International Journal of Advance Research in Science and Engineering
Vol. No.6, Issue No. 07, July 2017
www.ijarse.com
IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

Design and Fabrication of Brake and Accelerator by using single pedal

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ABSTRACT

The Project deals with construction and working of Accelerator and Brake operated by single pedal using on/off and cutoff limit switches for electronic vehicle and this same technique is also applicable to normal vehicles. It is technique for easily controlling of solar cart vehicle in the future and will reduce accidents and it can be used for physically challenged person. The main objective of this innovation is to eliminate the operator's risk of pressing the wrong pedal at the time of emergency as well as reduction in the driver's reaction time to switch from accelerator to brakes or vice versa. This new mechanism is designed in such a way that it can be implemented in any type of automotive vehicle. This concept is used to operate the brake and accelerator by a single pedal so it is simple and can be adopted conveniently. Now the automobiles are equipped with independent pedal controls for operating the accelerator and brake, these pedals being operated by right foot, and since the two functions are opposed and incompatible it is necessary to leave one pedal free in order to operate the other. It can therefore be supposed that some drivers have difficulty in removing their foot from the accelerator pedal and transferring it to the brake pedal quickly in emergency situations.

I. INTRODUCTION

One of the worst cases occurred in Santa Monica in 2003, when an 86-year-old man pressed the wrong pedal killed 10 people and injured 63 when his speeding car plowed through an outdoor market his incident happened because of pedal misapplication. Now a days the increment in the death rate of India is 27% because of the accidents on the highways hence this innovation can help us to reduce the death rate by 10% to 15% since this can be used in the any 4 wheeler. Some solar cart driver feels uncomfortable on racing because of shifting the feet from pedal to pedal. For this we introduce limit switches in this operation. The innovation relates to the improvements in the mechanical movements and has a particular reference to a Combined foot brake pedal and accelerator pedal movement. That is arranged in such a form that its action to affect one or the other function is carried out without the possibility of error, and without one function interfering with the other. As conventional pedals are equipped with separate brake and accelerator. The clutch is to the left, the accelerator to the right and the brake in the middle. One side of the foot should be used for pressing the accelerator and brake. The arrangement guarantees, that the throttle is released as the driver brakes. However, it also means that the foot is almost always placed at a distance from brake, that is, on the accelerator, thus movement time adds to brake reaction time. The foot which may inaccurately placed on the brake. Which result in bad braking performance

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ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

and it may even miss the brake and hit the accelerator. It is being observed that it takes longer to brake in an emergency with separate pedals. It takes at least 0.25 seconds to move your foot from one pedal to other and hence, at 80 kilo meters per. hour this adds five meters to vehicle's stopping distance. Moreover, due to sight misjudgement it is easy to hit the wrong pedal which leads to accelerator being clipped, causing a crash This new mechanism enables the driver to control acceleration and braking using one feet, which will lead to reduction in stopping distance, misjudgement and ultimately decrease in number of road accidents that may happen each day.

II. CONSTRUCTION

The main components used in this project are base frame, rod, wires, eliminator, motor, limit switch(on/off) and cut off limit switch, spring(torsion and tensile).

The pedal consist of two pivot points 1 and 2. The pivot point 1 and 2 used for acceleration and braking. For acceleration pivot point 2 is used and for braking pivot point 1 is used. The pedal is made up of Mild steel.

2.1. Base frame

A frame is often a structural system that supports other components of a physical construction and/or steel frame that limits the construction's extent. The frame can with stand all the other components like motor ,limit switch , cut off valve and other rods etc.. The frame should have the maximum load withstand capacity. The frame is joined by using arc welding.

Fig.1 Base frame

2.2. Tensile and Torsion spring

A spring is a flexible elastic object used to store mechanical energy. Torsion spring is a spring that works by torsion or twisting. It is used for automatic retrieving of pedal during acceleration (Feet Moment) Tensile spring is used for breaking (Leg Moment)

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Fig.2 Torsion Spring

Fig.3 Tensile Spring

2.3. Pedal

Automotive the pedal used by the driver of a vehicle to operate the brakes and acceleration. Examples from the Web for brake pedal and acceleration pedal. The controls appeared to be functioning smoothly enough. In this project we can use single pedal for braking and acceleration to quickly stop the vehicle. The pedal is joined by using arc welding. A combined and pedal mechanism is designed to function as both brake and accelerator, which can be adopted by driver quickly and effortlessly. This new mechanism enables the driver to control acceleration and braking using one feet, which will lead to reduction in stopping distance, misjudgement and ultimately decrease in number of road accidents that may happen each day.

2.4. Limit switches (on/off and cut off)

ON/OFF Limit Switch supply the current to motor. ON/OFF Limit Switch is used to actuate the motor during acceleration. CutOFF Limit Switch cut the current supply to the motor. CutOFF Limit Switch is used to stop the

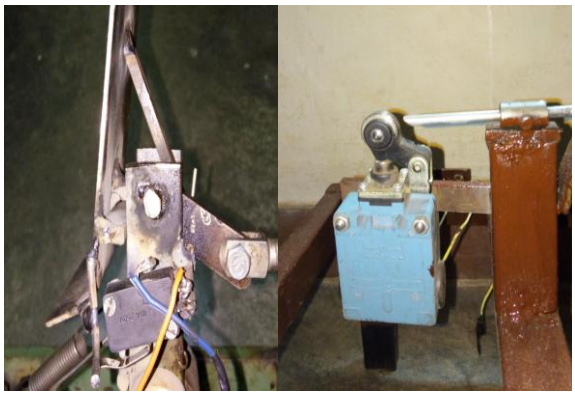

Fig.4. ON/OFF Limit Switch and
Cut OFF Limit Switch

2.5. DC motor

Here the motor is run by using the limit switch .When the limit switch is ON the motor is run. when the cut off switch is actuated the motor is stopped. This technique is used for solar cart vehicle.

IJARSE
ISSN (O) 2319 - 8354
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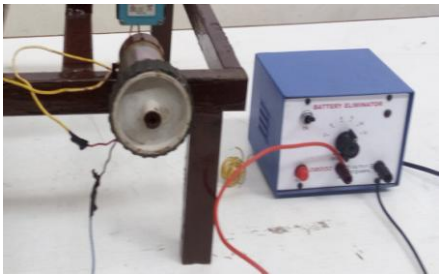

Fig.5 DC motor

2.6.Eliminator

Eliminator is used for converting the power supply from AC to DC voltage current. It also varies the voltage between 5v to 12v. It is a device powered by an electrical source other than a battery. It may be used by a second device designed to be powered by batteries.

Fig.6 Eliminator

2.7.Connecting rod

The rod which is used to actuate the CuttOFF limit switches. The connecting rod is attached to the pedal. When pedal is pressed during braking .The connecting rod moves forward and hit the CuttOFF limit switch and motor stops.

Fig.7 Connecting rod

III.CONNECTIOINS

There are two terminal positive and negative. In which the positive terminal from the rectifier is connected to the ON/OFF limit switch and that ON/OFF limit switch is connected to the CUTOFF limit switch and this CUTOFF limit switch is connected to motor. In other side the negative terminal is connected to the motor from rectifier. The current is passed to the ON/OFF limit switch when this limit switch is ON. The current is passed to the CUTOFF limit switch. When the CUTOFF limit switch is not actuated the power is passed to motor and the motor runs. When the CUTOFF limit switch is actuated. The power is not passed to the motor and the motor is stopped.

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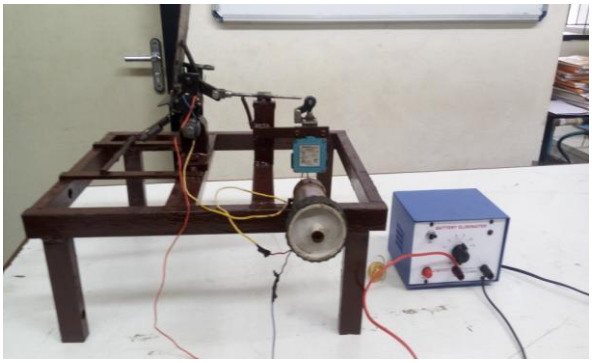

Fig.8 Connection

IV.WORKING PRINCIPLE

4.1.Acceleration

In order to accelerate, the feet movement is used. lever rotates about pivot point 2(upper pivot point). The upper half of foot lever moves in downward direction and lower half of pedal moves in upward direction rotation of foot lever would be in anticlockwise direction. For solar vehicle during acceleration

the limit switch in the lower side of the pedal ON and actuate the motor. The support is kept in stationary position, this resistance is achieved by using helical tension spring. The main purpose of spring is to provide Resisting force to the support during throttling. Hence, by using upper half of the foot, driver can accelerate the vehicle without actuation of brakes.

4.2. Braking

In order to brake, leg movement is used. Feet movement is used for acceleration. In this the foot lever and support both moves in linear direction. Due to linear movement the connecting rod which is attached to the pedal through the linkage is moved towards the CUTOFF limit switch and hit the button on top of the CUTOFF limit switches and the motor stops rotating. For normal vehicle. there would be no acceleration of the vehicle. This is achieved by fixing the source (acceleration cable) at the bottom end of the pedal near the heel rest. On releasing the pedal, the spring tends motor during breaking. One end of motor is connected with battery and other end is connected with cutoff of input. to come in original position due to spring action. Hence, driver can decelerate or stop the vehicle without actuation of throttle.

V. WORKING PROCESS

5.1.WELDING

Arc welding is a process that is used to join metal to metal by using electricity to create enough heat to melt metal, and the melted metals when cool result in a binding of the metals. It is a type of welding that uses a welding power supply to create an electric arc between an electrode and the 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, vapor, or slag. Arc welding processes may be manual, semi-automatic, or fully automated. Here the arc welding is used for join the base frame and the pedal to the base frame.

IJARSE
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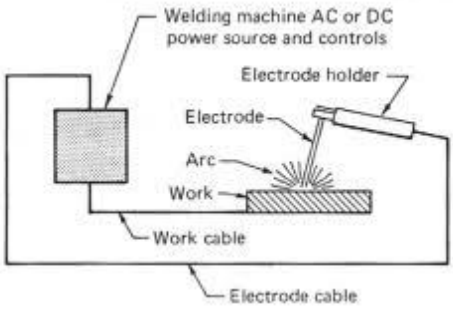

Fig.10 Welding

5.2 CUTTING

Cutting is a collection of processes where in material is brought to a specified geometry by removing excess material using various kinds of tooling to leave a finished part that meets specifications. The net result of cutting is two products, the waste or excess material, and the finished part. In woodworking, the waste would be sawdust and excess wood. In cutting metals the waste is chips or swarf and excess metal.

5.3.SOLDRING

Soldring is a process in which two or more items (usually metal) are joined together by melting and putting a filler metal (solder) into the joint, the filler metal having a lower melting point than the adjoining metal. Soldering differs from welding in that soldering does not involve melting the work pieces. In brazing, the filler metal melts at a higher temperature, but the work piece metal does not melt. In the past, nearly all solders contained lead, but environmental and health concerns have increasingly dictated use of lead-free alloys for electronics and plumbing purposes. Soldering is used to form a permanent connection between electronic components**.**

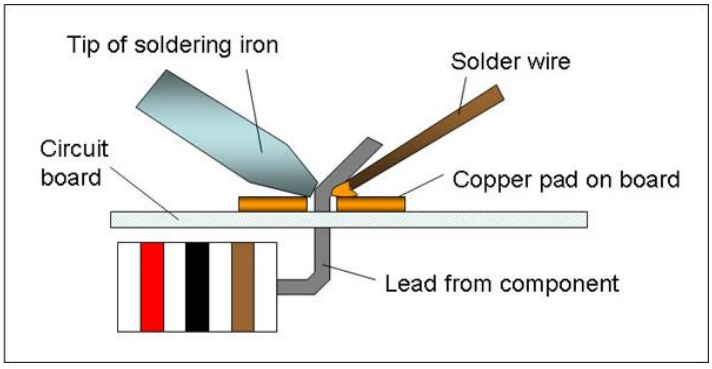

Fig.11 Soldring

TABLE-1 *MOTOR SPECIFICATION*

S.No	Description	Values
1	RPM	60 at 12 V
2	Voltage	4 to 12V
3	Torque	18 kg-cm
4	Shaft diameter	6mm
5	Weight	140gm

IJARSE
ISSN (O) 2319 - 8354
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TABLE-2 *PEDAL MEASUREMENTS*

S.No	Description	Dimensions (mm)
1	Length of the pedal	175
2	Width of the pedal	68
3	Thickness of the pedal	2

VI. ADVANTAGE

1. This combined pedal mechanism thus provides a driving control which permits the quick and smooth transition from acceleration to braking, without needing to transfer the foot from one pedal to another.
2. For physically challenged persons the pedal is more useful because they no need to change their foot.
3. A system to generate heat from Scheffler reflector consists of a number of subsystems and components. However, it is easy to see what the entire system does by specifying just a few basic parameters.
4. The acceleration and brake can be done quickly. It will also used in electric motor vehicle.

VII. LIMITATIONS

1. There is more force is required while apply a sudden brake to stop the vehicle.
2. It is difficult to operate the pedal during climbing on hills. To overcome that problem .we should use handbrake. It will be uncomfortable to user

VIII.CONCLUSION

We can conclude that this new mechanism results in avoiding interference of braking during acceleration and vice versa. The rapid increase in number of vehicles on roads day by day, demands an exploration of such mechanism to get rid of driver's effort and reduce road accidents. This innovative project will be useful for physically challenged person in future.

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