



The finished pen, a Baron with closed ends and an invisible clip.

The Invisible Clip

Russ Fairfield

Closing the end of kit pens has become a popular modification, and it has become relatively easy with the availability of the various special mandrels. The closed-end pen and the mandrels for making them are described in "Sterling Instrument," by Richard Kleinhenz (*AW*, vol 21, no 4). Closing the cap is also made easier if we ignore the clip and leave it in the bag with all of the other unused parts. Mandrels for turning both ends of the popular pens are available from www.arizonasilhouette.com.

Making a pen with an invisible clip allows us to make a one-piece, closed-end cap without leaving the clip in the parts bag, and the result is a pen that has the look of a classic 1950s fountain pen. Also, the weight of the cap is reduced by about half when we throw away the heavy metal in the kit finial.



The shape of the clips, left to right: flat washer, large ring, small ring, and the hybrid which is a large ring on its parent kit, but becomes a small ring when used on a larger kit.

The clip isn't really invisible. It is the attachment that is invisible from the outside of the pen. Some prefer to call this a "recessed clip," but I started using "invisible" about six years ago when I first began making this modification to a pen kit. Either way, pens look great with the clips invisible.

The steps are simple: make a closed-end cap, cut a slot in the cap, modify the kit clip to fit into the slot, and hold the clip in place with a plug that is inserted from the open end of the cap. This article will guide you through these steps.

Selecting the kit

Most kits can be modified with an invisible clip, even the Slimline and similar pens. It is also possible to move most of the clips from pen to pen. The clip and pen combinations pictured show some of the various clips I have used and some of the pens I have used them on. The El Grande kit has one of the easiest clips to make invisible while the Slimline is the most difficult because of its smaller diameter. I am using the Baron kit from Berea Hardwoods (www.bereahardwoods.com) for this article. The same kit is sold as the Navigator by Woodcraft (www.woodcraft.com).

Choosing the clip

Pictured are three shapes of clip attachments: flat washer, large ring, and small

ring. A fourth, the hybrid, is a large ring on its parent kit, but becomes a small ring when used on a larger pen.

Flat washer

This attachment is a large, flat washer with a small hole in the middle. The washer is usually the same diameter as the outside diameter (OD) of the pen barrel at the cap finial. This attachment is used on Ameroclassic and Perfect Fit kits and their variations, and the only difference between them is the width of the stem that attaches the clip to the washer.

Large ring

The clip attachment is a large, thin ring that is the same OD as the pen barrel at the cap finial. The Baron is an example of this attachment. Other kits, including the Slimline, use this same type of clip, with the only difference being the diameter.

Small ring

This clip is similar to the large ring, except that the OD of the ring is smaller than that of OD of the pen barrel at the cap finial. The El Grande and all of its variations use this attachment.

Clips that have a large ring when used on the parent kit can become a small ring when used on a pen from a larger kit. In this case, use a Slimline clip with a larger Baron pen.



(Left) Clip and pen combinations, left to right: A stock Baron clip and finial, a closed-end Baron with the kit clip, the Baron with an Ameroclassic clip, the Baron with a Perfect-Fit Convertible clip, the El Grande with the kit clip, and the Berea StreamLine with the kit clip.

Modifying the washer clips

The flat-washer clip from the Ameroclassic and Perfect Fit are the easiest clips to modify and install in pens. I also believe it to be the strongest clip. These are the clips I started with, and I still acquire them whenever I can.

The washer is simply reshaped to form a tab (*Photo 1*) that is inserted into the slot cut in the cap. The hole in the washer is retained to lock the clip in place. I reshape the washer using my grinder (*Photo 2*), but a file could accomplish the task, only more slowly. Be careful to not hit any of the plating that will be on the outside of the pen. Keep the clip cool by dipping it in cold water because the heat can peel off the plating. Always hold the washer in the trailing position to keep the wheel from grabbing it.

A similar tab can be added to any clip by removing the entire attachment ring, either large or small, and silver soldering a tab to the remaining stub after the ring has been removed. This clip will be only as strong as the silver solder joint. A solder with a high silver content is best, but I have made these with soft silver solder, and they are holding well with limited use. I would not, however, sell a pen with a clip that was attached with soft silver solder. I have also experimented with a shop-made spot welder to make this joint.

Modifying the rings

The ring attachment has to fit *inside* of the drilled hole in the cap. I use the inside of the brass tube as a gauge. If the ring attachment will fit inside of the cap tube, it will fit inside of the drilled hole (*Photo 3*).

Modifying the washer clips



1 Left pair is the clip attachment for the Ameroclassic pen kit and its modification. The right pair is the Berea Perfect-Fit Convertible and a similar modification.



2 Grinding the flat washer. Keep it cool, and always hold it in the trailing position as shown. Make sure your toolrest is as close as possible to the rotating wheel.

Modifying the rings



3 Using the brass tube as a sizing gauge, the ring must fit inside of the tube, as the El Grande shown here with the Baron cap tube.



4 If the ring fits inside the cap tube, the only modification is to remove a section of the ring so it may be threaded to the inside of the cap, as with this El Grande clip in a Baron cap tube.



5 If the ring is larger than the tube, it has to be clipped and reshaped until it fits as shown here with the Baron clip in a Baron cap tube.



6 Bend the large ring after removing a 90° section. Use two pairs of pliers and hold the clip in a piece of leather to prevent damage to the plating.

If the ring is already smaller than the inside of the tube, the only modification is to remove a 90° section of the ring so it can be threaded into a slot in the barrel (*Photo 4*). Some large clip rings will become a small ring when they are used with a larger-diameter pen.

If the ring is too large to fit inside the cap tube, it will have to be reduced in size. First, cut a section out of the large ring. Then, bend the ring to form a smaller diameter that will fit *inside*

of the brass tube (*Photo 5*). I use two pairs of pliers to do this; conventional pliers hold the clip, and needle-nose pliers bend the ring. Hold the clip with a piece of leather to prevent damage to the plating (*Photo 6*). The Slimline clip ring can be bent to fit inside the 7 mm cap tube, but it will be more difficult because of its smaller size.

Almost any clip can be used with any kit by using one of the three modifications. The only stipulation is if the ►

washer or ring can be modified so it can be threaded through a slot in the cap, and then captured in place.

Drilling the cap

Any of the various methods of holding the cap so it can be turned with a closed end can be used. It doesn't matter whether you use an expansion mandrel, a modified 7 mm mandrel and bushings, an o-ring mandrel, or if the cap is turned between centers. What *does* matter is that the drilled hole in the cap be *flat* on the bottom because the clip will be clamped in place against the bottom of the hole. It must also be deep enough so that the tip of the pen doesn't hit bottom when the cap is screwed on.

There are several ways to get a flat bottom in the drilled hole; however, the bottom will already be flat enough if a brad-point drill bit is used.

A better option is to use a bottoming drill. To make a bottoming drill, first grind the tip of a standard twist drill to a square end. Then, grind no more than 2 or 3 degrees of relief behind the cutting edges (*See photo*).



The cap blank is drilled with a $\frac{29}{64}$ " or $\frac{15}{32}$ " drill bit to achieve a square bottom. Use either a pilot point drill bit, or grind a bottoming drill.

Yet another option is a pilot-point drill bit (*See photo*). It leaves a flat-bottom hole with a smaller hole beyond that. I use the pilot-point drill bit and drill the pilot hole out to a diameter of $\frac{7}{32}$ ", but no deeper than $\frac{1}{8}$ " to accept the threaded end of a standard 7 mm mandrel for turning the pen. This method for holding the pen for turning is described on page 31 of the previously mentioned article in *AW*.

The depth of the hole should be the depth of the brass tube, *plus* enough to accommodate the clip and a plug to

Turning the cap



Put the drilled blank on the mandrel and turn to shape. Shown is a blank screw onto a standard 7 mm mandrel that is held in a collet chuck. The tailstock center is just there for additional support, and is not required to drive the blank.

Cutting the slot



Mark the location of the clip slot and the end of the pen.



Locate the slot for the clip with a small saw that leaves a $\frac{1}{32}$ " kerf.



Start the slot with a sharp dental pick.



An alternative method is to start the slot with a Dremel tool and a small $\frac{1}{32}$ " or $\frac{3}{64}$ " milling cutter or drill.



Continue cutting the slot with a small saw blade held in a piece of dowel.



This slot-cutting tool is a piece of a coping saw blade, about $\frac{1}{32}$ " wide.



The pyrographic alternative is quicker and more accurate.



The slotting tool is a Detail-Master No. 2D calligraphy pen.



The burned area around the slot can be turned and sanded off.



Fit the clip into the pen.

hold it in place, *plus* whatever length was removed from the center band. I recommend a hole that is $\frac{1}{4}$ " deeper than the length of the brass tube for

the first pen. Then, add any additional depth to compensate for any length that is eliminated at the center band.

Removing rings from the center

band will allow the fitting to be pushed farther into the brass tube – that could be enough to interfere with closing the cap on a fountain pen by jamming the tip into the bottom of the cap, so watch for that. For the Baron kit with a brass tube that is $2\frac{13}{16}$ " long, I drill the hole to $3\frac{1}{8}$ " deep if the center band is stock, and to $3\frac{1}{4}$ " deep if the two loose rings aren't used at the center band. This will ensure that the fountain pen tip will have clearance in the bottom of the cap. Save trying to make a shorter cap until you have made a couple pens.

I drill the cap with a $\frac{29}{64}$ "-diameter drill bit because I like the brass tube to have a tighter fit. Sometimes, however, the fit is too tight, and it is necessary to sand out the inside of the hole with a piece of sandpaper wrapped around the end of a dowel. Use a $\frac{15}{32}$ " drill bit for a loose-fitting tube. I use CA glue for the tubes. Don't worry if the glue freezes before the tube is all the way in. It isn't necessary to use the whole length of the brass tube because we aren't going to be pressing anything into the other end. One inch of brass tube inside the cap is plenty. Cut off the excess tube, trim the end, remove the burr from inside the tube, and the cap is ready to turn.

Turning the cap

The only caution when turning the cap is that it be left slightly oversized, so the surface can be cleaned up after making the slot. Other than that, there is no difference from turning any other closed-end cap (*Photo 7*).

Cutting the slot

Measure the actual depth of the hole in the cap, and transfer this dimension to the outside of the cap (*Photo 8*). Also locate the top of the cap. Allow $\frac{1}{4}$ " between the top of the cap and the bottom of the hole. You can do this with a pencil mark on a stick of wood, but I recommend using a dial

caliper since some degree of precision is helpful. The dial caliper I use is plastic because it won't damage the pen. The dial is graduated in both $\frac{1}{64}$ " and 0.010" increments and that is close enough. I always make a cut with a parting tool so I will know where the top of the cap is.

Make a start for the slot with a thin $\frac{1}{32}$ " hacksaw blade (*Photo 9*). The best slot will be flush with the bottom of the hole with no overlap. It's better to fudge a little than have to make a wider slot in order to get the clip into the cap. The length of the cut doesn't matter, so long as it isn't longer than the width of the clip.

The next step is to pull the blank back so the end of the mandrel isn't under the slot, and then punch a hole through the cap. This can be done from scratch with a dental pick (*Photo 10*), or with a $\frac{1}{32}$ " milling cutter in a Dremel tool (*Photo 11*). A small drill bit, no larger than $\frac{3}{64}$ ", will do the same thing, but it will be harder to control and cannot make a sideways cut.

I make the slot only long enough that I can poke a small scroll saw blade through it (*Photo 12*). After that, the slot is lengthened by any means possible to where either the tab or the modified ring can be threaded through it. A dedicated tool can be made from a piece of a scroll saw blade that is $\frac{1}{32}$ " wide, glued into small hole drilled into the end of a dowel (*Photo 13*).

An optional, and sometimes easier, way to make the slot is to burn through the cap (*Photo 14*). I use a wide, flat Detail Master No. 2D calligraphic burning tip (*Photo 15*) and a Detail Master controller. When burning the slot, you do not want to char the wood too much or melt a huge hole in a piece of plastic. It is possible to make the slot without doing either. That means burning the slot, and then removing the burning tip as fast as possible. A little charring is inevitable

Turning and finishing the pen

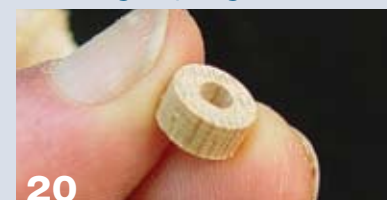


18
Finish turning the cap to whatever shape you choose.



19
Sand and finish the cap.

Making a plug



20
The plug that will hold the clip in place is ready to place in the hole.

on the wood surface (*Photo 16*), but that can be turned and sanded away. Any remaining discoloration will add an accent around the clip. The setting for plastic is more critical because the goal is to melt through the plastic without blowing out a larger area. Either way, make the slot and immediately remove the burning tip.

I start with a 7 setting on my controller for wood and a 5 or 6 setting for plastics, and always make several test slots whenever I am using a new wood or plastic material. Once the initial slot has been burned, the temperature is reduced to lengthen the slot.

Check the fit and make any adjustments in the clip at the same time the slot is being cut. Usually, I have to cut a wider opening in the ring. ►

However we choose to cut the slot, it will take some amount of time and frustration to achieve a good fit with the clip (*Photo 17*). Cussing helps.

Turning and finishing the pen

The pen is now turned, sanded, and finished (*Photos 18 and 19*). Do not wet sand the pen, because the water can get into the wood around the slot and get under the finish. This can cause a blush under the finish, or the finish will come loose from the wood.

Making a plug

Turn a small length of wood to a diameter that will be a close fit inside of the cap. A piece of dowel or pen blank works fine. Drill a $\frac{1}{8}$ "-diameter hole (or anything close) through the center and part off a plug that is about $\frac{3}{16}$ " in length (*Photo 20*).

Assembling the pen

Clean out the slot to remove any finishing materials. Do lots of fitting and trial runs to make sure the clip fits and lies square with the pen. Be satisfied with the fit before gluing it in place. Now is the time to do any final bending because it will be too late after the glue dries.

Slip the clip into place and put a large drop of epoxy down inside of the tube. *Do not* use CA glue here. The fumes from the CA will eat the plating

off of a fountain-pen point and leave a white ash in the feed, and it will continue to do so for months afterward. No amount of accelerator or waiting will prevent this.

My choice of glue is the Quick Cure-5 by System Three. This epoxy is available from Craft Supplies (www.woodturnerscatalog.com) or any Woodcraft retail store. It is a true five-minute epoxy with a short transition time and a fast cure after the five minutes are up. It is also the least sensitive to variations in mixture of any two-part, five-minute epoxy I have used. It is never rubbery and never brittle when a reasonable amount of care is used when mixing. The longer working time allows for a thorough mixing, which is important for an epoxy.

Keeping the epoxy off the inside of the pen tube isn't difficult. I use another tube that fits inside of the tube in the cap, and then drop the epoxy down through that using either a thin screwdriver (*Photo 21*) or a soda straw. Using the soda straw is simple – scoop the uncured epoxy up inside of the straw, drop it down inside of the tube, and then blow on the other end of the straw to make sure all of the epoxy is out. Don't use too much epoxy – just enough to cover the bottom of the hole and the clip.

Remove the smaller gluing tube. Then drop the plug down inside the tube. Don't put any epoxy on the plug, because glue will get on the inside of the barrel. Push the plug down with a dowel. The hole in the plug will allow the excess epoxy to come up inside the barrel rather than being squeezed out through the slot. Here is where you will discover how much epoxy is really needed on your next pen cap.

Hold the plug in place with the dowel or a piece of brass tubing until the glue starts to cure. You will know when this happens because the clip will stay in place by itself without clamping. Remove the dowel, make any last-minute adjustments in positioning the clip, clean up the inside of the tube with a cotton swab dipped in isopropyl rubbing alcohol, wipe off any epoxy that got on the outside of the cap with the same alcohol, and set it aside to cure.

I place the pen into a hole drilled into a short piece of 2" x 4" lumber. A $\frac{3}{4}$ "-diameter hole is large enough that I can push a piece of foam rubber into the hole with the cap. The foam rubber will act as a clamp to hold the clip in place (*Photo 22*).

The cap is finished. Push in the threaded center band and threaded sleeve (*Photo 23*). Make sure that the end of the cap is protected with a piece of leather to prevent damage to the finish or wood when using the pen press.

Now make the other end of the closed-end pen. Screw on the cap and you will have what I call a "Collector's Pen."

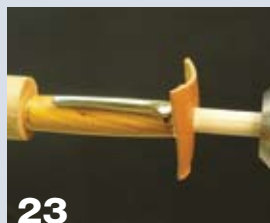
Assembling the pen



21 Mix and drop 5-minute epoxy glue into the bottom of the hole. Use a smaller brass tube to keep the glue off of the cap tube. **DO NOT** use CA glue.



22 Hold the cap inverted until the glue has had at least 30 minutes to set.



23 Push the center-band and threaded sleeve into the cap. The leather prevents damage to the finish. The cap is finished. Now make the other end of the pen.

Russ Fairfield is a retired engineer who lives in Post Falls, ID. He is an active member of the Inland Northwest Woodturners and the newly formed INW Pen Turners Association; he teaches woodturning classes at the Woodcraft store in Spokane, WA. He has traveled extensively demonstrating at local clubs and regional symposiums. For more information, visit www.woodturner-russ.com.