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## Strand Beest Bicycle

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### ABSTRACT

*In this research paper, we are describing a new feature and technology bicycle. We make this bicycle by adding Jonson linkage mechanism in the bicycle. The Jonson Linkage is add in the rear side of the bicycle which works as footstep on the difficult surface like sand (beach)/ ice-surface and like another normal bicycle, there is also normal wheel in rear and front side of bicycle for work in the surface. When bicycle on sand (beach) or ice surface we are going to use linkage mechanism because Jonsen linkage works more efficiently on that surface than the wheel and when bicycle on normal road surface we use the rear wheel on work because it works more efficient than linkage mechanism on a road. We add Gearbox in bicycle to transmit power to both linkage mechanism and rear wheel of a bicycle at different time. When power is transmitted to the Jonson linkage to work in sand/ice surface then the rear wheel is isolated from power transmission, and all power is transmitted to the linkage so that it works efficiently in that surface. When then all power bicycle on a road surface transmits to the rear wheel with the help of gearbox and linkage mechanism become free. Power transmission in the linkage mechanism and rear wheel of the bicycle is control by manually and the source of input power in the bicycle is physical power. We add crankshaft in a bicycle for converting rotating motion of transmit power from gearbox into the reciprocated motion to drive linkage mechanism.*

**Keywords**— Strand beest bicycle, Jonsen linkage, Gearbox, Linkage mechanism

### 1. INTRODUCTION

Riding your bicycle regularly is one of the best ways to reduce your risk of health problem associated with the sedentary lifestyle. Cycling is a healthy, low impact exercise that can be enjoyed by people of all ages, from young children to older adults. Bicycle is eco-friendly vehicle it is very useful for environment but Most of the bicycle cannot be used in sand (beach) and ice surface efficiently because they are designed to run on normal road all these problems inspire us to make a bicycle that works inland, sand (beach) and ice surface with efficient way.

The normal bicycle has two-wheel to move the vehicle but in the strand, beest bicycle has additional system which makes the bicycle able to work inland as well as sand and ice surface efficiently for that we add Jonson linkage mechanism in the bicycle which helps it to work in different surface like sand(beach)and ice inefficient way, there is also normal wheels in bicycle which is used at the time when we need to run it on normal road surface because in normal road wheel are more efficiently work than linkage mechanism. The bicycle has also a gearbox for transmitting power to wheel and Jonson linkage according to the requirement in different surface. We also add crankshaft in the mechanism which converts input rotational motion into a reciprocated motion for linkage mechanism.

### 2. WORKING

Like another normal bicycle, it is also working with physical power, rotation of pedal with the help of foot transmit power through a chain to the freewheel hub of cycle at the rear end, the free wheel's axel of cycle connected with a gearbox which transmits power to the rear wheel's axel and jonsen linkage mechanism's crankshaft which are connected through chain with gearbox. In this bicycle at the rear end, we have used a linkage mechanism and normal wheel to work on a different surface. For sand and ice surface we use footstep linkage mechanism which enables the cycle to work efficiently in that surface, where normal wheel cycle skid and not efficient to work these surface. And for plane land surface the normal rear wheel comes under function because on plane surface wheel work more efficiently than linkage mechanism. All the power transmitted to the linkage mechanism and rear wheel to work in the different surface is control by gearbox and transmit at the time of requirement.

When bicycle in normal road then we use rear wheel for work in road, that time no power transmitted to the linkage mechanism, there is no contact between linkage mechanism and road surface and linkage mechanism remain idle above the road surface, when bicycle in sand (beach) and ice surface than rear-wheel fold back to the middle of the bicycle and become idle than there is

no power transmitted to the wheel and linkage mechanism come underwork that time in the surface. Through a chain with the help of gearbox power transmitted to the wheel and linkage mechanism's crankshaft according to the requirement. The crankshaft is used to convert the rotating motion of gearbox into reciprocated motion to the linkage mechanism

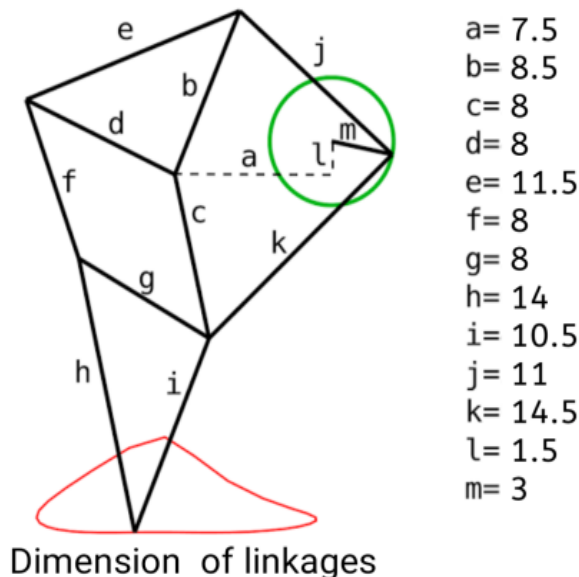


**Fig. 1: Strand beest bicycle**

**3. COMPONENT USED:**

**3.1 Jonson linkage**

We have use jonsen linkage to generate a smooth walking motion in a cycle. For that, we use four jonsen linkage mechanism which is connected with crankshaft in series to run a cycle. The purpose of jonsen linkage is to provide smooth walking motion to the cycle in the sand (beach) and ice surface when the normal wheel fails to work. The central crank link of Jonson linkage move in a circle with the help of crankshaft rotation. All other links and pin joints are unactuuated and move because of the motion imparted by the crank. Their positions and orientation are uniquely defined by specifying the crank angle and hence the mechanism has only one degree of freedom. TO generate smooth walking motion in the difficult surface we have to add four jonsen linkage in strand beest bicycle which help bicycle to run on sand /ice surface.

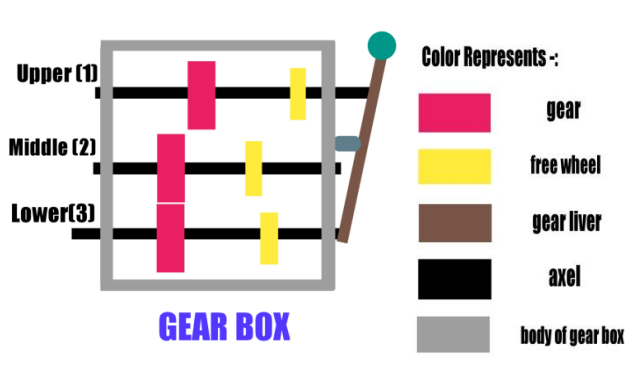


**Fig. 2: Jonson linkage**

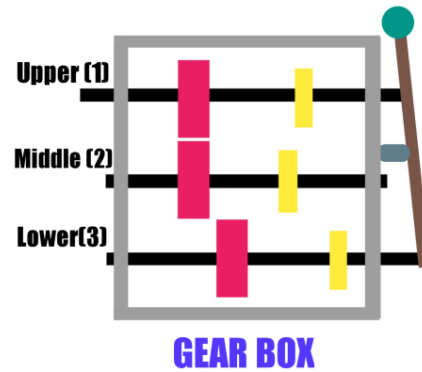
(All these above dimensions are in inch)

**3.2 Gearbox**

The gearbox use gears and gear train to provide speed and torque conversions from a rotating power source to another device. In this bicycle, Gearbox is used to transmit input power to the rear wheel and linkage mechanism of bicycle according to requirement. In gearbox, there is 3 gear which is parallel to each other and also there are three freewheels in a series with each gear of gearbox, middle free wheel of gearbox connected to the crankset of pedal, upper free connected to the linkage and lover free wheel connected to the rear wheel of cycle through a chain. In the middle freewheel, there is continuous power supply from the pedal. When power needs to the rear wheel to run on road surface than lower gear(3) of gearbox through a gear lever engage with middle gear(2) of gearbox in which continuously power supply from pedal movement and that time upper gear(1) of gearbox disengage from the middle gear(2)as shown in Figure 3. When Jonsen linkage mechanism requires power to run in sand/ ice than upper gear(1) engage with middle gear(2) and lower gear(3) disengage from middle gear(2) with the help of gear liver as shown in Figure 4. Power transmission in the gearbox is controlled by manually.



**Fig. 3: Gearbox**  
(Case: When power transfer to Real wheel)



**Fig. 4: a Gear box**  
(Case: When power transfer to linkage mechanism)

### 3.3 Freewheel

A freewheel is a device in a transmission that disengages the driveshaft from the driven when the driven shaft rotates faster than the driveshaft. The condition of a driven shaft spinning faster than its driveshaft exists in the most bicycle when the rider stops pedalling. In a fixed-gear bicycle, without a freewheel, the rear wheel drives the pedals around.

In this bicycle, we have used 4 freewheels, 3 in the gearbox with gear and 1 in the rear wheel of bicycle. because freewheel work in one side and another side it moves freely, due to this property free wheel of gearbox in which real wheel of the bicycle is connected through a chain is used to fold back a rear wheel in the middle of bicycle, while the rear wheel is not used.



**Fig. 5: Freewheel**

### 3.4 Crankshaft

A Crankshaft is a rotating shaft which converts reciprocating motion into the rotation motion and vice-versa. In this cycle, the crankshaft is used to convert rotation input motion into the reciprocated motion. Crankshaft consists of a series of cranks and crankpin to which the cranks of Jonsen linkage connected.



**Fig. 6: Crankshaft**

### 3.5 Gear

A gear is a rotating machine part having cut teeth which mesh with another toothed part to transmit torque. In the cycle, we have used three spur gear to transmit torque. Which are connected parallel to each other with the same gear ratio? Spur gears are the simplest types of gear. These gears mesh together correctly only if fitted to parallel shafts. No axial thrust is created by the tooth loads. Spur gears are excellent at moderated speeds.



**Fig. 7: Spur gear**

## 4. CONCLUSION

This paper has presented the use of new technology in the bicycle. The use of a bicycle is very important to keep our body fit and healthy, the bicycle is an environment-friendly vehicle so the use of this bicycle is a benefit not only for physical health purpose but also for environmental purpose. Any person, children to old age can use this cycle for their purpose.

The main feature we have given is that we can run this cycle not only in the planned road but also in the sand (beach) as well as ice surface easily with the help of physical power. By this cycle, we can move safely on the ice surface and sand surface, where the normal cycle is not safe to move. We can use this cycle also for weight loss and exercise.

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