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Design and Fabrication of automatic Side Stand Retrieval System in Two Wheelers

Jerome Nithin Gladson G[1], Sukanya R[2], Vishal V[3], Vishwa M[4]
[1,2]*Professor, Department of Mechanical Engineering, Saveetha Engineering Collge, Chennai.*
[3,4]*UG Scholar, Department of Mechanical Engineering, Saveetha Engineering Collge, Chennai.*
Corresponding Author: xxxx (10)

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ABSTRACT: Automobile vehicles play important role especially two-wheelers i.e. (motorcycles& bikes) play a major role for commutation. Even though they are helpful, there are some sad events like accidents due to carelessness of rider, majority due to forgetting of lifting side stand. To rectify this problem many preventive measures have taken, but they consume extra power and also less in life. so as to eliminate this demerit and get effectiveness a new idea is taken as a project and it deals in this. This system is more effective and no separate power or effort consumption and easily be implemented practically in all types bikes. The new system "AUTOMATIC SIDESTAND RETRIEVING SYSTEM" is designed based on the working principle of bikes. Since all bikes transmit power from engine to rear wheel by means of chain drive. Since designed setup is kept in between chain drive, setup rotates and side stand get retrieves automatically.

KEYWORDS: Automobile, sensors, Engine, Power

I. INTRODUCTION

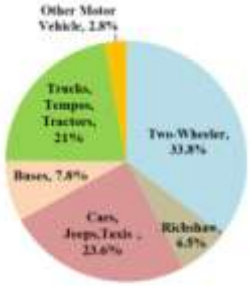
Motor cycle plays very important role because it saves the time of the traveller by reaching the target place very faster. Motor cycles are generally provided with stand for supporting the motor cycles when they are not in use. The major accidents occur due to forgetting to lift the side stand, because all other source of accidents has preventive measure. If the side stand is in park position while the motor cycle is moving, a serious safety hazards exists. The pinion transmits power to the rear wheel pinion and vehicle gets its motion.This principle is followed in all types of two wheelers, based on this sprocket side stand retrieve system is designed because this system worked with the help of the power from the chain drive. The power is used only on sprocket during lifting the stand and after that no power is needed; hence it does not affect the efficiency of the vehicle.

1.1 STATICA REPORT

According to a sales survey conducted by Statista ,the sales of two-wheelers for the fiscal year 2017-18 were around 20 million units for the top six OEM's and is expected to grow surpassing China to claim the first position in two-wheeler sales. Still, the rates of accidents caused by these vehicles are significant. The road accidents for different types of vehicles observed in the year 2016

II. PROBLEM STATEMENT

The problem may be small, but a considerable amount of accidents are caused due to these reasons. In India, about 22 % of accidents were observed to be occurred due to ignorance in lifting the side stand.



2.1 OBJECTIVE

To reduce the number of non-fatal accidents injured about 1,53,060 people in 2016, which includes forgetting to retrieve the side stand or not following the safety regulations , we design and fabricate the automatic side stand retrieval system .

III. LITERATURE REVIEW

Elimination of such kinds of accidents can be achieved by introducing additional safety devices to the vehicles, which will not only enhance the riding quality but also acts as a safeguarding device

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for the rider. This can be achieved by implementing the mechanism for retrieving side stand, which consists minimum addition of components in an already existing transmission system of a two-wheeler.

3.1 POWER TRANSMISSION :

• Bharaneedharan Muralidharan, Ranjeet Pokharel, "Automatic Side Stand Retrieve System", Indian Journal Of Research, ISSN - 2250- 1991, Volume: 3, Issue: 2, Feb 2014.

• K.Gowtham, G.Gokulnath, K.Jeevanandhan, C.Senthilraja, L.Vinoth, "Automatic Side Stand Retrieves System", International Journal of Innovative Research in Science, Engineering and Technology, ISSN: 2319-8753, Vol. 4, Special Issue 13, December 2015. Based on the working prnciple of two-wheeler the power is generated in the engine and it transmits power to the pinion and makes it to rotate. The pinion transmits power to the rear wheel pinion and makes the vehicle to move

3.2 DESIGN OF SPROCKET IN CHAIN DRIVE:

• Dr.J.Hameed Hussain, Durairaj V. P, "Design and Fabrication of Automatic Side Stand Retrive System", International Journal of Pure and Applied Mathematics, 357-362, ISSN: 1314-3395, Volume 116 No. 14 2017.

• Suthar Nirav, Patel Bhavin, Patel Shrijay, Vikram Panchal, Jayesh Patel, "Proposed Work on Sprocket Side Stand Retrieve Mechanism in Two Wheeler Vehicle", International Journal for Scientific Research & Development, ISSN: 2321-0613, Vol. 5, Issue 06, 2017.

If Sprocket is kept between the chain drive, it make the sprocket to rotate , It gains the power from the chain and make specially designed component (lifting lever) to rotate. When bike is moving then chain drive will rotate then sprocket will rotate along with chain drive. Lifting lever is fit with sprocket. Then corresponding lifting lever is rotate. It will push side stand. Then stand is lifted .

IV. DESIGN CALCULATION

4. 1 ACTUAL SAFETY FACTOR;

Let, N1= speed of pinion, Z1=number of teeth in pinion, N2 = speed of sprocket, Z2=number of teeth in sprocket, a= 1540mm

N1= 4500rpm Z1= 14 N2= ? Z2 = 43

Step-1 Calculation speed ratio:

i = N1/N2 = Z2/Z1

4500/N2 = 43/14

N2 = 1465.1 rpm

i = 43/14 => i = 3.07

Step-2 calculation of standard pitch:

p - pitch a=(30-40)p [DDB pg.no.7.74]

p min = a/50= 1540/50=30.8mm

p max = a/30= 1540/30 =51.3mm

Pitch lies between 30.8 - 51.3 [DDB pg.no. 7.72] Let p = 31.75mm

Step-3 calculation of breaking load:

power is in Kw

N= Q . V / 102 . n . ks in Kw [DDB.pg.no7.78]

n is power :.

v= Z1N1p / 60 for chain and sprocket velocity.

=14 x 4500 x 31.75 x 10 -3 / 60

v = 33.3 m/s.

n= min safety factor [DDB.pg.no.7.77]

n= 13.1 for around 1465.1 rpm.

k s = service factor

k 1 = 1.5

variable load or load with heavy shock [DDB.pg.no.7.76] k 2 = 1.0

adjustable support

k 3 = 1 centre distance sprockets k 4 = 1 position of sprockets

k 5 = 0.8 oilbath lubrication

k 6 = 10 single shift.

ks = k1 + k2 + k3 + k4 + k5 + k6 = 1.2 N = Q x 33.3 / 102 x 13.1 x 1.2

Q= 286.67 kgf

Step-4 selection of chain: [DDB.pg.no.7.73]

20 B-1 -R3119 for p = 31.75 & [Q]> 286.67

roller dia = 19.05 mm.

width = 19.60 mm

bearing area= 2.58 cm^2

wt /m= 3.65 kgf

breaking load= 9500 kgf .

Step-5 actual factor of safety:

[n] = Q / ∑ p [DDB pg.no.7.78]

p= all forces in kgf

p t = 102 N / v = 102 x 5.9 / 33.3= 18.07 kg f

pt - tangential force

pc = Wv2 / g = 3.65 x (33.3)2 / 9.81 ,= 412.5 kg f

pc - centrifugal force

ps = k. W. a

ps - tension due to sagging k= 6 (horizontal sag)

ps = 6 x 3.65 x 1320 x 10-3

ps = 28.9 kg f

[n] = 9980 /(18.07 + 412.5 + 28.9) = 21.7 ~ 22 .

[n] > n => 22 > 13.1

Step-6 checking for bearing :

power N = σAV / 102 Ks in kw [DDB pg.no.7.77]

5.9 = σ x 2.58 x 102 x 33.3 / 102 x 1.2

σ = 0.08402 kg f /mm2

[σ]= 1.87 kg f / mm2 for 1465.1 rpm

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(allowable stress)
$\sigma = 0.08402 < [\sigma]$.
Hence the design is safe.

4.1 Calculation of safety factor for additional set up

no of teeth of additional sprocket pinion : 14
diameter of sprocket pinion d= 3cm or r = 1.5cm
weight of the sprocket pinion : 200g
weight force of 1g = 32.1740 f/s
Sprocket pinion force = 200 x 32.1740 / 1000 = 6.4348 kg f < 9800 breaking load.
It does not affect the chain drive and the design is safe.

V. SPECIFICATIONS OF MATERIALS

Specification axle;
Material - Mild Steel
Shape- Cylindrical rod
Length - 50mm
Diameter -13mm
Inner Dia. of Supporting Axle
15 mm
Outer Dia. Of Supporting Axle
17mm
Length - 30mm
Thickness - 3mm

Specification of sprocket ;

Material - High Carbon Steel Pitch -12.7mm
Width -30mm
Teeth - 43
Balls -High carbon high chromium steel balls

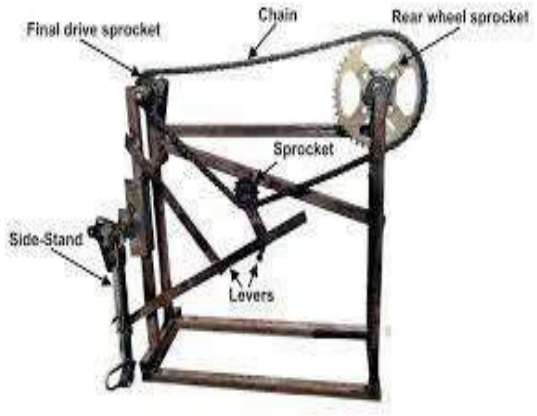
Specification of pushing lever ;

Material -Mild Steel
Length Of Lever -180mm
Thickness -3mm
Diameter Of Hole -8mm

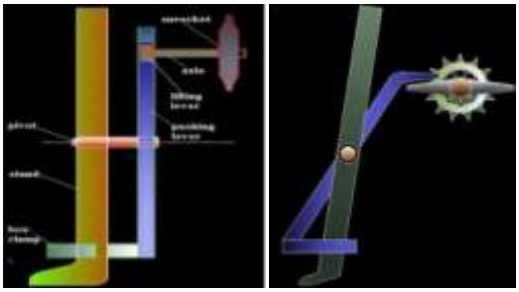
Specification Of Lifting Lever;

Length Of Lever -95mm
Thickness -10mm
Tapered Angle -45deg
Chamfered Angle-20deg
Position -Parallel To Sprocket
Welded Length -13mm
Material Used -Mild Steel

VI. MODEL PRESENTATION



PART DIAGRAM REPRESNTATION:



VII. WORKING PRINCIPLE:

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 bikes transmit power from engines 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 wheels sprocket and converted into rotary motion. That rotary motion of the rear wheel makes the bikes to move. Based on this Sprocket side stand retrieve systems 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 (lifting lever) to rotate. This rotation incites engaged pushing lever to push the side stand to retrieve.
The working of Sprocket-Side Stand Retrieve System is explained below in both (resting & riding condition of two-wheeler)

1. 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 retriever assembly

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(pushing levers tapered end get engage with tapered end of lifting Lever).

Sprocket- side stand retrieve system will definitely good retrieve system. Since the setup is compact it does not affect the performance of the vehicle. Because of the power is obtained from chain drive. It will be the major system to control accidents due side stand problem and protect the careless rider. This system can be implemented in all types of bikes by changing small variation in size and cost of this system also very low and so it will not affect the economic level also. While compare to other system this SPROCKET SIDE STAND RETRIEVE SYSTEM will be the life saver.

2. Riding Condition:

When two-wheeler is started, Engines 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. so, when the sprocket rotates the lifting lever mounted with axle rotates. hence the lifting lever lifts engaged the pushing lever and therefore the pushing lever pushes the side stand by clamping it clamp stand holder and hence the spring tensed in the side stand get compressed quickly as a result side stand get retrieves.

VIII. PHOTOGRAPHS:

ADVANTANGES

1. It reduce the human effort
2. It does not require any additional power source.
3. Compact in size, so there is no need of more space to initialize
4. Prevents from accidents
5. Complexity is reduced

CONCLUSION:

- "Sprocket- side stand retrieve system " will definitely good retrieval system .since the setup is compact it does not affect the performance of the vehicle ,because of the power is obtained from the chain drive
- Definitely the system could be used in all types of two wheelers .
- These system can be implemented in all types of bikes by changing small variation in size and cost of this system also very low and so it will not affect the economic level, while compare to other system this "automatic side stand retrieval system will be life saver.

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