

INTEGRITY



SERVICE

# STUDEBAKER COMMENTS On Four-Wheel Brakes

There is little difference mechanically between two-wheel brake and four-wheel brake mechanisms.

Front-wheel brakes are merely added capacity, of conventional design. All four brakes are operated by the foot pedal.

The emergency brakes on rear wheels or transmission, operated by the hand lever, are retained in all four-wheel brake systems.

Controversy already exists between four-wheel brake advocates as to the relative merit of external or internal types of brake pressure on front wheels.

The duplication of parts, added weight, and increased friction of four-wheel brakes are common knowledge.

If four-wheel brakes were necessary, safe, and simple in operation, their existence would be justified, even with these impediments.

The factory makes proper adjustment of clearances between brake linings and drums.

After the factory ships the car, its responsibility ceases for brake adjustments, and the responsibility is shifted to the owner.

Electric starters, battery ignition, and vacuum tanks are acknowledged developments in the evolution of the automobile. They are built complete, encased in housings by the factory, are practically automatic and require few adjustments. Four-wheel brakes are in an entirely different category.

Numerous dealers and factory branch salesmen selling four-wheel brake cars, are already advising buyers that the front brakes may be disconnected, if they are not wanted. This would mean, of course, that the extra weight and impediments would be carried around uselessly.

Other front-wheel brakes are adjusted for such weak pressure that they cannot lock the front wheels, and the brakes are thus merely camouflage.

Four-wheel brakes will cause more trouble and accidents in a month than they will prevent in a year.

In fact, the Rolls-Royce Company states that "they show such decidedly dangerous disadvantages that they are considered unsafe to put in the hands of the general public, and are not nearly the equal of the powerful, efficient, lasting, and easily equalized brake design now employed in our design."

Four-wheel brakes have been a bone of contention in England since 1910, and yet today only 5 or 6 of the 150 odd English makes of cars use them at all. Several manufacturers use them as optional equipment, or furnish them on one of their models only.

Adherents of four-wheel brakes claim that they (1) permit quicker stopping and (2) prevent skidding. These are the only claims made for four-wheel brakes. With front-wheel brakes fully applied, quicker stopping is possible. This is not denied.

That quick stopping which locks the front wheels is an advantage, is vigorously denied. Such stopping is positively dangerous, because steering control is immediately lost.

The claim that four-wheel brakes prevent skidding and sliding is denied. No matter what kind of brakes are used, skidding will occur if wheels are locked be-

fore the momentum of the car is offset by the resistance of the road or pavement, whether dry or wet.

Skidding on wet pavements can be reduced to the minimum, with either two- or four-wheel brakes, only by slowing down speed and gentle brake pressure with clutch engaged.

## Disadvantages of Four-Wheel Brakes

Against the only advantage (?) of four-wheel brakes, namely, quicker stopping, there are six serious disadvantages which make them mechanically impracticable, dangerous, uncomfortable, and expensive to owners, as follows:

1. *Danger of Accidents.* With permission, we quote from a recent circular of the Rolls-Royce Company to their dealers, upon which we cannot improve:

"Basically, the fault with front-wheel brakes lies in the danger of front-wheel skids, which are uncontrollable and consequently vastly more dangerous than a rear-wheel skid.

"It must be appreciated, first of all, that for their ability to steer the car the front wheels depend on their rolling motion. When front wheels cease to roll they lose all power to steer the car, which slides straight ahead on a flat road, or into the ditch if on a crowned or cambered road.

"When the brakes are used in an emergency it is of primary importance that the direction of the car should be under control; that is, that the car can be steered from the time that the brakes are applied until it is brought to a complete stop.

"When an obstacle suddenly presents itself (as in night driving) the driver's instinct is to immediately apply the brakes as hard as possible.

"If, under these conditions, the front wheels are suddenly locked, disaster may overtake the driver, through inability to control the car's direction, even though it may stop before meeting the obstacle.

"In traffic driving the ability to dodge—to control the direction of the car—is of almost equal importance with the ability to stop.

"On a wet or sprinkled city street, granting that the front-wheel brakes were perfectly equalized, the car would slide straight ahead unable to take advantage of traffic conditions, either right or left.

"If the brakes were not perfectly equalized, immediately the pressure was applied, the front wheels would take on a skid, which would be uncontrollable, in whichever direction the equalization of the brakes was faulty.

"In traffic driving, under most favorable conditions (perfectly equalized brakes and dry pavement) a sudden application of the brakes checks the car so precipitately that cars following have been known to crash into the car ahead, causing a rear end wreck through not having stopping room and time.

"It is, of course, obvious that front-wheel brakes present double the difficulty of keeping the brakes properly equalized.

"Aside from the above apparent defects in front or four-wheel braking, there is the stiffening effect on the steering to take into consideration when the brakes are applied, and the drag on the steering unless the braking effects on both wheels is absolutely equalized. This, of itself, constitutes a serious disadvantage reflected in the handling of the car."

2. *Adjustments by Owner.* Brakes must be properly adjusted, lubricated, and kept free from dirt, gravel, and foreign substances, to prevent unequal pressure of brakes and possible locking of front wheels. The burden of this responsibility rests on the owner, not on the factory.

3. *Added Impediments and Lubrication.* Four-wheel brakes double the number of parts in the braking mechanism, add about one hundred pounds of unsprung weight to the front end of the car, and create from twenty to thirty additional places (mostly inaccessible) requiring lubrication which must be applied by hand.

4. *Decreased Car Efficiency.* The added weight, extra parts, and increased friction resulting from four-

wheel brakes decrease to some degree the efficiency of the car. Poorer acceleration, reduced hill-climbing ability, and increased gasoline consumption result.

5. *Harder Steering and Control.* The increase in unsprung weight, added parts, and friction necessarily increase the strength required to steer the car and to operate the brakes.

6. *Expense of Maintenance.* Extra service work in repairing, adjusting, and relining brakes puts the car in the shop oftener and increases the expense of maintenance.

## Patent Situation

Four-wheel brakes have been in existence for about twenty years, during which time thousands of patents have been taken out in Europe and the United States, many of which have expired, and it is very doubtful if there are any basic patents preventing the use of four-wheel brakes.

## European Experience

European manufacturers have experimented with four-wheel brakes for two decades. English manufacturers generally refuse to use them, although there are a few exceptions.

French manufacturers use them more generally, but many cars are equipped with "servo mechanisms," which are an added attachment intended to prevent locking of front wheels, insure equalization, ease the pedal pressure, etc., but this device introduces further complications of weight, lubrication and expense.

## Trade Authorities

AUTOMOTIVE INDUSTRIES—July 12, 1923

"In some cases the layout is such that the act of steering tends to release the front-wheel brake, rendering it less effective when the wheels are cramped. If, with this arrangement, steering is made harder, or the brakes less effective on a curve, or when the vehicle must make a sudden turn—as it must often do in an emergency—there is grave reason to doubt whether the braking is any safer with four- than with two-wheel brakes."

MOTOR WORLD—June 6, 1923

"If necessary precautions are not taken, skidding is liable to be more frequent and more serious than with rear brakes only."

## Studebaker's Position

Studebaker research and engineering departments have been studying, experimenting with, and testing four-wheel brake mechanisms for two years.

These tests merely convince us that four-wheel brakes are unnecessary, mechanically impracticable, and dangerous in the hands of unskilled drivers.

The 1924 model Studebaker cars are equipped with brakes on the rear wheels only. The foot pedal operates the external contracting brakes and easily locks both wheels.

The hand lever operates the internal expanding brakes, and likewise locks the wheels easily.

The foot brakes are used in driving, and the hand brakes to hold the car still when parked on grades, also in emergencies, if necessary.

Studebaker brakes are safe, simple, and practicable. There are no more reliable brakes in use on any automobiles.

**The 1924 model Studebaker cars are not, and will not be, equipped with four-wheel brakes**

South Bend, Indiana  
October 6, 1923

The Studebaker Corporation of America

**O. N. BONNEY MOTOR COMPANY**

2550 FARNAM STREET

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