Restoration report

South German or Austrian Tafelklavier c. 1830-40

Andrew Nolan, Broadbeach, Queensland. **copyright 2011**

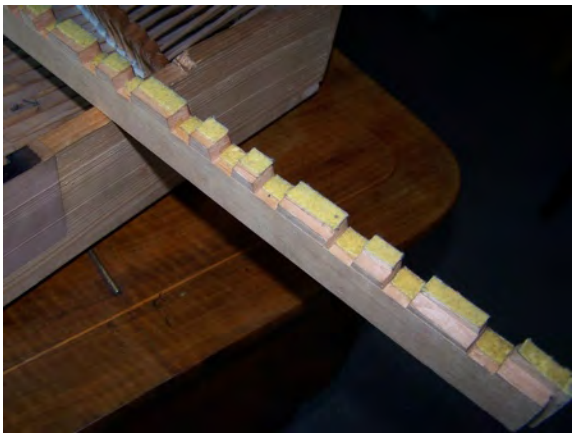
Description

This instrument is a 6 1/2 octave (CC-g4) square piano of moderate size standing on 4 reeded conical legs with casters, veneered in bookmatched figured walnut in Biedermeier furniture style with a single line of inlaid stringing at the bottom of the sides and a border around the top of the lid. This was originally stained red to resemble mahogany and the original finish appearance is visible under the front lid flap. The interior is veneered in bookmatched figured maple with a line of dark stringing.

It has a wrought iron string plate on the right which is lacquered black on a gold base with

droplet like pattern similar to in concept to the string plates of Broadwood c 1828-30. The pinblock and yoke are at the front of the instrument over the keyboard as in a grand style piano and the bass strings run from the front left corner to the right rear corner. The stringing is bichord except for the extreme bass CC- C where there are single overwound strings, and the top 1 1/2 octaves of the treble where there is trichord stringing. The top section of the nut for the trichords is made of an iron bar with brass hitch pins inserted at the top, this was screwed and glued to the leading edge of the pinblock. There is a music rack of walnut which fits into holes in the yoke. The back of this rack is hinged in the middle and at the bottom.

The action is Viennese, with the lower half hammers having a light layer, possibly felt or buff leather in them under the outer leather layer. There are individual back checks. There are small lead weights which are original in the rear of the keylevers. The natural keys are covered with bone with the heads thicker than the tails and the accidentals of charred pearwood with an ebony top slip. The front guide pin mortises were created by a rotary tool. The balance pins are of iron and the front pins are brass bars. The let-off for the escapement of the action is adjustable by tapping the top part of the rear touch rail back or forwards to adjust the position of the escapement pawls.

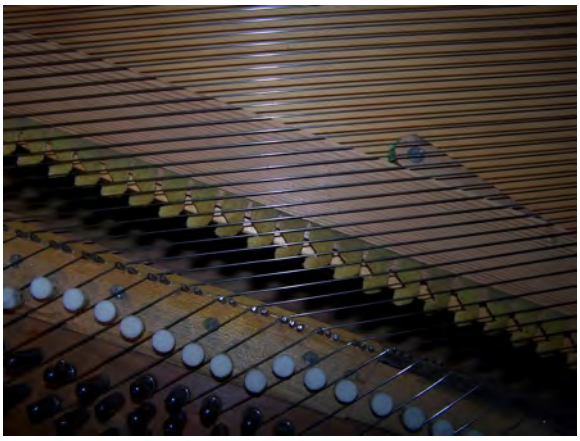


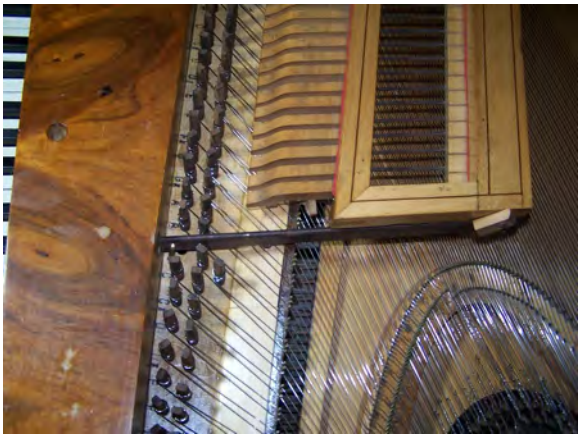
The action is raised on 3 wooden bars which slide under at the bass, middle and treble rails. There is a front slip which fits into 2 recesses either side. At the back of the keys a black lacquered wooden batten has individual cut-outs for the accidentals in the manner of Walter or Kulmbach. There are 2 candelabra mounted on blocks either side of the keyboard.

The damper system is composed of overhead levers in a rack hinged on vellum at the back and operated by small wooden stickers. The key levers have a sticker wire and damper stool rising in front of the hammer heads which in turn operates the wooden sticker through a hole in the pinblock and nut and then operates the damper lever. The dampers are made in maple with a line of dark stringing as decoration. The whole damper rack is pivoted at each side and operated at the left by a push sticker from the pedal trapwork.

The moderator batten with individual "7" shaped moderator tabs is mounted on 2 levers and operated by a square mounted inside the left keywell.

There is a trapezoidal shaped wooden plate of maple approximately 5mm thick at the Left rear side of the instrument, supported on threaded wires above an opening in the framework.
There is a pedal lyra with 2 pedals, moderator and dampers.





Date

Tafelklaviere of this configuration occur from the 1820s to the early 1840s and developed in size and keyboard range. They occur mostly from Viennese or South German origin, clearly developed from the Viennese hammerflugel. A very early form found around 1800 was the querfluegel, basically a piano within a bentside spinet case. This configuration continued to be made occasionally but most were made in square piano configuration. I know of no examples after the mid 1850s. They initially had jack damping adapting the damping system used on contemporary hammerflugeln, but then moved to overhead levers, just as the grand style pianos did. Increases in string sizes and range necessitated stronger structures so wooden hitching arrangements were replaced by metal string plates and later the addition of tension bars both in the treble and a long bar in the bass. Keyboard range developed from 6 octaves in the 1820s to 6 1/2 octaves in the 1830s with an extension from FF to CC in the bass and from f4 to g4 in the treble. Naturally the cases became longer deeper and higher. Examples were also made by Reuss in Cincinatti, USA. I believe this example to be in the early 1830s based on its furniture style, the style of the keyboard, the size of the hammers and the style of the string plate. There are similar dated examples by Phillipi and Kulmbach.

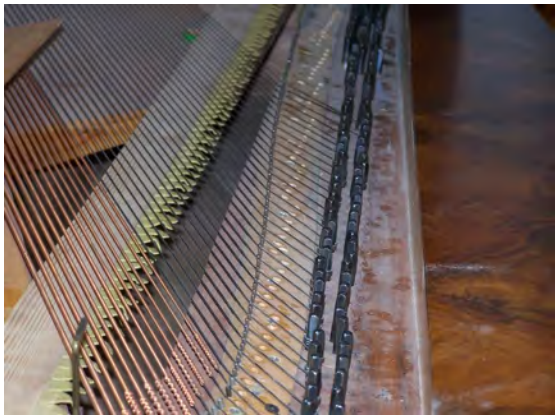
Kulmbach tafelklavier

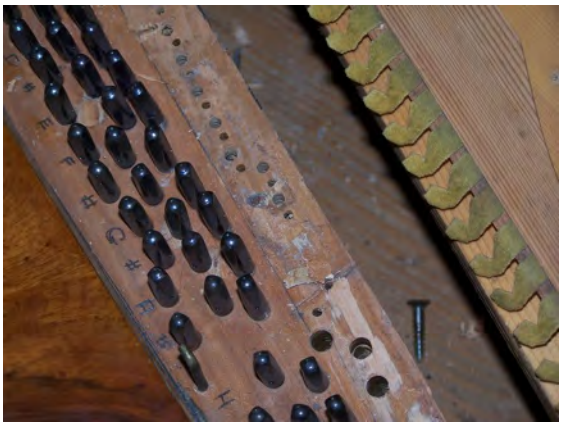
Provenance

The instrument was purchased from the owners in Munich who had received it as a wedding present in the 1970s and then shipped to Australia. There were no issues with CITES (required for importation and exportation of ivory) as the keyboard was covered in bone.

Condition

The instrument has about 1" of twist when strung. This may have existed since manufacture as the leg blocks attached to the baseboards are of different heights to allow the instrument to stand flat on the floor. The cabinet work and veneer is in good condition and appears to have been retouched in places after repairs in the 1970s. The legs of solid walnut have some woodworm damage and the front right leg probably requires further consolidation. The damper rack is in good condition but the damper material is modern wool felt. The strings are modern patent piano wire several sizes too heavy. The pinblock is a poorly made replacement from laminated material with a layer of cheap plywood underneath, it has been installed by cutting the yoke at either side of the keyboard and partially removing the old pinblock from under the yoke. It was fastened in place under the yolk and at each side with carriage bolts, also glued with PVA.





The stringplate and soundboard have been removed in the process, damaging the internal veneer at the back right corner. The soundboard and bridge appear to have been disassembled to some extent and rebuilt using PVA glue. There is a metal plate sandwiched between the pinblock and yoke at the treble which has been cut at the back, possibly removing some extension that might have been there.
The replacement pinblock is too thick and has been crudely cut out underneath to accommodate the damper stools. In addition when the old nut was glued back (crudely) the stringband was too high and the damper rack was out of alignment. They repositioned the pivots to overcome this but the dampers still functioned poorly.Because the stringband was too high the hammer let-off could not be adjusted to make the action function reliably with soft playing. Examining the pinblock underneath showed that they attempted to re-use the holes in the nut for the damper stickers but had to have several goes at realigning the nut resulting in multiple sets of holes being drilled through the pinblock. The pins used to replace the original pins if they existed were large size grand piano pins which were crudely positioned, not in line and drilled at various odd angles.
To make matters worse, the nut was eventually glued in a position so that the stringband was imperfectly aligned with the hammers resulting in neighbouring strings being struck at times. In the Viennese action it is possible to vary the strike point of the hammer on the

string, according to the type of stroke used to play a note. This is not normally a problem with grand type instruments whose strings run parallel with the orbit of the hammer shank, but in an obliquely strung instrument this could result in a neighbouring string being struck if the hammer strike was too close normally. This happens over time in diagonally strung tafelklaviere as case twist develops, particularly when restrung with wire which is too heavy. The string band tends to move to the left as the pinblock twists and pulls in towards the gap, resulting in the hammers striking the next higher string.
The moderator still had its original cloth in good condition but the bushing leather for the levers had been replaced with thick felt.
The keyboard and action were in fair condition. There were about 20 repaired hammershanks. The hammer leather was in good condition. The action had been set up at some point to not escape but act like a primitive prellmechanik, by pushing the adjustment cap of the back touch rail too far forward and pinning it in place. This resulted in a pattern wear of the beak leather on the hammershanks where there was an indentation about 5mm in from the end of the beak leather. The kapsels and key mortises were in good condition. There was one pawl missing and this was located inside the instrument. Five of the thin top ebony plates on the accidentals in the middle of the compass were missing and the bare pearwood accidental bodies had been painted with black lacquer to hide this. Somehow the bass side rail of the action frame had been broken off and repaired used PVA glue. The ends of the action frame had been cut back possibly in an attempt to realign the action with respect to the string band, then a crude adjustment in the form of cup headed wood screws in the back was used. The sides of the action frame appeared to have been planed lightly with a hand power planer, possibly to try to move the action to one side.
The action cloths were surprisingly in good original condition, with no moth damage visible. The original finish on the body of the instrument had been stripped and replaced with tinted nitrocellulose lacquer.

Plan of Repair

It was clear that replacing the pinblock and pins and nut was desirable. However this was likely to be difficult and would require removing the yoke and pinblock without causing significant damage. It was not clear initially what type of glue might have been used. Therefore I initially elected to trial simply replacing the nut to see if a workable compromise between the string placement and the damper sticker positions could be achieved. In addition I wanted to see if a proposed re-stringing schedule using information from a very similar instrument by Kulmbach would be workable. I worked out a spreadsheet of string tensions using the gauge-marks given in Nuremberg notation on the Kulmbach instrument, using the likely thickness of gauge 1/0 for 1820 and extrapolating using the methods given by Paul Poletti.
While the tonal results with the new gauges and wire (Malcolm Rose type B+) were good, it was not possible to re-use the existing damper sticker holes, nor achieve a reliable damper action. The poorly installed tuning pins were also an eyesore. For this reason and with some trepidation I set about removing the yoke and pinblock.

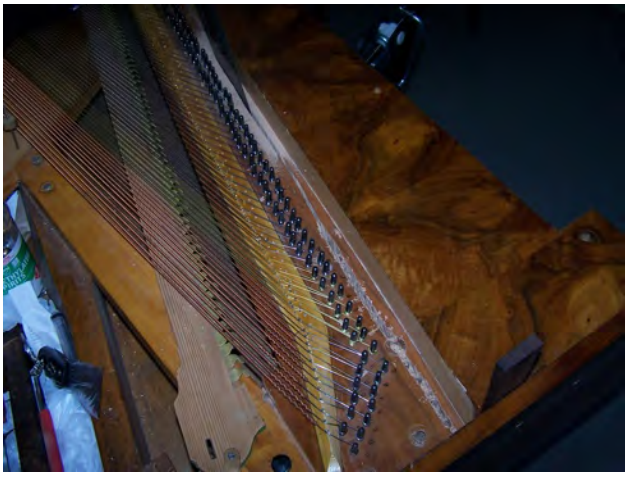
Stringing Calculation

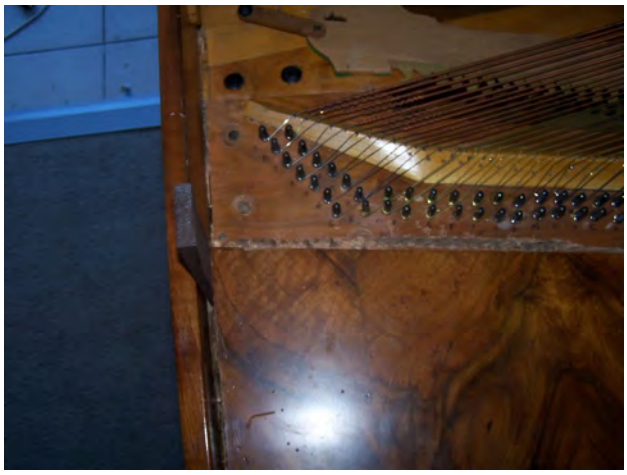
note name	gauge mark	Kulmbach measurements	calculated 1820 measurements	Rose B wire best fit
Cs	7/0	1.15 brass	1.15	
D		1.07		
Ds	6/0	1.06	1.04	
Fs	5/0	0.90	0.94	
B	5/0	0.90 steel	0.94	0.95
cs	4/0	0.85	0.855	0.85
fs		0.80		
h	3/0	0.75	0.77	0.75
ds1		0.70		
a1	2/0	0.65	0.70	0.70
fs2	0	0.60	0.635	0.65
fs3	1	0.55	0.58	0.58
		mm	mm	mm

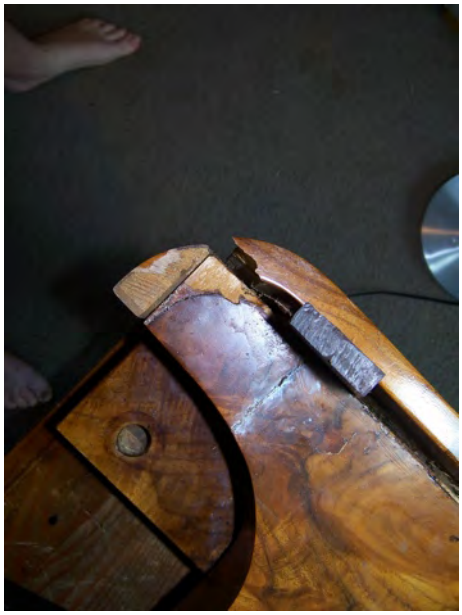
Removing the Pinblock and Yoke

This piano was constructed from the baseboards up, first creating the internal framework and major assemblies such as the pinblock/yoke and soundboard/bridge, then after installing these parts putting the case walls on and then veneering and attending to the 'furniture' parts of the instrument. The pinblock/yoke assembly was glued to two wide cross-members to form the keywell, and to other frame members at the right of the instrument. The front left corner of the yoke was incorporated into the front left corner of the instrument and likely the same for the right side. It was clear that the previous workers on the instrument has avoided these areas by cutting or breaking the yoke at positions where it would still function when glued back. In order to undo the glue joints I started working at the bass end where the size of the joint was largest. I repeatedly used heated paint scrapers which were able to melt and powder the glue, as well as injecting ethanol into the joints. As the joint started to open I used a car jack to carefully push it open further and removed the accessible part of the replacement pinblock by drilling and sawing it out. This allowed the yoke to flex more and open the joints more. When the joint gave way it took the front left part of the yoke with it that had not been previously removed, causing some veneer damage. All the pieces of the veneer were saved in order to repair this area in due course. A more involved repair might have been to strip the finish completely off the yoke and adjacent areas and soak out the veneer prior to disassembly but given the nature of the veneer, damage would again have been likely.

The joint surfaces were thoroughly cleaned of PVA glue residue. In many areas the previous workers had not bothered to remove the previous hide glue under the PVA, this made the job somewhat easier. It was surprising to think that instrument had actually been





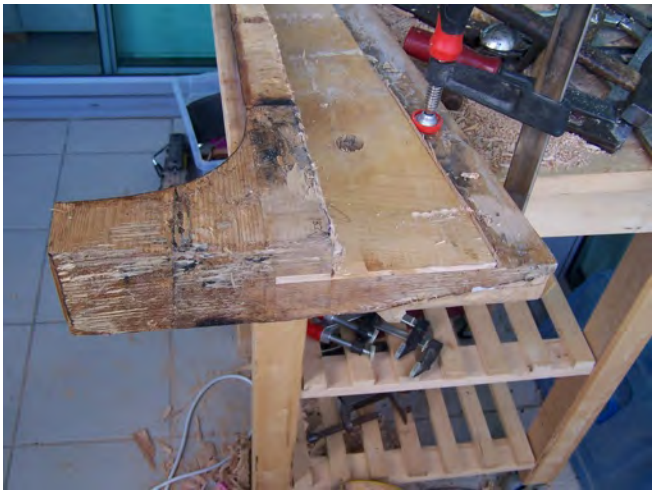


fairly stable regarding tuning, even when glued with PVA, I attribute this to the large gluing surfaces involved and the mechanical lock-in nature of the joints.

Disassembly and Rebuilding the Pinblock

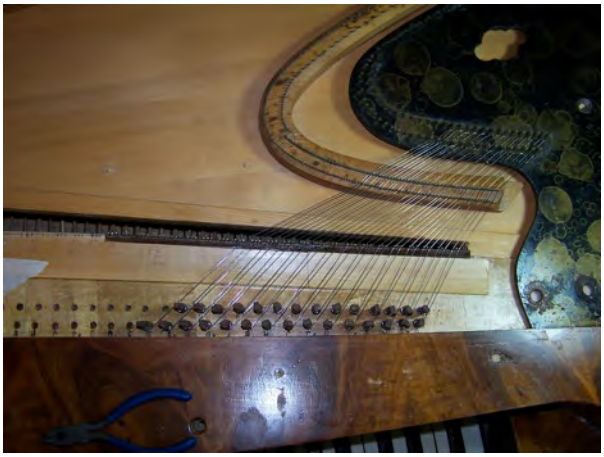
The laminated replacement pinblock was glued to the yoke with PVA glue, often without removing underlying hide glue, and fixed in place with multiple carriage screws with square

heads. It is possible that some of these might be original and they were saved for re-use. After they were removed, the pinblock came away very quickly using a chisel and wedges. A metal surface or lamination was apparent in the treble, it had been cut where it passed over the visible surface of the pinblock with a rotary cut-off wheel. It was found to extend over half the length of the yoke and was fastened to the pinblock with 1 " screws. The pinblock and yoke were additionally fixed together with bolts passing through into captive nuts under the veneer on top. One bolt was not able to be removed and a small square of veneer was 'popped' out to access the nut. The replacement pinblock had had only 3" of gluing surface width with the yoke and a more substantial replacement was considered necessary. The thicknesses of the pinblock laminations could be deduced by examining the remnants contained under the yoke. A new pinblock blank in beech was prepared and



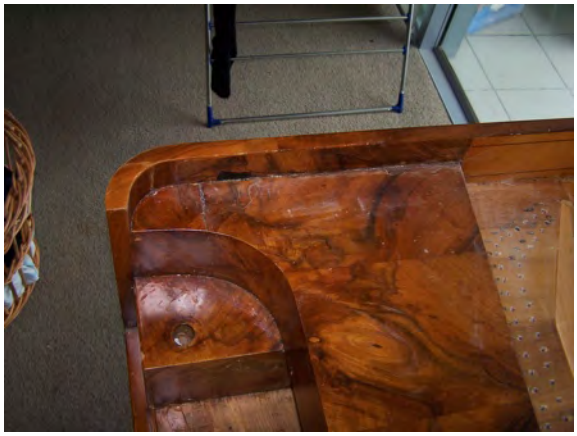
fitted into the case. The gap position was worked out based on the hammer strike line and carefully cut out and the gap left a little too far back initially. Hard maple capping veneer was sawn and planed to thickness and glued in place across the plank.

The parts of the new pinblock which were to be joined with the case were carefully planed to match the old joint surfaces. Pine veneer was glued to the underside of the new pinblock but avoiding the joint areas as in the original.
The pinblock top with its laminations in place was carefully planed to fit the undersurface of the yoke.The position of the metal bar was determined by marking and drilling the the hole through the pinblock for the bolt hole which was accessible at the top surface of the yoke because the veneer had been removed. the pinblock bar and yoke were assembled in position and bolted in position, then the front accessible part of the bar was traced onto the pinblock. After disassembly the metal bar was positioned and pilot holes for the 1 " screws and the other bolt holes were drilled.
Before final reinstatement of the pinblock/yoke assembly the nut and tuning positions had to be done
Some discussion and thought was given to reusing the metal nut section and whether to re-adopt trichord stringing in the upper register of the instrument.The metal section has had extra fixing holes drilled in it but the pinned section was serviceable. It was unlikely that this piece would survive longer term if not re-installed. While bichord stringing is easier to tune and has a less complex sound than trichord, in the treble with thinner strings it is easier to overcome the elasticity of the strings with heavy playing resulting in a dull sound. Most pianos of this type used trichord stringing in the treble, particularly as time went on. On a practical note, it is easy to reduce trichord to bichord by simply removing strings, but to reinstall a section of the nut and layout and drill for more tuning pins is considerably harder! The original nut was reinstated, after a 7 mm recess was chiseled from the front treble section of the pinblock. The nut was chalk-fitted to the recess and some lateral lee way was allowed for. The nut was fixed temporarily in position and test strings were used to check its location. Finally it was glued and screwed into position and a small wooden plug filled the gap in the recess on one side.



While the original scaling of the instrument was not known exactly, the scaling with the first replacement nut seemed satisfactory and concurred with other similar examples so it was decided to use that. The position of the line of damper stools with the action in place was marked onto the pinblock as a check as these should run from 8- 15 mm behind the hitchpin line. A new nut was made and glued in place, meeting the metal nut at the same height. An extension of the wooden part of the nut was made to sit behind the metal nut.There was a separate small bass section made and mitred to the long section. The height of the nut was checked against the original.

Determining the locations of the hitching points was not easy as the string band in this instrument was splayed out a little in the tenor and compressed in the treble, to accommodate the larger hammers towards the bass. The original nut existed (although not able to be reused) but the original position of this nut was not known and so the spacings could not be simply transferred onto the new nut. The damper rack positions looked to have been unaltered apart from the damper material being replaced so it promised to be useful. The hammer strike positions provided some reference points where original hammer shanks were intact with no sign of regluing or bending of the Kapsels. Eventually enough points were determined to allow intermediate points to be calculated. Interestingly instead of the spacing reducing from bass to treble in a linear progression, the spacing was constant in the lower half of the compass and suddenly reduced somewhere around the middle. Even with the care taken to determine proper spacing, some errors were made and hammer heads had to be repositioned. After the nut pin positions were determined, they were marked with an awl then using a protractor lines were marked intersecting with the lines marked for the rows of tuning pins. The angle of backdraft varied throughout the compass and was taken from pictures of similar instruments. The tuning pin positions were marked with an awl and later drilled with a hand held electric drill with a 5 degree tilt back by eye.
Note names were stamped into the pinblock in front of the nearest row of pins to the player, using the German system of note lettering. These letters were inked for clarity.
I had a cache of antique oblong -headed tuning pins from a gutted upright piano (most of us restorers hoard these) and these were prepared to use as authentic-looking replacements.They had been factory-drilled, although with the age of the piano it was possible that the treble pins at least had been originally undrilled.

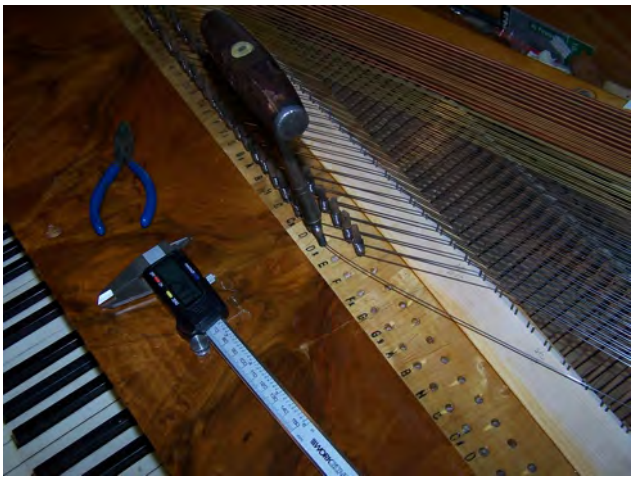


Now that the pinblock and yoke were ready to be re-installed, the procedure was planned and a number of 'dry runs' done to ensure accuracy. A number of experiments were done with the available hide glue and the metal section in the yoke and I was unhappy about the future integrity of the construction using hide glue. I therefore chose to glue the yoke/ metal/pinblock joint and the yoke/ yoke joint in the treble where it had been sawn through with Epiglass epoxy, a quality gap-filling high strength glue with long history of use (1960's) and little to no creep characteristic, capable of bonding wrought iron to timber. All the other joints were glued using hide glue to allow for their non-destructive reversal should this be necessary.
After the pinblock /yoke assembly was glued and the bolts and screws tightened, the case side/ left front corner was attended to. The veneer on the bass side had been damaged by the previous restorer and the underlying case side pine has been split in multiple places. Using hide glue and gently heat and water to remelt glue it was possible to push everything back in position to provide a decent cosmetic result. The area will then be treated with lacquer sticks to disguise missing veneer chips and tinted nitrocellulose spray used to refinish it.

The pinblock/nut/ yoke area was finished with tinted shellac and the nut drilled and pinned using brass pins starting at 2mm diameter in the bass and finishing at 1.4mm in the treble. The tops were cut to length using a wooden stop and then filed to equal length.
The instrument was then strung according to the schedule worked out previously and brought to pitch.





One question is whether there should be
carriage bolts through the pinblock to its mounting blocks. Certainly on similar instruments these are present but in this instrument there were non-original hex headed bolts used, and obviously non original holes drilled through the string plate to accommodate them. The gluing areas supporting the pinblock are at least 3 times that in the bass compared to a contemporary hammerfluegel, and a little less in the treble now but the pinblock and yoke originally extended another 500mm to the right side of the instrument so the need for bolts seems questionable.

The Action

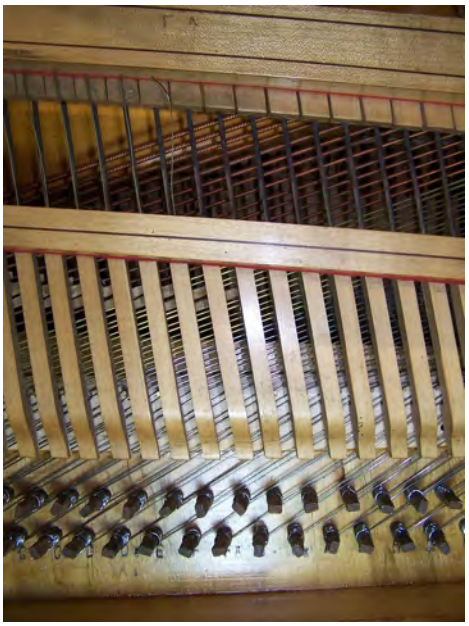
At this point most of the hammers contacted their correct string pairs but about a 1/3 needed adjustments to the hammer head positions and another 1/3 had had poor hammer shank repairs. First the balance punchings and back rest cloth were checked, then the kapsels were inspected for any bending and the line of hammer beak leathers was checked to make sure it was straight and level.

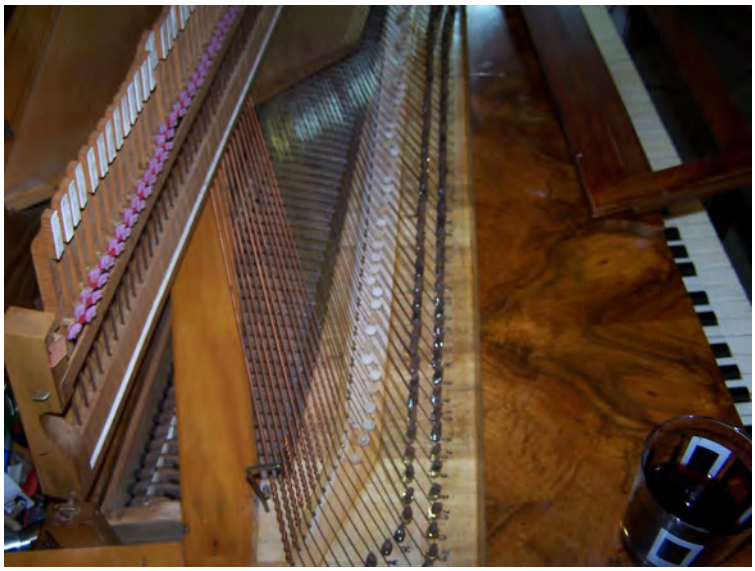
The hammer heads and bad shank repairs were loosened by carefully soaking the joints in a shallow tray on an incline (actually a plastic dustpan!), avoiding getting the leather heads wet. After 4 or 5 hours the heads were sat on their bases on a kitchen hotplate set on low until the glue joints had heated, The joints were carefully pulled apart by a clamp adapted for the purpose from a adjustable chisel honing guide. All parts were numbered and set aside to dry. The original hammer shanks were of pear wood but this was not readily available and I chose to use maple for the replacement patches. The broken ends of shanks were planed at an acute angle to make a long scarf joint and corresponding patches were made and then glued with hide glue and bound with thread and set aside to dry. When dry the thread was cut off gently and the patch planed on a small nose plane and sanded lightly to match the original complete shanks. The shanks without heads, both original and repair were remounted in their kapsels. Successively the position of the heads was determined by arranging a series of heads on their shanks in the likely correct position, installing the action in the instrument, noting the position of the heads relative to their ideal position on paper (as + or - 0.5 to 2.0mm), when correct, marking the head position on the shank, and finally gluing the head on.

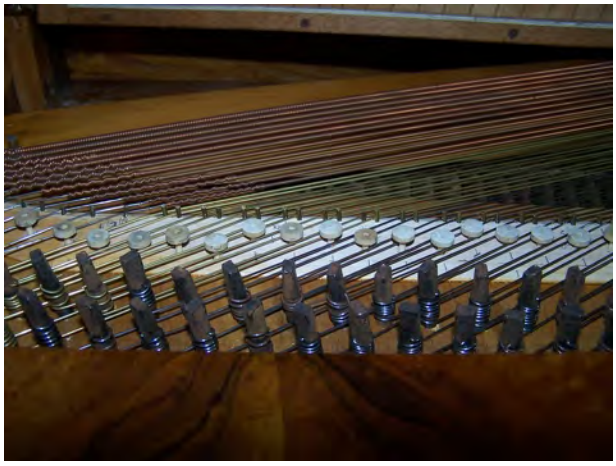
I checked the Kapsel tightness and adjusted this so that each hammer had as free travel possible short of rattling. I checked each note for correct escapement and for some notes adjusted the tightness of the pawl springs or lightly sanded beak leather where there was a furrow from the previous set-up.
Action set up is an iterative process where although there is an order to the tasks, often readjustments are necessary until a satisfactory state is achieved.

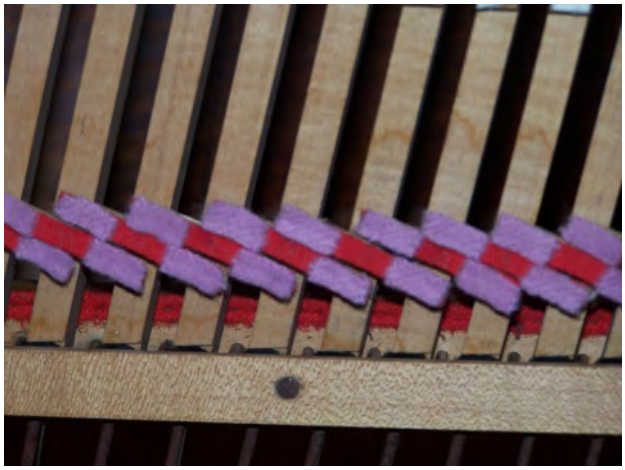
Dampers

Next I turned my attention to the damper system. The damper rack unit bass side was mounted at the end of a small block originally nailed to the side of the left keywell. The treble end pivot pin sat in a hole in a metal bar and was retained in position with a small turnbuckle. This bar was cantilevered from the side of the yoke and its height determined by a pivot and adjustment screw. This arrangement is also found in later Kulmbach instruments. One tuning pin had to be relocated to clear the bar. Because the string positions were close but not identical to the original ones, dampers would have to be repositioned. In this instrument the overhead damper levers have damper mounting blocks glued to them. These blocks are tapered in height and are positioned over a string pair. The apparently original cloth strips for the treble dampers remained and were in good condition so these were retained and similar damper cloths for the remainder were made





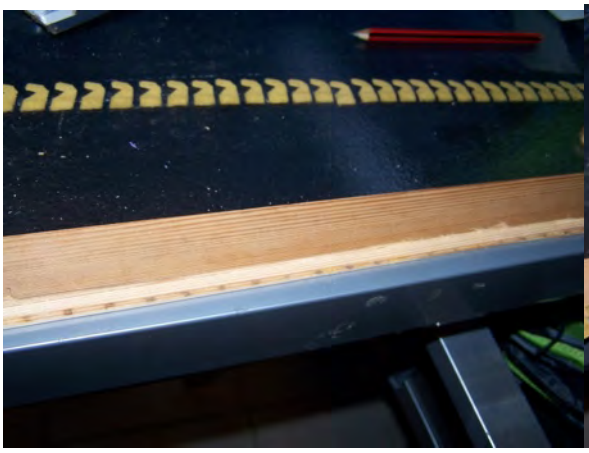
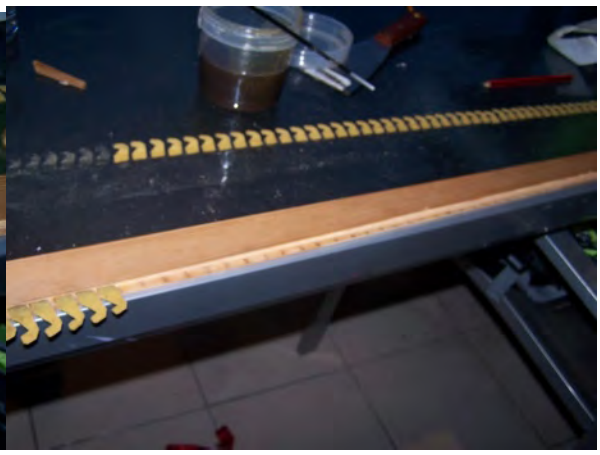


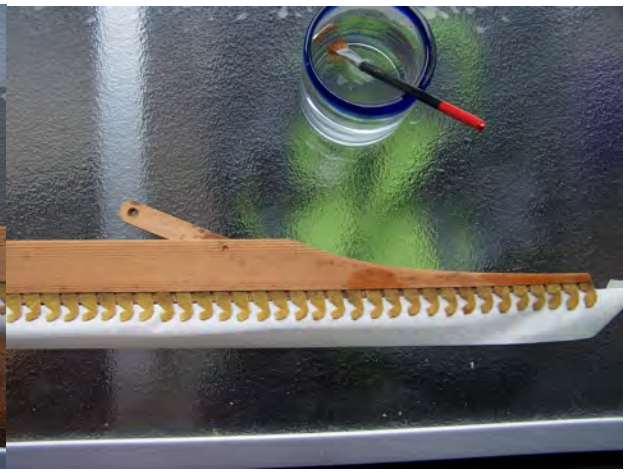


from slightly thicker baize cloth and glued to the blocks. The blocks were carefully unglued with a small amount of water positioned near the glue joins, and reglued to sit correctly over their string pairs. The levers were pushed up by small stickers and the next task was to determine their positions and drill the holes. The original stickers were missing but a broken stem of one was found after searching through debris and dust inside the instrument. This broken stem gave me the diameter of the sticker shafts. A substitute was found -smooth bamboo skewers. The small heads were modified from piano action adjustment buttons by cutting each in half and drilling for the shaft to get the 3mm high by 8 mm dia. size required. The positions of the sticker holes were determined by marking a line on the nut representing the centrelines on the overhead levers. As the string pairs crossed the nut obliquely there were one or two places where the hole could go, avoiding the strings, the sticker resting on the damper stool and its head under the centreline of the damper lever. These locations were marked with an awl and then drilled by eye through the nut and pinblock. One mistake was made, because of a broken drill bit a new hole had to be made next to a planned one. The instrument was tuned roughly to pitch and the damper stickers were fitted, sanded and smoothed as necessary and trimmed so that there was a small 0.5 -1 mm free motion before the sticker engaged the lever. This was done so that when playing a note, the hammer was the first to get the impetus of the stroke. Where cloth dampers interfered with a neighbouring string, they were trimmed back a little.
A new damper rack sticker was needed and this was made from brass rod and installed.
At this point as the instrument was playing, it was brought up to pitch at A430 and and played in, investigating and correcting any action problems as they arose.
A source of buzzing with different notes was tracked to a cut end of a string eyelet in the bass just touching another string like a harp bray -this was corrected by using listing made from mauve baize to silence the string after lengths.

Moderator

As the string positions and strike points had been altered, the position of the moderator tabs would need to be altered.
These were unglued by wetting them, and kept in order. The strike line was taken from the hammer head rear edges with the hammers at rest in the action and the existing batten front edge and top rabbet adjusted so that the moderator tabs would be engaged equally throughout the compass. The moderator tabs were then reglued and the moderator batten leather rubbing strips replaced and the moderator remounted.



Soundboard and bridge

While the soundboard ribs and bridge had been reglued using PVA, because the tone of the instrument was good and the bridge position satisfactory and it was unlikely that regluing these parts with hide glue would offer any benefit, it was decided therefore that it was better to leave this part of the instrument alone. In addition there was a significant chance of damage attempting to dismantle these parts.

Tension Calculation

This calculation was performed to check if the available wire could be used at the diameters proposed after research on similar instruments. It was found that it was likely that instrument was scaled for use with iron wire available in the early 19th century rather than the steel wire which was just starting to become available. In contrast, many of the square pianos by Andre Stein which came a little later than this one cannot be strung successfully with iron wire. Rose B wire is available in a harder drawn variant, B+.

note	sounding length	dia.	tension	dia.	tension	Rose B+ recom. tens.		
CC	1550							
FF	1383							
C	1293							
F	1181							
c0	995	0.84	32.71	0.80	29.67	31.5		
f0	805							
c1	541	0.74	27.32	0.70	24.45	26.0		
f1	409							
c2	283	0.60	19.66	0.56	17.13	18.7		
f2	215							
c3	145	0.59	19.96	0.52	15.51	17.1		
f3	111.5							
c4	79	0.57	22.12	0.48	15.69	15.4		
f4	63.5							
	mm	mm	Kg	mm	Kg	Kg		