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Leaf Springs

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For leaf springs, there are no commercial examples. Though you cannot use a commercial spring as a starting point, it is possible to make a single leaf, measure its load and deflection and extrapolate from that. Even mild steel may be used, making allowance for lower Young's modulus.

Leaf springs are, in principle, easier to make to requirement than coil springs. In this case, the weight carried at a given deflection is proportional to

- T^3 (t = leaf thickness)
- $1/L^3$ (L = leaf length)
- b (b = leaf width)
- $1/n$ (n = number of leaves)

Usually, scale springs made entirely from steel and with scale appearance are far too stiff for model loads. There various options to achieving a working spring:

- Use thinner leaves and more of them. (eg twice the number of leaves at half the thickness gives one quarter of the stiffness) or use a mixture of thick and thin leaves.
- Change the leaf length (not if it spoils the scale appearance).
- Use a softer material for some of the leaves. On the Class 08, only the top three leaves are steel and the rest are Tuffnel.

A useful source of thin spring steel which is readily cut and drilled is steel banding – used for industrial packaging. All steel springs need a curve applied by rolling. Tuffnel can be curved by fixing to a curved former and putting in the domestic oven for an hour at 150 deg C. (Put the extractor fan on). Recent letters in Model Engineer have claimed that successful springs cannot be made from Tuffnel. Oh yes they can! So long as maximum working load for the material is not exceeded. I have some working leaf springs made entirely from Tuffnel which have been successfully in use for years. The other advantage of composite leaf springs is that modifications can be made by changing the material of one or more leaves. The Class 08 has three steel leaves at the top and two steel leaves at the bottom, the rest being

Tuffnel. I have a spare steel leaf for the Class 08 in case it turns out to be heavier than estimated. As a rough guide, one steel spring can be replaced by between 10 and 20 Tuffnel ones of the same geometry or, put another way, the Tuffnel springs have a small effect on the stiffness of a spring with several

steel leaves but will increase the damping. And, working leaf springs do look good and also provide valuable damping, which eliminates bounce. The Director's Saloon was unstable in roll when running light until I fitted some auxiliary leaf springs, which damped out the oscillation.

Testing sample springs:

