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Automatic Side Stand Retrieval System

Bharat Krishan Nirmal

G.B. Pant Engineering College, Department of Mechanical and Automation Engineering,
Okhla Industrial Estate, Phase- 3, Delhi 110020, India

Abstract: ***Automobiles, especially two-wheelers play an important role in daily commute on Indian roads due to their swiftness and agility, but they are more prone to accidents. A major cause of such accidents is forgetting to lift the side stand. To rectify this problem, "Automatic Side Stand Retrieval System" is designed to work in coalescence with the powertrain of two wheelers, i.e., chain drive.***

Keywords: Automatic Side stand retrieve, Sprocket lift up side stand

1. Introduction

Based on the working principle of two-wheeler, i.e., the power is generated in the engine and is transmitted to the rear wheel pinion by the use of sprocket and chain drive. The "automatic side stand retrieval system" is designed based on this principle. The system consists of four components; readily and cheaply available in Indian markets.

2. Components and their Specifications

2.1 Axle

Axle is the metallic rod made up of mild steel. It connects the lifting lever and sprocket centrally. The axle is welded centrally to the sprocket. Specifications are mentioned in Table 1.

Table 1: Axle specifications

Material	Mild Steel
Shape	Cylindrical rod
Length	50 mm
Diameter	13 mm
Ultimate tensile stress (uts)	400 N/mm^2
Yield stress (y_s)	250 N/mm^2
Design stress {min.(2/3* y_s or 2/5*uts)}	160 N/mm^2
Peak torque in Bajaj pulsar 200ns	18000 N-mm
Maximum torsional shear stress (2*t_s / πR^3)	41.748 N/mm^2

2.2 Sprocket

Sprocket 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. Since it is a free wheel, it allows the toothed part to rotate free from central position in a single direction. In order to withstand the impact loads, teeth of sprocket are made of high carbon steel. The specifications of sprocket are as follows in Table 2.

Table 2: Sprocket specifications

Material	High carbon steel
Pitch	12.7 mm
Width	30 mm
Teeth	16
Balls	High carbon high chromium steel

2.3 Lifting Lever

Lifting Lever is a rectangular rod made of mild steel. It is composed of two metal rods, which are welded at either sides of the axle. The free ends of the lifting leaves are tapered as shown in Figure 1. This tapered surface makes the lifting lever capable to withstand the effect of torque of engine. Refer to Table 3 for specifications.

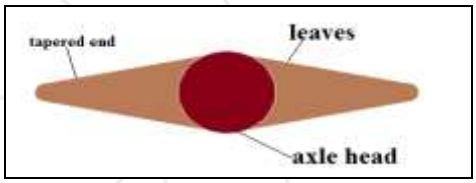

Figure 1: Lifting lever

Table 3: Lifting Lever specifications

Length of lever	95mm
Thickness	10mm
Tapered angle	45deg
Position	Parallel to Sprocket
Welded length	13mm
Material used	Mild Steel

2.4 Pushing Lever

Pushing Lever is the component pivoted centrally to the side stand. The pushing lever is a metallic rectangular plate,

whose bottom end is bent in shape of C and top end is welded with a small piece of rectangular rod. Since this rod engages or lays over tapered edge of lifting lever, the retrieving occurs smoothly. Table 4 illustrates specifications.

Table 4: Pushing lever specifications

Material	Mild Steel
Length of lever	180 mm
Thickness	3 mm
Diameter of hole	8 mm
Length	30 mm
Thickness	10 mm
Diameter of clamp	28 mm
Diameter of stand	25 mm
Pivoted angle	55 degrees
Bolt diameter	8 mm

3. Assembling and Arrangement

3.1 Stimulator Assembly

Stimulator assembly consists of axle, sprocket and lifting lever. The sprocket is mounted on the center of the axle and the lifting lever is welded at the front side of axle as shown in Figure 2. This is the main assembly as it receives power from chain and stimulates the lift up assembly to retrieve the side stand because stimulator assembly is kept under the chain such that the sprocket attached centrally with the axle get attached with chain drive.

This setup is arranged in the bike such that it is held by the small hollow shaft with rod welded at the center, which is then welded to bottom side of the bike. The stimulator assembly's sprocket gets engaged with the chain drive. When the sprocket rotates, the axle along with lifting lever rotates.

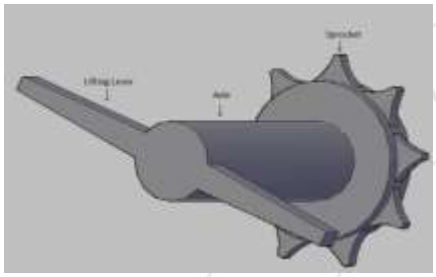

Figure 2: Stimulator assembly

3.2 Lift Up Assembly

Lift Up assembly consists of pushing lever and side stand. The pushing lever is centrally pivoted (drilled and bolted) with the side stand and the pushing lever's tapered end is at the top side and clamp is at the bottom as shown in Figure 3. The pushing lever is arranged such that the flat rod is kept at the top as to mesh with lifting lever. C clamp end is kept at the bottom in order to push the side stand by receiving the power from stimulator assembly.

The two assemblies are arranged relative to each other as shown as the side view in Figure 4.

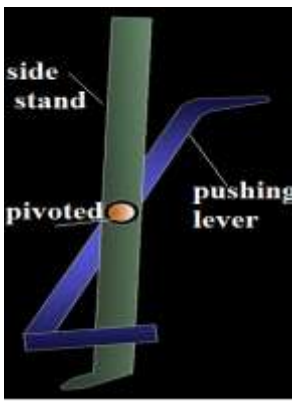

Figure 3: Lift Up assembly

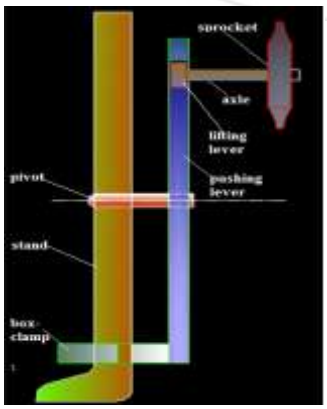

Figure 4: Side View

4. Working

When sprocket is kept between the chain drive, it rotates with chain drive. The sprocket gains power from chain and makes the lifting lever to rotate. This rotation stimulates engaged pushing lever to push the side stand to retrieve. When chain rotates in anti-clockwise direction, the sprocket rotates in clockwise direction.

4.1 Resting Condition

When two-wheeler is in resting condition (shown in Figure 5), i.e. the pushing lever, that is pivoted at the center of the side stand is engaged with the stimulator assembly lifting lever. Pushing lever's length can be changed according to type of bike and distance between side stand and chain drive. Closed coil helical spring when gets pulled, the coil of spring gets tensed during resting condition.

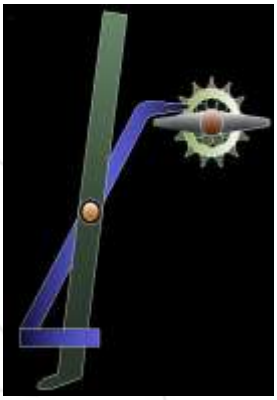

Figure 5: Resting Condition

4.2 Riding Condition

When two-wheeler is started, engine's pinion transmits power to the rear wheel by chain drive. The stimulator assembly which is kept at the center of chain drive gets rotated as the sprocket is engaged with chain drive. This in turn rotates the lifting lever mounted with axle. Hence, the lifting lever engages the pushing lever and the pushing lever pushes the side stand by clamping it with the C shaped clamp. Consequently, the tensed spring in the side stand gets compressed quickly resulting in retrieval of side stand. This is represented in Figure 6.

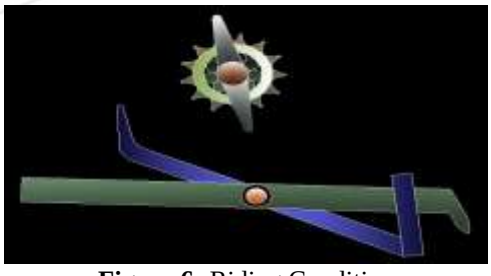

Figure 6: Riding Condition

5. Conclusion

This setup is cheap, compact and effect on performance of vehicle is less than 5%. It can be used in all type of bikes by changing the length of pushing lever can be changed with respect to length of side stand. Automatic side stand retrieval system will prove to be a major system to control accidents due to side stand problem. Cost of this system is also very

low and hence can be implemented in any bike without effecting the overall cost of vehicle.

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Author Profile

Bharat Krishan Nirmal completed B. Tech in Mechanical and Automation Engineering from G.B. Pant Government Engineering College in 2017. He has done apprenticeship with National Thermal Power Corporation in 2015 and Engineers India Ltd. in 2016. He is currently working with Godrej and Boyce Mfg. Co. Ltd wef June 2017.