



A Hoseus Banjo Restoration

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Intrigued by the sound of another recently restored example, I attempted to bring a sadly abused, bottom-of-the-line, Hoseus-equipped banjo up to playable condition. Reminders, lessons learned, and the joy of (albeit crude) handiwork made it well-worth the purchase price. The actual sound and physics of the Hoseus contraption remain hidden in the complex interaction of the various parts, as demonstrated by the accompanying sound sample files.

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FIG. 1. The restored banjo with five additional frets.

An 1890 manufacturers' encyclopedia lists the Hoseus Brothers as banjo makers in Brooklyn, New York. Brother Henry has two patents to his name, one for a super-tambourine (1887) and the other for a banjo head support system (1886).[1] But I could find no mention of the Hoseus brothers in banjo history scholarship. A few instruments were bought and sold in recent years that incorporate a simplified version of the patented support system. These were likely made by a handful of other manufacturers, and no surviving instruments that I've seen in pictures are unambiguously of Hoseus manufacture.

The basic idea of the patent is that the vibrating area of the head be supported by a metal ring which, in turn, is supported by springs attached to the inside of the wooden rim. Hence, the vibrating head is a bit higher and of smaller diameter than the wood rim itself. Also, the spring supports allow more vibration than direct head/rim contact. The patent describes a system with fewer springs than appear on the surviving instruments but describes, in addition, two long springs that traverse the pot as diameters and allow adjustment of the stiffness of the support of the metal ring. The simplified system (without the diameter springs) is what appears in the photo on page 1, in FIG. 2, and on all Hoseus-equipped banjos pictured on-line.



FIG. 2. With steel strings and a 1/2" bridge.

A very worn, warped, and abused example appeared recently on eBay. I was intrigued by the sound sample included by Jake Wildwood in his description of another (much higher-end) instrument that he had restored.[2] No one else was foolish enough to be interested in this latest for-sale item. It featured an 11" mylar head that had been fit to the 10 3/4" rim by kinking its edge and discarding the original hook and shoe at the kink. The fingerboard and a couple of frets were deeply worn. On receipt, I found that the plastic nut was too narrow and had been installed backwards. The rim was neither round nor flat.

After addressing all the obvious little issues, I assembled and strung up the banjo — only to find the disaster I should have noticed at the start. The one-piece neck was straight (and only very slightly twisted). But the rim and dowel stick had been pulled way out of shape under the tension of the strings. This substantially angled the neck upwards, producing a totally unplayable action. The single-ply rim is 1/4" thick and 2" high, made of not-particularly-hard wood. The dowel stick is simply a 3/4" dowel.

I managed to loosen the dowel with heat and force, but it wasn't going to come out in one piece. It wiggled a tiny bit as if one or more now invisible toe-nails were holding it in place. I injected some Old Brown Glue to re-set the dowel.

Shaving the neck heel and re-positioning the tail end attachment of the dowel brought the neck/pot angle back to something reasonable. I strung up some extra light gauge steel strings (9 to 20 1000th of an inch). A 1/2" bridge that I pulled from a drawer gave the best compromise between too much space above the neck and too little space above the head.

My wife used "shimmer" and "shine" to describe the ethereal sound, somewhat reminiscent of the Wildwood recordings.[2] Here are links to a couple of quick samples:

hoseus-steel-HM.mp3

hoseus-steel-JH.mp3

A huge problem remained. The rim and dowel are so flexible that any change in holding the instrument changes the neck/pot angle. With steel strings that was enough to substantially change the pitch. I couldn't really tune the banjo because letting go of the neck and grabbing a tuner put a different tension on the strings than when playing. And, while playing, any motion of the left hand resulted in a similar flex and pitch shift.

Nevertheless, the fretboard wear showed that this particular instrument had been played vigorously and at length once upon a time. Amusingly, the deep wear leaves a clear picture of a feature of the player's style. Compatible with the wear is gCGBD tuning and use of only C, F, and G major chords in only the first position. Clearly, someone thought they were making music.

Ah, ha! The problem was incompatibility of the steel strings. It's not that they do not give a period-authentic tone. (They don't.) It's not that they might warp the neck in time. (They would.) It's that they are simply too sensitive to the flex of the whole instrument. The original strings were much stretchier.

The stretchiest (also the cheapest and most immediately available) that I could think

of was fishing line. If one ever buys some, one has enough for a lifetime and a supply for all friends. I used 25, 60, 40, 30, and 25# test and double-C tuning. Compared to steel strings, the lower overall tension allowed a $5/8''$ bridge. I went with one patterned after an S. S. Stewart ad, shown in FIG. 3. It weighs 1.1 oz., in contrast to the 2.0 oz. $1/2''$ bridge used with the steel strings. That weight difference is part of the difference in sound,[3] the string material being the other obvious issue.



FIG. 3. With fishing line for strings and a $5/8''$, 19th Century-style bridge.

Here are links to the fishing line versions:

[hoseus-fish-HM.mp3](#)

[hoseus-fish-JH.mp3](#)

(Only after removing the steel strings and deciding on fishing line did I realize I should have played Fishin' Blues, but I didn't want to go back and add to my four puncture wounds from the on-and-off steel strings.)

I. MINUTIA

I got my money's worth just from the fun of working on the parts — and knowing that my own modest level of competence was adequate for attacking a bottom-of-the-line banjo that no one else wanted. For posterity, here are some of the details.

I made a nut out of a well-dried beef soup bone. I apologized to a younger guy using the tiny shop at work for the smell of the band saw bone cuts. Not surprisingly, it was the same smell as a dentist drilling.

The smallest commonly available fret wire was a fair match to the original, except that all modern wire seems to have much thinner tangs than the slots on this neck. So I crimped the tangs a bit. Three frets needed to be replaced. I added five new ones to the high end, bringing the total just one short of the desired 22. Yes, I like to hit that high, high C for flourish and effect — and don't care too much about what other people think. Formed and baked Sculpey supported the thin high end of the fretboard during installation of the last frets.

Left over from when Caltech still had some real machine shops that I could use and pilfer, I had some rolled $1/8'' \times 1/8''$ square stock for a flesh hoop and some $1/4''$ rod for the Hoseus ring. There was a tiny propane torch in the corner of the one tiny, mismanaged physics shop that still exists. That worked for silver solder.

I was eager to try Bart Veerman's clever hose clamp skin head stretcher scheme,[4] but the particular rim shape and arch top feature left the rim too slippery. For an amateur who mounts only a couple of heads per decade, there's nothing better than just having a big enough piece of skin.

I started with a chunk of aluminum for the missing shoe because brass seems to have disappeared along with the laid-off machinists. It works, but I sorely miss them. The missing Hoseus spring replacement was bent out of some steel pallet banding ribbon. Even that is something of an anachronism. It seems that steel has largely been replaced by braided nylon in that context.

I moved the position of the screw for the dowel tail end as close to the Hoseus ring as possible. It's now a flat head screw that tucks under the crown. The original tailpiece holder remains in its original place, but now threaded as an 8-32 screw.

A $3/4''$ copper tubing coupler was cut down to make a ferrule. (What a fine word!)

Three screws snug the rim to the neck at the heel. For these and the one at the tail end of the dowel, I found new screws that were just a tad thicker than the originals (although possibly the same nominal gauge). They are also longer: $1/4''$ more into the heel and $1/2''$ more into the dowel. Those attachments are really solid. There is nothing flexible about those joints.

II. CONCLUSION

Two big lessons emerged. They're nothing new but worth the reminder. Steel strings require structural integrity, just to maintain pitch. Gut, nylon, and other synthetics are more forgiving. (That's the same physics as what makes them easier to tune.) A reasonable procedure for investigating the sound of a particular design or feature is to compare instruments that are otherwise as identical as possible. That's certainly what I've tried to do in most of my "banjo physics" investigations. Reviving a single Hoseus-style banjo didn't come close to identifying what the spring supported ring does for the sound. That would require far more sophisticated comparisons.

III. THANKS

Thanks to the folks who contributed inspiration and serious expertise in the original BHO thread that launched this adventure.[5]

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- [1] Henry Hoseus' 1886 banjo patent: <https://www.google.com/patents/US342098>
 - [2] Jake Wildwood repairs and restores stringed instruments in Rochester, Vermont. Here is his description of a Buckbee/Hoseus banjo, including a sound file: <http://antebelluminstruments.blogspot.com/2015/12/1890s-buckbee-made-hoseus-tonering-5.html>
 - [3] D. Politzer, *Banjo Bridge Mutes*, <http://www.its.caltech.edu/~politzer>, HDP: 15– 01; scroll down to March 2015.

- [4] Bart Veerman's hose clamp head mounting technique: <http://banjobridge.com/hidehead.htm>
- [5] <http://www.banjohangout.org/topic/320412/#4080916>