

The Evolution of the Ford Wheel

By **CLINT DARMSTED**
THE VINTAGE WHEEL SHOP
Box 423
Murphys, California 95247
(209) 728-2102

Clint Darmsted has made over 1600 wood-spoke wheels for Fords and other antique cars. The following article is based on his experience with the wheels he has seen and reproduced. Reader comment is invited on the subject in an effort to better establish the dates and changes in the Ford wheels.

Much has been written about the evolution of the Ford motor car but little is concerned with its wheels, an important part indeed. I wonder if any other single part proceeded through so many changes. There were at least ten, perhaps as many as fifteen, different wheels used on the Ford cars through the years.

If this comes as a surprise to you, then let's take a closer look at the Ford wheel. It is understandably a direct descendant of its counterpart on the horse-drawn vehicle; wood felloe, wood spokes and splice plates on the felloe joints. The Model C and F Fords even had the same shape spoke as many of the buggies of that era. Only the hub and rim were modified. The hub of course had to be adapted to serve either the front or rear axle. The rim was simply rolled to receive the pneumatic tire.

It may be interesting to note here the possible origin of the word "tire. The rim of a wood-spoke wheel holds the thing together and in the early wheelwright shops it was referred to as the "tye ring. This was shortened to "tyre and ultimately to "tire.

The earliest Ford wheels I have built were for a 1905 Model C, owned by Mr. T. J. Brandenburg of Damascus, Maryland. The clincher rim was 28 by 3. The hubs, front and rear, had the same outside appearance with a six-inch flange and plate. The plate had a deep 1 1/4" flare with round 3/8" hub-bolt holes. The box, or part of the hub that goes through the wheel, was 2-3/16 in diameter its entire length. The rear axle was of the straight type with the dowel pin held in place by the hub cap. Ball bearings were fitted to the front hubs. Felloe splice plates were oval with no letter embossed in the center and were fastened through the felloe and rim with high crowned rivets. Four screws were evenly spaced around the circumference to complete the fastening of felloe to rim. Felloes were rounded between the bossed holes that hold the spokes. The spokes were quite different in shape

than any other Ford wheel. There was no arch between them. They were cut straight here with an abrupt slope for about three inches, then flared out thicker through the middle and tapered down to the felloe. A teardrop cross section prevailed from the flare to the felloe. The 1903 Cadillac and Reo had this same strange-shape spoke but with different dimensions. The spoke thickness through the hub was 1-1/8.

The 1905 Model F Ford wheels that were made for Mr. Cecil Church of Harrisburg, Illinois, were almost the same as these Model C wheels. They differed only in the rim and the fasteners that held the felloe to the rim. The rim was a flat band approximately three inches wide and perhaps 3/32 thick. I have yet to learn how a tire was fastened to this. The felloes were attached to this rim with No. 12 bolts and square nuts.

The Model K Ford wheel would seem to be almost as experimental as the car itself. Both of the Model K Fords I have seen had two different front hubs. One was of steel with a deep 3/4" flare on the outside plate. The other had only a 1% flare and was cast. The flange and plate were 7/4" in diameter with 7/16 -high crowned hub bolts. The 26 clincher rim held a 34 by 4 tire with six clamps evenly spaced about the wheel which helped to hold the tire on the rim. The felloe splice plates were unlettered oval shape with 1/4"-high crowned rivets holding them in place. The spokes were 1% thick through the hub with the same straight cut where they meet. They tapered from the hub for about 3/4," changing to a teardrop cross section down to the felloe. The felloe was 1% by 1-9/16, very slightly rounded between the spoke bosses.

Model N and R Fords were fitted with 28 by 3 wheels. The hub and flange plate were reduced to five inches in diameter with 5/16 -high crowned hub bolts. The hub box was 2-1/8 in diameter with the straight rear axle and dowel pin. Again the front and rear hub had the same appearance except that now a deep indentation or square groove appears between the outside plate and the hub cap, much the same as the common Model T Ford front hub. Ball bearings were used in the front hubs. Splice plates, rivets, screws and felloes were unchanged. The spoke is changed dramatically in shape and size. A prominent arch appears between the spokes with a gentle slope down to a thin taper measuring only about

1/4" thick at the felloe. The teardrop shape prevails throughout with spoke thickness remaining 1-1/8 through the hub.

Model S Ford wheels for some reason were increased to 30 by 3 front and rear. Everything else appears to be unchanged.

Now the 1909 Model T Ford car evolves with 30 by 3 rear wheels and the same 30 by 3 front wheels. Perhaps the larger rear tire was supposed to provide better traction and a softer ride. One might wonder why the larger tire was not also used on the front wheels. A possible explanation may be that steering is much better with 3 tires (a great improvement in steering was noticed when the wheels were changed on my 1913).* Three more changes occur in the wheel at this point. The hub flange and plate were increased to 5" diameter; the spoke becomes 1 1/4" thick between the flange and plate and tapers to about 5/8" thick at the felloe, providing a sturdier wheel for a heavier car. All other details remain the same until sometime in the middle of 1911.

In 1911 no less than seven changes became evident. The hub flange and plate diameter returns to 6" as it was in 1905, with the same high-crowned 3/8" hub bolts except that now they are carriage type requiring square holes in the plate. The rear hub has lost its indentation between the plate and hub cap and does not protrude out so far because the new tapered axle requires space for the castellated nut and cotter pin. The felloe splice plate has a letter embossed in it; either a K for Kelsey, or a P for Prudden, or an H for Hayes, the manufacturers of Ford's wheels at the time. Wagon box rivets were used exclusively to fasten the felloe to the rim. This was a fine improvement as the screws had a habit of working loose and puncturing the tube. The seventh change was in the spokes, which were about 1/8" thicker throughout but still of the same tapered shape.

Somewhere around 1915 the oval-shaped spoke appeared but otherwise the wheel was similar to the earlier type. The date of this change is uncertain; it may have been as early as 1913 or later than 1915.

A dramatic change takes place about 1919 as we see the demountable steel felloe wheel emerge with heavy round spokes. Now the wood felloes with their splice plates are a thing of the past. The tire is mounted on a rim which is clamped to the wheel with four lug bolts. These steel felloes came in several styles. I have no less than thirteen different steel felloes and there are probably more.

This is also the time the Timken roller bearings replaced the ball bearings in the front hub. This seems to be about the time the front hub lost almost two-thirds

**Ed. note: The larger tire was used because of the increased weight of the car. Tires were the most expensive single item in those days; 30 by 3 tires cost less than 30 by 3 1/2. The additional weight-carrying capacity was not needed in the front.*

of its hub cap threads, allowing a little more metal for strength. The thrust of the roller bearing being in a different direction than that of the ball bearing may be the reason for this modification. The earlier hub is very apt to crack if the ball bearings are replaced with the roller type.

It is about this time that the square wood felloe makes its appearance. It is pretty much agreed that this wheel was a replacement part sold by Western Auto and others. The 1925 Western Auto catalog clearly shows the square wood-felloe wheel selling for \$4.75.

The 1926 Model T Ford wheel sports a 4:40-4:60 by 21" straight-side tire requiring a split rim. The brake drum which has persevered since 1905 with only the bolt hole size and pattern being changed is now much larger. Also at this time in history the inevitable happens. A radically new wheel is introduced and becomes the standard for several years. All the wood disappears and a beautiful welded wire wheel blooms.

The use of wood for an automobile wheel has always perplexed me and I have wondered why a more suitable material was not used. An article I read recently about Henry Ford's quadricycle explained that it was fitted with bicycle wheels. Being single laced (double lacing apparently came sometime later) they were prone to popping their spokes on the turns. Single laced spokes on a bicycle wheel is fine as very little resistance to side thrust is necessary, but on an automobile it became evident that a sturdy wheel was needed. The only other proven wheel available at that time was the wood-spoke wagon wheel. Also the fact that most of the very early autos were built in wheelwright shops surely influenced the use of wood wheels.

Wood is a material that swells and shrinks with the relative humidity. The swelling and shrinking is okay in itself but the change in dimensions is not. When the old-timer's wheels became dry and started to squeek he often drove the car into a creek and let the water swell the wood until they were tight again. It didn't take long for the water to dry out and the wheel became loose once more. If the wood were saturated with linseed oil instead of water it would remain tight because the oil would stay in the wood. The thing to do is actually soak the wheel in a bath of ten percent linseed oil in turpentine. The turps acts as a vehicle for the oil which fills the tiny cells of the wood, swelling it to its maximum.

Build a shallow tray of any scrap wood and spread a sheet of polyethylene on the bottom and up the sides. Put the wheel in and cover with the oil and turps solution. To reduce the amount of liquid needed, put rocks or pieces of metal between the spokes and other vacant spaces. A lid on this will reduce loss by evaporation. Soak this wheel for a week or so and when you remove it place it in the sun and occasionally wipe the oil off until it stops bleeding. Do not allow this solution to dry on the metal parts because it becomes sticky and hard to remove. Now seal the wood with a good sealer and paint with enamel. Lacquer will not adhere to the

saturated wood but enamel will if you have allowed all the bleeding to take place. I have talked to several people who have done this to old wheels and tightened them up. Of course, an old wheel would have to be scraped and sanded down to new wood so the solution could penetrate. The whole idea is to saturate the wood with oil.

So we have made the complete circle from wire wheels, all through the evolution of the wood wheel,

and twenty-three years later are back to the wire wheel. If it were not for you restorers these wood-spoke wheels would be gone forever. What a tremendous loss that would be.

These comments are reflections of my experience with the Ford wheels that restorers have provided for rebuilding and are not necessarily to be taken as all the facts available on the subject. Any comments or further information from readers would be more than welcome.

MODEL T FORD FRONT WHEELS

By GA R Y HOONSBEEN

A majority of "Ford Owner s Manuals were written in a form of answers to specific questions to educate the owners in 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 wheel 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 always "standard equipment on Fords into the mid twenties and the owners manuals may only refer to these.

The reasons for "dishing are as follows:

1. To increase sideway strength.
2. To provide elastic properties to the wheels.
3. It allows the spokes, at the bottom of the wheel, to be vertical with the ground.

The camber of the Model T is three inches, or the top of the front wheels are three inches farther apart than 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 Fordowner* in 1921: ".....camber is obtained by the off-set in the spindle bodies in that while the spindle body bolts are parallel to each other, and are vertical in a sideways direction, yet the axle spindles slope downwards towards their 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 funnel or flat cone with it, we find that the sideways strength is enormously increased. Let s call this cone-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 that 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 that, "an important advantage of camber is that it makes for easier steering by bringing the point of contact (between tire and ground) 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 of the rim to the center point of the axle spindle, so as to make the wheel a kind of 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 in 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 is afforded by dished wheels is of far less importance in vehicles designed for good roads as are most automobiles, which need only such inclination of the spokes as will provide for the even distribution of shocks and the maintenance of uniformity in pressure.