

HYDRAULICALLY OPERATED CENTRE STAND FOR TWO WHEELERS

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Abstract: Existing ways of standing a two wheeler is done with two components used for parking the two wheelers, mainly side stand, and centre stand. These two components experience static loading when the two wheelers are parked. The side stand is easily deployable allows the two wheelers for leaning to the left side. The two wheelers must be elevated up onto the centre stand. For the operation of the centre stand, the rider has to get down from the two-wheelers and pulls against a lever that is difficult to pull sometimes. The rider has to elevate a minimum of 50 percent of the weight of two wheelers for retracting the centre stand. The paper aims at developing an automatic centre stand that comprises a hydraulic pump or other actuators like a motor that is powered by the battery and is controlled via a knob. The functioning of the pump is to retract the centre stand legs and elevate the vehicle. The automatic centre stand reduces the human conciliation to almost negligible.

Keywords-Centre stand, DC motor powered hydraulic pump, key-switch, battery, etc.

I. INTRODUCTION

The traditional method of implementing a centre stand requires a great deal of human effort[1]. It is a painful task to apply the scooter centre stand, especially for ladies and the elderly. Therefore, they go side by side, but more parking spaces are consumed. The centre stands automatically reduces manpower[2].

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1.1 Determination of the problem

Motorcycle history indicates that many models have been streamlined due to new engineering and innovation[7]. Chassis, engine assemblies, pneumatics, and suspension systems are optimized, but for different components, there are still several open loops. The parking system, the centre and the side stand present many unsafe problems[8].

Some of the problems are listed below: -

- i. **Ian Falloon** has recorded that keeping two-wheelers on side stand for a long time adversely affects the lifetime of the tyre[9].
- ii. **James R. Davis** discussed about the safety and dynamics which include both the centre stand and the side stand. These both stands do not restrict forward motion completely. In such cases, the two-wheelers need to be kept in first gear when parked[10].
- iii. **Zainul Huda** investigated the reasons behind the failure of the side stand. Due to the excessive loading of weight and the phenomenon of corrosion, large stresses get developed in the material by which the side stand is fabricated. Manufacturing and fabrication of both the side stand and main stand are done by plain carbon steel conventionally. Severe corrosion also results in the main stand. This investigation concludes that change in the material is also a factor for failure of the side and main stand.

On the basis of a survey conducted, it was discovered that about 72 percentage of men and 28 percentage of women drive two-wheelers. Among 20% of these people are elderly and the others are adults. It has been found that it is difficult for women and old people to apply for a central position.

Greater efforts are required for retracting the side stand of the two wheelers[11]. If the main stand installed in the two wheelers performs the same work as of the side stand, then there is no requirement of such a side stand that only increases the overall weight of the two wheelers. Hence there is a need to develop an automatic centre stand in order to support the two wheelers when parked.

In addition, on the application of the side stand of the two-wheeler,

- a) Fatigue is developed due to overloading on the stand
 - b) Chances of the accident are increased
 - c) More parking spaces are required
 - d) Upon application of the side stand that is in contact with the earth and lifetime of the battery is reduced.
- As the negative terminal of the battery is attached to the two wheeler's body which in return is connected to the two wheeler's stand, so the battery gets grounded via the stand.

II. FORMATION OF THE SOLUTION

The automatically operated centre stand assembly is mounted at the same place as that of the conventional stands. It possesses 3 main components: -

A hydraulic pump helps in providing linear motion to the legs of two wheeler's stand that is attached to the joint. It is attached in such a manner that loads are distributed evenly on both limbs of the stand.

A guide way supporting structure having an ability to get attached to a chassis that holds on reciprocating legs.

The motion of the leg is monitored via the key switch that monitors and controls the operation of the hydraulic pump (with the inbuilt DC motor) powered by the battery.

III. COMPONENTS REQUIRED

- a) Twelve-volt DC (Direct Current) powered the hydraulic pump
- b) Modified Centre stand
- c) Key-operated switch
- d) Battery

a) **Twelve-volt DC (Direct Current) powered hydraulic pump:**

The linear actuator is the actuator that is employed for creating motion in the straight line in contrast to a circular motion of the existing electric motors. It handles a greater amount of the static load and holds position even when the supply of the power is withdrawn. The fixed limit switches present at each end of the actuator cuts off the supply of power, tripped for preventing the overrun. These actuators are used in the operations of the machine tools and types of machinery of the industries. These are also used in computer-related devices like disk-drives, printers.

Operation of the twelve-volt DC (Direct Current) powered hydraulic pump is illustrated below.



Fig. 1: Initial Position



Fig. 2: Final Position

b) Modified Centre Stand

- i. The front view of the modified centre stand comprises of the following parts listed below.
- ii. Connecting joint fabricated for the hydraulic pump.
- iii. A guideway and supporting structure capable of getting connected to the chassis of the two-wheeler.
- iv. Reciprocating legs (moving up and down).
- v. A contact pad

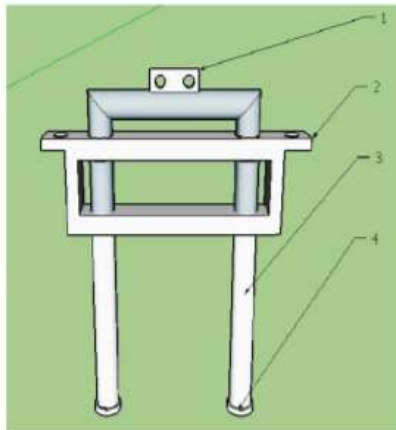


Fig. 3: Front View

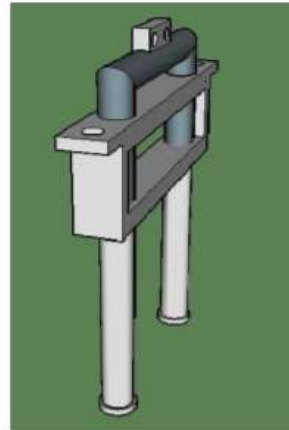


Fig. 4: Perspective View

c) Key-operated Switch

The key-operated switch is primarily employed for safety and security purposes. It basically operates like that of the existing switch with rotary motion. The switch can be only activated via using a key. Various types of the key-switches are already available basing on the rating of the ampere.

The primary advantage of employing a key-operated switch in the place of a normal switch is done for avoiding accidental applications of the normal switches while driving the two-wheeler vehicles. This also aims at providing safety to the children and when operated by unskilled people.



Fig. 5: Key

d) Battery

The electric battery is the device that comprises one or more than one electrochemical cell that transforms the stored chemical energy into electrical energy. Each of the cells contains the positive terminal (i.e. cathode), and the negative terminal (i.e. anode). The electrolyte allows the ions to travel between the terminals and the electrodes that result in the production of the current for flowing out of battery in order to perform work. Various types of batteries are already available in markets with the desired specifications and features.

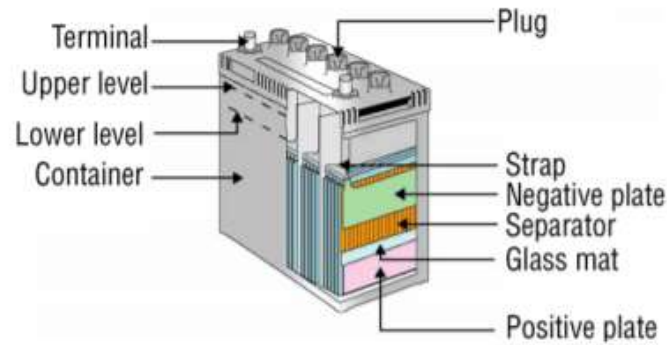


Fig. 6 Battery

IV. WORKING PRINCIPLE BEHIND THE OPERATION OF THE CENTRE STAND

The linear hydraulic pump that is attached to the middle of the stand actuates and pushes the stand down when the main switch is switched over using the pin. When the floor is touched, the stand cannot move further and therefore the motorcycle gradually rises.

The stand is in the required position on the full movement of the hydraulic pump. The actuator cannot be pushed manually without a button, which provides a further safety advantage. The hydraulic pump begins to move in the reverse direction and therefore lifts the stand and lowers the motorcycle back onto the wheels when it changes turning key in reverse direction to OFF position.

V. ADVANTAGES

- i. No human effort is required
- ii. Less space is required for parking
- iii. User-friendly as it is easy to handle both for women and the old persons
- iv. Easily accessible by the differently-abled persons
- v. Easy overhauling as this can be easily installed and uninstalled

VI. CONCLUSIONS

Hydraulic pump with battery power and modified booth are used for automatic operation of the stand. By contrast to a vehicle on a side stand, the principal benefit of this system is a reduction by human resources and needed parking space. This also provides guidance on security.

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