The Owner's Guide to Piano Repair

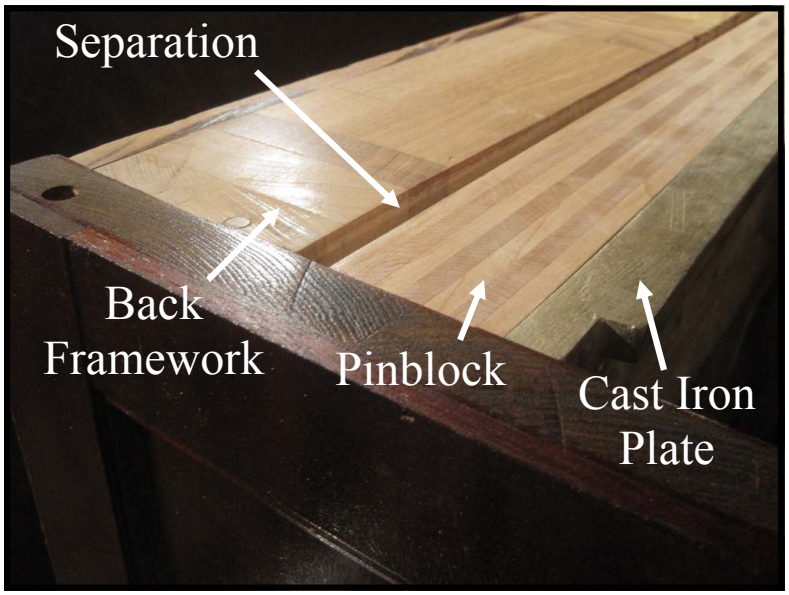


Focus On: Repairing the Separated Back of a Vertical Piano

Information provided courtesy of:

Lee Gordon / The Piano Shop
Member: Piano Technicians Guild
P.O. Box 22958
Honolulu, HI 96823-2958
Phone: (808)722-0618
Email: leegordon53@gmail.com
Web: www.hawaiipianoshop.com

The back structure of the vertical piano needs to be rock solid in order to hold the 18 or more tons of tension exerted by the strings of the piano. The cast iron plate, the pinblock and the back framework of the piano all work together to hold this tension in check and provide a stable foundation for tuning. This solidly built structure can, however, develop problems later in the life of an instrument as essential glue joints weaken with the passage of time. In particular, if the joint between the back framework and pinblock of a piano loosens and starts to separate, any tuning the piano is given will be very unstable, the touch of the piano will likely be affected, and actual breaking of the plate is a real possibility. **Your piano has either developed a separation between the pinblock and the back framework (or is showing symptoms of a separation*) which could cause very serious problems if left untreated.**



Top view of pinblock / back framework separation.

The following questions have been answered to give you the information you'll need in considering this repair:

What is the cause of this type of structural failure in a vertical piano?

Several factors come into play. For older upright pianos, the back framework and pinblock were traditionally glued together with hot animal hide glue. Although the resulting joints were very strong, given enough time they can fail. If the vital glue joint between the pinblock and the back framework weakens and allows the enormous tension of the strings to open up even a hairline crack, a set of lag screws are all that remains to hold pinblock and plate in place. These screws, however, don't penetrate very far into the back (sometimes less than an inch—see photo, next page). Once these screws pull away, the only thing left holding the structure together is the rigid nature of the cast iron plate itself.

*In some pianos, this glue joint is covered and not readily visible.



The photo left (taken during the repair of a separated back / pinblock assembly) illustrates the problem. The original lag screws (one of which is shown resting on top of the plate and pinblock) weren't able to hold things together once the glue joint failed. The white line shows where the pinblock ends and the back bracing begins. Obviously, the screws didn't penetrate the back to a degree sufficient to hold the joint together once the glue failed. The gap had reached 3/4" by the time the repairs were done!

What then is the standard operating procedure for such a repair? Is it a straightforward procedure or can there be complications?

Unfortunately, there can be factors which make the repair somewhat complicated to perform. The first issue that must oftentimes be dealt with (even before an absolute diagnosis of the extent of the separation may be given) is the fact that on many older upright pianos the upper portion of the back and pinblock is firmly covered—either by the back half of a split lid that is glued in place, or by a wooden cap underneath the lid which is again firmly glued into place.



With such a covering in place, it is impossible to see the extent of the separation, let alone deal with repairing it. In the case of the maple cap glued in place in the photo to the left, the fissures which had opened up in the cap gave evidence of the separation occurring below it, but until the cap was removed, nothing could be done.

One way or another, a cap or a lid which is glued into place must be first removed before repairs may be accomplished. Depending on the strength of this glue joint, this process might be easy or very difficult.

Ironically, the glue joint holding the lid or the cap in place oftentimes is rock solid (not having been subjected to the constant pull of the strings), and resists being pulled apart. A split lid usually may be pried off without serious damage to the veneer on the top of the lid, but the veneer on the underside of the lid is almost always damaged (evidenced by broken pieces of veneer seen in the top photo on page 3). A cap, however, is not veneered as are the case parts, and therefore is not so easy to pry loose. Many times a solid wooden cap (ordinarily made of maple) must be split off or even routed off (photo right) in order to give access to the back framework and pinblock. Once repairs have been accomplished, a new hardwood cap may be produced and installed—preferably with countersunk screws to allow access in the future.



Once the actual separation has been exposed (photo left), repairing the problem may begin. For anything greater than a simple hairline crack, the first step is to clean any debris out of the crack, block it open, then take the stress off the assembly by letting most of the tension off the strings. With the tension released, an adhesive is worked down into the crack. Finally, the gap is closed by using clamps to squeeze the assembly together.



The type of and number of clamps used depends upon the amount of separation which has occurred. For a very small crack, several large C-clamps may be sufficient to draw the back and the pinblock together. For a wide crack, however, larger clamps in greater number are preferable. A number of bar or pipe clamps spaced evenly from one side of the piano to the other (see photo page 5) is the ideal arrangement. With this setup, the clamps may be turned down gradually without placing too much stress on any individual spot along the plate at one time.

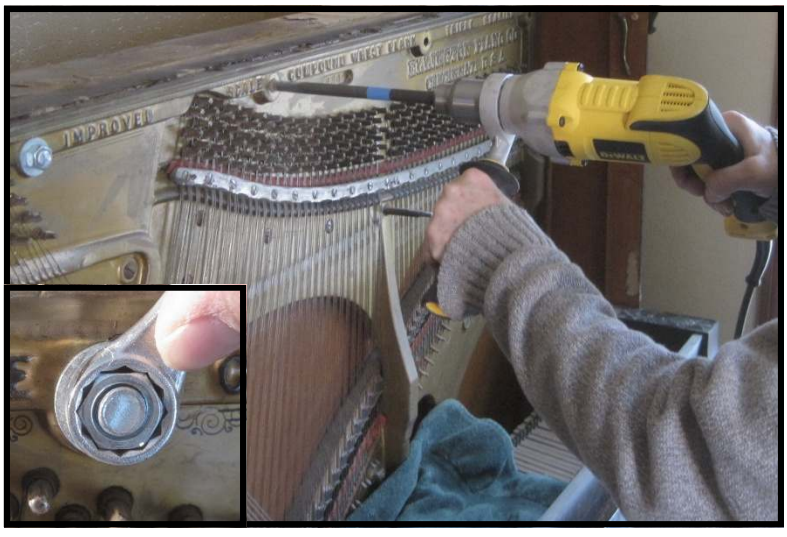
Important note: Even using extreme caution in applying pressure to the plate, it is possible that the plate can crack, especially if the separation is severe.



With this system the plate may be gently eased back into position. The crank on each clamp can be turned a fraction of a rotation at a time if necessary to apply pressure evenly from side to side. Once the gap has been closed sufficiently, the clamps may need to be left in place overnight (depending upon the adhesive used) to allow the glue to cure before proceeding.

Once the clamps are removed (but before the tension is returned to the strings) the original lag screws may either be returned or replaced with longer threaded rods. The advantage to returning the original lag screws (after plugging and retapping the holes) is a simple cosmetic one —the appearance of the piano will be unaltered. For a more reliable repair, however, the screw holes may be drilled all the way through the back of the piano so that either carriage bolts or threaded rods with nuts and washers on either end might be inserted. This does make the repair more obvious, especially from the back of the piano, but it insures that the problem will never crop up again. The glue joint is now reinforced with a set of bolts that will not allow a crack to open again.

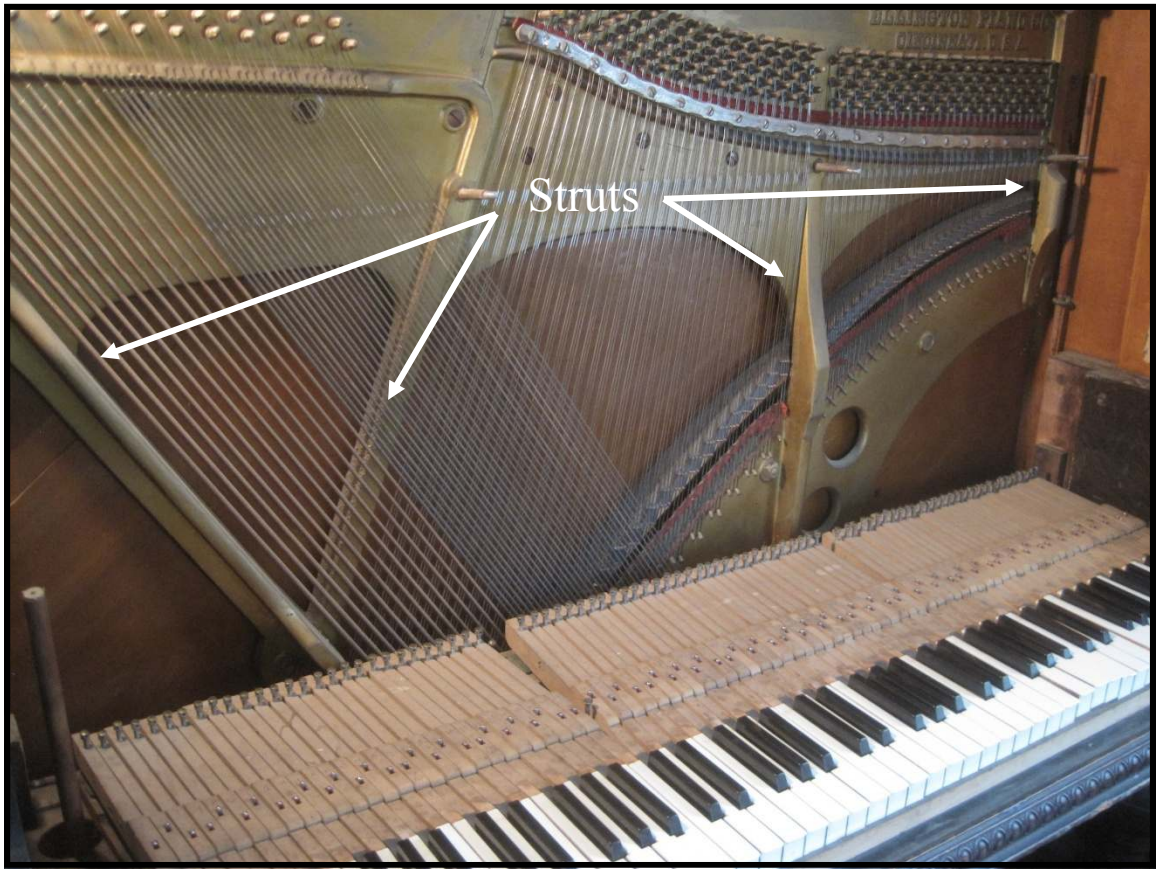
The standard procedure for this repair is to drill 1/2" holes though the plate (photo right) where the original lag screws were placed. The cast iron drills easily, and the holes will be just slightly larger than they were originally. Then the holes are extended on through the pin-block and the back frame of the piano. By doing this step of the repair after the crack has been closed, one avoids having chips produced during the drilling from finding their way into the separation.



Carriage bolts or pre-cut threaded rods are inserted into the extended holes and the nuts are tightened down to apply permanent compression on the joint (inset).

If the problem is ignored, what are the risks?

First of all, any tuning done on a piano with a pinblock which has come loose from the back is going to be unstable to a greater or lesser degree. If the crack has widened to the point where the bolts have let go, the piano will most likely go flat very quickly if tuned, as the separation widens even more.



The cast iron plate revealed.

Much more serious, however, is the fact that with the top of the plate only attached to the pinblock, the tension of the strings will typically pull the plate further and further from the back. Although the cast iron plate looks as if its a solid expanse of metal when viewed from the top, it's actually not. In between the top and the bottom of the piano are struts which must resist the downward pull of the strings.

The problem is that when the top of the cast iron plate is being pulled forward and away from the back of the framework, the middle section and the bottom of the plate are still firmly held in check. If enough deflection of the top of the plate occurs, the plate can break, usually at one or more of the struts. Ask anyone who has broken up an old cast iron bathtub. Cast iron is very strong, but given enough force it will eventually break.

If the repair is done on my piano, will there be other issues that need to be dealt with?

If your piano has a split lid which needed to be pried off, it must be secured following the repair work—preferably with screws instead of glue. The most common procedure is to drill two holes on either side of the lid partway through (left photo), position the lid on the piano and drill a smaller pilot hole through the rest of the lid and into the back framework of the piano (center photo), insert round head screws and finish by covering with rubber bumpers (right photo).



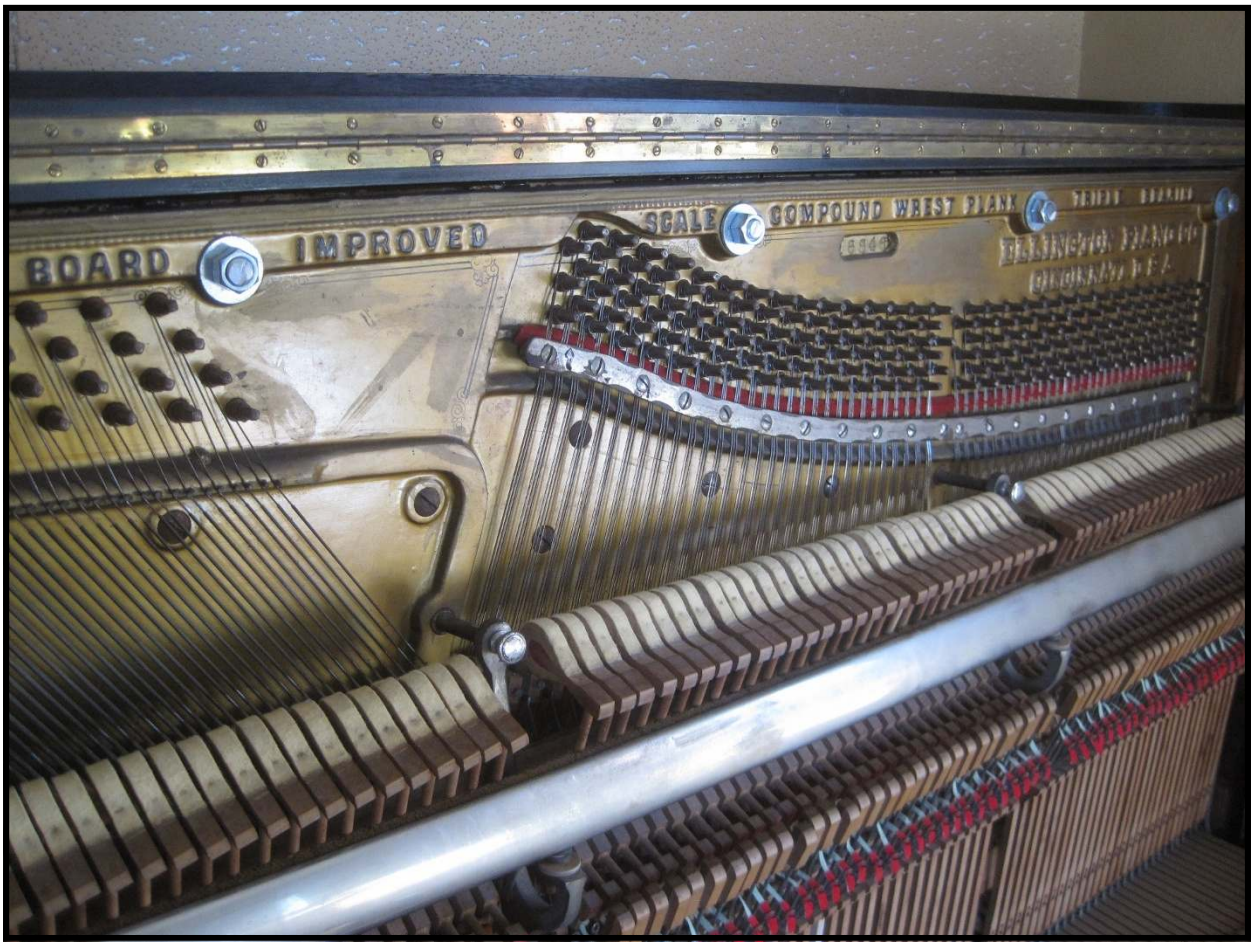


Very possibly (especially if the separation between the back framework and the pinblock had been an issue for a period of time and adjustments were made to compensate for any change in the geometry of the strings / action), the touch of the piano will be unsatisfactory once the repair has been made. If that is the case, the piano will need to be regulated (photo right) to put all the important adjustments to the action back to their proper specifications. This is a time-consuming process which will need to be scheduled as a separate repair.



In addition to resetting the touch of the piano, the piano will most likely need several tunings before it settles down. With most of the tension removed then put back on the piano, it takes more than a single pass for the piano's tuning to be stable.

With the basic structure of your piano back on solid footing, it may once again be safely tuned up to pitch. After it has been regulated (if needed) and any other repair issues have be cleared up, it should be playing up to its potential once again.



Repaired back allows tuning at A-440 for the first time in decades!

"In business to bring your piano to its full potential."

Please advise me when you wish to have this repair professionally done.

Lee Gordon / The Piano Shop
Member: Piano Technicians Guild
P.O. Box 22958
Honolulu, HI 96823-2958
Phone: (808) 722-0618
Email: leegordon53@gmail.com
Web: www.hawaiipianoshop.com