluctuation in the distance between the wire and the base material is quickly rectified by a large change in current. For example, if the wire and the base material get too close, the current will rapidly increase, which in turn causes the heat to increase and the tip of the wire to melt, returning it to its original separation distance.

The direction of current used in arc welding also plays an important role in welding. Consumable electrode processes such as shielded metal arc welding and gas metal arc welding generally use direct current, but the electrode can be charged either positively or negatively. In welding, the positively charged anode will have a greater heat concentration and, as a result, changing the polarity of the electrode has an impact on weld properties. If the electrode is positively charged, it will melt more quickly, increasing weld penetration and welding speed. Alternatively, a negatively charged electrode results in more shallow welds. Non-consumable electrode processes, such as gas tungsten arc welding, can use either type of direct current (DC), as well as alternating current (AC). With direct current however, because the electrode only creates the arc and does not provide filler material, a positively charged electrode causes shallow welds, while a negatively charged electrode makes deeper welds. Alternating current rapidly moves between these two, resulting in medium-penetration welds. One disadvantage of AC, the fact that the arc must be re-ignited after every zero crossing, has been addressed with the invention of special power units that produce a square wave pattern instead of the normal sine wave, eliminating low-voltage time after the zero crossings and minimizing the effects of the problem. Duty cycle is a welding equipment specification which defines the number of minutes, within a 10 minute period, during which a given arc welder can safely be used. For example, an 80 a welder with a 60% duty cycle must be "rested" for at least 4 minutes after 6 minutes of continuous welding. Failure to observe duty cycle limitations could damage the welder. Commercial- or professional-grade welders typically have a 100% duty cycle.

VII. FABRICATION AND WORKING METHODOLOGY OF PROPOSED CONCEPT

7.1 FABRICATION AND ASSEMBLY

7.1.1 Before Assemble

(a). Bevel Gear with Linear Solid Shaft

Figure7:Bevel Gear with linear Soild Shaft

Above illustration is shows a straight bevel teeth cutting with same linear shaft, before taking a solid shaft after it can be remove the material by using lathe machine and gear cutting is done by axle gear cutting machine.

(b). Secondary Bevel Gear

Figure8:Secondary Bevel Gear

Secondary gear is attached to rear and front pedaling linkages because its only helps to move the vehicle towards front then it’s have 6 hole near to local region that is used to couple to free wheel and another one is used to couple to pedaling lever.

(c). Bearing Housing

Figure9:Bearing Housing

Bearing is a frictional avoiding elements for moving component and bearing is also required a housing or casing because to guide the protective layer of inner or outer walls.

7.1.2 After Assemble

(a). Side View of Proposed Concept

Figure10:Side view of proposed concept

Above illustration is shows a rear view of proposed bicycle and it's indicate the two gears are merge with one over another and it will be mounded on vehicle chassis by using welding process.

(b). Front View of Proposed Concept

Figure11: Front View of Proposed Concept

Above illustration is shows a front view of proposed bicycle and it's indicate the two gears are merge with one over another and it will be mounded on vehicle chassis by using welding process and it is a pedaling arrangement of driver area.

(c). Top View of Proposed Concept

Figure12: Top View of Proposed Concept

Above illustration is shows a top view of proposed bicycle and it's show the clear view of two matting components and pedaling region.

(d). Actual View of Power Transmitting Mechanism

Figure13: Actual View of Power Transmitting Mechanism

Above illustration is shows a side actual view of proposed bicycle and its show the clear view of two matting components and silently say how the bevels are transmit the power via cutting pitch region.

(e). Full View of Proposed Concept

Figure14: Full View of Proposed Concept

Above illustration is shows a full actual view of proposed bicycle and its show the clear view of two matting components and silently say the how transmit the mechanical energy front to rear wheel axle, then here the proposed concepts is implement on Indian branded cycle.

7.2 WORKING METHODOLOGY

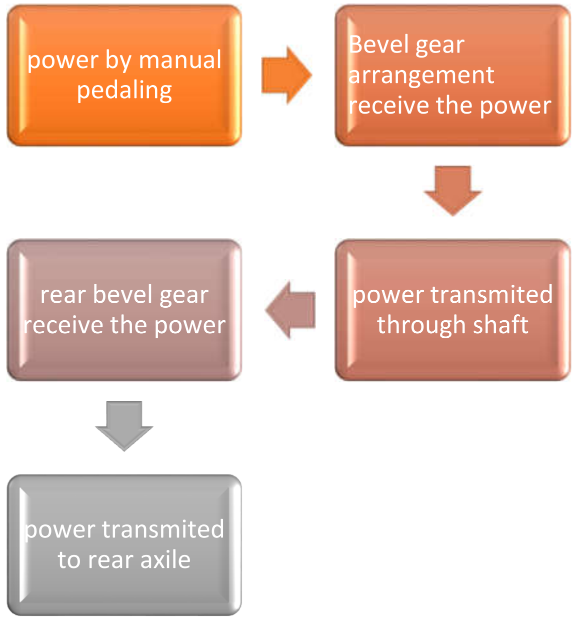

Figure15:Architure

Initially to rotate the bicycle pedal by human force. The rotary force is directly passed to meshing bevel gears. Then the gears transmit power through the solid shaft to the rear axle bevel gear arrangement. The shaft not only transmit the power, its transmit torque along over the shaft. The meshing bevel gears are fixed, both end of the solid shaft. The front end of the shaft bevel is transmit power to the rear end of the bevel by propeller shaft. Then the rear hub bevel gear receive power from the shaft bevel gear, after the rear wheel is move forward.

VIII. PARTS SPECIFICATIONS

Wheel and Pinion

1. No of tooth on wheel $\mathbf{Z_1}$ = **40**
2. Diameter of wheel $\mathbf{D_1}$ = **14**
3. No of tooth on pinion $\mathbf{Z_2}$ = **12**cm
4. Diameter of pinion $\mathbf{D_2}$ = **4.5**cm

Shaft

1. Length of the shaft **L** = **140**mm
2. Diameter of the shaft **D** = **16**mm

IX. CONCLUSION

Now-a-days the chain drive mechanism mostly used in worldwide in all innovation parts, but some draw back will be there. In future, propeller shaft drive mechanism is reduces the losses which were in the chain drive mechanism. The invention comprises a coaster or three-speed bicycle having bevel gears and a drive shaft mechanism replacing the traditional spur gears and chains. Rotary motion from a driver bevel gear is transferred to the drive shaft(s) and then to a driven bevel gear that is attached to the hub of the rear bicycle wheel.The propeller shaft gets power the manual pedalling and it is connected to the rear axial. In chain drive the power is getting from crank to pre wheel via chain. But shaft drive mechanism the bevel gear is meshing to transmit power to the rear gear arrangements. Which is connected to propeller shaft at both ends. ultimate aim of this project is to abace losses and major advantages of proposed concepts are (drive system is less likely to become jammed or broken, a common problem with chain-driven bicycles, the use of a gear system creates a smoother and more consistent pedalling motion, the rider cannot become dirtied from chain grease or injured by the chain from "chain bite", which occurs when clothing or even a body part catches between the chain and a sprocket, lower maintenance than a chain system when the drive shaft is enclosed in a tube, the common convention, more consistent performance. dynamic bicycles claims that a drive shaft bicycle consistently delivers 94% efficiency, whereas a chain-driven bike can deliver anywhere from 75-97% efficiency based on condition, greater clearance: with the absence of a derailleur or other low-hanging machinery, the bicycle has nearly twice the ground clearance, for bicycle rental companies, a drive-shaft bicycle is less prone to be stolen, since the shaft is non-standard, and both noticeable and non-maintainable. this type of bicycle is in use in several major cities of Europe, where there have been large municipal funded, public (and automatic) bicycle rental projects, perfectly suited for around-town cruising and medium-distance (5-12 miles) commuting, drive system is less likely to become jammed, a common problem with chain-driven bicycles, the rider cannot become dirtied from chain grease or injured by "chain bite" when clothing or a body part catches between an unguarded chain and a sprocket, lower maintenance than a chain system when the drive shaft is enclosed in a tube, more consistent performance. dynamic bicycles claims that a drive shaft bicycle can deliver 94% efficiency, greater ground clearance: lacking a derailleur or other low-hanging machinery, the bicycle has nearly twice the ground clearance.

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