7.10.3.3 Paul Bigsby's vibrato

As some kind of Renaissance man about town, Paul Bigsby repaired and invented devices of all kinds. Around 1947, he also built a few electric guitars (e.g. for Merle Travis). His real claim to fame, however, was his vibrato system that was deployed on many early guitars. The strings were hooked into a rotatable shaft, with the counter-torque being delivered by a spring-loaded lever. Allegedly, it was a spring taken form a Harley – an obvious choice for motorcycle mechanic Bigsby. The vibrato system shown left in **Fig. 7.121** is one from a Gretsch Tennessean built around 1960. Here, the bridge merely consists of a solid metal cylinder that can be adjusted in height via screw and threaded nut – there were however also other bridge designs (aluminum wedge, roller-bridge).

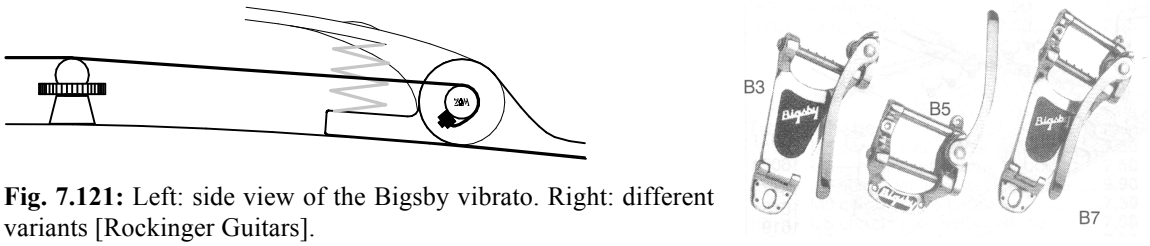

Fig. 7.121: Left: side view of the Bigsby vibrato. Right: different variants [Rockinger Guitars].

The Gretsch Tennessean is a hollow guitar without any sustain block; its thin top cannot take any large forces. Maybe the bend angle of the strings must in fact not be more than 4° (as it showed up on the investigated guitar), maybe more could be allowed … we cannot find out using a non-destructive approach. At least the strings do rest on a solid steel cylinder and not on jittery bridge saddles. For those who like to use thin strings and can do without the rather instable vibrato system: replace the vibrato shaft by a cylinder, drill 6 holes through it and insert the string through the holes. This increases the bend angle, and the bearing forces reach about the value they had with the factory-supplied strings. All that is at your own risk, of course.

For guitars that are able to withstand larger forces on their tops, the Bigsby was (or is) also available with an additional pinch roller increasing the bearing forces but also the disruptive frictional forces (shown on the right of the figure).

The bridge in the form of a cylinder (of a diameter of originally 13 mm, later 9.5 mm) acts as non-linear bearing because the string experiences a shortening as it vibrates *towards* the guitar body. This effect is, however, not strong; compared to a sitar, the cylinder radius is small [Burridge et al. 1982: The sitar string, SIAM J. Appl. Math. 42, 1231 – 1251].

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