Automatic Mechanical Sprocket Side Stand Retrieve System

J. K. Singh[1], Roshan Malakar[2], Keshav Verma[3], Vikram Sonkar[4], Shitesh Nayak[5]
Department of Mechanical Engineering, O.P. Jindal Institute of Technology, Raigarh (CG), India
email: jitesh.singh@opjit.edu.in

Abstract— **In modern developing world, automatic process plays a major role especially in automotive technology. In spite of their easiness of use, sometime they are prone to accidents. The two wheeler concerned accidents occurs due to riding the vehicle without maintaining the speed limit and forgets to lift the side stand while riding the vehicles. The automatic mechanical side stand retrive system can reduces the accident if rider forgot to lift the side stand. To resolve this issue, the systematic design of system is made with the aim to consume very low amount of power initially for few seconds to retrieve the stand. To achieve the objective, the power obtained from the chain drive is transmitted to the appropriate component without power loss. Then the power consumption does not occur after retrieving the stand. The result of automatic mechanical sprocket side stand retrieve system is that there is no need of external source, no electric control required and more customer safety. The scope of the study is to implement this system in all types of bikes by changing small variation in size and cost so that automatic mechanical sprocket side stand retrieve system will be the safer and life saver.**

Keywords—**Retrive System, mechanical sprocket, pushing liver, etc.**

I. INTRODUCTION

In modern world the various type of equipments are developed by human which is more useful but dangerous, they continuously give output with their specific requirements. The automobile takes a great part in the development, since it plays one of a major key in daily life. While automobile is concern two-wheeler i.e. motorcycle and bikes, plays very important role because it saves the time of traveler by reaching the target place very faster .Although it saves the time but it does not save the life of rider if rider is careless. While the two wheeler concerned accidents occurs due to riding the vehicle in high speed , ignores to use helmets , does not maintains the speed limit and forgets to lift the side stand while riding the vehicles. To prevent accidents occur due this side-stand many Electronic Control Unit and mechanical project had been found.

The modern ECU contains a 32 bit and 40 MHz processor. It will be fast as pc's microprocessor. The ECU decides timing and functioning of engine and its parts. This play its role in dashboard, this indicates the gear shifting, side stand, to wear helmet in digital display. But the people ignore to listen those indicators and safety rules. So for safe guard many mechanical projects have been found to retrieve the side stand automatically.

In existing mechanical project many ideas had been found to lift the side-stand automatically.

II. CONSTRUCTION

The whole construction of automatic mechanical sprocket side stand retrive system is simple and efficient. The arrangement and position of components makes the system to functional. The power obtained from the chain drive is transmitted to the appropriate component without power loss. The systematic design of system is made in order to consume only very low amount of power initially for few seconds to retrieve the stand. The power consumption does not occur after retrieving the stand. Automatic mechanical sprocket side stand retrieve system consists of the following components-

- Sprocket pinion
- Lifting lever
- Pushing lever
- Shaft
- Bearing
- Hub
- Chain
- Spring

Sprocket Pinion- Sprocket pinion is the major component of this system because it is the power transmitting device. It gets power from the chain drive and makes this system to work. It is the device which transmits the linear motion of meshing chain drive into rotary motion by means of the tooth found on it.

Fig 1.1 Sprocket Pinion

Lifting Lever- Lifting lever is the second major component of the system. The lifting lever is the rectangular rod made of mild steel which consists of two lifting leaves which is mounted with the edge of axle. The lifting leaves should be parallel to the sprocket pinion. The lifting lever is composed of two metal rods, where both are welded at either sides of the axle. The free ends of the lifting leaves are tapered well. The ends are machined well for tapered shape for smooth engaging with pushing lever.

Pushing Lever- The Pushing lever is the component pivoted centrally to the side stand. The pushing lever is metallic rectangular plate, whose bottom end is bended in shape of C and top end is welded with a small piece of rectangular rod. This small piece of rod is used for getting lifted by the lifting lever. Since this rod engages or lays over tapered edge of lifting lever, thus the retrieving occurs smoothly.
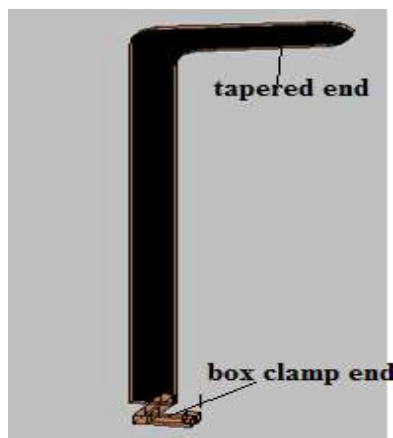

Fig-1.2 Pushing Lever

Shaft- The shaft is a mechanical component it is inserted in between the bearing and sprocket pinion. It is made by mild steel. In this working model shaft is not rotate. Bearing is rotate by the power is coming from the chain.

Bearing- Bearing is a mechanical rotary component which is connect with shaft and inserted in the sprocket. The sprocket is rotated by the power which is coming from the chain. The chain is rotated by the power which is coming from the engine.

Fig-1.3 Bearing

Hub- The hub is a mechanical component. This is coupled with shaft and large diameter sprocket or gear. It consists of an axle, bearing and a hub shell. The hub sells typically two machined metal flanges to which spoke can be attached.

Chain- Chain is a mechanical element. It is connected with flexible series of links. It is used for holding objects together and for transmitting mechanical power. In automatic mechanical sprocket side stand retrieve system the chain is used for transmitting power from engine to the rear wheel or rear wheel hub.

Fig-1.4 Hub arrangement with chain

Spring- A spring is a device that changes its shape in response to an external force, returning to its original shape when the force is removed. The energy expended in deforming the spring is stored in it and can be recovered when the spring returns to its original shape. In automatic mechanical sprocket side stand retrive, the spring is used on stand for up and down motion of the stand.

Fig-1.5 spring

Assembly of Components- For the functioning of system the above components are arranged in two assemblies. These are **inciter assembly** and **retriever assembly**.

Inciter Assembly- Inciter assembly consists of sprocket and lifting lever.

Fig-1.6 Inciter Assembly

The Sprocket is mounted on the centre of the shaft with the help of bearing and the lifting lever is welded at the front side of the sprocket. This inciter assembly is main assembly because it receives the power from the chain and incites the retriever assembly to retrieve the side stand because this inciter assembly is kept under the chain as such that the sprocket attached centrally with the bearing engage with chain drive. This set up is arranged in the bike as such that this inciter assembly is hold by the small hollow shaft with rod welded at the centre which is welded to the bottom side of the bike. As the inciter assemblies sprocket get engage with chain drive. When sprocket rotates, the axle along with lifting lever also rotates.

Retriever Assembly- Retriever assembly consists of pushing lever and side stand. The pushing lever is centrally pivoted with the side stand as the pushing levers tapered end is at the top side and clamp is at the bottom.

Fig-1.7 Retriever Assembly

Power Sources- The power source of the working component and how the component works is explained below with flow chart.
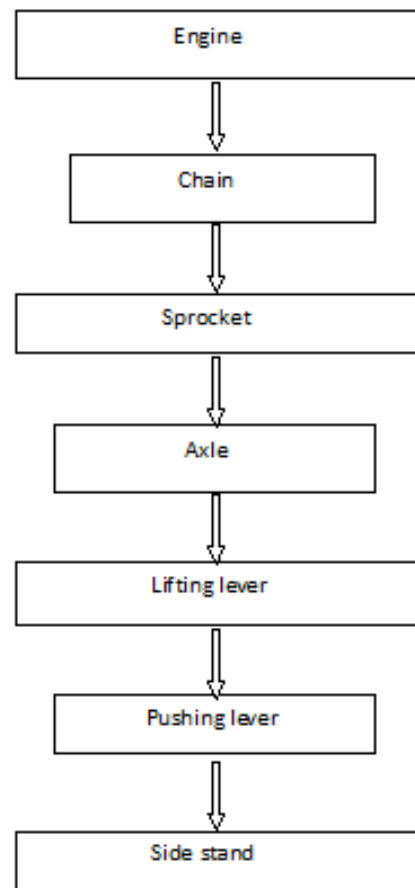

Fig-1.8 Flow chart of source of power

III. METHODOLOGY

Automatic mechanical Sprocket side stand retrieve system retrieves the side stand automatically if the rider forgets to lift the side stand while moving the bike. It works based on the working principle of the two-wheelers. Every bike transmits power from engine's pinion to the rear wheel i.e. rotary motion of the pinion makes the linear motion of the chain. That linear motion of the chain is absorbed by rear wheel's sprocket and converted into rotary motion. That rotary motion of the rear wheel makes the bikes to move. Based on above methodology, this Sprocket side stand retrieve system is designed.

If Sprocket is kept between the chain drive, it make the sprocket to rotate so, using the sprocket as the major component this system works. It gains the power from the chain and make specially designed component so the lifting lever to rotate. This rotation incites engaged pushing lever to push the side stand to retrieve it.

When chain rotates anti-clockwise direction, the inciter assembly's sprocket absorbs the power and rotates in clockwise direction. The working of automatic mechanical sprocket side stand retrieve system is explained below in both resting & riding condition of two-wheeler.

Resting Condition- When two-wheeler is in resting condition i.e. when rider actuates the side stand of the vehicle to ground, the pushing lever that is pivoted at the centre of the side stand gets engage with the inciter assemblies lifting lever. During this condition the inciter assembly is at rest and pushing lever's tapered end get engage with tapered end of lifting lever.   Pushing lever's length can be changed according to type of bikes and distance calculated between the side stand and chain drive. Closed coil helical spring which gets pulled, the coil of spring gets tensed during side stand resting to ground .This is the condition of system during resting stage.

Fig- 1.9 Resting Condition

Riding Condition- When two-wheeler is started, engine's pinion transmits power to the rear wheel by the chain drive. The inciter assembly which is kept at the center of the chain drive gets rotates as the sprocket gets engage with chain drive. When the sprocket rotates the lifting lever mounted with axle also rotates.

Fig-1.10 Riding Condition

Hence the lifting lever engaged the pushing lever and therefore the pushing lever pushed the side stand and hence the spring tensed in the side stand, get compressed quickly as a result side stand get retrieves.

IV. CALCULATION

1. Free length of spring (L)-
We know that-
Wire diameter of spring = 2mm = .002M
Outer diameter of spring (D) = 15mm = .015M
Inner diameter of spring (d) = 12mm = .012M
No of coils in springs = 37
So free length of springs (L) = πDn = 1.74M

2. Deflection (x)-
We know that- (x) = $8PD^3n/Gd^4$ = 11.56mm   (here n= n'+2 and D = (D'+d)/2
Deflection (x) = 11.56mm

3. Stiffness (k)-
We know that- (k) = $Gd/8C^3n$ = 1.7M/mm
Stiffness (k) = 1.7M/mm

4. Force (F)-
We know that-(F) = Deflection X stiffness = 19.61N
Force (F)= 19.61 N

5. Torque (T_1)-
We know that (T_1) = FxR = 0.1324N-m (Here R =13.5/2 = 6.75mm)
Torque (T_1) = 0.1324N-m

6. Force due to stand weight (F_1)-
We know that-
Stand weight = 400gm
Spring weight = 56gm
Combined weight of spring and stand = 400 + 56 = 456gm = 0.456kg
So force due to stand weight (F_1) – mgsinθ =3.708 N   (Here θ = 56)

7. Torque due to stand weight (T_2)-
We know that- (T_2) = F_1xR = 0.025N-m
So torque due to stand weight (T_2)- 0.025N-m

8. Total Torque (T)-
We know that T = $T_1 + T_2$
So total torque (T) = 0.15733N-m

9. Power (P)-
We know that- (P) = $2\pi NT/60$ = 1.483 j/s or 1.483watt (Here N = 90RPM)
So power (P) = 1.483 watt

V. RESULT AND DISCUSSION

- The two wheeler concerned accidents occurs due to riding the vehicle without maintaining the speed limit and forgets to lift the side stand while riding the vehicles.
- The automatic mechanical sprocket side stand retrive system can reduces the accident if rider forgot to lift the side stand.
- To resolve this issue, the systematic design of system is made with the aim to consume very low amount of power initially for few seconds to retrieve the stand.
- To achieve the objective, the power obtained from the chain drive is transmitted to the appropriate component without power loss.
- Then the power consumption does not occur after retrieving the stand. The result of automatic mechanical sprocket side stand retrieve system is that there is no need of external source, no electric control required and more customer safety.
- The scope of the study is to implement this system in all types of bikes by changing small variation in size and cost so that automatic mechanical sprocket side stand retrieve system will be the safer and life saver.

VI. CONCLUSION

- The mechanical sprocket side stand retrive system will be the best retrive system. The setup of this system is compact and it does not affect the performance of the vehicle because of the power is obtained from chain drive.
- This system can be used in all type of two-wheelers like TVs'-XL, Hero, Honda, Bajaj CT-100 and Bajaj Pulsar for retrieving the side stand.
- It will be the major system to control accidents due to side stand problem and protect the careless rider.
- This system can be implemented in all types of bikes by changing small variation in size. The cost of this system also very low and so it will not affect the economic level also.

- While compare to other system this automatic mechanical sprocket side stand retrive system will be the safer and life saver.

VII. FUTURE SCOPE.

- The power consumption does not occur after retrieving the stand so automatic mechanical sprocket side stand retrive system is not need of external source, no electric control required and is more customer safety.
- The mechanical sprocket side stand retrive system is compact and it does not affect the performance of the vehicle because of the power is obtained from chain drive.
- The automatic mechanical sprocket side stand retrive system can reduces the accident if rider forgot to lift the side stand save the life of rider.
- This system can be implemented in all types of bikes by changing small variation in size. The cost of this system also very low and so it will not affect the economic level of rider.
- Automatic mechanical sprocket side stand retrieve system will be the safer and life saver.

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AUTHORS BIOGRAPHY

Mr. Jitesh Kumar Singh, born on 10.02.1978, completed graduation in Mechanical Engineering from The Institution of Engineers (India). He has completed his post graduate in Mechanical Engineering from Delhi Institute of Technology Management and Research, Faridabad (Maharshi Dayanand University-Rohtak), Haryana, India. **Roshan Malakar, Keshav Verma, Vikram Sonkar, Shitesh Nayak** are the final year students of Mechanical Engineering Department at OP Jindal Institute of Technology, Punjipathra, Raigarh, C. G. India.