

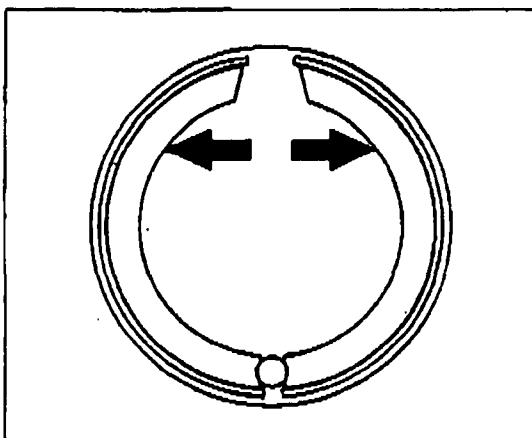


Figure 1.2, The principle of the drum brake with its internal shoes that expand outward dates back to 1902 (courtesy of NAPA United).

The early drum brakes were made of sheet metal rather than cast iron. Though light-weight they proved to be noisy and easily scored (deeply scratched). They also couldn't take a lot of heat, which caused them to warp and "bellmouth" ... a wear condition in which the drum weakens and its open end expands into a bell shape, preventing even contact with the brake shoes that worked by applying steady friction to the drum.

Brake drums made of cast iron proved to be much better. Cast iron provided a better friction surface which was more resistant to wear and scoring, and it was a stronger material which reduced the problems of distortion and bellmouthing. The added thickness and rigidity of the casting also helped it dampen noise as well as absorb and dissipate more heat. Buick introduced aluminum drums with cast iron liners in 1957. Aluminum is lighter weight and cools better than cast iron. But aluminum's high cost has limited aluminum drum applications. Drum brakes are covered in Learning Unit 4.

DISC BRAKES

Good as drum brakes were, disc brakes proved to be even better. As vehicles became heavier and more powerful, tire and wheel sizes were downsized. This left less room and air cooling for the brake drums. Another limitation of the drum brake design was that it tended to trap water when driven through puddles. The trapped water would then act like a lubricant which, in turn, would seriously reduce the brakes' ability to stop the vehicle.

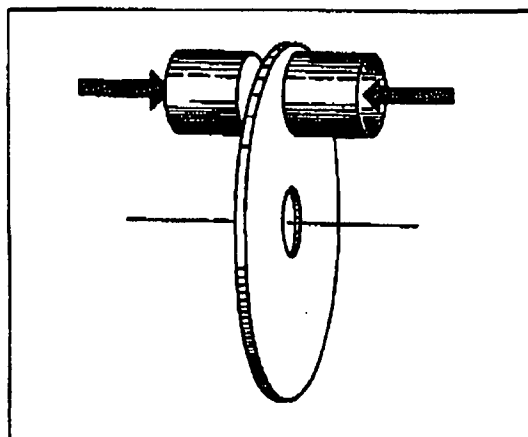


Figure 1.3, Operating principle of a disc brake (courtesy of NAPA United).

DISC ADVANTAGES AND DISADVANTAGES

Using a disc (see Figure 1.3) rather than a drum offered several braking advantages. One was that a disc wouldn't trap water, making it a safer brake for wet weather driving. Another was that it could safely handle higher temperatures without fading. The flat faces of the rotor presented a more open surface for air cooling, and the addition of fins between the rotor faces (vented rotor) increased its ability to absorb and dissipate heat even more. A third advantage was that disc brakes could be made more compact to save weight and space. And disc brakes were self-adjusting which eliminated the need for self-adjusters or periodic adjustment.