

Michael Cole has very kindly contributed the following piece, which eloquently makes the case for using proper hide glue - and he shows that it has many advantages, and is not difficult to use.

Some Thoughts on Adhesives

Friends' webmaster David Hackett has given a useful summary [*see after this article. DH*] of the possible adhesives that might be used in restoring or repairing square pianos. It is quite a long list, but it is clear that David has some doubts about the appropriateness of some of them. I am going to make the case for using only the one historically correct adhesive, and I am hopeful that I can convince everyone of two things: first, that it is not too difficult, and second that, contrary to popular opinion, for many restoration jobs it can save you time and effort. Also, it hardly needs saying, that as it is reversible you can have a clear conscience about every repair you do in this way.

We are talking about hide glue, otherwise known as 'Scotch glue' (to old buffers like me). It is usually supplied in small pearls, or clear brown seed-like droplets, hence also known as 'pearl glue'. I have gone on record previously as saying that this was the only adhesive used in antique instruments [*Pianoforte in the Classical Era*, p.283]. No one has rebuked me yet, though there may be some silent quibblers out there somewhere. And of course, this glue is still the medium of choice for violin and guitar makers. And so it should be. Every repair you make is completely reversible, and every glue joint made by previous hands can be disassembled by you, just using hot water.

A cautionary tale

I once overheard two harpsichord makers in conversation (quite well-known men in this field, men whom I would count as my friends). We were at an early music exhibition in London, and as I hovered on the edge of their conversation one was saying to the other that he wanted to repair one of his own instruments, but he was in a quandary. After ten years his beautifully made soundboard had buckled and he dearly wished he could take it out in one piece so that he could repair it and re-install it. This soundboard had been made from excellent timber and those ten extra years of maturity made it even more resonant than at the beginning. But he had glued it in with some non-reversible adhesive, Cascamite as I recall, virtually impervious to every known solvent. His friend had no answer. I heard all this but refrained from making the obvious remark. So, my hope is that if you read the following advice you will never have to regret using the wrong adhesive yourself.

Make a start

Nothing can be more enchanting than a beautifully-made square piano. And nothing is more disappointing to a would-be player than to find it has one or two detached hammers. To an experienced restorer of course it is not a great problem – until you find that someone has previously tried to mend some of them by clumsy and inappropriate methods. In one method the repair man sees the remnant of a leather hinge sandwiched in the hammer butts, and saws into it to create a slot for a new leather hinge. The saw inevitable goes off line, taking out more wood

than intended. In another horror story he has made a repair by forcibly splitting the hammer butt which he then reassembled it with non-reversible glue. The original cause of all this trouble is that two-hundred-year-old leather hinges degrade, and like the covers of leather-bound books, the hammers eventually become detached from their support structures. You may play the key, but nothing happens. Be sure that if one hammer has fallen off sooner or later the rest will follow. So your best plan is to replace every hammer hinge. Proceed as follows. If no-one has interfered with the piano you will find it delightfully straightforward.

Take off every hammer (or as many as necessary), carefully marking each one with its correct number in sequence. This is best done with a graphite pencil on the back of the hammer head. Lay them out in order on a board. The remnant of the leather hinge is sandwiched between two wooden components: the hammer shank and the short under part, the butt. These are glued together. As you want to disassemble these pieces and reassemble them exactly in their original positions you need to put a location guide on them. I suggest you make randomly aligned knife cuts (or very fine shallow saw cuts, say with a veneer saw) on the sides of every hammer butt. Be sure they are not too deep, so that you can disguise or eradicate them later. Aligning these when you reassemble the parts should ensure that the hammer strikes both strings as intended and that the hammer butt is correctly positioned against the hammer rail.

Take each hammer, hold by the head, and dunk it, butt end downwards, in a cup of very hot water. Usually within one minute the two components come apart of their own accord – the hotter the water the quicker the action. The small wooden hammer butt will float on top of the water while the remnant of the leather shrivels up and is fit for nothing. Dry the two wooden components and put them back on the board in such a way that you can never be in doubt which is to assemble with which. You will, incidentally, see that the newly exposed interior surfaces are as clean and tidy as on the day when the maker first stuck them together [unless, of course, some idiot has used a saw on them!]. When you have done them all leave them to dry overnight. You next need to prepare your leather and your glue.

What leather should you choose? There is no doubt in my mind that the best choice for durability and flexibility is alum-tawed goat skin, if you can obtain it in a suitable grade. It is usually white, soft, and flexible, but when you pull it does not stretch. Several makers used this in the eighteenth century, and if you are lucky enough to have invested in a example by Adam Beyer, or an early square piano by John Broadwood, there is a good chance that no hinges will be broken, or showing any sign that they are about to break. (See photo on my website at www.squarepianos.com/broadwood) However, another frequent choice by historic makers was thin vegetable-tanned calf. It is flexible, but ultimately it is not so durable. If you buy some from a bookbinders' supply house choose 'repair calf' which is usually supplied in a natural colour and may even come in a suitable thickness. You have to buy a whole skin of course, and this may answer for a good number of jobs. Occasionally you might come across some thin chrome tanned calf skin that is flexible enough and not too highly polished, and if so it may be used on English square pianos post 1810. On no account use sheepskin. It is too soft and stretches alarmingly. If you are repairing a single-action square piano, which uses the simple Zumpe-style mechanism, it is vital that your hammer hinges are as flexible and friction free as possible, otherwise the touch will be uneven and frustrating to play. [By the way: you may have read in Grove's Dictionary, 1980 edition, that square piano hammers are hinged with parchment or

vellum. Do not believe it. In thirty odd years I have only once seen hammers hinged with vellum. This was a Fredrick Beck, c.1788, and its touch was terrible. However, it may have been original as the hammers, though apparently original, did not have guide pins. Dampers, you understand, need vellum or parchment hinges to maintain their alignment.]

Now your glue: the bead-like brown pearls must be soaked for some hours. Put a quantity in a container and add water until there is about 5mm of clear water above them. Stir it once, then leave it overnight. Now, I am assuming that you are not an experienced professional restorer so you may not want to invest in a copper glue pot. Here are some suggestions. You can use a clean glass jar (a jam jar, for example). If you are careful you will be able to stand this in a heated bath of water (an old saucepan will do) and use it many times over. But you have to heat it of course. A low output electric plate is good for this purpose. The most ingenious solution I ever saw was in the workshop of an amateur model maker. He took an old electric laundry iron, made an iron-shaped cut-out in a piece of plywood, and then placed the iron upside down supported by the plywood, with his 'improvised' glue pot on top. The iron had a thermostat (marked for woollens, or linen, or silk) so his water never got too hot. You can use an old baked beans tin as the container, but it begins to rust within a week. Another alternative (for quick jobs only) is make your glue in an old tea cup which you have the option of heating in a microwave oven, but be very careful not to over-cook it. If you expect to need it often an electrically heated glue pot can be bought from bookbinders' supply shops, and even some good woodworkers' websites.

So next morning you cut up your leather in to small pieces, being careful to ensure that each piece is cut in the same direction on the skin, and that adjacent hinges come from the same part of the hide. Meanwhile your glue is heating. Use a small bristle brush, such as are sold at incredibly low prices for children's paint brushes. The glue is right when it runs smoothly off your brush in a continuous stream, like warm syrup, not excessively watery. Turn the hammer shank upside down; place glue in the rebate for the hinge, and then place the leather, skin side downwards, into this rebate. I hope your leather is wider than the hammer butt, because you will trim it off later. Lay some glue on the hammer butt and position it, observing those cuts or location marks you made on the sides, and press together. If you have a vision visor or a magnifying stand make use of it to look very closely at the location marks and the bevels while the glue is still soft enough to permit adjustments. Be sure there is no excess glue squeezed out beside the bevel which goes next to the hammer rail; if you see any remove it immediately with your finger nail. If it oozes out of the sides remove the excess now, with hot water, to save a job later. Now lay it down and go to the next hammer. There is absolutely no need to clamp them. I cannot emphasize this too much. Just squeeze the parts together and the glue will grab. When you have done the whole set mark the hinges with their numbers – in ink, with a quill pen naturally! You can cut away any excess width now. If you trim it close against the wood at both sides the hammer will look as good as new, ready for another two hundred years of music making.

One thing that you need to know is that your Scotch glue can be reheated and used tomorrow and indeed for many weeks, but each time you reheat it the viscosity increases and the set takes place more rapidly. You can of course use this to your advantage, with experience, but remember, the first time you heat the glue is when you have the longest possible assembly time. Fresh glue is essential on longer operations such as gluing the soundboard into a harpsichord.

Conversely, when re-hinging square piano hammers, you want a quick grab, so a several-times reheated glue is probably ideal.

Now you could attempt something more difficult

If you've read this far it seems likely that you will at some time think of re-covering some hammer heads. Scotch glue will make your life so much easier. Let's assume that you have prepared your new leather covers, probably of buff leather or goatskin, you have pared one edge that will be glued to the left side of the hammer head, so now using the same brush as before apply glue to the hammer, being careful to allow none to get near the crown or striking surface area, press your new cover in place. After a few hours, or better still next day, glue the other (right) side and this time also put a little glue on the leather near its lower extremity. Now pull it tight over the crown, down the side, and underneath, press the end firmly flat against the previously glued end. Now relax; there is nothing further to do! Wait till the next day, then with a very sharp fresh scalpel blade trim the excess leather away. There is no other adhesive that will do this job nearly so well.

Obviously this is not a treatise on voicing and selecting leathers. The only intention is to urge everyone to repudiate modern synthetic glues for repairing square pianos. But what of Franklin's 'Liquid Hide Glue'? Straight from the bottle: isn't this a simpler alternative? Well, you can certainly say in its favor that it is convenient to use — and readily reversible. However it has two disadvantages. First, it doesn't give the quick grab of traditional hide glue, so it is unsuitable for jobs that are not clamped. And second, it doesn't seem to set so hard, and so for any load bearing applications it may suffer from long term 'creep', which is also a disadvantage of many other modern adhesives. So it is not advisable to use it to glue the bridge to the soundboard, for example.

Other tasks

Everything that I have said about hammers also applies to other action parts that have leather hinges. This includes under levers [=intermediate levers or 'under hammers'] and the toggles [= 'buttons'] that connect wire-operated dampers to the levers below. Likewise, you may encounter, as I have, hoppers in Geib-style actions where the vellum hinge is broken. In repairing this I cannot conceive of anything better than Scotch glue, indeed it would be a very difficult task using any other adhesive.

One other thought: when gluing back-touch cloths [not felts please!] makers like Broadwood cut a rebate to take the front edge of the cloth in the back touch rail. Lay Scotch glue into this rebate, in short lengths, say 6 inches at a time, and press your woollen cloths down. Your cloth will be faultlessly secured without any pins, clamps etc. The first section quickly grabs, so you can gently pull your cloth as you lay in succeeding sections, so making it sit evenly. Do try it.

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