

Design and Fabrication of Automatic Side Stand Lifter for Two-Wheeler

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Abstract— In modern developing world, automobile plays important role especially two-wheeler i.e. (motorcycles & bikes) plays a major role. Even though they are helpful there are some sad events like accidents due to careless of rider. Some accidents occur due to forgetting of lifting side stand. To avoid such accidents, cause due to uplift the side stand, we may be produce the new advance in bike that as we press the gear lever to lift the side stand. So, we have made the project of “Automatic Side-Stand Lifter for Two-Wheeler” is to be designed based on the working principle of bikes. This mechanism is operated manually means on the feet power of rider. After starting the bike immediately when the rider puts the first gear, the side stand lifts automatically.

Key Terms— Automatic, Avoid Accident's

NOMENCLATURE

The detailed view about the automatic side stand lifter for two-wheeler and its working principles.

INTRODUCTION

The side stand plays major role while the vehicle is in rest position. The side stand is used for supporting a parked motorcycle, some disadvantages takes place as while the driver is starting the motorcycle, there may be a possibility they forget to release the side stand that will caused to unwanted troubles. Then the undistracted stand hitting the ground, affected the riders control during the turn. It causes some accident, so we make a project of automatic side stand lifter for two-wheeler.

While the two-wheelers are concerned, accidents occur 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. These are the major source for accidents, forgetting to lift the side stand causes huge accidents in rural areas partly in urban areas too, because all the other source of accident has preventive measure, but accident due to side stand do not have proper preventive measure. Most of our daily activities take place outside our home. Because of this, transportation affects every aspect of our lives specially in doing our daily routines such as going to work, school, market, mall, bank, gym, etc.

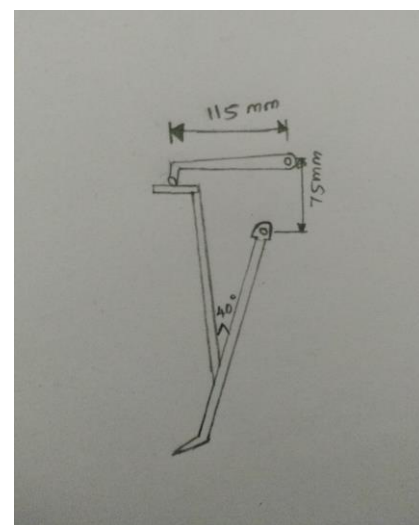
Motorcycle is generally provided with a side stand to support when they are not in used. The side stand usually

comprises of a bar or rod which is attached to the lower portion of a motorcycle frame and movable to a laterally down widely extending portion so that the motorcycle can be titled against and rest upon the bar. When the motorcycle is in use, the bar is swing upwardly and along the frame so that it will not interfere with the running of the motorcycle.

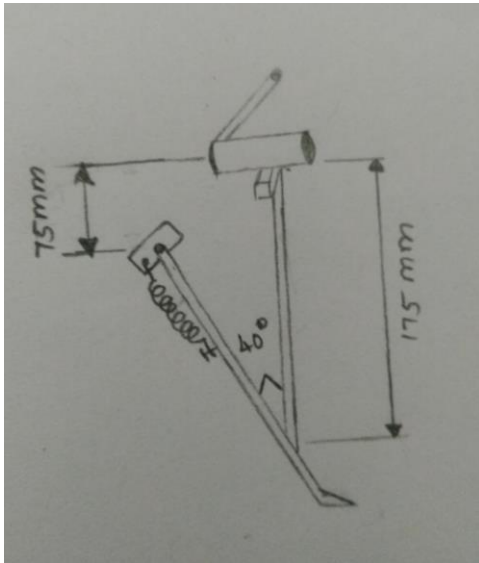


Automatic side stand lifter for two-wheeler

LINE DIAGRAM



Front view



Side view

WORKING

The main working of Automatic side stand lifter for two-wheeler is based on the working of spring. An iron rod is welded with the side stand of the bike. The spring already used in the side stand has been shortened in terms of its dimension. Since the dimension of the spring is reduced, the force exerted by the spring is extremely high. Since the rod is being welded with the side stand and when the first gear is being put, high force is exerted by the spring. Since the force is high, the side stand will be automatically lifted when the first gear is being put. This is the working of Automatic side stand lifter for two-wheeler.

COMPONENT OF SYSTEM

1. HELICAL SPRING

A coil spring, also known as a helical spring, is a mechanical device which is typically used to store energy and subsequently release it, to absorb shock, or to maintain a force between contacting surfaces.



Helical spring

2. SIDE STAND

A side stand is a device on a bicycle or motor cycle that allows the bike to be kept upright without leaning against another object or the aid of a person. A side stand is usually a piece of metal that flips down from the frame and contacts the ground.



Side stand

S.NO	During The Year	Reason for The Accident	%Of Accidents
1.	2012-2015	Forgetting to lift side-stand	36%
2.	2012-2015	Does not maintain speed limit	38%
3.	2012-2015	Does not obey traffic rules	22%
4.	2012-2015	Other problems	04%

Survive for Bike Accident

3. CAST IRON ROD

Cast steel is an alloy, which is produced by pouring molten iron into a mold. Nonferrous metal rods. Nonferrous metal rods can be defined as rods that do not contain any iron or iron alloys. Some common nonferrous metals that are used to make rods are aluminum, copper, cobalt, nickel, refractory, and titanium.



Cast iron rod

5. LIFTING GEAR LEVER

Lifting lever is the third major component of the system, the lifting lever is the rectangular rod made of MS-rod, 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 side 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. Lifting lever this smooth engagement leads proper retrieving of side-stand. This tapered surface makes the lifting lever as capable to withstand engine impact. When stand is moved vertical in position, the pushing lever engages with lifting leaves. This may not possible in all time, since the angle of lifting lever maybe any degree. So, due to effect of freewheel and tapered surface of the lifting lever can adjust itself.

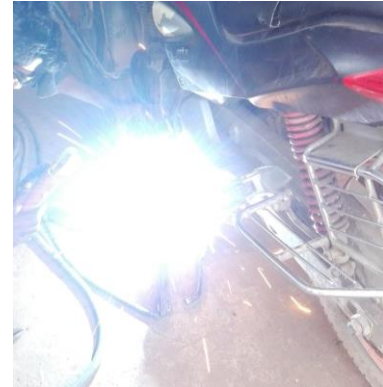


Lifting gear lever

6. ARC WELDING

Arc welding is a type of welding that uses a welding power supply to create an electric arc between electrode and 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 or slag.



Arc welding

EXPERIMENTATION

The idea for this project aroused when once I faced the consequences when I forgot to lift the side stand. At that moment, I came out with the idea of automatic side stand lifter for two wheelers. The main idea is that when the first gear is put, the side stand should be automatically lifted. At that time, I came across the internet and I found out that the same idea has been implemented in the bikes with double lever gears. But the bike I have is of single lever gear. So, I thought to implement the same idea in the single lever gear. This is the starting point of our project. I told my idea to two of my friends and we decided to implement the above idea. At first the idea was to fit a rod in the side stand such that it touches the front lever of the gear, so when the gear is put the side stand will be lifted. Cast iron was the material we used first because other materials like aluminum cannot be used since it is not as strong as iron. So, we tried a square type cast iron rod. During the process of welding it was hard to do it as the position of the rod changes during the welding. Trying it several times at last welding is done. The rod is inverted L shape. After welding, we tried to put the gear but the gear lever was stuck because of overweight of the rod and the length of the rod is long. The idea works if the force exerted on the lever is high but that is practically impossible. So, the design we first designed ended in a failure. While using the square type rod, the welding cannot be properly done due to the shape of the rod. Due to that we decided to try with different shape of the rod. Instead of square rod we used cylindrical rod as it is light weight compared to square rod and the welding can be done properly. Arc welding has been done to weld the rod with the stand. Instead of arc welding, gas welding cannot be used because heat produced in gas welding is very high and hence it will melt the stand and it will damage the stand. The usual spring attached to the side stand cannot be used as the tensile strength is very high. So, by applying normal force the stand cannot be lifted due to insufficient force. Hence the tensile strength of the spring is reduced to lift the stand by applying normal force. Even after all this modification we could not achieve our target as the angle between the stand and the rod during welding was not correct for the lifting of stand. After several attempts at last

the correct angle was determined and the rod is welded. Finally, for the safety purpose and for a good finishing of the project, grinding process is done so that the unwanted materials and fittings in the welded area is removed and a good finishing is achieved. And for the safety of the rider a rubber covering is given to the rod. This is done or else the rod may damage the rider’s leg while putting gear.

DESIGN AND CALCULATION

Calculation for helical spring

Normal wire diameter (d): 2mm Normal spring diameter

(D) : 15mm Deflection of spring (y) : 50mm

Normal load acting on spring (P) : 70N

To find number of coils:

$$y = \frac{8PD^3n}{Gd^4}$$

Assume $G = 0.8 \times 10^5 \text{ N/mm}^2$ $50 = (8 \times 70 \times 15^3 \times n) / (0.8 \times 10^5 \times 2^4)$ $n = 34$ coils

$$\text{Active coils } n_s = n + 2 = 34 + 2$$

= 36 coils

Calculation of free length and solid length: Solid length

$$L_s = n \times d = 34 \times 2 = 68 \text{ mm}$$

$$\begin{aligned} \text{Free length } L_f &= L_s + y \\ &= 68 + 50 \\ &= 118 \text{ mm} \end{aligned}$$

Calculation of pitch:

$$P = \frac{L_f - L_s}{n_s} + d$$

= (118 - 68) / 36 + 2

= 3.3 mm Calculation of helix angle:

$$\begin{aligned} \alpha &= \tan^{-1} \left(\frac{P}{\pi D} \right) \\ &= \tan^{-1} \left(\frac{3.3}{\pi \times 15} \right) \\ &= 4 \end{aligned}$$

ADVANTAGES

- It is easily installed.
- It is rigid versatile.
- It is low cost application.
- Near about less maintenance.
- It is light in weight.
- Electrical supply not required.
- It does not affect the structure of a vehicle.

APPLICATION

- It can be used in all type of bikes and motorcycle which have gears, this same gear can be used to operate lift the side stand.
- Many people while driving the vehicles forget to lift stand and hence accident takes place with the help of these application road accident can be avoided.

COST ESTIMATION

SI.NO	MATERIALS	AMOUNT
1.	WELDING	300
2.	CAST IRON ROD	80
3.	SPRING	30
TOTAL		410

Cost estimation CONCLUSIONS

During the time of riding a bike with side stand in its uplift may create problems and accident but with the help of our accessories we solve this problem. The objective of this project is to provide the rigid and safety mechanism without changing in any standard design of bike. It does not disturb the performance of the vehicle. And it is different than other mechanism. Other system requires battery power or chain power but it is not required any external power. Moreover, it should be economical for every class of society. it is new product it will promote employment and vast field development for new engineer in day period. By using this system, we avoid the accident which happened due to the side stand. Also, it’s easy to installed in any gear bike and economical.

REFERENCES

- [1] Vishal Srivastava, Tejasvi Gupta, Sourabh Kumar, Vinay Kumar, Javed Rafiq, Satish Kumar Dwivedi, "Automatic Side Stand", International Journal Of Engineering and Advanced Technology (IJEAT), ISSN: 2249-8958, Volume- 3, Issue-4, April 2014.
- [2] Pintoo Prjapati, Vipul kr. Srivastav, Rahul kr. Yadav, Ramapukar Gon, Pintu Singh, Mr.
- [3] Bharaneedharan Muralidharan, Ranjeet Pokharel, "Automatic Side Stand Retrieve System", Indian Journal of Research (IJR), ISSN: 2250-1991, VoLUME 3, Issue 2, Feb 2014.
- [4] Mr. V.V.R. Murthy, Mr. T. Seetharam, Mr. V. Prudhvi Raj, "Fabrication and Analysis of Sprocket Side Stand Retrieval System", International Journal and Magazine of Engineering Technology, Management and Research(IJMETMR), ISSN: 2348-4845, Volume -2, Issue-7, July 2015.
- [5] K. Sudershn Kumar, Dr. Tirupathi Reddy, Syed Altaf Hussain, "Modeling and Analysis of Two Wheeler Connecting Rod", International Journal of Mordern Engineering Research(IJMER), ISSN: 2249-6645, Volume-2, Issue-5, Sep-Oct. 2012.
- [6] Sanjeev N K,"Bike Side Stand Unfolded Ride Lock Link", International Journal Of Engineering Science and Research", ISSN: 2277-9655, Volume- 2, Issue-9, September-2013.