

Replacing Action Cloth in a Square Piano

One of the constants of the universe is that, on opening and inspecting a square piano that is a candidate for restoration, the action cloth will be found to be in poor condition, or even absent! The usual suspect is insect damage from the larvae of the common case bearing clothes moth (*Tinea pellionella*) which can be spotty or widespread throughout the action.



You'll find these casings left behind in every crevice and corner of the action, and it is usually some work just to chase them all out. But the cloth is ruined, and replacement is in order. I spent a good deal of time and travel looking in fabric retail shops for a suitable cloth for this replacement, which is a fairly thick wool blend with a medium weave. In Longman and Broderip squares, the touch cloth for the hammers is sometimes a coarser weave than that used for the key beds, and was constituted of wool and coarser animal hair to make a durable mat. This must have been very tasty as it was the first to be consumed by the hungry larvae. Most if not all of the fabric choices today are the wrong color, too thin, too thick, wrong weave, or synthetic.

Happily, Graham Walker (see our links page for Early Keyboard Cloth) has commissioned a cloth for the restorer that answers to all the key cloth needs, and also services well for hammer touch cloth. It seems L&B used the coarser cloth to speed installation (insertion over the hammer guide pins) and because it was cheap, not for sonic reasons!

Graham does offer the following aside with which I completely agree – “Just one point of observation: It is possible to find square pianos where the original cloths remain serviceable or at least serviceable in part although invariably fairly dirty. It is not always necessary for wholesale replacement. The decision to replace should be based on practical considerations of a working action rather than appearance. When previous repairs have been undertaken, it is often found that boxcloth or even felt has been used and this should be replaced with a satisfactory cloth such as the Early Keyboard Cloth.”

One of the difficulties of matching the old cloth with modern material is the process approach. At 60X magnification, we can see that old Broadwood cloth from a 1784 square is actually woven of mostly green fiber, with orange, pink, black, red, and blue fibers woven in, which from a distance gives an overall ‘olive’ sort of look. Modern material is dyed after weaving so a more uniform green color is achieved. (All color micro photos made under 3200K halogen light)



1784 action wool from Broadwood 60X

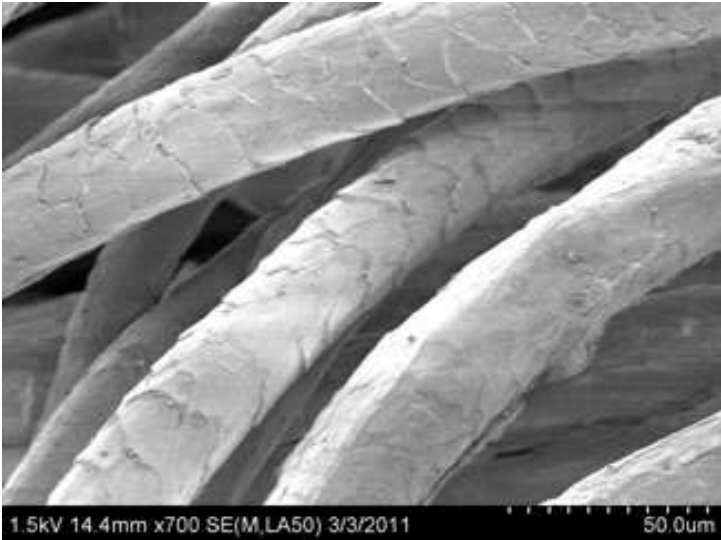
However, the overall fiber structure of the old and new wool is quite similar in appearance.



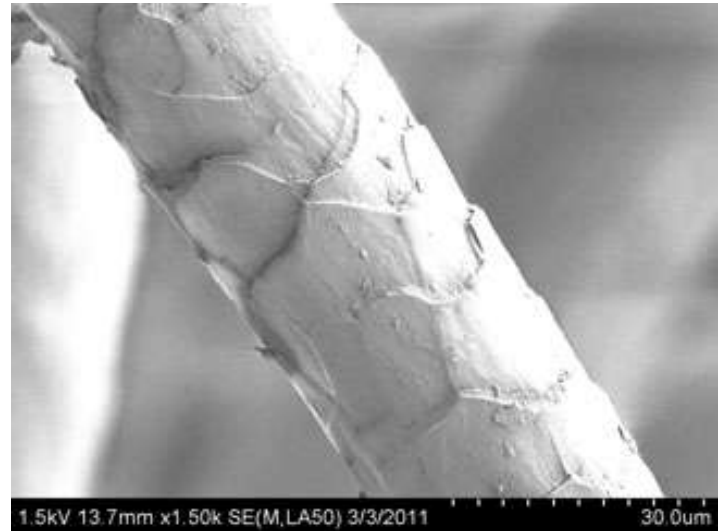
Old woolen cloth 50X



New woolen cloth 50X



Wool, 1784 Broadwood, in scanning electron microscope at 250 and 700 X



New wool at 250 and 1500X. Note that shaft scale pattern remains similar; both shafts are ~30 microns diameter.

Graham has kindly contributed the following clarifications regarding the cloth that was commissioned.

“The type of wool yarn used for The Early Keyboard Cloth is the nearest to the original texture that could be found. If you were to examine the wool used for modern clothing garments, it may show a greater difference in structure compared with original cloth. The preparation of the wool for dyeing and the dyeing process has obviously changed since the early 19th century and the difference that results in the uniformity of colour between the old and new can be seen even with the naked eye.

If I understand correctly from my discussion with the woollen mill on this subject, the process for the preparation of the wool today includes neutralisation or removal of impurities to enable uniformity in the take-up of the dye and, of course, the dye today is not natural. Therefore in the early 19th century, the dyeing of the yarn or the cloth resulted in various rates of colour take-up and if there were fibres used other than wool, the variation in take-up may have been much more.

Different types of dye will result in different shades of colour when seen in different colour temperatures of light. I decided to match the shade of colour of The Early Keyboard Cloth in daylight but if you look at the old and new under fluorescent light there will be a significant difference. In taking the magnified images of the old and new cloth that you have shown, an additional light source was used. The colour temperature of that light affects the colour as seen from the images. (Ed. Note – As indicated, I have used a 3200 deg K halogen light. Colour balance in the digital image, and reproduction in this document and on your computer will obviously alter colours further. It is best to order a sample if there is a need for further certainty before using this cloth.)



Early 19th C Broadwood cloth
compared with [Early Keyboard Cloth](#)

I have found that there are a few variations in the quality of cloth used at the end of the 18th century, but more consistency during the early part of the 19th century. Adam Beyer and some of the other early makers used a cloth that is slightly thinner than the later cloth. This cloth has a nap on one side only and not both.”

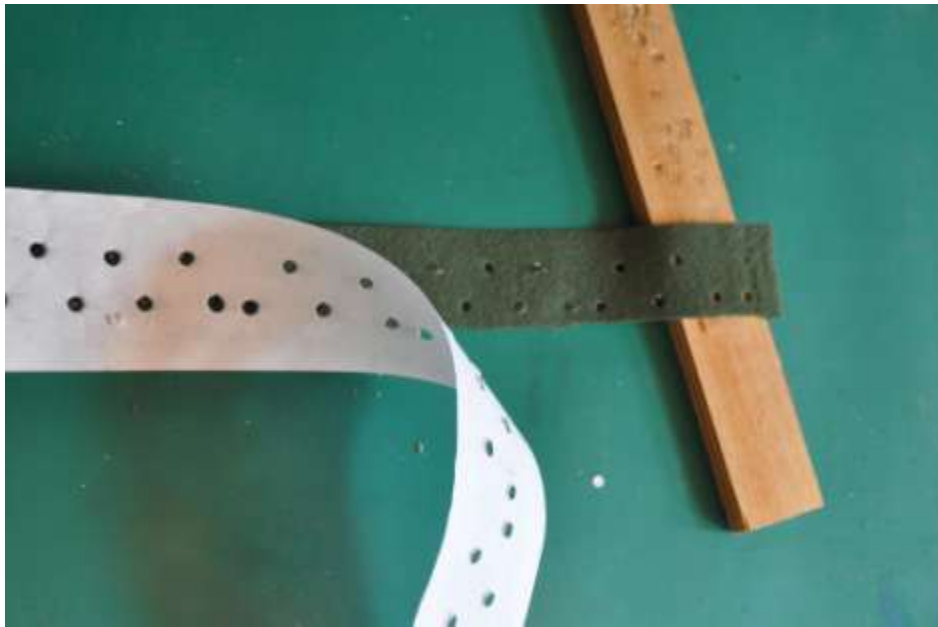
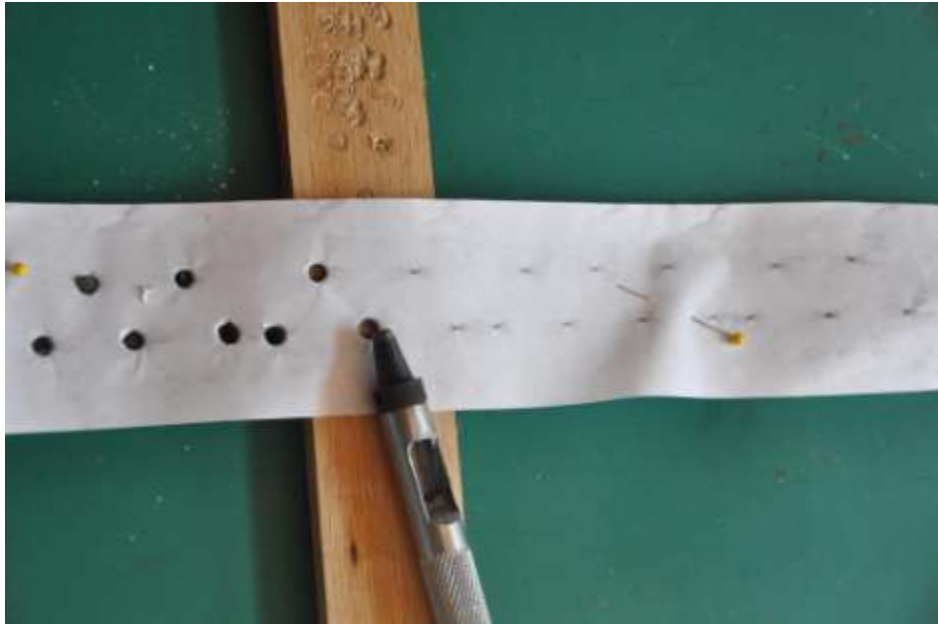
Old cloth is simply glued down with hide glue, so dampening with water and waiting for a couple of hours is generally enough to let you lift it up. It helps to heat it with a hair dryer or heat gun before you take it up though. Clean the wood frame of residue, and measure for the new cloth strips. On some squares, the cloth for the front and rear key dip is a simple strip without any provision for cut outs or pins, but Broadwood typically cut a toothed profile for the balance pins, and a full strip that fit over the



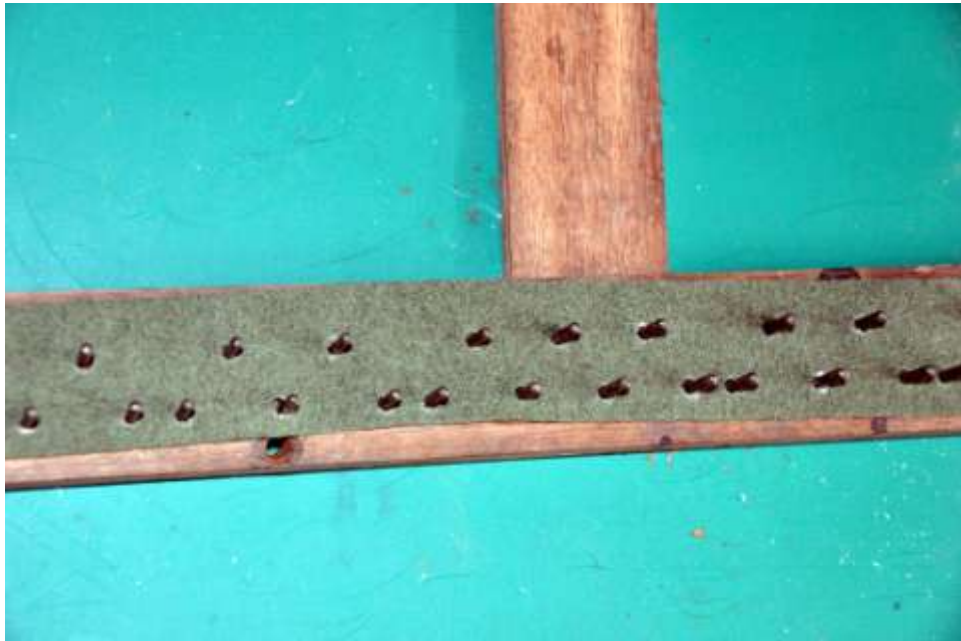
front guide pins. In all cases, the balance pivot pin cloth in the center of the action, and any hammer touch cloth, will need to have the cloth fitted over the pins. The hammer guide pins are very thin, so the weave generally will allow penetration easily. Balance pins and front guide pin must be precut for easy installation. A simple way to accomplish this is to make a paper pattern of the pins with a graphite rubbing, and using tailor's straight pins, pin the paper pattern to the precut cloth strip.

Paper positioned over the pins and the pin locations marked in graphite.

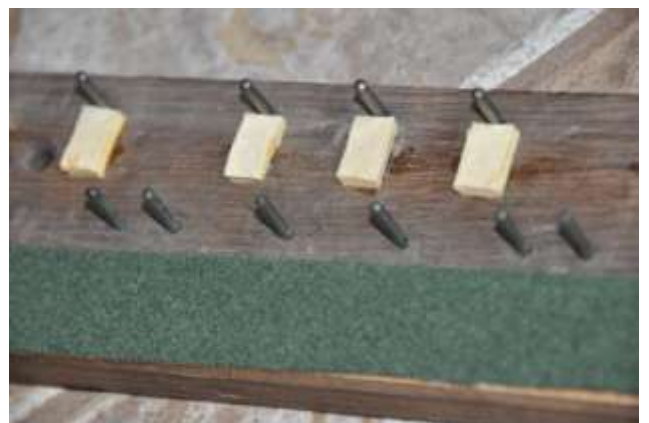
Once marked and pinned, cut the pin holes with a punch or similar, just a little oversize ($\sim 0.5\text{mm}$) for the pin, so the cloth can lie down flat even if the registration is not perfect.



The cloth can now be fitted over the pins and the ends trimmed. These over-the-pin cloths usually were not glued down, but you can secure the ends if desired.



The finished action for this Longman and Broderip has buff leather stops for the sharps, and a single continuous strip for the natural key fronts. The rear is a simple strip with a cutout for the action rail support rods.



Broadwood used flatter key bottoms and so used a toothed profile cloth for the key balance rail, made as shown below. You can find cuts in the frame from the original installation, so obviously the balance rail cloth was installed full width and rebates cut afterward.

