

MODEL T FORD WHEELS

By Bruce McCalley

A series of questions on the club's internet question and answer page regarding Ford wheels has prompted us to take a look at the evolution of the subject. It is relatively common knowledge that 1909 and 1910 Ford wheels were different from those of 1911 and later, and that there were a number of changes throughout the years.

Questions have come up asking if, and if so, why, the front wheels were dished. When did they stop furnishing rounded wooden felloe wheels and change to the square type? What about those non-demountable wheels which have steel felloes instead of wood?

In the January-February 1977 issue of *The Vintage Ford* Gary Hoonsbeen wrote the following article on the subject of dishing.

WHY ARE FRONT WHEELS DISHED?

By Gary Hoonsbeen

A majority of *Ford Owners Manuals* were written in a form of answers to specific questions to educate the owners on the operation of their "new Ford."

One question asked in the 1914 Owners Manual was, "How does the setting of the front wheels differ from that of the rear wheels? The answer given to this was, "It will be observed that the front wheels are 'dished, that is, the spokes are given a slight outward flare to enable them to meet side stresses with less rigid resistance while the spokes of the rear wheels are straight....."

This same question and answer appears up until at least the 1922 *Owners Manual*. No mention is made of demountable wheels being different than non-demountable wheels. It cannot be concluded, however, that when Ford offered demountable wheels in 1919 that this practice of dishing the front wheels continued. Non-demountable wheels were "standard equipment on open cars until 1926 and the owners manuals may only refer to these.

The reasons for "dishing" are as follows:

- . To increase sideways strength
- . To provide elastic properties to the wheels
- . It allows the spokes at the bottom of the wheel to be vertical with the ground

The camber of the Model T front wheels is three inches, that is, the distance between the

top of the wheels is three inches greater than the distance between them at the bottom. To put it another way, the wheels are each tipped in (at the bottom) three degrees from a ninety degree vertical position.

"Dishing" of the front wheels was explained by Murray Fahnestock in his book, *The Model T Ford Owner* in 1921: ".....camber is obtained by the offset in the spindle bodies in that while the spindle body bolts are parallel with each other, and are vertical in a sideways direction, yet the axle spindles slope downwards towards the ends.

"To understand camber we must first consider wheels. Now a perfectly flat sheet of paper has very little sideways strength it is just about the "limberest thing there is, and flops over of its own weight. Yet if we take this same sheet of paper and form a trough, we find that the sideways strength is enormously increased. Let's call the trough-shaped form a "dish.

"Now a perfectly flat wheel would have but little sideways strength when it came to hitting ruts, etc. but by building Ford front wheels with some "dish" to them the spokes are thus placed at a more effective angle to resist side shocks and the effective strength of the wheel is greatly increased.

"Since only the spokes at the bottom of the wheel (between the hub and the ground) are used in supporting the weight of the car, we find we can place these bottom spokes at a truly vertical angle by tilting the entire wheel, thus using the spokes most effectively as 'columns for supporting vertical loads.

Mr. Fahnestock goes on to say, "an important advantage of camber is that it makes for easier steering by bringing the point of contact between tire and road more nearly under the center point of pivoting, which is the center line of the spindle bolt extended.

A book titled *Self-Propelled Vehicles*, first published in 1909, devotes an entire chapter to the subject of wheels. The dishing of wheels was described as follows:

"Where wooden wheels are used in any kind of vehicle, the effect of elasticity is greatly increased by 'dishing, that is, by inclining the spokes from the exterior plane to the rim to the center point of the axle spindle, so as to make the wheel kind of a flattened cone. This construction has the effect of transforming the spokes into so many springs, possessing elastic properties and

renders the wheel capable of being deformed under sidewise stress. The shocks of collision with obstacles are thus distributed through the flexibly-connected parts, as could not be the case if the wheel were made of one piece or on one plane, and the consequent wear and strain is greatly reduced. The dish of the wheels is usually balanced by slightly inclining the axle spindle from its center line, thus bringing the lowest spoke to a nearly vertical position with relation to the ground. A great resisting power to shocks produced by obstacles such as afforded by dished wheels is of far less importance in vehicles designed for good roads are most automobiles, which need only such inclination of the spokes as will provide for even distribution of shocks and maintenance of uniformity in pressure.

From the above we can conclude that Ford front wheels were, indeed dished. But for how long? Well, at least until demountable wheels became standard on closed cars in 1919. Demountable wheels are listed in Ford's *Price List of Parts* books as the same for both front and rear (when supplied without hubs, of course). Demountable wheels were not dished. On the other hand, non-demountable wheels were listed with different part numbers for front and rear. An obvious reason for this is that front and rear non-demountable wheels were of a different size; using 30 by 3 tires in front, and 30 by 3-1/2 in the rear. (In 1926 a non-demountable front wheel was listed which used 30 by 3-1/2 tires, but still carried a different part number from the rear wheels, probably due to the different hub which was included in the part.)

In about 1921 the spokes were made heavier and changed from an oval to a round shape. This may have ended the dished design. Also about this time a new style non-demountable wheel appeared in which the felloe was steel, rather than wood. The factory number of this new metal-felloe wheel was changed from T-291 to T-291B.

The Evolution of Ford Wheels

There is no positive way to establish exactly when the design of Model T wheels changed. For one thing, they were supplied by different manufacturers during any given period, and these manufacturers did not make wheels identical to those of their competitors. When a modification was made in the design of a wheel, there would have been a considerable period in which both the old and the new style would have been used which is typical of most modifications made in the car. However, listed below is a generalization of the major modifications and their periods of use.

1909-1910

The front wheels were factory number T-291; the rear wheels were T-99. They came in red, green and gray to match the body color. Beginning about June 1909, green became the standard color; the red and gray body colors being discontinued. The spokes of these wheels were quite thin, and the hub flanges were about 5-1/2 inches in diameter. The hub bolts were round-headed, similar to carriage bolts but did not have the square shoulders to keep them from turning when the nut was tightened.

1911-1917

With the introduction of the 1911 models, the standard color became blue. The spokes were made a bit stronger (about 1/8-inch thicker) and the hub flanges were increased to six inches in diameter. The hub bolts, while appearing similar to the earlier type, now seemed to have the square shoulders like a standard carriage bolt. The manufacturer's initial was stamped on the felloe splicing plate; "P" for Pruden, "K" for Kelsey, and "H" for Hayes of the manufacturers of Ford's wheels at the time.

With the advent of the tapered rear axle during the year, the rear hubs were redesigned to match the axle. The factory numbers in the *Parts Lists* did not change in the *Parts Lists*.

In 1911 and 1912 the rims were riveted and screwed to the felloes, as they had been in 1909 and 1910. In mid-1912 the screws were replaced with 3/16 rivets and 1/2 washers on the inside of the felloe to eliminate the problem of the screws coming loose and puncturing the inner tubes. In addition, a steel tube was placed in the hole for the valve stem. These tubes were 9/16 outside diameter and were flanged on the inside and expanded on the outside to secure them to the rim.² The felloes of all these wheels were rounded (7/16 radius) between the spokes. Wheels were painted black after early 1913 (in spite of what the *Parts Lists* say about them being "Blue").

1917-1918

The wooden felloes were no longer rounded between the spokes (the so-called "square felloe wheels"). Initially, apparently, the felloe was truly "square" but the edges were given a 1/16 radius after a short time.

1919-20

Demountable-rim wheels were introduced as standard equipment on the Coupe and Sedan. These cars used 30 by 3-1/2 tires all around. These wheels and rims were made by Kelsey and

Hayes. The rims used on the Kelsey wheel would not fit the Hayes, and vice-versa.

Introduced at the same time were Timken roller bearings on the front axles with the demountable wheels. The Timken bearings made a small design change in the front hubs, making them a bit stronger to accommodate the extra pressure exerted by the tapered-roller bearings. Non-demountable wheels continued the ball bearings. The non-demountable wheels no longer had the steel tube around the valve stem hole.

1920-1921

During 1920 a new non-demountable wheel, made by Hayes, apparently, began to be used. The felloe and rim of this wheel was one piece steel instead of the wooden felloe and steel rim assembly. For the first time Ford began supplying replacement non-demountable wheels without hubs, made possible by the stability of the steel rim-felloe design. (Demountable wheels all had steel felloes.)

About 1921 the spokes on the non-demountable wheels were made a bit heavier, and this design continued until 1926.⁴

1922-1926

About 1922 Ford began making demountable wheels, in addition to those being supplied by Hayes and Kelsey. By late 1923, apparently, the rims for the three suppliers could be interchanged, apparently being based on the Hayes design.

During 1925, before the 1926 models, balloon tires became an option. These required all-new wheels and rims to accommodate the 21-inch tires.

In 1925, perhaps after the introduction of the "Improved Fords" for 1926, the wheels for the balloon tires could be had in a natural wood finish in addition to the standard black.

1926-1927

Non-demountable wheels, now with Timken roller bearings, were discontinued early in the 1926 model year. Demountable-rim 30 by 3-1/2 front and rear wheels continued but during 1926 the standard wheel was the 21 balloon wooden-spoked demountable-rim type. Unlike the 30-inch rims, the 21-inch rims were split so that they could be reduced in diameter to allow installation of the tires. A spreader tool was used to press them back into shape. The standard wheel color was still black, with the natural finish an option.

Although announced in mid-1925 (for the then-new 1926 models), wire wheels were apparently not actually available until about January 1926. These wheels used the regular 21-inch tire but were "drop center" instead of having the collapsing separate rim. Initially offered in black as the standard wire wheel color, other colors were offered as options, apparently dealer-installed or special ordered from the factory. Wire wheels became standard equipment on all sedans and coupes in late 1926 and early 1927, but were always optional on the open cars.

NOTES

The hub bolt design is based on the observation of Clint Darmsted, founder of the Vintage Wheel Shop, who had built hundreds of wheels using the hardware of the original wheels.

A note dated October 17, 1912 said, "We have specified that the 3/16 rivets to be used throughout for attaching the rim to the felloe. On some wheels which we now have in stock, the rims are riveted to the felloe only at the points where the felloe clips are located, and #10 by 3/4 flat head wood screws used at the other points, and it is these wood screws which we would like to have replaced by the 3/16 rivets. We have also specified that on rivets which do not go through the felloe clips, we have called for a 3/64 by 1/2 washer on the inside of the felloe. We have also specified the holes for the tire valves to be lined with steel tubing, 9/16 outside diameter, gauge #23 B.W. Ga. - .025. These tubes, you will note are flanged over to the inside end and expanded to fit tight in the hole in the rim, the end of the tube to come 1/32 below the face of the rim. NOTE: These corrections were made from a sample of the wheels which are being furnished by the W.K. Prudden Co. Drafting room sent sample of the above mentioned steel tubing, so same could be furnished to wheel Co. not using them now.

A note dated April 16, 1918 said: "Brought drawings up to date with the wheels as they are being made by specifying the felloe to be square instead of having the corners rounded with 7/16 radius. Another letter, dated June 15, 1918, specified the corners of the felloe to be rounded with 1/16 radius.

The change from the oval to the round spokes was noted in a letter dated July 14, 1921. They were increased in size, as well; the diameter at the outer end from 1 to 1-1/8 and from 1-1/32 to 1-1/4 at the hub. □