

Schaff Piano Supply Company Presents:

# Splicing Broken Grand Hammer Shanks

## Basic Step-by-Step Procedures



Action Work

By Chuck Behm

## Splicing Broken Grand Hammer Shanks



### **-Rationale-**

When hammer shanks have broken in a grand piano, the piano technician has several options as to repairs. If the piano or the action is in his shop for restoration work, the best fix for a case of brittle and breaking hammer shanks would be replacement of the entire set along with a set of all-new hammer heads.

In situations, however, where simply fixing the immediate problem of notes not working is called for, there are two simpler solutions. First, the technician can save the old hammer head but replace the broken hammer shank and flange with a new replacement. With an older piano, especially one of a lesser known brand, the problem can be finding a replacement that matches or settling for a universal part.

As an alternative, the technician can splice the broken shank. Occasionally, if the break in the shank is a long split, the two pieces of the shank can be mended together quite easily. If this is not possible however, as in the case with a stubby break at the end of the hammer shank where it joins the hammer, a splice may be made by joining the flanged end of the shank, with a segment of a new hammer shank spliced to it. Several tools supplied by Schaff Piano make this an easy and effective fix.

## Action / Splicing Broken Grand Hammer Shanks



*Note: This type of break necessitates either replacement of the shank, or splicing in with a segment of new shank. In the case of this particular piano, a new set of shanks and hammers were recommended and were slated to be installed at a future date. For the time being, however, repairing the piano to work was the order of the day. A simple splicing of several broken shanks was recommended as a temporary measure so that the piano might be played again.*

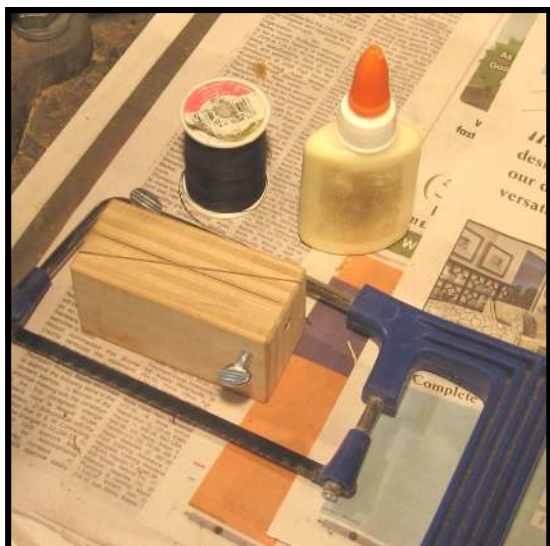


**Step 1:** Remove any broken shanks from the action. Number the flanges, if more than one shank is involved. Locate the broken off hammers. If several shanks close together have been broken off, match hammers to shanks by examining the broken ends. Number the hammers before going any further to avoid confusion.



**Step 2:** Organize the damaged parts so that you are able to proceed without losing track of where everything is at. It's too easy, when multiple action repairs are being made, to misplace items and spend valuable time looking for that one screw, spring or part that you set down somewhere without thinking.

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**Alternative repair method:**  
Before going through the steps involved in splicing a broken grand hammer shank, the technician should consider the alternative approach. If a new hammer shank and flange set is available that will fit and work, it is at times an easier repair method. With a vintage piano, however, differences in touch between new shanks and flanges and the neighboring originals may be noticeable, making for more time used to match the touch of neighboring notes.

*Hint: Purchasing a sample selection of the various grand hammer shanks that Schaff sells will allow you to make side-by-side comparison between the original shanks and flanges with the available new parts. This is more reliable than simply lining up the old parts with pictures that are printed in the catalog.*

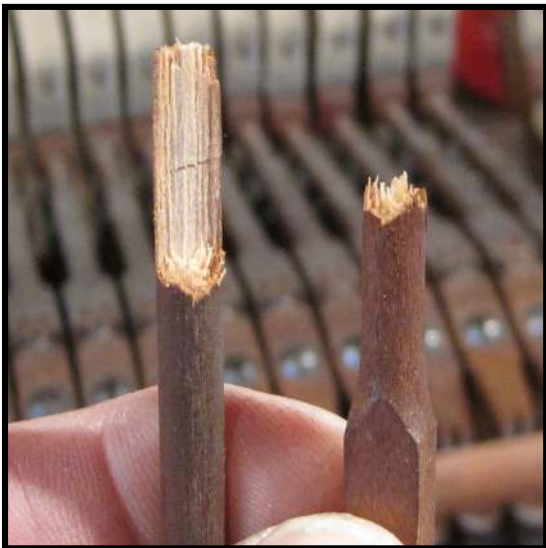
**Step 3:** If splicing is the chosen method, set up your work area by getting out the necessary tools. Some of the primary tools shown in the photo are the hammer shank miter box, (Cat. No. 3116), the Handy Hacksaw (Cat. No. 295), and a small bottle of Titebond, (Cat. No. 392-1). The fourth essential item for the repair is high-strength thread, available at any sewing center.

Action Work

## Action / Splicing Broken Grand Hammer Shanks



*Caution: Would you trust your thread to do this? If not, it probably isn't strong enough and will most likely break on you when you get to step 13. Bad luck, indeed!*

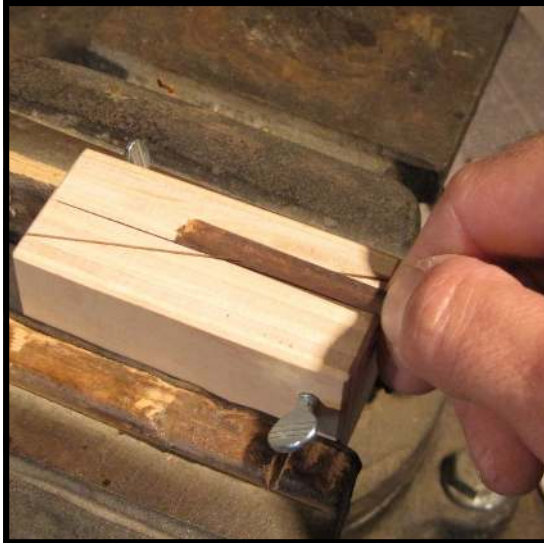


*A long break compared to a stubby one. The long break presents adequate surface area for effective gluing and may be repaired using the same gluing and wrapping procedures as a prepared splice, but without having to add in a segment of new shank. For repairing this type a break, skip ahead to step 10.*

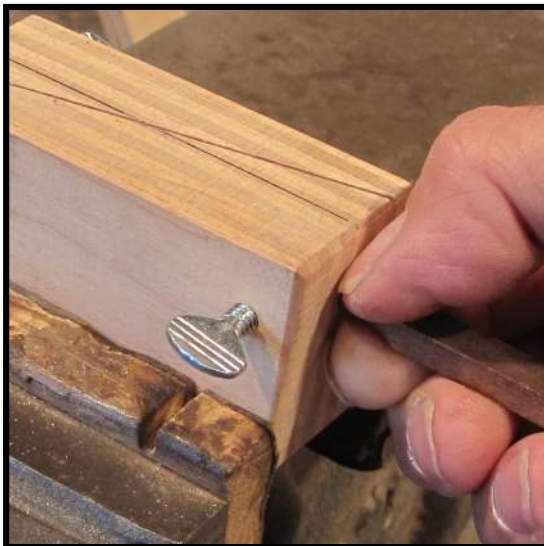


**Step 4:** Set up your hammer shank miter box in a heavy-duty vise for a more stable and accurate cut.

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**Step 5:** Begin the repair process by gauging the amount of shank to insert into the miter box. Hold the shank along a line drawn on the box to represent the alignment of the hole. Make sure the entire break will lie beyond the cut line in the box. Grip the shank at the point to which the shank needs to be inserted.



**Step 6:** Insert the flanged end of the hammer shank into the hole in the miter box up to where your fingers are holding it. Tighten the set screw on the end of the miter box closest to you.

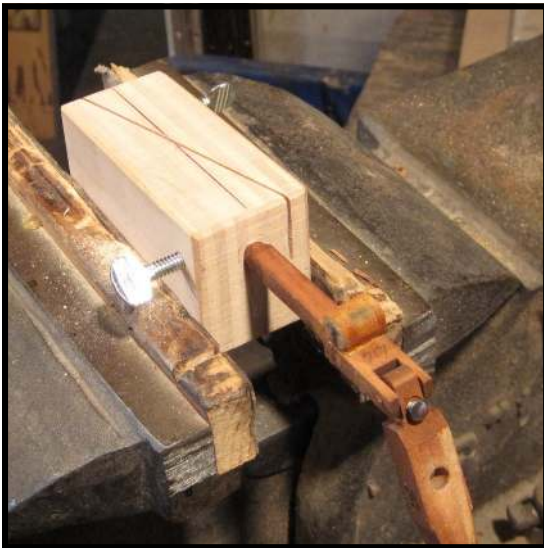


**Step 7:** Using your Handy Hacksaw, cut through the shank with even strokes. You'll feel the blade drop in the slot slightly when the shank has been sliced all the way through.

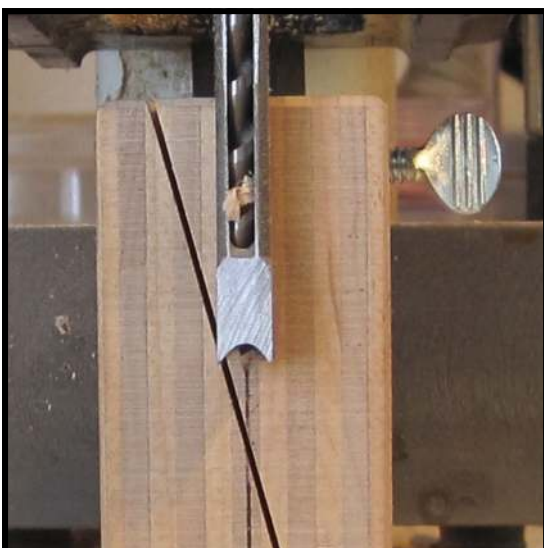
## Action / Splicing Broken Grand Hammer Shanks



*Notice that the extreme angle of the cut affords a large gluing area. With this amount of contact surface, a glue joint that will be as strong as an intact shank will be possible.*

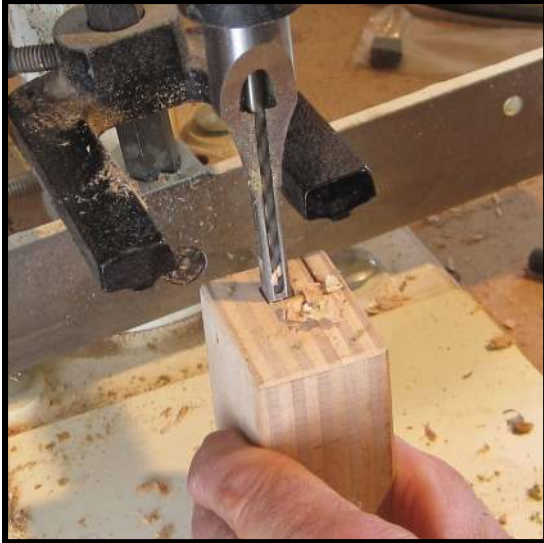


*Note: Sooner than later you'll run into this problem. A break too close to the squared-off portion of the shank to fit far enough into the miter box to cut. You are literally trying to fit a square peg into a round hole. It doesn't work.*



*To solve this problem, a square hole on one end of the miter box may be cut with a mortising machine using a 1/4" mortising chisel bit. Before drilling the square hole, set the mortising machine's depth gauge so that the chisel bit will stop slightly before the diagonal guide line for the miter saw is reached, as shown in the photo. The hammer shank will then have a round hole supporting it on both sides of the saw, keeping it steady in the hole as it is being cut.*

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*Cut the hole to the full depth, then widen it slightly by trimming another 1/32" or so from the sides with the chisel bit. Without just a bit of widening, most squared shanks will bind or refuse to go into the hole.*



*Voila! Now you have the perfect square hole for a square peg.*



*Now, repeat step 4. As an alternative to simply holding the shank at the correct point, you can also mark it with a pencil or pen.*



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*Finally, repeat steps 6 and 7.*

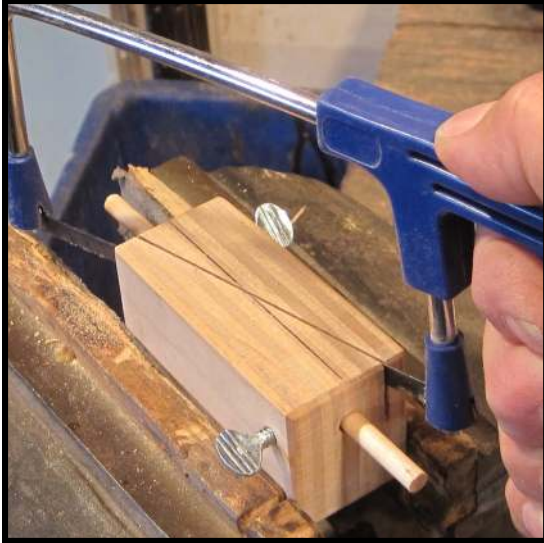


**Caution:** *Before proceeding any further, clear out the hole in the miter box. If the left over stub doesn't fall out, use a blunt ended punch to tap it out. If you forget this step, you'll likely have a "log jam" develop at some point, when the split end of a shank, and the tapered end of a sawed off shank get jammed together. If this happens, you'll most likely need to drill the hole out again.*



**Step 8:** Use a [micrometer \(Cat. No 3338 shown\)](#) to measure the diameter of the original shank. You will want to use a hammer shank that is at least as large as the original for splicing. In most cases [upright shanks, \(Cat. No. 504\)](#) which are 7/32 inch (or .2185") will be the best choice. Modern grand shanks typically measure either .204 or .196 inch. The slightly larger upright shank may be knurled or reduced to fit in a grand hammer that is bored for a standard grand shank.

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**Step 9:** Taking a new hammer shank, insert it into the miter box for cutting. Unless an extra long segment of shank is needed for a splice close to the flange, you can usually cut the shank at its center to produce two splicing shanks for use.

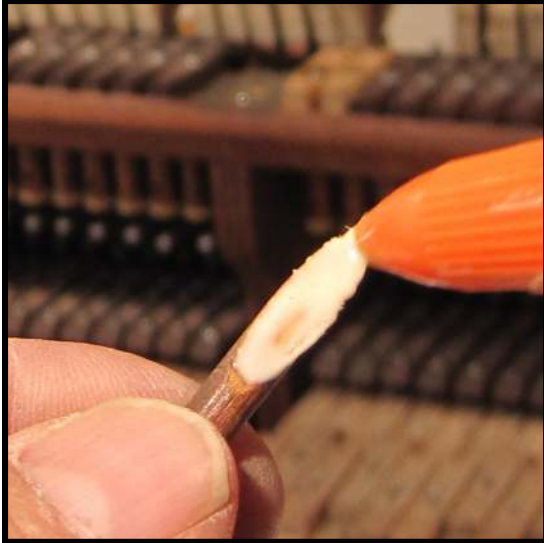


*Hint: To expedite the procedure, keep a supply of precut splicing shanks on hand.*



*The matching gluing surface on the new splicer. One convenient thing about using the hammer shank miter box is that you never need to worry about the angle to cut. You will automatically have matching surfaces to work with.*

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**Step 10:** Apply Titebond to one half of the joint. Be generous in your application, in that a little squeeze-out is helpful, unless you intend to remove the thread after the glue dries (refer ahead to page 16 for a note on this). Have your spool of thread within easy reaching distance at this point with a foot or so of thread unwound.



**Step 11:** Join the two halves of the joint together, making sure that the cut surfaces are correctly aligned.



**Step 12:** Hold the joint tightly together at approximately the half way point with your left hand, pinching the joint with your thumb and forefinger. Double-check alignment.

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**Step 13:** Without releasing your grasp of the glue joint, take up the spool of thread, hold it up and bite down on the end of the thread. Reel out about a foot of length. Keep a constant tension on the thread as you work.

*Note: If your thread breaks every time you try this, you weren't taking me seriously on page 5. Go buy some better thread!*



**Step 14:** Position the spool of thread in your right hand as shown in the photo so that you may unwind as much thread as you need as you wrap the spliced shanks. Unwind an adequate amount of thread to work with, then grip the spool tightly to keep the tension on the thread.

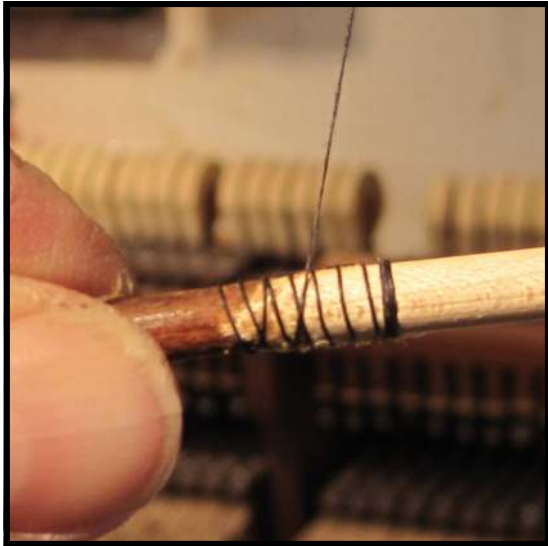


**Step 15:** Start your winding by wrapping the thread up and over the splice just above where you are pinching it the two halves of the splice together. Make three tight windings going in the direction **away** from your left hand.

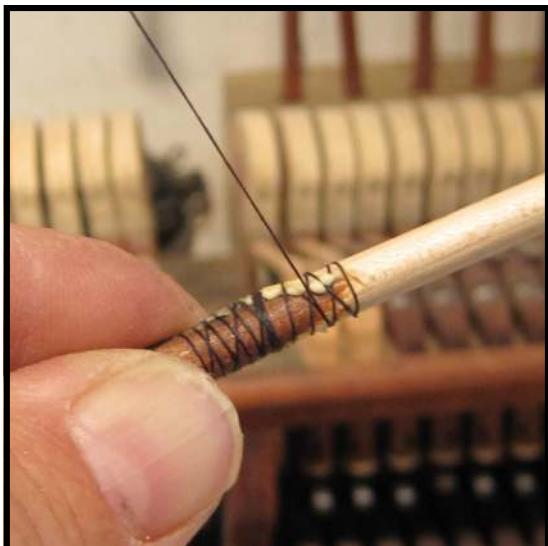
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**Step 16:** With the initial windings done, double back, and begin heading towards the flanged end of the shank. As you do this, release your grip on the end of the thread with your teeth and allow that portion of the thread to fall loose. Scoot your fingers back a bit out of the way as you go, and wrap with a more widely spaced winding towards the flange end of the splice.

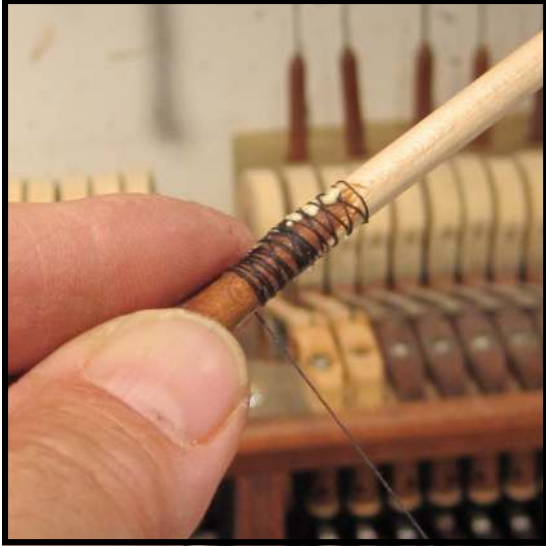


**Step 17:** When the winding is slightly beyond the extent of the splice begin wrapping away from your fingers again, maintaining or even widening the width of the windings. Continue back across the starting point, towards the hammer end of the splice.



**Step 18:** Double back one last time, and head all the way to the flange end of the splice.

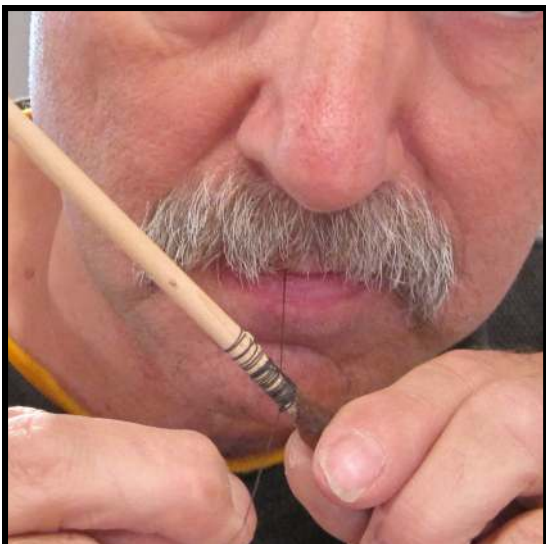
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**Step 19:** Once you're to the end of the splice, hold the two ends of the thread firmly in place with the forefinger of your left hand (one thread not visible in photo), set the spool down on the bench, and pick up your scissors.



**Step 20:** Snip both ends of the thread, leaving about a foot or so of extra thread to work with (the photo shows the thread being cut rather short for the purpose of getting everything in the picture. Longer would be better.) A sharp pair of [curved nose scissors](#), (Cat. No. 164), works well for this job.



**Step 21:** Without releasing your hold on the end of the windings, take one end of the thread between your teeth again, and use your free hand to tie a simple knot. Cinch it up tight. (Again, for the purpose of getting everything in focus for the photo, the thread has been cut rather short. A little more length would make the job easier.) Keep the thumb of your left hand over the knot to prevent loosening.

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**Step 22:** With the first knot tied tightly, maintain the tension with the segment held in your teeth while holding the juncture in place with your thumb. Knot the thread two more times for insurance.



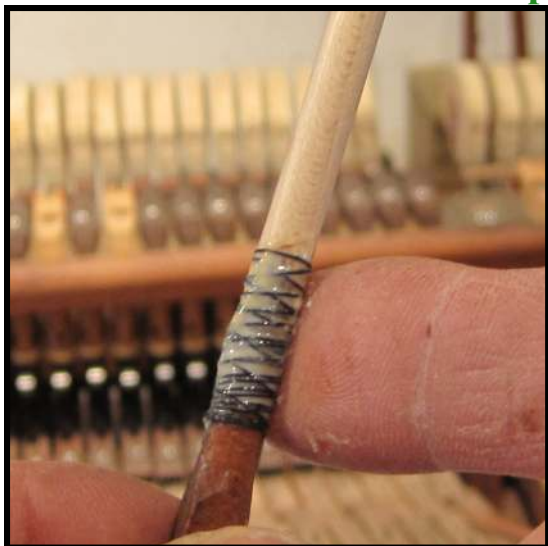
**Step 23:** Snip the threads again, this time leaving approximately 1/2" of loose thread.

*Caution: Snipping the ends of the thread perfectly flush with the knot will likely result in the knot coming loose and the winding unraveling.*



**Step 24:** If you intend on leaving the wrapping on the shank, spread a bead of Titebond glue across the windings.

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**Step 25:** Even the glue out over the windings by turning the shank and holding your finger stationary. Once dry, the windings will be anchored in place, maintaining a firm grip on the splice.



### Alternative method:

If, for either cosmetic reasons or out of concern for the effect of the weight of the thread and extra drop of glue or so on the responsiveness of the action, the wrapping may be removed after the glue joint has dried adequately (overnight drying time recommended). Use a razor to cut the thread, then unravel it from the shank.



Finish the shank off by lightly sanding off the remnants of thread and glue.

*Note: I've done this repair on pianos for years, at times leaving the wrapping on and at other times taking them off. Never once have I had the glue joint fail either way.*



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**Step 26:** To cut the new shank to the approximate length, first screw the flange back in place. It takes just a few extra seconds, and will insure that the flange and shank stay put and that you cut the shank at the correct spot.

Note: As you look at the pictures of the action, keep in mind that this piano was manufactured in 1885. At the time of this writing (2010), it is 125 years old!



**Step 27:** Line up the repaired shank with a next door neighbor.



**Step 28:** Using a pair of [hammer shank cutters \(Cat. No. 237\)](#), snip the shank a bit long. Once the hammer is glued in place, the excess shank will be further trimmed and filed flush with the tail.

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**Step 29:** Turning your attention to the corresponding hammer, place the hammer head in a leather or cork-lined vise as shown for removing the remaining portion of the broken shank. Use a sharp awl to mark the exact center of the top of the old shank.

*Caution: Do not attempt this step by holding the hammer shank in your left hand, and pushing down with the sharpened awl with your right!*



**Step 30:** Use a [grand shank press \(Cat. No. 131\)](#) to extract the old stub. Remove the hammer head from the vise, and place it in the press as shown with the point of the plunger lined up with the hole that you marked in the top of the shank. Carefully steam the glue joint where the shank is inserted, (avoid the felt) then begin turning the screw down.

*Sometimes with older instruments the hammers do not need to be steamed. Experiment to see what works best.*



**Step 31:** As you turn the screw of the press down, you should feel the shank give way and begin to move. Watch underneath the hammer for evidence of the old shank emerging from the hammer head. On an old hammer and shank, the emerging shank will be lighter in color.

*Caution: If you do not see any evidence that the old shank is being pushed through, stop! Additional measures need to be taken to avoid damaging the bore of the old hammer head.*

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**Step 32:** If using the grand shank press doesn't budge the broken stub, try drilling a small pilot hole in the old shank, moistening it, then screwing in a dry-wall screw. Heat the screw as shown, then carefully pull out the stub of the shank with pliers. If all else fails, the remaining cylinder of wood may be removed in bits and pieces, or as a last resort the hole may be redrilled on a drill press.



*Note: This photo explains a lot about past work done on the instrument. The hammers on this piano are replacement hammers, and are lightly worn. They are bored, however, for a .204" shank, while the original shanks only measured .199". The thread helped obtain a tighter fit.*



**Step 33:** If you intend to use hot animal hide glue in the process, now would be a good time to prepare the glue. I would recommend the [Hold-Heet Electric Glue Pot \(Cat. No. G-1155\)](#), used along with [dry cabinet glue \(Cat. No. 399-1/2\)](#). For this type of job, you only need to prepare a very small batch. Simply mix the glue crystals with water, and plug the pot in. Stir occasionally to maintain an even consistency.

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**Step 34:** Test the fit of the new spliced shank in the hole of the hammer head. It should be snug and tight, but not so tight that it ratchets (exhibits jumpiness when turned). If it is too tight, or if it can't be inserted into the hammer at all, the shank will either need to be reduced or knurled.

*Caution: If the hammer ratchets on the shank, you will find it nearly impossible to align accurately in the gluing process. If it's fitted so that it turns smoothly, a exact alignment will be much easier.*



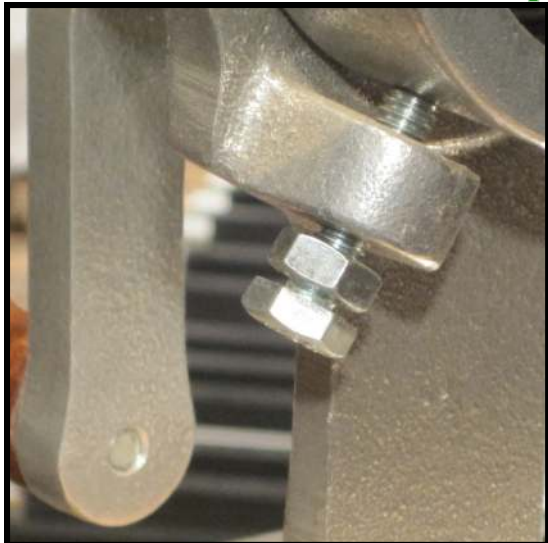
**Step 35a:** A light knurling of the shank may be accomplished by rolling the end of the shank several times at pressure under a **flat bastard, coarse cut file (Cat. No. 252)**. For best results, use a solid metal surface, such as the anvil of a vise (shown), and position the flange off to the side so that it may rotate freely. Check the fit frequently, in that you don't want to go too far and end up with a loose fit.



**Step 35b:** A more efficient knurling may be done with a production-type **hammer shank knurler (Cat. No 217)**. Feed the end of the shank into the tool, turn the handle, and the job is done.

*Hint: Experiment on a piece of new hammer shank to get the tool set up at exactly the right amount of compression. Check the fit of the test piece before using the tool on the actual part.*

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*Note: Setting the amount of compression on the tool is a simple adjustment, as shown in the photo at left. The desired length of the knurl may also be easily adjusted. The hammer shank knurler may be attached permanently to your bench, or may be attached to a wood block to fit in a bench vise.*

**Author's note - This is really a great tool that I would highly recommend!  
Chuck Behm**



*Note: Using the hammer shank knurler results in an evenness of results that is hard to achieve with the file rolling technique. It is especially useful on complete hammer replacement jobs, where every shank needs to be accurately knurled.*



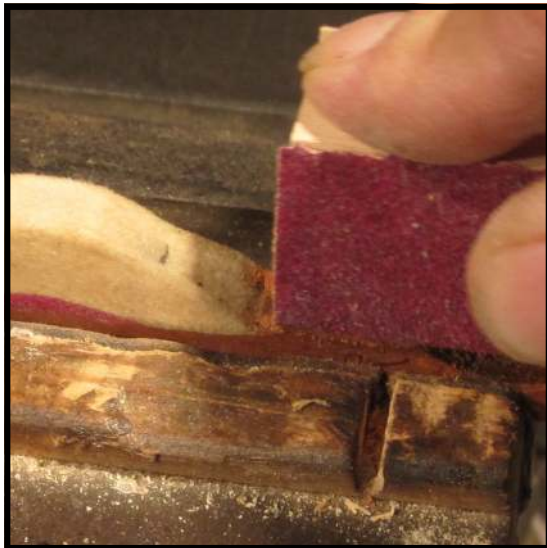
**Step 35c:** Instead of knurling hammer shanks, a correct fit may also be obtained by using a [hammer shank reducer](#), (Cat. No. 75) along with a [combination tool handle](#), (Cat. No. 26).

*Caution: Knurling hammer shanks involves compressing the wood. Reducing the hammer shanks involves actually removing wood. If knurling hammer shanks was compared to hemming up the legs on a pair of slacks, reducing would be more like cutting them off.*

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**Step 36:** To prepare the hammer for gluing, mount the hammer head in your vise with the bottom of the molding facing up.

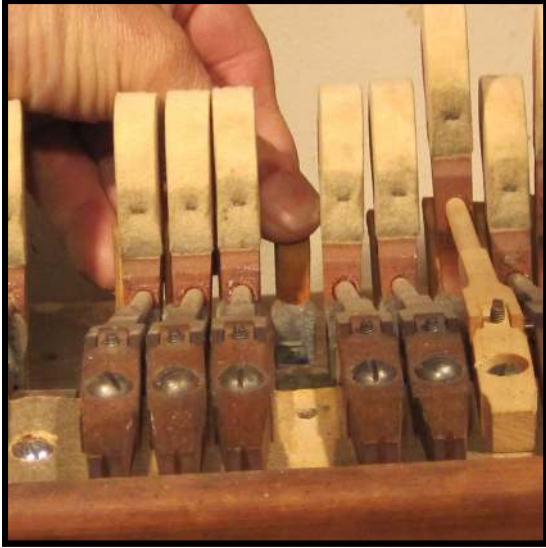


**Step 37:** Use a miniature sanding block, and a small piece of 150 grit paper to sand off any glue remnants from the bottom of the molding. This step will make it easier to form a well made collar when the new glue is applied.



**Step 38:** If you wish to have a useful reference to use during gluing, draw a line on the underside of the molding bisecting the shank hole.

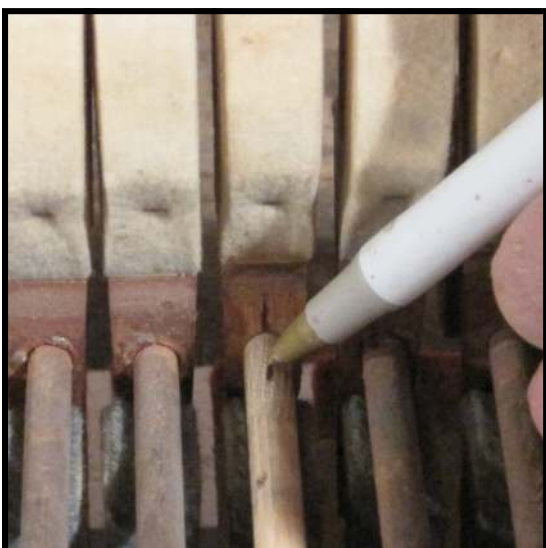
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**Step 39:** In the spot where the repaired shank / hammer is going, temporarily push the backcheck further back to avoid contact with the extra bit of shank which will protrude from the top of the hammer until the glue has dried.

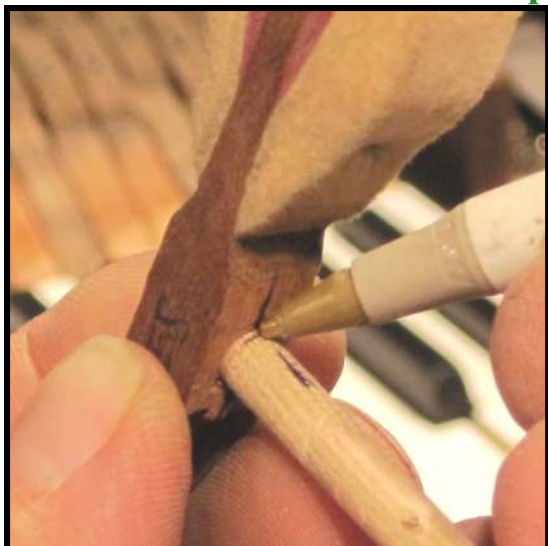


**Step 40:** To finish marking the reference lines for gluing, put the shank in place with the hammer attached (but not yet glued). Tighten the flange screw down, checking to see that the shank is parallel to its neighbors, then pivot the hammer to the right or left until it is correctly aligned.



**Step 41:** Now, mark a line on the shank corresponding to the reference line on the bottom of the molding of the hammer head. Mark the line on the shank out far enough from the hammer so that it won't be obscured by the collar of glue which will be formed. This line will be sanded off once the glue has dried.

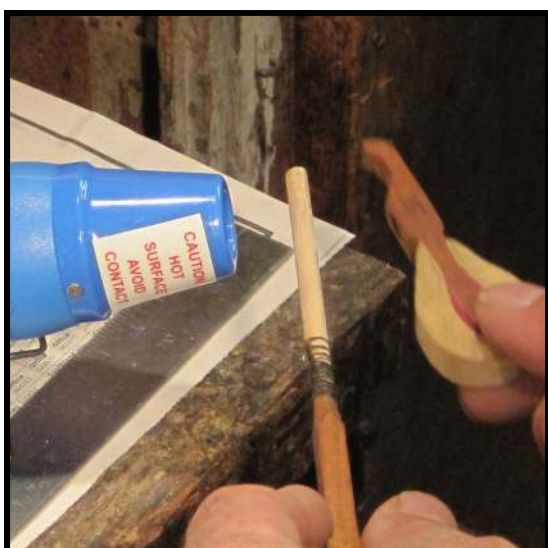
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**Step 42:** Remove the shank and hammer, and mark one last reference line parallel to the underside of the molding of the hammer to watch as the shank is inserted into the hammer.



*Hint: Check your glue before applying to the shank and hammer head. It should be fairly runny (but not watery), with no evidence of unmelted crystals in the mix. Add a bit of water, or a few more crystals to obtain the correct consistency as needed. Allow a few more minutes to come back up to correct temperature, or for new crystals to melt..*



**Step 43:** Preheat the end of the hammer shank, and the tail end of the hammer surrounding the hole. The [Ungar Heat Gun, \(Cat. No. 416\)](#) works well for this process. Gently wave the hammer and the shank back and forth across the stream of hot air, until they are noticeably warm to the touch. This step will help prevent the glue from gelling too quickly, giving you a bit more time to align the hammer precisely once it is returned to the action.



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**Step 44:** Using a Q-Tip which you have dipped into your hot glue, swab the inside of the hammer shank hole in the molding of the hammer. Set the hammer down for a moment.

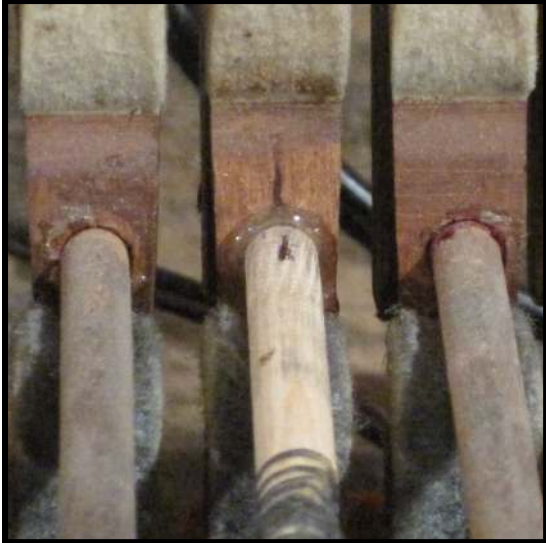


**Step 45:** Pick up the hammer shank, and apply glue to the end of the shank, staying within the last reference line drawn.



**Step 46:** Insert the hammer shank into the hole in the hammer molding, and swivel it back and forth to create a collar of glue as you push the shank in to the correct depth. Line up the two matching reference lines.

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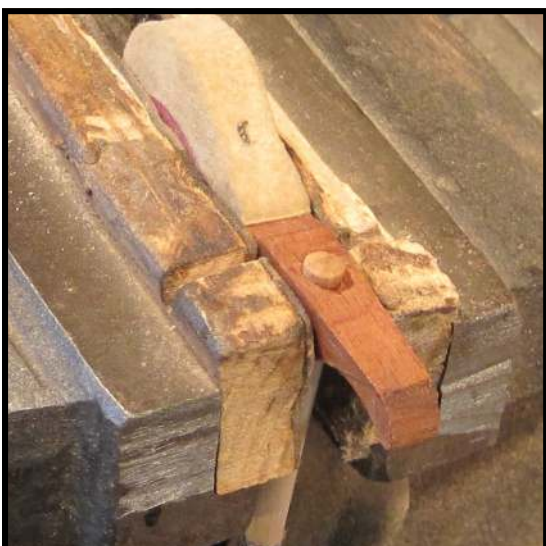


**Step 47:** Quickly place the assembled hammer shank / hammer into place and make any final adjustments in alignment. (Here's where you will appreciate the fact that the shank doesn't ratchet as you turn it.)



### Alternative repair method:

Titebond glue makes an acceptable substitute for hot animal hide glue, and is more convenient to use in the field, or in the shop when only one or two shanks are being spliced. It does have a bit slower grab time than hot hide glue, giving you a bit more time to get the assembly back into the action and aligned.



**Step 48:** After the glue has cured, remove the assembled shank and hammer and place the hammer in the vise once more in order to trim off the excess shank.

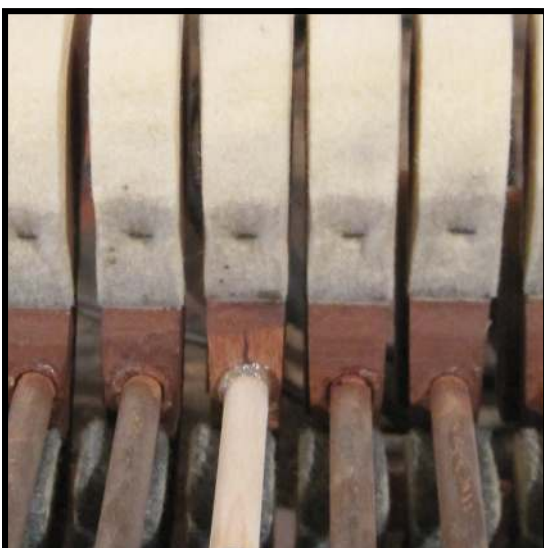
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**Step 49:** Use a coarse, then fine file to mill down the top of the excess hammer shank.



*Note: With this type of work, one job leads into another. A more refined shaping of the tails would be next the next job on my agenda, if the customer were to decide to go one step further.*



**Step 50:** With the splice successfully completed, the hammer / shank assembly may be returned to the action. The back-check should be returned to its normal position. Soon, all the hammers will be functioning again.

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### **In a perfect world. . .**

In a perfect world, all pianos would be maintained to perform at 100% of their potential. A technician's customer would always take his recommendations, and opt for the best possible repair scenario, regardless of the expense..

In reality, however, one must often bow to the realities of the customer's budget when estimating a job. In the case of the piano featured for this article, so much needed to be done to bring the action up to speed that a complete replacement of all the parts of the action would have been the ideal scenario. Hodge-podge repair work done over the decades, as seen in the photo above, had done little to really improve the piano. Some work, such as replacement hammers bored at .204" for hammer shanks that measured .199" (see threads used for sizing in the photo for step #32) was substandard. At the time that these photos were taken, however, the customer could not afford extensive work to be done.

In this type of situation, repair work should be chosen which will give the customer the most "bang for the buck." Falling squarely into that category would be whatever it would take to get all the notes working properly. Like an old, neglected car which needs its tires filled with air and its battery charged just to get it up and running, splicing the hammer shanks at least helps to get things working again. Knowing how to do a proper job of such repair work shows one is a professional who takes pride in his work, no matter how big or small the job may be.

If you're a technician who both cares about your customers and takes pride in yourself and your work, learning to do your best, no matter what the circumstances, insures that at least your little corner of the world will be as perfect as you can make it be.

## Tools and Supplies

For your convenience, all the tools and supplies necessary to complete this procedure are listed with corresponding catalog numbers.

### Tools:

Hammer shank miter box.....	Cat. No. 3116
Handy Hacksaw.....	Cat. No. 295
Micrometer.....	Cat. No 3338
Curved nose scissors.....	Cat. No. 164
Hammer shank cutters.....	Cat. No. 237
Grand shank press.....	Cat. No. 131
Hold-Heet Electric Glue Pot.....	Cat. No. G-1155
Flat bastard, coarse cut file .....	Cat. No. 252
Hammer shank knurler.....	Cat. No 217
Hammer shank reducer.....	Cat. No. 75
Combination tool handle.....	Cat. No. 26
Ungar Heat Gun.....	Cat. No. 416

### Supplies:

Titebond.....	Cat. No. 392-1
Upright shanks.....	Cat. No. 504
Dry cabinet glue.....	Cat. No. 399-12

Important note: Ordering information is given for the use of Schaff account holders only.

To order, call Schaff Piano Supply at 1-800-747-4266,  
or go on-line at <http://www.schaffpiano.com/>

## Action / Splicing Broken Grand Hammer Shanks

### Notes on Procedures