The Owner's Guide to Piano Repair

Focus On: Upright Hammer Replacement

Information provided courtesy of:

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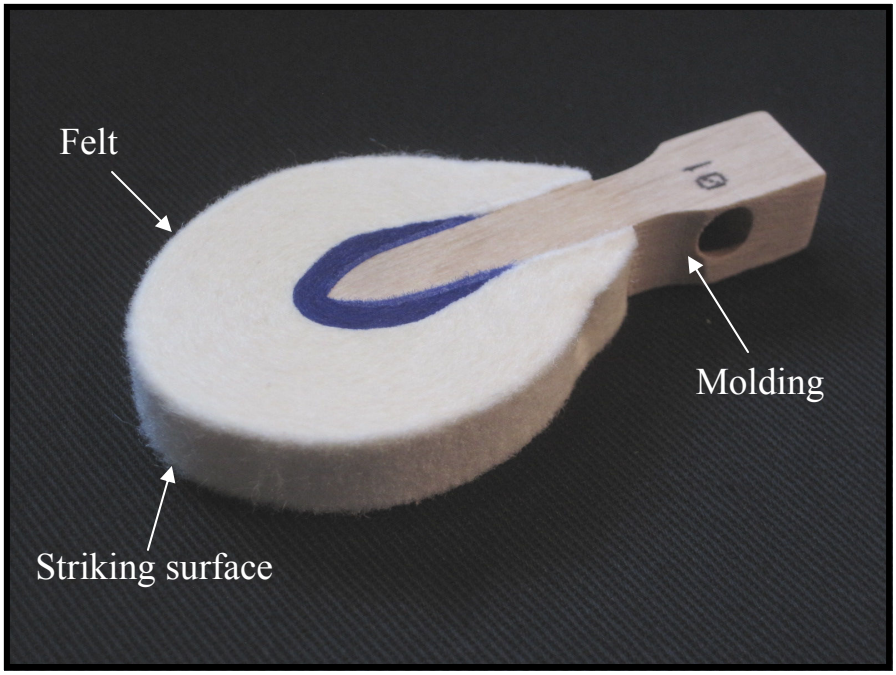
Although the hammers on an upright piano are extremely durable, they do deteriorate over time, and at some point need to be replaced. Worn hammers may cause the tone of a piano to be harsh and unpleasant and can also make it difficult to control the keys to produce the music you love. **The hammers on your piano are worn to the point where replacement would help bring back beauty and richness to the tone of your instrument.**



A new hammer head ready to install.

Do you find yourself frustrated with the poor performance of your piano and wondering what could be done? The following is intended to help you decide whether or not to have a new set of hammers installed in your piano.

Why exactly do worn out hammers cause a problem with the tone of a piano?

When hammer heads are manufactured, thick, stiff felt is stretched around a wooden core, or molding, at great tension. The striking surface is smooth and round and more or less egg-shaped (see photo above). The tension of the felt provides a bounce to the hammers so that when they strike the strings the deflection that they cause to the strings results in vibration or tone.

Over the years, however, the steel of the treble strings and the copper windings of the bass strings gradually cut into the felt, breaking the felt fibers and resulting in a layer of felt on the outside of the hammers which is pulpy or dead. The piano's tone is altered as this dead layer increases, and eventually the hammers don't produce a clean blow at all, but instead strike the strings with a flattened and grooved surface (see photo on next page) which produces an unsatisfactorily harsh sound.

This photo illustrates the type of wear and tear that hammer heads are subjected to. These hammers are from the treble section where each note has three steel strings. Over the years the strings cut deeply into the felt. Instead of striking the strings with a clean blow, hammers such as these produce a muddy, muted tone—a far cry from the tone the piano once had.

No matter how good the tuning of a piano, or to what extent other repair work has been done to a piano with a set of hammers in this condition, the resulting tone will be less than optimal.

When the hammers are worn, is there any less expensive option than outright replacement?

Yes, if the amount of wear is minimal, the hammers may be suitable for a job of reshaping and voicing. However, if the cuts in the felt are deep, reshaping may not be feasible.

Hammer with significant wear.

Same hammer after reshaping.

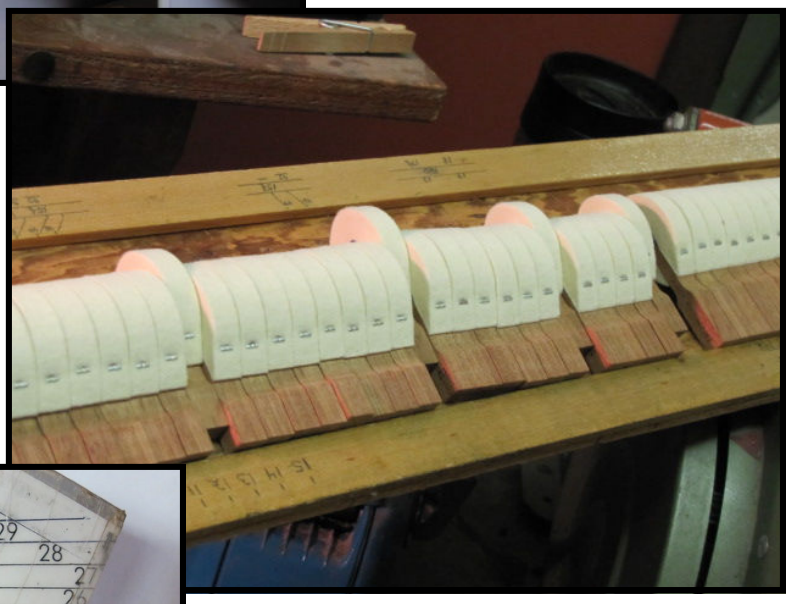
If the amount of felt which would have to be removed during the shaping process is significant (to the point where the profile of the hammers is drastically altered, as in the photos above), replacement with a new set of hammers would be a better choice. Otherwise, the changes to the weight and dimensions of the hammers which result from shaping would adversely alter the touch of the piano.

Are replacement hammers a one-size-fits-all type of product, or are they custom made for the individual piano?

Hammers are always custom-tailored for the individual piano. Sample hammers from the old action are used for the purpose of duplicating original felt weight, boring angles, etc. to allow for a new set of hammers to be made which replicate the original set. The first step is to select a set from those available (photo below) which match the originals from a dimensional standpoint.

Hammer selection is also determined by what you as the owner want the piano to sound like. For example, do you want to go in the direction of a loud, aggressive sound or more towards a sweet, singing tone without the brilliance that characterizes many pianos today?

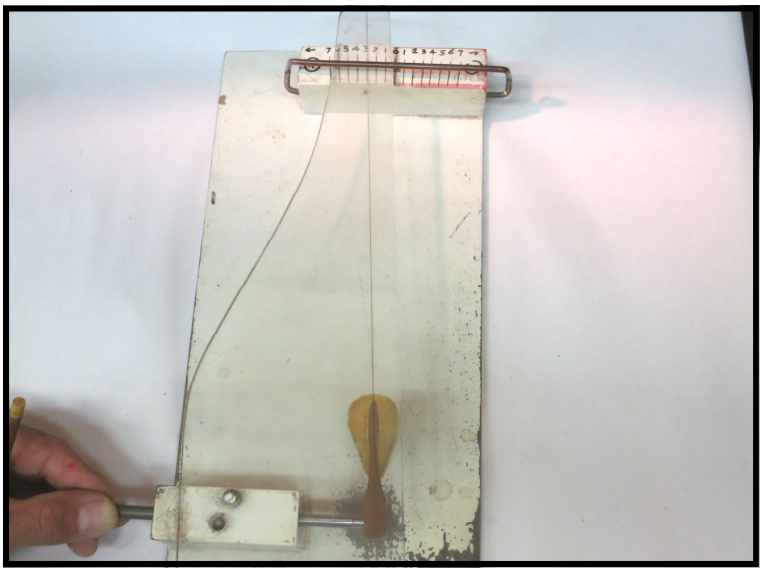
Once the hammers which best fit the bill are chosen, the set is unpackaged and laid out to be worked on. Since the factory set comes with more than 88 hammers, a few hammers are first removed.

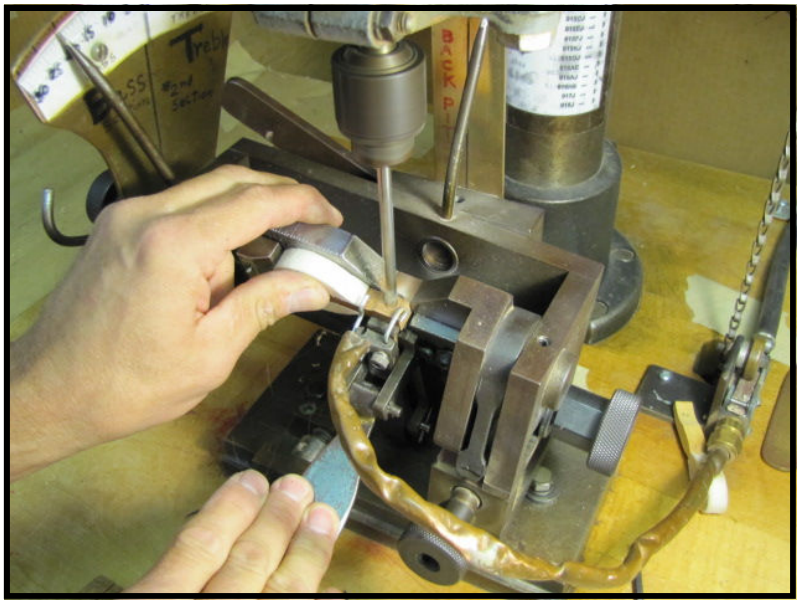


To duplicate the original hammers, careful measurements of important angles are taken. Here the bore angle of the shank to the molding (the wooden center) of the hammer is calibrated.

(*Photos on pages 4 and 5 courtesy of Schaff Piano Supply Company, Lake Zurich, Illinois)*

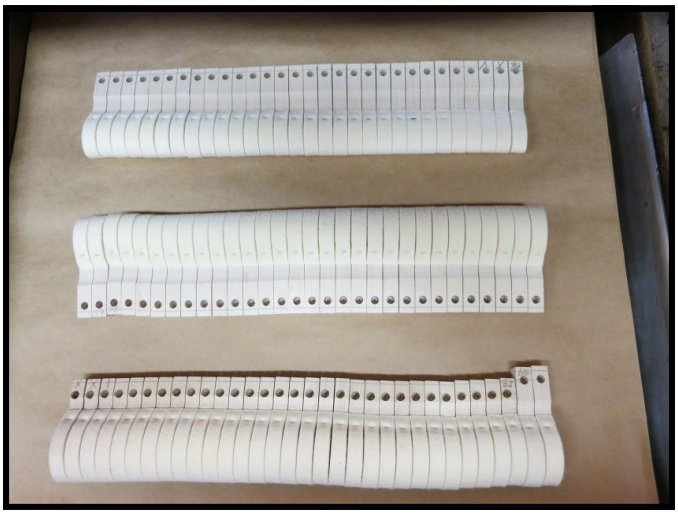
Hammers are drilled at precise angles so that they strike the strings exactly as the originals did. Since drilling angles vary from piano to piano, precision measurements must be taken of the sample hammers from the original set. In this photo the rake, (angle up and down) of a sample hammer is carefully determined.





A special drill press dedicated to the boring of hammer heads is used to drill each hammer at the exact angles needed. (Not only are the necessary angles critical, but also the precise location of the hole in the molding—the wooden core of the hammer).

The entire set of hammers is drilled and made ready for installation. A new set of hammers such as this is a huge improvement for an older instrument. With modern manufacturing techniques, hammers produced today rival or even surpass the quality of the hammers which were installed in the day that your piano was produced.



Is the installation of new hammers simply a matter of gluing them on, or is there more to it than that?

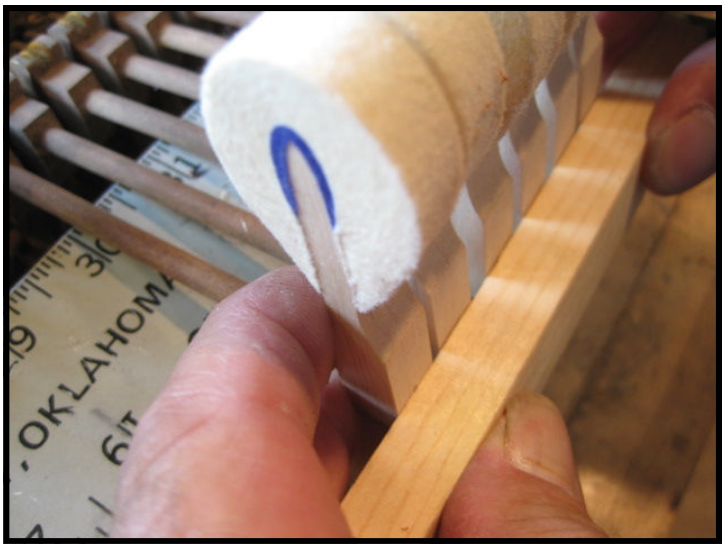
There is considerably more to installing a set of hammers than simply gluing them on. The old hammer shanks are carefully prepared for the installation of the new hammers. The type of glue is carefully chosen to best match the piano's needs and applied in a specialized way. The exact positioning and orientation of the original hammer is analyzed and duplicated.

If the original hammer shanks and butts are retained, the remains of the old glue must be removed from the old shanks, and the end of each shank carefully sized (using tool shown in photo right) before the new hammer heads are installed. The fit must be neither too tight nor too loose for proper adjustment.

Depending on the circumstances, either a cold glue or a hot glue might be used. Here, hot hide glue is mixed to achieve an exacting viscosity and temperature for maximum performance.

Positioning of the new hammers begins with a determination of the orientation of the original hammers. In the photo to the right, the exact line at which the hammers impacted the strings is determined. The new hammers will be installed to match this measurement precisely.

Using a straightedge, the positioning of each hammer is checked in four different ways, adjusted if necessary, then re-checked to make sure that all four measurements are precise. The exactness of this positioning makes for a job which looks "factory" in every way.



A ring of excess glue in the form of a well-defined "collar" is one signature of a professionally done job. This practice is an example of the rich tradition that is a hallmark of piano production. Both quality piano manufacturers and skilled rebuilders alike are aware of the importance of adhering to traditional methods.

Is the value of an instrument lessened by the removal and replacement of the original hammers?

Just the opposite. An old set of hammers on a vintage upright piano might be compared to a balding set of tires on a classic car. Worn out hammers add nothing to the value of a piano in that they represent maintenance which needs to be taken care of before the piano is performing up to its potential. A strong case might be made for the keeping of original ivory which is still in good shape, or the original finish if the case has a lovely patina–but not for the hammers once they have outlived their usefulness. Having a new set of hammers professionally installed is always an improvement which adds value to the instrument in that the tone of the piano will be vastly improved upon—the beauty of the piano's voice won't be masked by worn out hammers. (Other related issues may need to be dealt with as well, but having worn-out hammers replaced with a high-quality set of new hammers is always a huge step in the right direction!)

A set of new hammers will go a long way towards creating a beautiful tone once again.

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

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

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