Restoration Projects: Miniature Ansonias and Waterburys

For some reason in the last few years we've seen an increased interest in restoring miniature American-made turn-of-the-century clocks. We have repaired or restored about 14 or so miniatures, many of which have been full restorations (movement, case, less frequently dial). The most interesting of these have been the early eight-day Waterburys (Spiders, Hornets, and Wasps) as well as the Ansonia Bees (peculiar that they're all named after insects!). All of them prove to be very interesting and technically challenging restorations for a variety of reasons.

One of the reasons the miniatures listed above are a challenge is that they are all 100 years old or more. They were designed to enter the marketplace at the time against many competitive products. Those that have made it this far are often extensively worn, have survived generations of owners'(and repairers') hands, perhaps having been wound and set thousands of times over.

The Ansonia Bee. One technical aspect all of these clocks have in common is a less-than-robust method for delivering power from the mainspring to the center wheel. Part of the challenge is the compact "double decker" design of these clocks, with the mainspring stacked on top of the rest of the movement. For example, the Ansonia Bee uses the rear cover of the clock as a combination winding key, mainspring barrel and "ratchet wheel," as shown in the following figure:

Figure 1: At the left is the rear cover of the clock (acting as a mainspring barrel and ratchet wheel). In the center is the main wheel (driven by the mainspring in the barrel shown at the left. At the right, the Ansonia Bee movement with cover and main wheel removed. Inset: One of the Ansonia Bee clicks

The "click" is a pair of flimsy brass tabs protruding from the pillars of the movement as shown in the inset. We have only seen one original undamaged click out of the many clocks we've examined. Usually they have been soldered onto the pillars (as is shown here) because the original staking had come loose or the click had broken off at the base. Most of the

time, one or both of the clicks are missing and replacements must be fabricated. It's best to fabricate replacements from strips of spring steel (brass does not hold up), then fasten them back to the posts with taper pins inserted into a 0.020" hole drilled into the pillar tab. Solder must be avoided. Blobs of solder are unsightly and flux from the solder can cause irreparable corrosion and damage to the rest of the clock.

There are two other common problems with the Ansonia Bee power train. First, the mainspring is often shortened because more than likely it suffered a fracture some time in the past. The last Bee we had in the shop was particularly challenging: the mainspring was broken in the middle. Unfortunately, there is no standard replacement available for this family of clocks, which use a ¼" x 0.015" x 84" spring. There isn't anything even close to this available from the suppliers. So now what?

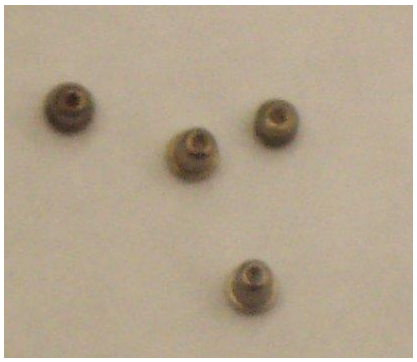
Sometimes you have to take drastic measures and Gibbs Wire and Steel was happy to accommodate. Gibbs manufactures the raw stock for this mainspring, ¼" x 0.015" radiused spring steel strip. Yep, we purchased 300ft of this material (their minimum order)--but fortunately, at a fairly reasonable price. So now, we have a lifetime supply of spring material for Ansonia Bees—enough to replace springs on over 40 clocks! That's when you know you're a true alarm clock lover!

The second common class of problem with the Ansonia Bees is damaged or worn main wheels, second wheel pinions, and second wheels. Somehow the center wheel survives and can be reused. But often, the main wheel and second wheel assembly must be fabricated. This is a topic for a future article. For now, suffice it to say that it is a rather time-consuming process but always yields very satisfying results.

There is one important note on bushing work with miniature alarms. The standard Bergeon or KWM approach is too much of a compromise between available bushing sizes, ratio of plate thickness to bushing diameter, etc for miniature alarms. An approach which is just as fast, much neater, and longer lasting is the time-tested method of making bushings on the lathe and staking them into the movement. Although nearly non-existent today it seems, there is nothing more rewarding than seeing the bushing disappear into the plate, hardly detectable except under a 10x magnifier. The staking operation also work hardens the brass and makes for a longer-lasting repair.

A friend of mine was telling me about an alarm clock that he had shipped to him from an Ebay purchase, in which one of the friction-fit bushings had fallen out of its place and was rattling around inside the clock! Horrifying stories like his solidify our belief in staking and riveting bushings into place, especially given the somewhat thinner plates found in alarm clock movements.

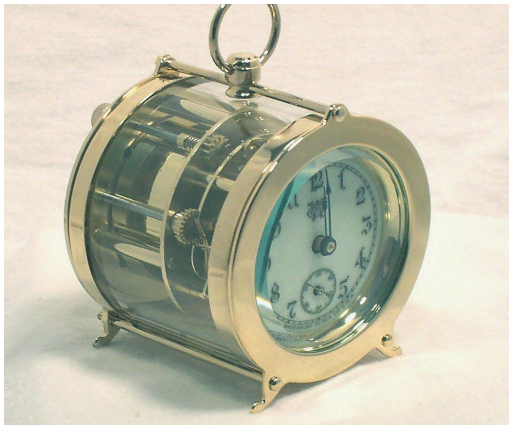
A frequently neglected repair is the balance pivot/balance cup. When balance pivots are worn, they usually wear the cups as well. It is very difficult to examine the cups even under highest magnification because of the inward conical shape. Light reflects off the surface and obscures the wear, which is near the apex of the cup. With 100 years of use,



it's almost certain these cups will need to be refitted. And, most certainly the balance staffs will need to be turned on a lathe and resharpened. Neglecting this repair will result in erratic timekeeping or even a clock that will not run for more than a few hours.

Once the movement work is done, attention is turned to the case work. Just as the movement requires special care, so it goes for the case as well. Handling these clocks over 100 years has the effect of wearing the nickel plating away. Skin oils and acids then attack the brass and sometimes leave deep pits. To repair these cases, all of the darkened nickel must be removed and the brass resurfaced. We use an environmentally safe product from MetalX to remove the nickel. To repair the pits, multiple layers of copper are plated over the brass, sanding between layers and ultimately buffing the copper to bring back the luster. Thereafter, nickel is plated over and a coat of metal wax applied. The finished product is shown in the following pictures, fully functional and ready to brave another 100 years of service ☺ :

Waterbury "Insects". There are a variety of Waterbury miniature styles. In general, the two broad turn-of-the-century models we've encountered have been the 30 hour Waterbury Hornets and Wasps along with the 8-day Spiders and Fangs. Tran Duy Ly lists these as metal case novelty clocks and shows more ornate models such as the 8-day



Bogie and Era which utilize the same movement as the Spider and Fang. This 8-day movement was used in a number of Waterbury novelty clocks of the era. Both the Spider and Wasp were gold-plated with a glass sleeve, and the movement can be seen through the glass. The Fang is the same clock as the Spider, but without the see-through case. All are fitted with a beautiful beveled lens and enameled dial. Generally, these clocks have been referred to me as Hornets and obviously there is some understandable confusion over identification of the different but very similar models. Adding to the confusion is that the Hornet and Fang are listed as having jeweled movements. I've not personally encountered any jeweled Spider or Fang movements as of this writing. Shown here are two Spiders that were subject of recent restorations.

As with the Ansonia Bee, getting power from the mainspring to the center wheel is a big challenge in these clocks. It's the source of 75% of the problems encountered. However with the Hornet, things are complicated by the very large mainspring, at least large in relation to the main wheel, transfer pinion, and third wheel. The mainspring barrel and spring take up more interior volume than the rest of the movement. The mainspring itself measures in at ¾" x 0.012" x 92".

Real trouble starts when an 8-day mainspring fractures. The mass of the spring, the inertia in the uncoiling, and the fragility of everything around it add up to disaster. Shown below is an example of the main wheel from the Waterbury pictured above right, victimized by a broken mainspring. The "kick back" created by the uncoiling mainspring crashing into the sides of the barrel damages not only the main wheel, but also bulges the thin barrel at the hook which causes interference with the movement pillars. In extreme circumstances, this force can distort the barrel to the point where the lid no longer fits securely. We've seen third wheel pinion leaves bent by this force as well.

Left: Waterbury main wheel damaged by the sudden uncoiling of a fractured mainspring. Right: New main wheel attached to reconditioned barrel.

After spending hours reconditioning a barrel, it is important to exercise extreme care with the replacement mainspring (fortunately these are available!). We wind and unwind the spring on a winder at least 10x to identify potentially defective springs that might fail

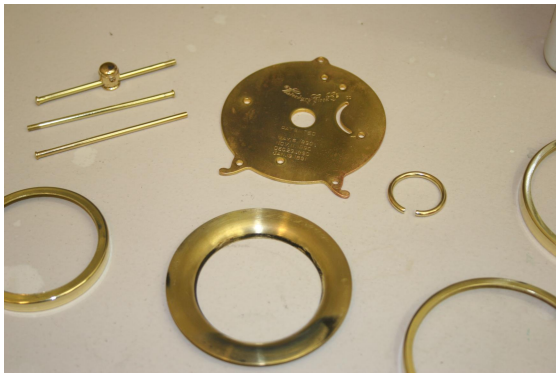
soon after being fitted into the clock. Once the spring is fitted in the clock, we take great care to inspect that the tail of the spring is well fastened to the hook (actually a rivet in this case). While a slipping mainspring tail won't destroy the power train, it might just cost us a few hours of disassembly and repair of a fractured spring or damaged hook. However, if it lets loose when the spring is fully wound, it WILL do major damage.

After taking care of fabricating a new main wheel (and possibly transfer pinion and third wheel pinion, if necessary), the next step is inspecting the movement for wear. Usually, these 8-Day Waterburys will have severely worn lower main wheel bearings. Yes, bearings—these clocks utilize a special bearing that combines the pivot hole of the center wheel with the pivot hole for the main wheel, a part that is riveted to the plate, making it difficult to fabricate and replace.

The transfer pinion holes are almost sure to require attention as well. Every 8-day Waterbury double-decker I have seen had transfer pinion holes that were worn to the point where the gearing locks up. It's amazing that some of them still run—barely. The transfer pinion is affixed between the plate and a bridge, so care must be taken in rebushing these holes—but only after any wear is polished out of the transfer pinion pivots.

Last but not least, the Waterbury ratchet and click are examined carefully. If either of these fails in an assembled clock, the results will be the same as in the case of a broken spring—another day or two in the machine shop. We don't hesitate to replace or recondition both of these. It's cheap insurance.

Restoring a Waterbury Case. The case on a Waterbury Spider is made up of a complicated sandwich of brass rings, collets, plates, and bolts, and a glass sleeve. Some of these components are shown below. Shown at the right is the "holy grail" of how to



disassemble the case. The top bolt was manufactured with the bolt staked to the center ring assembly, after the bolt had been passed through the upper hole in the front bezel. The result is an assembly that cannot be taken apart which makes it impossible to restore correctly. We've found the best technique is to grind off the front dimple. Afterwards, the bolt is chucked in the lathe, trued and center drilled, then tapped with a small tap such as a 1-72 or possibly a 2-56. A new "dimple" is fabricated with a threaded tail much like a screw but with no slot in the head, shown here assembled for polishing. This allows reassembly later, after all the parts have been restored. The resulting repair is invisible.

After filling pits in the case parts with copper, each part is either tumbled or machine buffed to luster (depending on the size and delicate nature of the part). A nickel flash is applied, immediately followed by a heavy 18 karat gold brush plate. There simply isn't anything like the finish of gold plating on a Waterbury Spider. It is difficult to avoid the gold if significant pitting has to be filled with copper, although we have seen some nice restorations done by polishing and lacquering the brass base metal (if it is in good condition) instead of gold plating. However, it just isn't quite as nice as the gold.

The final finish on the movement is of interest. After cleaning and repair work, parts are brushed with a high-quality metal polish such as Flitz polish. The edges of the movement plates are polished to a high gloss, as are the pillars (which are turned in a lathe while buffing them) along with the mainspring barrel. Most of the internal parts of the movement do not appear to have been gold plated with the exception of the main wheel barrel (due to its massive size).

Of all the heartbreaks encountered with the glass-cased Waterburys, nothing is more disappointing than a broken glass sleeve. Although no one to our knowledge sells replacements for these sleeves, there is a way out. Simax borosilicate glass tubing can be purchased in the broadest selection of shapes and sizes from Friedrich and Dimmock in New Jersey. See their website at www.fdglass.com/store. They were willing to cut a 5ft section of tubing to the size we needed, but there was a $150 minimum sale charge. The other difficulty was that we needed to grind the ends of the sleeves to square and parallel. Presumably it's difficult to expect a glass cutter to hold tolerances needed in clockmaking.

Shown below is a broken Waterbury glass sleeve, and the cut replacements in the foreground. Unfortunately, we haven't found a source for glass with air bubbles and ripples as was the case with the vintage glass. ☺ Simax glass is literally a laboratory grade, crystal clear, flawlessly beautiful product.

Glass Sleeves. Shown in the foreground are three cut sections of glass sleeve to be used as Spider cases. The diameter of these sleeves is about 1mm smaller than the original sleeve, which is not noticeable once installed in the clock. This standard Simax product, cut to size, makes a nice replacement for broken or missing Spider glass cases. An original broken Spider case is shown in the back.