



A COMBINED PEDAL FOR BRAKE AND ACCELERATOR

¹Mr. Girish A R, ²Mohammed Safreed, ³Antony Dcosta, ⁴Ahammed Munaim Hashmi, ⁵Mohammed Muzammil Arshak

¹Assistant Professor, ²Student, ³Student, ⁴Student, ⁵Student

¹Department of Automobile Engineering,

¹Srinivas Institute of Technology, Mangaluru, India

Abstract: *The present paper deals with design, construction and working of Accelerator and Brake operated by one pedal, which may be a technique for reducing road accidents. 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 used in any type of automotive vehicle. The mechanism used for combined brake and accelerator is simple and can be adopted conveniently. At the present time 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. To solve this problem, a new brake pedal and accelerator system is designed. Then a prototype has been prepared which confirms the required mechanism and finally tested for its working. Therefore, it gives an optimized design for new combined pedal mechanism. Hopefully this project will help everyone to understand how implemented mechanism works more efficiently, which can help to reduce the accident that may happen in each day.*

I. INTRODUCTION

Nowadays the increment in the death rate of India is 20% because of the accidents on the highways hence this innovation can help us to reduce the death rate by 7% to 10% since this can be used in the any 4-wheeler. 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. It essentially consists of a joint pedal for operating the brake and accelerator, 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.

The conventional pedals are equipped with separate brake and accelerator system. The clutch is to the left, the accelerator to the right and the brake in the middle. The right 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 break reaction time.

The foot may be inaccurately placed on the brake resulting in bad braking performance 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 0.2 seconds to move your foot from one pedal to other and hence, at 80 kilo-metres per hour this adds five meters to vehicle's stopping distance. Moreover, due to sight miss-judgement it is easy to hit the wrong pedal which leads to accelerator being clipped, causing a crash.

In order to eliminate such kind of problems, a combined 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 foot, which will lead to reduction in stopping distance, miss-judgement and ultimately decrease in number of road accidents that may happen each day.

II. PROBLEM DEFINITION

Generally, while driving an automobile the driver needs to press the brake and accelerator pedal during the motion of the vehicle. In case of emergency driver needs to press the brake pedal and sometimes instead of brake drivers press accelerator pedal due to panic. Hence, to overcome this a combined pedal for both accelerator and brake can be used which reduces the chance of accident and damage to the vehicle.

III. MANUFACTURING PROCESS

Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing, and planning the production process prior to manufacturing.

IV. COMPONENTS

The components that are used in the project A COMBINED PEDAL FOR BRAKE AND ACCELERATOR are as follows,

- Frame,
- AC motor
- Wheel arrangement,

- Brake shoe,
- Brake oil,
- Hydraulic reciprocating pump,
- Combined Brake and accelerator pedal.



Fig. 4.1 Frame



Fig. 4.2 AC motor



Fig. 4.3 Hydraulic pump

V. WORKING MECHANISM

5.1 Acceleration

In order to accelerate, the foot 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 i.e., rotation of foot lever would be in anticlockwise direction. However, 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.

5.2 Braking

In order to brake, the foot lever and support both moves in linear direction such that, 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. Therefore, the whole assembly (foot lever, support) rotates about the pivot point 1 and spring comes in stretched position. On releasing the pedal, the spring tends to come in original position due to spring action. Hence, driver can decelerate or stop the vehicle without actuation of throttle.

5.3 Neither Acceleration nor Braking

In this condition foot of driver simply rests on foot lever, it does not cause either of the function. Figure shows the positioning of foot, any further movement results in acceleration or braking.

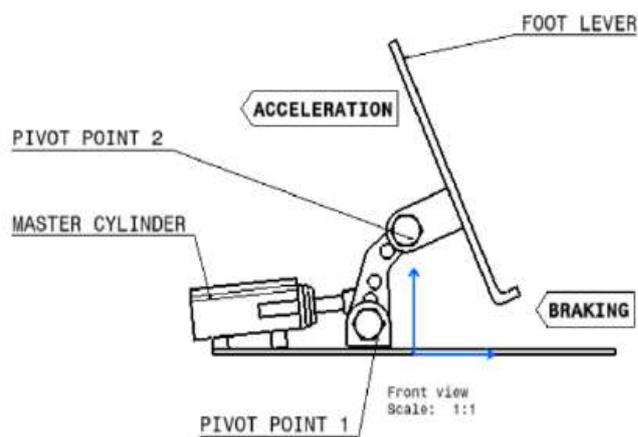


Fig. 5.1 Working Mechanism

VI. COMBINED BRAKE AND ACCELERATOR ARRANGEMENT

The pedals mounted at the centre of a vertically displaceable pivot. The ends of the pedal serve as accelerator and brake. To accelerate driver, pivot the pedal while to Brake driver, and push the entire pedal mechanism forwards. Accelerating is a feet movement and, while braking comes from extending whole leg.

A driver can switch from acceleration to braking instantly, just by pressing the combined pedal forwards. A few potential disadvantages with the combined pedal may be noted. One significant problem is the risk for confusion when the person that is familiar with separate pedals for the brake and accelerator must relearn these actions when required to use the combined pedal. The most obvious danger is that drivers will move their foot away from the pedal, particularly in emergency situations. A corresponding problem can arise when the driver, who is accustomed to the combined pedal, returns to the system of separate pedals.

In this latter case, the driver stretches his out his or her leg during braking and hence inadvertently presses the accelerator instead of the brake pedal. A second possible hazard concerns an ergonomic problem. If the driver has difficulty in relaxing because of concern for unintentional braking, physical tension and strain likely to occur. The third imperilment is that the shortened reaction time in braking in combination with the increase in flexibility can bring about what is known as the compensation phenomenon.



Fig. 6.1 Combined brake and accelerator pedal

VII. RESULTS AND DISCUSSION

1. It takes longer to brake in an emergency with separate pedals. It takes at least 0.5 to 1 second to move the foot from one pedal to other.
2. With the design shifting the pedal is totally eliminated so driver can immediately apply brakes.
3. Another problem with separate pedal is that there is a possibility of hitting the wrong pedal, this problem is also solved.

VIII. CONCLUSION

With the above study it is concluded that this new mechanism results in avoiding interference of braking during acceleration and vice versa. Moreover, it is advantageous over conventional pedals. 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 feet from one pedal to other. The rapid increase in number of vehicles in the road's day by day, demands an exploration of such mechanisms to get rid of driver's effort and reduce road accidents. This innovative project will be helpful for physically challenged persons in future.

REFERENCES

- [1] *Encyclopedia of Automotive Engineering*, Online-2014 by John Wiley & sons, David Crolla, and David E Foster.
- [2] *AUTOMOBILE ENGINEERING Vol.1 & Vol.2* by Dr. Kirpal Singh.
- [3] *A Textbook of MANUFACTURING TECHNOLOGY* by R. K. Rajput.
- [4] www.wikipedia.org
- [5] www.Howstuffworks.com
- [6] *Design Data Hand Book* – K. Mahadevan and K. Balaveera Reddy, CBS, Publication.