

“Advancement in Automobile Brakes”

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Abstract: Need of mobility all across the world is increasing exponentially. This is also an important prerequisite for the progress of modern society. In the past, automobile has played a crucial role and shall continue to play a dominant role in the progress of society. The demand of automobiles is increasing rapidly especially in the countries like China, India, Brazil and Korea. The rising economies of these countries will further increase the demand of automobiles. In order to achieve safety, comfort and environment friendliness, automobile companies are investing heavily in research and development. More and more vehicles are being equipped with many Automatic braking systems. These systems intend to help the driver avoid or mitigate accidents by automatically applying the brakes prior to an accident. Initially only rear-end collision were addressed but over time more accident types are incorporated and brakes are applied earlier and stronger, in order to improve the braking a new method is described in this paper.

Keywords: Profiled Tires, Profiled Brake pad

I. Introduction

Driven by a growing demand for fuel efficiency, combined with strict automotive standards for safety, durability and noise, as represented by the new EU tire label, automotive tire manufacturers are continuously seeking to create better and more ecological tires. Now these tires can also be used for efficient braking. Brakes are devices whose function it is to slow and stop the automobile. They are mandatory for the safe operation of vehicles. When a car is in motion, it has kinetic energy or energy derived from this motion. In order for the car to slow down, this energy must be decreased. This is accomplished by transforming it into another form. In the case of brakes, this form is heat. In short, brakes transform the kinetic energy of the car into heat energy, thus slowing its speed and, if enough energy is transferred bringing it to stop it.

Brakes have been refined and improved ever since their invention. The increase in traveling speeds as well as the growing weights of cars has made these improvements essential. The faster a car goes and the heavier it is, the harder it is to stop. An effective braking system is needed to accomplish this task. Today's cars often use a combination of disc brakes and drum brakes. Disc brakes are usually located on the front two wheels and drum brakes on the back two wheels.

II. Previous advancements in braking systems:

- From the 1830s, steam carriages used a hand operated braking system, the application still being through linkages and levers to wrought iron brake shoes rubbing against cast iron wheels
- In the late 1890s the use of pneumatic tires made the external shoe brake obsolete. The contracting band brake was developed. It operated on the principle of a band acting on a hub. The brake was less effective in wet weather. Dirt often became trapped between the lining and the hub reducing the braking effectiveness. The band brake would not operate when the vehicle was in reverse.
- The next development in braking systems was the introduction of the drum brake. A mechanically operated drum brake was first used by Louis Renault in 1902. The drum brake was unaffected by dirt and weather since the brake shoes were enclosed in the brake drum. The mechanical drum brake was inefficient due to frictional losses in the joints. Severe wear of the moving parts required constant maintenance, and the system had to be meticulously balanced to deliver equal, safe braking forces to the brake shoes.
- In 1904, the Mutton Car Company heralded a revolution in braking technology when a hydraulic system was introduced to operate the rear brakes.
- By 1910 most motor vehicles were using two independent and separate brake operating mechanisms on the rear wheels; the first a hand operated lever system, the second either a pedal operated mechanical system or a pedal operated hydraulic system.
- Around this time front wheel brakes also began to appear. The advantages of having brakes on all four wheels was that the stopping distance could be reduced. When brakes are applied on a motor vehicle, much of the weight force of the vehicle is thrown forward onto the front wheels, leaving the rear brakes relatively ineffective.

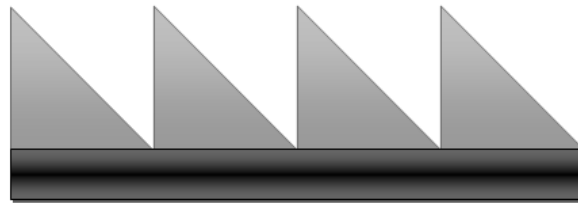
- The introduction of hydraulically assisted ‘servo-brakes’, and, in 1924 the ‘vacuum servo’, led to power assisted braking systems. During the 1930s hydraulic systems were gradually introduced to all braking systems in vehicles.
- The next major development in braking systems was the use of disc brakes. Although originally developed in the early 1900s, it was regarded as a ‘new invention’ at the London Motor Show in 1951.
- Previously disc brakes had only been used on motorcycles, airplanes and trucks but not motor cars. This development revolutionized the braking industry, so much so, that by the 1960s the use of disc brakes was widespread in British and European cars
- Another major development in recent years is the anti-lock braking system, (ABS). This system prevents wheels from locking during

III. Suggested new advancement

a. Construction:

According to the idea of the paper a profiled tire is made (I.e.) a normal automobile tire in which the side walls are profiled with some triangular projections these triangular slots or projections are coated with non stick materials to avoid the sticking or blocking by dust or sand particles. These triangular projections have more friction surface than other shapes and hence this is selected.

In the same way a brake pad actuated by pneumatic or hydraulic system have such triangular profiles to have a contact with those triangular projections in the tires which are extruded out of the surface as shown in the figure below. To avoid the sticking of sand particles in the tire slits Teflon coating is given at that area.



b. Making process:

The automobile tire is made by the same process used now in addition to that a impression in the tire is simply made during the making of tire by simply pressing a die against the tire so that triangular slits are formed in the tires and a special type of brake pad is manufactured by casting process in that rubber is used as contact surface.

c. Working :

In normal when brakes are applied a brake pad is forced against a rotating drum or the shoe expands against the drum so that the automobile brought to rest in addition to this a triangular profiled brake pad is made to force against the rotating tire (as shown in fig1) which has the same triangular profile cuts (as in fig2) hence the rubber brake pads slips over the tire triangular slots and so sudden and smooth braking is possible. This is mainly used when the brake failure occurs or it can be used along the normal brake. This can be integrated with the normal brake system and so this is also actuated during braking.

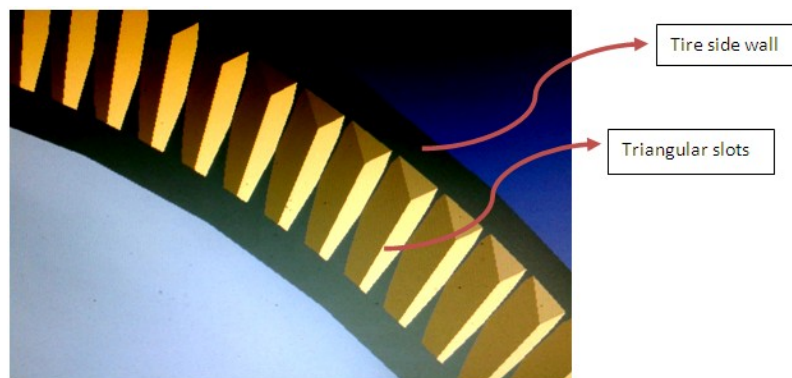


Fig 1

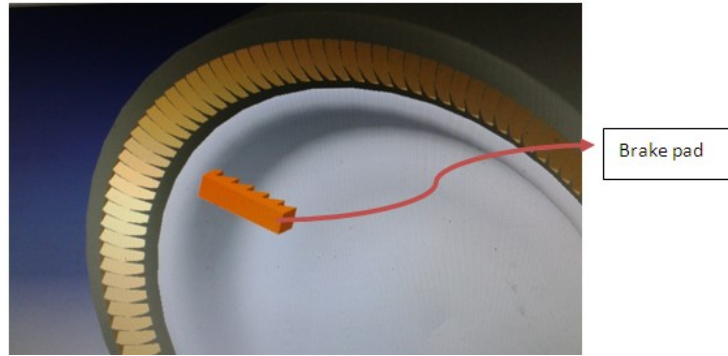
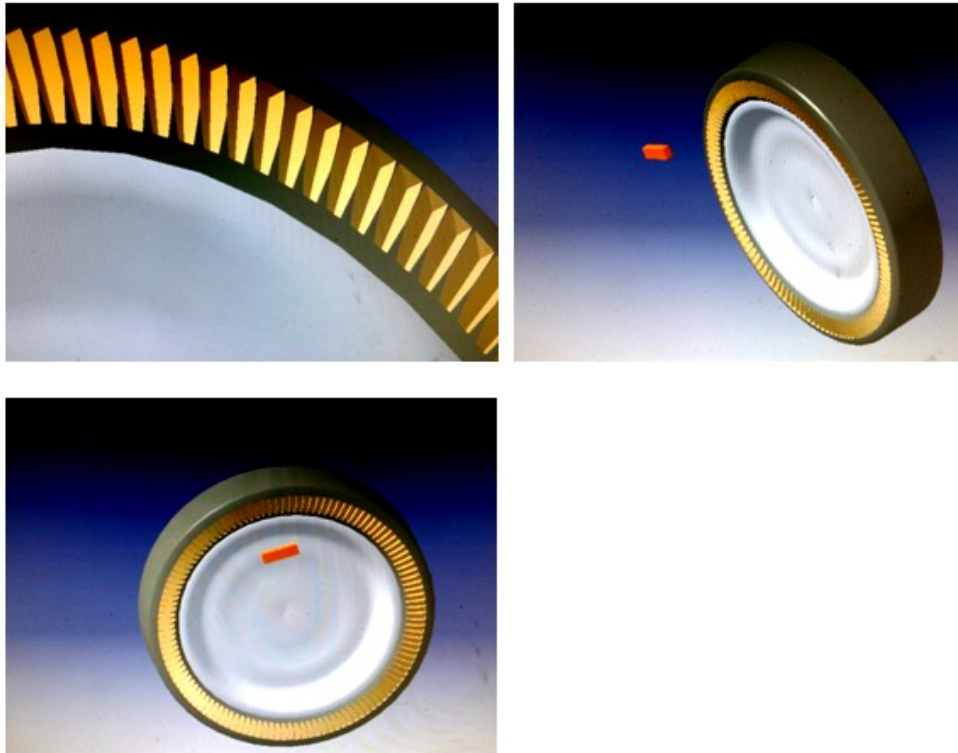


Fig 2

IV. Images of this idea:



Advantages :

- Cheap process
- Faster and sudden braking is possible
- Improved safety
- Simpler manufacturing
- Brake failure is eliminated.

Disadvantages:

- Wheel locking is quiet often
- Wear is more

V. Conclusion:

For years now we have heard of how new technology to improve the braking in automobiles and present am sure a lot of papers have been presented before and that has been a seed to what we see and use in today braking systems. And implementing this idea will help the drivers to apply sudden brakes and use this in case of brake failure.

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