PRINCIPLES OF THE CENTRE-LOCK RUDGE-WHITWORTH WIRE WHEEL

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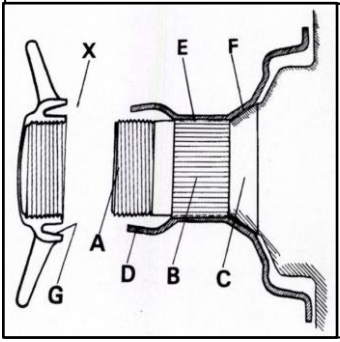
Reprinted from 'Safety Fast!', January 1992, by kind permission of the MG Car Club

It was, I think, a transatlantic writer who described the MG TC as 'a coffin riding on four harps', wire wheels of 19" diameter being then a somewhat unusual sight in post-war America. Yet, they are with us still, though they have shrunk a good deal in the past twenty years, and many enthusiasts deny the very name of sports car to any vehicle that lacks the flashing spokes and twinkling hub caps of this curious anachronism. So the harp specialist has also survived, though in dwindling numbers, and it is still possible to have wire wheels repaired, in Britain, at least.

Possibly because of childhood experience with bicycles, the need to maintain correct spoke tension is fairly widely appreciated. What is equally widely misunderstood, however, is the all- 'important bit in the middle of the wheel. Since the Rudge-Whitworth pattern of locking hub has been in use for more than half a century, this is a little odd. One possible explanation lies in the fact that it is apparently simple to the point of crudity and, therefore, is frequently abused through failure to appreciate finer points. I confess that my understanding came only recently, after reading a very lucid description in *The Autocar Handbook* of 1918!

Let us take a closer look at this assembly, referring to the central portion of the wheel as the 'wheel centre', which is fitted to the 'hub' and fixed in place with a 'locking cap'. The first thing to be appreciated is that the wheel centre does not come into contact with the brake drum. There is, in fact, a clearance

How the wheel centre is held in place on the hub



A - Locking thread on hub (left or right hand thread).
B - Driving splines on hub.
C - Back taper of hub,
D - Outer taper on wheel centre.
E - Driven splines of wheel centre.
F - Inner taper of wheel centre.
G - Taper in groove of locking cap
X – Spinner

of about 1/8" when the wheel is fully home. It is the inner taper of the wheel which comes into contact with the back taper of the hub.

Notice the taper which is formed on the outer surface of the wheel centre. This engages with yet another tapered surface formed on the inside of the locking cap. When the wheel is fitted to the hub, and the locking cap screwed on, it is therefore centralised and held between two pairs of tapers.

The only other contact between hub and wheel centre is provided by the splines, which carry the driving and braking forces. The locking thread, on the hub and cap, is right- handed on the left (near) side of the car and left-handed on the right (off) side. One of the endearing mysteries of the wire wheel is that the spokes are not, and indeed never can be, in compression. The weight of the stationary car is suspended from those spokes which are uppermost in the wheel when the wheel and locking cap are loosely fitted, therefore, the upper portion of the outer taper is pulled firmly into contact with that of the locking cap taper, and the lower portion of the locking cap thread is in contact with that of the hub.

A slight clearance then exists between the tapers at the bottom, and also between the threads at the top. As the car moves forward, a different portion of the wheel rim takes the weight, and relative movement occurs between wheel centre, locking cap and hub. The effect of this is to tighten the locking cap, and the locking action continues until there is firm contact between the tapers all round when it ceases.

The clearances involved are, of course, minute, but the locking action is nevertheless completely positive and entirely automatic. There are people who deny the very existence of the locking action, and presumably attribute the left and right hand threads to sheer cussedness on the part of the manufacturer. They are, no doubt, the people who bash their locking caps with heavy hammers.

The earliest instructions that I have been able to trace advise leaving the locking cap finger-tight, and no more. A later recommendation is to hammer the locking cap tight, check for slackness after twenty miles, and tighten again if necessary. ‘Hammer them tight’ means the application of a lead, copper or hide mallet, and a little common sense, with the wheel locked up. Not a murderous attack with a blunt instrument when the wheel is on the jack.

The tapers and splines must be kept scrupulously clean. As for checking the tightness occasionally, this is obviously a good idea. Most pre-war instruction manuals advise putting some oil in the groove of the locking cap. Opinions differ as to the advisability of oiling the back taper on the hub, but in my experience this gets oily anyway if the splines are lubricated. And lubricated the splines must be, for it they rust, the wheel can become quite literally immovable, which is awfully embarrassing when a puncture occurs.

What is the effect of over-tightening? We have seen that the wheel is held in place between two pairs of tapers and does not touch the brake drum. Excessive tightening of the locking cap will, therefore, force the wheel centre farther on to the back taper of tie hub, expanding it and thus making it, eventually, a sloppy fit on the hub, The outer taper tends to be compressed, and the locking cap itself will actually expand to a small extent. This may cause the locking cap to contact the outer spokes or 'bottom out' in the hub, in either case preventing proper tightening.

An incidental calamity is that the inner spokes tend to be slackened and the outer ones over tensioned, thus pulling the wheel rim out of shape as well. A sloppy wheel centre soon starts to "fret" on the hub. The splines wear rapidly, even the back taper begins to wear, and eventually the whole assembly - wheel, hub and locking cap - is fit only for the scrapyard. In advanced cases, the wheel may turn on the hub by half-a-spline, jamming behind the unworn portion of the splines, and becoming completely impossible to remove.

[Regarding how to tighten the wheel spinners, the following description of the technique used by Nuvolari at the 1933 TT comes from Reg Jackson – Jacko – who was one of the MG factory support team who came to Ulster for the TT. Mike Allison, President of the Triple-M Register of the MG Car Club, worked with Jacko at Abingdon in the 1960s and made copious notes of his conversations with him about the pre-war period. Ed.]

"It was Nuvolari who showed me the way to fit them properly. When he was looking at the car before practice for the TT , he got me to take all the wheels off the car. He then made me clean the hubs and the wheels with petrol and get them dry. He then personally smeared the hub splines with grease, just thinly, on both wheel and hub itself. Then he smeared a thickish layer on the male and female cone at each end of the hub and hub spinner. He re-fitted the wheels , spinning the eared nut on by hand until it was pushed tight onto the wheel, rocking the wheel as he did so. He then let the wheel onto the road and gave all four hub nuts ONE biff with the hide end of the hammer and indicated that that was tight enough. The nuts certainly needed a hard knock or two to loosen after the race, but he insisted that we do that whenever a wheel was removed"