Combination of Break and Accelerator Pedal

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Abstract— It has been reported that some automobile accidents are caused by mistakenly pressing down the accelerator, when the intention was to press down the brake. Recordings of an electro-goniometer at the right knee joint on some subjects situations the knee initially became taut. 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. So this design makes ergonomically fit for user that enables reducing shifting time between accelerator and brake. Combination of brake and accelerator pedal is very much useful for driver.

Keywords: Automobile Accidents, Shifting Time, Misapplication of Pedal Pressing

I. INTRODUCTION

This is a combination accelerator and brake control mechanism where in there is a single pedal serving both as the charge control and the brake control. The single pedal is pivoted on a pivot fixed in a base, the pedal extending through the vehicle floor board hence it is single pedal pivotally mounted on one end of a lever, the other end of which is adapted to be pivotally mounted on the floor of the vehicle. The heel-engageable portion is connected by a link to the throttle-operating lever. A brake-operating lever is pivotally mounted on the vehicle and connecting rod pivotally connects such lever which attached with push rod of master cylinder. Pressing with the foot on the superior or upper part of the single pedal controls the charge to the vehicle motor, pressing with the foot on the lower or inferior part of the pedal controls the brakes of the vehicle. A see-saw rod contacts directly or indirectly with the ends of both the vehicle gas control rod or the brake control rod, and the motion of the pedal pressed down on its top end acting through the see-saw rod moves the charge control mechanism from neutral position to gas control position, and pressing the lower end of the pedal actuates the brake control mechanism. Thus, the action of the human foot with this device is very similar to that with the customary two pedal control, for the usual accelerator is usually operated by toe pressure and the brake pedal is usually operated by heel pressure.

II. RELATED WORK

At the present time, as is known, automobiles are equipped with independent pedal controls for operating the accelerator and the brake, these pedals being operated by the 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. Any car driver has been able to verify that the change of position of the foot, so that it may pass from one pedal to the other, needs a determined time, the duration of which depends on the skill and capacity for reaction of the driver, which time, added to that necessary to reduce the speed of the automobile until it comes to a complete stop, is translated into a greater distance covered by the car from the moment that the driver perceives the need to brake until the car stops. Thus, for example, assuming a time of three tenths of a second to effect the change from one pedal to the other in a travelling at sixty kilometers per hour, the distance supplementary to the normal braking distance will be five meters, and obviously considerably distance on the elimination of which there may depend a serious accident. The invention essentially consists in the realization of a joint pedal control for operating the brake and the accelerator, arranged in such a form that its action to effect one or the other function is carried out Without the possibility of error, and without one function interfering with the other.[1]

To reduce the problems facing the drivers eighteen male and female drivers varying in age participated in the study. The evaluation was carried out during special driving man oeuvres and in normal traffic in which all drivers used the same test vehicle. The results indicate that drivers were able to learn the new combined pedal mechanism quickly and effortlessly and that the number of mistakes was extremely low during the acquisition phase in learning the new system. The Gustafsson´s combined accelerator- brake pedal .An accelerator-plate is mounted to the end of a brake-pedal lever. When operating the pedal-system the driver puts the foot, which should be kept there all the time when driving, on the accelerator-plate. When accelerating the driver pushes with the fore foot and folds down the accelerator like in a conventional vehicle. But when braking the driver reaches out with the leg, still with the foot on the accelerator. The throttle is released as the brake is affected so the driver does not have to release the throttle by lifting the fore-foot before braking. An electromagnet supports the brake-lever to prevent accidental braking during acceleration. For safety reasons an extra brake-pedal is mounted to the left side of the brake lever in case the driver moves the foot away from the pedal in, for example, emergency situations.[2]

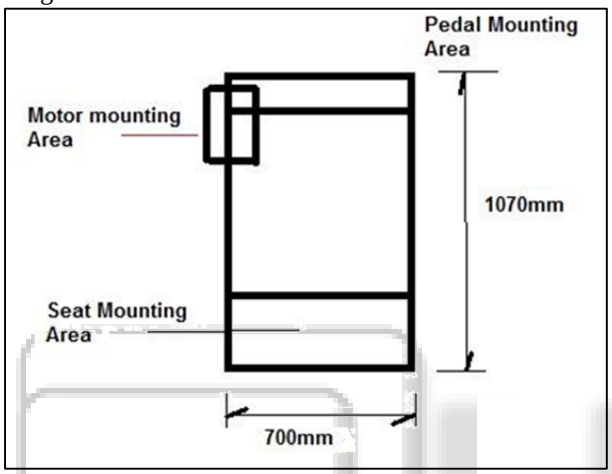
present invention generally relates to a control device for automobiles or similar type vehicles having an internal combustion engine with a carburetor normally provided with a throttle valve for controlling the ‘inlet of a fuel and air mixture in which there is incorporated a construction providing for closing of the throttle valve when the brakes of the vehicle are applied and providing for opening of the throttle valve when the brakes are released. The primary object of the present invention is to provide a‘ combination brake and accelerator specifically adapted for use in conjunction with automobiles having automatic transmissions but which may be employed with other types of automobiles. A further object of the present invention is to provide a combined brake and accelerator in which a connection is provided between the brake pedal and the throttle valve whereby application of pressure on the brake pedal will serve to close the throttle valve with upward movement of the brake pedal when released causing opening movement of the throttle valve with there being provided means for manually adjusting the opening movement of the throttle valve thus controlling the speed of the, vehicle and also automatically closing the throttle valve when the brakes are applied. 'These together with other objects and advantages which will become subsequently apparent reside in the details

of construction and operation as more fully hereinafter described and claimed.[3]

III. DESIGN OF COMPONENTS

A. Frame

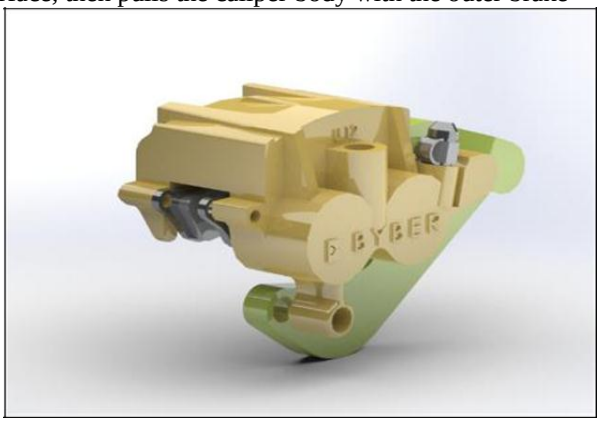
Frame is a supportive member for all equipments that are mounted on frame. It is made from steel bar having square section of dimension 1x1 inc We constructed a frame as per comfort of driver so, we constructed size of frame (l*b) 700x1070 mm. It has three mounting areas namely seat mounting, pedal mounting, motor mounting. Motor is mounted on left side of pedal, while pedal is mounted exact in front of driver. Section Used–1inch Square section is used having thickness of 2mm.



Frame

B. Caliper

The brake caliper is the assembly which houses the brake pads and pistons. The pistons are usually made of plastic, aluminium or chrome-plated steel. Calipers are of two types, floating or fixed. A fixed caliper does not move relative to the disc and is thus less tolerant of disc imperfections. It uses one or more pairs of opposing pistons to clamp from each side of the disc, and is more complex and expensive than a floating caliper. A floating caliper (also called a "sliding caliper") moves with respect to the disc, along a line parallel to the axis of rotation of the disc; a piston on one side of the disc pushes the inner brake pad until it makes contact with the braking surface, then pulls the caliper body with the outer brake



pad so pressure is applied to both sides of the disc Floating caliper (single piston) designs are subject to sticking failure, caused by dirt or corrosion entering at least one mounting mechanism and stopping its normal movement. when brake is not engaged or engaging it at an angle. Sticking can result from infrequent vehicle use, failure of a seal or rubber protection boot allowing debris entry, dry-out of the grease in the mounting mechanism and subsequent moisture incursion leading to corrosion, or some combination of these factors. Consequences may include reduced fuel efficiency, extreme heating of the disc or excessive wear on the affected pad. A sticking front caliper may also cause steering vibration.

C. Brake disc

The brake disc (or rotor) is the rotating part of a wheel's disc brake assembly, against which the brake pads are applied. The material is typically gray iron, a form of cast iron. The design of the discs varies somewhat. Some are simply solid, but others are hollowed out with fins or vanes joining together the disc's two contact surfaces (usually included as part of a casting process). The weight and power of the vehicle determines the need for ventilated discs.The "ventilated" disc design helps to dissipate the generated heat and is commonly used on the more-heavily loaded front discs. Discs for motorcycles, bicycles, and many cars often have holes or slots cut through the disc. This is done for better heat dissipation, to aid surface-water dispersal, to reduce noise, to reduce mass, or for marketing cosmetics. Slotted discs have shallow channels machined into the disc to aid in removing dust and gas. Slotting is the preferred method in most racing environments to remove gas and water and to deglaze brake pads. Some discs are both drilled and slotted. Slotted discs are generally not used on standard vehicles because they quickly wear down brake pads; however, this removal of material is beneficial to race vehicles since it keeps the pads soft and avoids vitrification of their surfaces. On the road, drilled or slotted discs still have a positive effect in wet conditions because the holes or slots prevent a film of water building up between the disc and the pads.

D. Master Cylinder

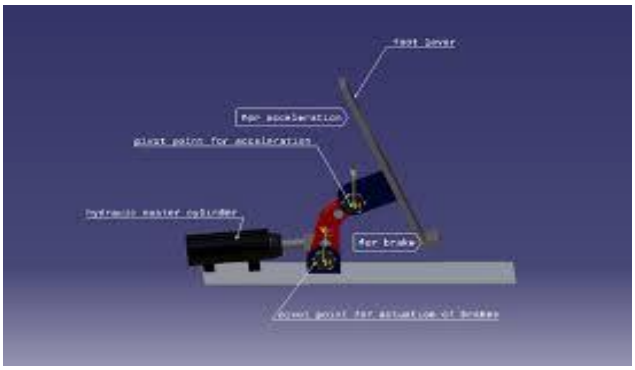
In automotive engineering, the master cylinder is a control device that converts non-hydraulic pressure (commonly from a driver's foot) into hydraulic pressure. This device controls slave cylinders located at the other end of the hydraulic system. As piston(s) move along the bore of the master cylinder, this movement is transferred through the hydraulic fluid, to result in a movement of the slave cylinder(s). The hydraulic pressure created by moving a piston (inside the bore of the master cylinder) toward the slave cylinder(s) compresses the fluid evenly, but by varying the comparative surface-area of the master cylinder and/or each slave cylinder, one can vary the amount of force and displacement applied to each slave cylinder, relative to the amount of force and displacement applied to the master cylinder.

E. Pedal

Pedals are manufactured by using LASER cutting machine. Laser cutting is a technology that uses a laser to cut materials, and is typically used for industrial manufacturing applications, but is also starting to be used by schools, small businesses, and hobbyists. Laser cutting works by directing the output of a high-power laser most commonly through

optics. The laser optics and CNC (computer numerical control) are used to direct the material or the laser beam generated. Commercial laser for cutting materials involved a motion control system to follow a CNC or G-code of the pattern to be cut onto the material. A typical The focused laser beam is directed at the material, which then either melts, burns, vaporizes away, or is blown away by a jet of gas, leaving an edge with a high- quality surface finish. Industrial laser cutters are used to cut flat-sheet material as well as structural and piping materials.

IV. DESIGN OF SYSTEM



A. Process Sheet

Following operations were while fabricate the project

1) Cutting:

The material as our required size. The machine used for this operation is power chop saw. A power chop saw, also known as a drop saw, is a power tool used to make a quick, accurate crosscut in a workpiece at a selected angle. Common uses include framing operations and the cutting of molding. Most chop saws are relatively small and portable, with common blade sizes ranging from eight to twelve inches. The chop saw makes cuts by pulling a spinning circular saw blade down onto a workpiece in a short, controlled motion. The workpiece is typically held against a fence, which provides a precise cutting angle between the plane of the blade and the plane of the longest workpiece edge. In standard position, this angle is fixed at 90°. A primary distinguishing feature of the miter saw is the miter index that allows the angle of the blade to be changed relative to the fence. While most miter saws enable precise one-degree incremental changes to the miter index, many also provide "stops" that allow the miter index to be quickly set to common angles (such as 15°, 22.5°, 30°, and 45°). The time required for this operation is 50 minutes.

2) Finishing:

The edges with grinder using grinding wheel. The machine used for this operation is hand grinder. An angle grinder, also known as a side grinder or disc grinder, is a handheld power tool used for cutting, grinding and polishing. Angle grinders can be powered by an electric motor, petrol engine or compressed air. The motor drives a geared head at a right-angle on which is mounted an abrasive disc or a thinner cut-off disc, either of which can be replaced when worn. Angle grinders typically have an adjustable guard and a side-handle for two- handed operation. Certain angle grinders, depending on their speed range, can be used as sanders, employing a sanding disc with a backing pad or disc. The backing system is typically made of hard plastic, phenolic resin, or medium-hard rubber depending on the amount of flexibility desired. The time required for this operation is 20 minutes.

3) Welding:

Square pipes of different lengths to make frame. The machine used for this operation is electric arc welding. Electrical arc welding is the procedure used to join two metal parts, taking advantage of the heat developed by the electric arc that forms between an electrode (metal filler) and the material to be welded. The welding arc may be powered by an alternating current generator machine (welder). This welding machine is basically a single-phase static transformer Suitable for melting RUTILE (sliding) acid electrodes. Alkaline electrodes may also be melted by alternating current if the secondary open-circuit voltage is greater than 70 V. The welding current is continuously regulated (magnetic dispersion) by turning the hand wheel on the outside of the machine, which makes it possible to select the current value, indicated on a special graded scale, with the utmost precision. To prevent the service capacities from being exceeded, all of our machines are fitted with an automatic overload protection which cuts of the power supply (intermittent use) in the event of an overload. The operator must then wait for a few minutes before returning to work. This welding machine must be used only for the purpose described in this manual. Read the entire contents of this manual before installing, using or servicing the equipment, paying special attention to the chapter on safety precautions. Contact your distributor if you do not fully understand these instructions. The time required for this operation is 120 minutes.

4) Polishing:

The welded joints with hand grinder using grinding wheel. The machine used for this operation is hand grinder. With refinement, grinding becomes polishing, either in preparing metal surfaces for subsequent buffing or in the actual preparation of a surface finish, such as a No. 4 polish in which the grit lines are clearly visible. Generally speaking, those operations which serve mainly to remove metal rapidly are considered as grinding, while those in which the emphasis is centred on attaining smoothness are classified as polishing. Grinding employs the coarser grits as a rule while most polishing operations are conducted with grits of 80 and finer. If polishing is required, start with as fine a grit as possible to reduce finishing steps. There is a wide range of grinding and polishing tools on the market and advice is available from ASSDA members to assist in particular applications. Polishing operations are conducted with the abrasive mounted either on made-up shaped wheels or belts which provide a resilient backing. The base material may be in either a smooth rolled or a previously ground condition. If the former, the starting grit size may be selected in a range of 80 to 100. If the latter, the initial grit should be one of sufficient coarseness to remove or smooth out any residual cutting lines or other surface imperfections left over from grinding. In either case, the treatment with the initial grit should be continued until a good, clean, uniform, blemish-free surface texture is obtained. The initial grit size to use on a pre-ground surface may be set at about 20 numbers finer than the last grit used in grinding, and changed, if necessary, after inspection. Upon completion of the initial stage of polishing, wheels or belts are changed to provide finer grits. Polishing speeds are generally somewhat higher than those used in grinding. A

typical speed for wheel operation is 2500 metres per minute. The time required for this operation is 20 minutes.

B. Advantages:

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 the other and at 80 kilometers per hour this adds five meters to your stopping distance.

Another problem with separate pedals is that it's there is possibility of hitting the wrong one. A slight misjudgment when going for the brake, can lead to the accelerator being clipped, causing a crash.

One of these advantages is the instantaneous and natural control available by single foot movement.

It reduces the use of handbrake and return of the car while driving on inclined road having positive slope.

V. CONCLUSION

1) We have taken up this project as real challenge, as we were not experience in the manufacturing. We started our work on this project facing new hurdles initially.
2) The experimental validation is carried out to check the stiffness of the selected spring and to validate maximum bending stress induced in pivot plate.
3) The stiffness is found by applying Hook's equation to spring mass system. The maximum bending stress is estimated from equation 6= (M*y)/I.
4) The maximum bending or the beam the section of beam is constant it is variable so the minimum section is selected to estimate the bending stress and distance from neutral axis for the section is taken.
5) With the above study we can conclude that new mechanism results in avoiding interference in breaking during acceleration and vice versa. Moreover, it is advantages over conventional pedals.
6) This combined pedal mechanism thus provides a driving control which permits the quick and smooth transition from accelerator to breaking without needing to transfer the foot from one pedal to another.
7) So we have conclude that the rapid increase in number of vehicles on roads day by day, demands and exploration of such mechanism to get rid of driver's effort and reduce road accidents.
8) At last we conclude that, this project will helpful for automobile industries as it is easy to operate with less cost.

