# HUDSONOTES

Column of Mechanical Miscellany
By George Schmidt
Mishicot, Wisconsin

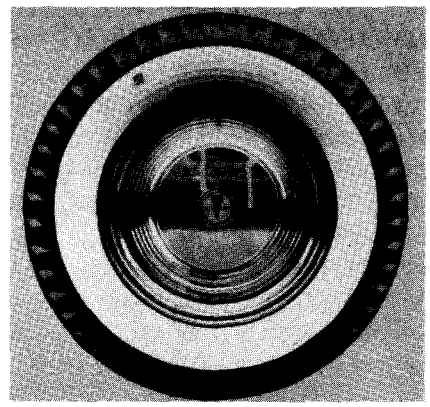
## Tired Tales

THE PNEUMATIC rubber tire was invented by John Dunlop of England in the later 1800's—for bicycles, not automobiles. It soon came into wide use, and proved to be a highly troublesome device, famous for punctures, blowouts, rapid wear, and other problems. But its characteristics of cushioning, traction, and smoothness outweighed the disadvantages, helping to preserve the machinery as well as the passengers, and becoming practically a necessity at any vehicle speeds above a fast walk—not only for cycles but for the newborn automobile as well.

It remains a necessity at present. True, many early (pre-Hudson) cars featured solid-rubber tires, as did some heavy trucks almost until 1930. By that time, in fact, the design of solid-rubber tires had become fairly complex (see any early edition of Dyke's *Automotive Encyclopedia*). Also, in the era circa World War I, a few replacement auto tires were available which contained metal springs instead of air pressure, although the practicality of these was doubtful.

But in general, the combination of mechanical springing for the vehicle chassis plus pneumatic tires for the wheels has proved to be the most workable arrangement by far, with the differing "spring rates" of the suspension and of the tires neatly complementing each other (with the possible exception of radial-ply tires used on some vehicles not designed for them).

Research work by rubber companies and others continued for years as to the practicality of pneumatic springing for the chassis as well as for the tires. "Air springs" have in fact been used on some bus models with fair success; and in the late 1950's General Motors offered them on several luxury car models as well, despite a few remaining problems of handling and durability. Today one may be saddened to see an early Cadillac Eldorado, for instance, which has been ignominiously converted back to ordinary steel vehicle springs, but it is probably far less troublesome to the owner in that condition.



Air suspension at present is most familiar in the form of supplementary devices such as Air Lift bags or inflatable-type shock absorbers intended mainly as adjustable aids for carrying heavier-than-normal vehicle loads. For convenience they are often connected to an external air fitting very similar to the accessory "spare tire valve extension" hose formerly offered for Hudson and other cars.


Changes and (mostly) improvements to pneumatic tires have of course also continued throughout the years. The B. F. Goodrich company (named for original founder Benjamin Franklin Goodrich, in case you've wondered about the initials) introduced the first modern tubeless tire in 1954 for the replacement trade and as standard equipment on Packard, causing problems for some shops until repair materials and techniques for the new tires became familiar. However, these were not the first tubeless tires manufactured. The very earliest pneumatic tires were of "single tube" construction, and the type with a separate removable inner tube was developed next—partly for greater ease of repair.

EARLY TIRES included several layers of woven fabric vulcanized in place to give them shape and strength. It was soon found, however, that for best flexibility and long life, the strong parallel warp cords in each layer could be used nearly alone, with only a few light woof threads (or later, none at all). The cords extended from one tire bead to the other, not straight across, but angled or biased somewhat to the right in one layer, and at exactly the same angle to the left in the next. Most often there were four layers or plies. Then, on most truck tires (and on some for early cars), to give added strength in the tread area, a "breaker strip" or belt made of two or more plies of similar cord was added around the outer circumference of the tire, just under the tread rubber. This—with, or more often without the extra belt—remained the standard mode of tire construction for decades, including the 1909-1957 span of Hudson motor car production.

During the 1950's it was realized that just two bias cord plies were sufficient for most tire ap-

plications provided the plies were made double-strength (thus giving the so-called "4-ply rating"). In this way it was possible to make a tire carcass thinner and more flexible (and hence, especially when tubeless, with less tendency to generate heat, even if run under-inflated)—without necessarily sacrificing strength. Nevertheless the idea of only two cord plies generated some public distrust, and this was probably justified in the case of the more cheaply built examples. Today 2-ply tires may still be found, but usually with a brand-new (??) added feature: a breaker strip or belt, thus giving a "belted-bias" product with a total of four plies in the tread area only.

However, a rival tire design had been introduced in 1949 in Europe by Michelin, one of France's (and the world's) oldest tire makers, already long famous also for its Michelin travel and restaurant guide books. This radical new "Michelin X" tire, too, featured a thin extra-flexible sidewall, but the cords were placed "radially"—that is, straight outward from one bead to the tread area, and thence across and straight down to the other bead, with no bias angle whatever. To hold this type of assembly together, of course, an extra-strong breaker strip or belt is needed around the entire tread area. This belt may be made of textile cords running circumferentially, at right angles to the sidewall cords; or in later versions it may be made of glass fibers or of flexible steel wire.

Although this belt under some conditions may tend to perform more like a tank or caterpillar track than a conventional tire tread, these "radial ply" tires can give improved tracking and cornering performance on many vehicles—that is, until the limit of adhesion is reached, at which point they tend to break away suddenly and without the gradual warning drift offered by most conventional tires.

GENERAL ACCEPTANCE of radial-ply tires in the U. S. was slow, but today they have nearly supplanted standard bias-plies for most uses. They are not authentic equipment for any Hudson models, although several club members have reported good results with them on HET vehicles. Radial tires should cause no loss in ride quality, even at low speeds, if a car's suspension is properly designed or "tuned" to match them. They do require extra precision in manufacturing, but this may actually have hastened their acceptance, since there had been far too many complaints during the 1950's and '60's about indifferently-made bias tires exhibiting lopsidedness, wobbles, lumps, and similar instabilities.

Radial tires at normal pressures are also a bit more free-rolling, giving a small possible saving in fuel—and while radial-ply sidewalls are easily injured (and difficult to repair safely), the tread rubber usually outlasts that on bias-plies, mainly because there is less "squirming" action of rubber at the road surface. This writer, in fact, using older radials on a Brand X vehicle, has never been able to wear one of them down to the point of baldness, although several have broken—or disintegrated—long before they were worn out.

For those who wish to use radial tires on a classic vehicle, a traditional wide-whitewall version has recently been announced. It is made up by carefully adding a permanent vulcanized white rubber ring to a standard radial-ply tire. Separate add-on white "porta-wall" rings to fit most radial or bias tires are reportedly also again available at present, though at much higher prices than formerly. For tubeless tires, the white extra ring, if properly installed, can sometimes also help to form a better airtight seal at the outer bead.

Because of their very different tracking and breakaway characteristics, radial and bias-ply tires should never be combined on a single vehicle, or some unpleasant handling surprises may result. . . even on a Hudson.

The cord angle on bias-ply tires for ordinary passenger-car use has been fairly uniform for many years, but it may vary somewhat more on special-purpose tires. For example, many sports-car and racing tires have been built with cords biased so little that handling is somewhat similar to that of radials (and sidewalls are extra flexible, but not tolerant of abuse). On the other hand, special "long cord" tires have been made with cords biased much more than usual, and these have been recommended for better handling of some tail-heavy rear-engine models. Here again a random mixture of cord angles on a given vehicle ought to be avoided.

TIRE CORD and fabric materials were almost exclusively cotton until the 1940's. After World War II, rayon cords gained rapidly in favor, with improved strength and moisture resistance; and like cotton they were not easily stretched out of shape during tire manufacture or later. Rayons or "artificial silks" are also our oldest synthetic fibers. Made principally from the cellulose in cotton, wood, etc., they were known for many years before they were employed in tires. A better-quality rayon for this purpose, trade-named "Tyrex," appeared in the 1960's.

However, a new synthetic fiber had been introduced by the DuPont company c. 1939. Called "nylon" (originally a trade name), it was said to be made of "coal, air, and water"; and after

the war it soon found many applications beyond parachutes and ladies' stockings. Though superior to both cotton and rayon in moisture resistance and ultimate strength, its early use in tires was limited by scarcity, cost, and a degree of elasticity which made precision in tire manufacture more difficult, and which also permits the cords to take a "set" upon cooling while a car is parked, and then may cause thumps for a mile or two upon restarting.

A bare-knuckles advertising battle occurred in the '60's between nylon and tyrex rayon, apparently not so much from tire makers (many of whom offered both fibers) as from textile suppliers. Further research yielded another variety of synthetic fiber, usually known as "polyester," with properties quite similar to nylon's, except for less tendency to cause thumping when cold. It is still much used in tire building.

Steel wire is also employed inside tire beads to prevent them from stretching. Early automotive tires were built exactly like cycle tires in that they had "clincher" type beads which were made to be stretched onto the rim (without requiring a dropped-center wheel), but each bead had a molded ridge at the side to help hold it in place in a groove in the rim flange when the tire was inflated. For large-size clincher tires this was not always sufficient, and so several "tire lug" bolts, with Y-shaped heads inside tire, and with threaded portions projecting through rim toward the hub, were sometimes added. They were notorious for pinching the inner tube if carelessly installed.

By the World War I era, however, many tires were being made with "straight side" non-stretching beads, as they are today. The Dunlop company was again credited with this innovation. The demountable rims made for these tires could be contracted enough to get the tire on and off; and many of the "quick-detachable" rims (that is, "split" rims made with one or both flanges removable), which were optional on early Hudsons and most other cars of the period, were specially designed to accept either a clincher or a straight-side tire. Modern drop-center type rims (for straight-side tires only) made their appearance in the early 1930's.

A HAPPY EASTER season to all. More "tire-some" tips another time.