

Harpsichord & *fortepiano*

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A TRIPLE-STRUNG 17TH-CENTURY ITALIAN HARPSICHORD

By Huw Saunders

In 2015 I was asked by my colleague Fergus Hoey to collaborate with him in restoring this extremely interesting 17th-century Italian harpsichord belonging to the Fitzwilliam Museum in Cambridge. As often happens, it had been restored before (by the late Trevor Beckerleg in 1975) but some of the problems that had been dealt with then had reappeared, and 40 years more research into historic instruments enabled us to get a little closer to understanding what its original configuration may have been. For reasons which will become clear, it has not been possible to return it to either its original or one of its subsequent historical states, but it has been made playable again, as it was when Beckerleg returned it to the museum, and more than 40 years on, that should probably be considered an historical state.

This is how Sotheby's catalogue described the instrument in 1931:

"A very fine Italian Harpsichord, or Gravicembalo of the 17th Century, enclosed in case superbly decorated inside and out with a heavy wreath of finely coloured flowers on a gold ground. The instrument has one keyboard, and two sets of unison strings, the keys are of cypress or box; the instrument is in approximate playing order; supported on separate wooden baluster legs, height, 2ft. 10 1/2in. width in front, 2ft. 7in.; length, 6ft. 5 in.

****An instrument of exceptional decorative beauty."*

(Quoted in Trevor Beckerleg's report of 1975. In what follows, all the material in italics is from that report with any commentary by me in non-italic font within brackets.) He goes on to say:

"It seems that the harpsichord was not sold that day. The pièce de resistance was perhaps the previous lot, a two manual marquetry walnut harpsichord by Jacob Kirkman dated 1760... Harpsichords in any case, went for a song, and Arnold Dolmetsch must have lowered still further Mrs Bullough's hopes of a sale by telling her that it could not be repaired because of the cracks in the soundboard. Eleanora Duse's harpsichord was presented to the Museum by Mrs Bullough in 1933 and thereby ended its adventures as a 'property'.

A look within the box prompts speculation of a different kind. The harpsichord, perhaps regarded by Sotheby's clients as of less value than its outer case, is more venerable. It bears no signature nor any lettering except two words in a modern hand on one of the jack guides, but its extremely pointed tail (35°) and very deeply-incurving bent-side, its decorative features—the finely detailed mouldings and elaborate parchment and veneer rose—indicate a Venetian instrument, probably of the sixteenth century."

Much pioneering work on Italian harpsichords has been done in the years since 1975 by Grant O'Brien, Denzil Wraight and others. Basing his case on the similarity of mouldings, arcades, and cheeks, Wraight¹ makes a convincing argument for this

harpsichord actually being Florentine, and probably by Giovanni Battista Boni who worked in Cortona during the early part of the seventeenth century. Beckerleg's report continues:

"The case and soundboard are of cypress, the keys of boxwood with ebony topped sharps, there being a compass of four octaves [The key levers themselves are probably chestnut] which will be discussed later, running from an apparent E to d³ It has the usual short octave arrangement in the bass whereby the lowest chromatic note is Bb; E in fact sounds C, F# sounds D, and G# sounds E, thus providing all the naturals from C to A. At present it has two sets of 8' strings and three rows of jacks. That nearest to the player faces left and offers an alternative plucking position to the furthest row, which plucks the same strings; the middle row faces right. The jacks are new and have been fitted during the 1975 restoration to obtain a reliable action. When given to the museum, the harpsichord had only two rows, the third guide having been veneered over and glued to the wrest-plank. Apart from the resuscitation of this register to fill an unsightly gap and enlarge the resources of the instrument, the 1975 restoration was confined to humdrum matters—securing the cracks in the soundboard by gluing strips of linen to the underside, restringing (the existing wires were not old and were too heavy) and minor attention to the keyboard action. The new jacks are fitted with quill.

The special interest of the instrument is that it had, at one time, three sets of strings. This appears in the three registers, in signs of three earlier rows of tuning pins and in triple pinning along the bentside, where the redundant pins have simply been bent down against the border moulding. Since it is not possible to have more than two sets of strings at one level on a harpsichord, it must be concluded that the instrument at one time had an unusual arrangement of bridges and nuts...making provision for a set of strings at a different height.

Harpsichords with three sets of strings where one is not at 4' pitch are rare and not yet comprehensively catalogued; however there seem to have been three separate purposes for incorporating a third register. On Italian instruments it sometimes took the form of an incomplete set of jacks applied to extra strings to ensure good tuning on certain notes in more distant keys. This explanation does not apply to the Fitzwilliam harpsichord since its jack guides, the authenticity of which is not in doubt, each originally contained 45 slots. The nearest slide was in this condition when uncovered, and the addition of two slots to each of the others is obvious. On some exceptional instruments, not necessarily Italian, a third register at unison pitch is found affording the possibility of triple 8' tone and in some cases giving an unusual plucking position. Otherwise it is supposed that a third register plucked strings of a different scale and was used for transposing. To which of the latter categories the harpsichord belonged is not clear.

The Key Frame

Confirmation of an original compass of 45 notes, C/E—c³ suggested by the jack guides, is to be found in the key frame...This has an oak balance rail which has been extended marginally in the treble and by about an inch in the bass. Forty-five balance pin holes (C/E—c³ have been filled and the rail re-drilled to give a compass of C/E—d³ (47 notes). The new balance pins are spaced about the width of one and a half keys to the left of the old; the rack has been moved about half a key width to the right and three slots have been added to it in the bass, presumably because the angled top of the end of the rack, still visible in the treble, made it desirable to shorten the old rack by one slot when extending it. Since two extra notes were added to the treble and since most of the extra space required, judging by the key frame and the width of the (modern) key blocks, was found in the bass, it may be assumed that the present keys sit about one key

space to the left of the originals. That is to say that, if the original nut and bridge positions have been retained, the scale has been lengthened.

The balance rail has also been re-set further back from the player and the pins spaced to lighten the touch of the sharps. The keys must date from these alterations, as they have no previous drillings. They could well be seventeenth century and have no special features except that the naturals are unusually short. It seems unlikely that the change to a two unison instrument was made at this time. If the touch had been too heavy, one would have expected the removal of a register to lighten it sufficiently to make it unnecessary to alter the position of the balance rail. The touch at present, with three registers, is not heavy.

The Wrestplank

An examination of the walnut wrestplank shows that the harpsichord had been extended in compass while retaining three registers. Three rows of old tuning-pin holes, now filled, are to be found running parallel to the keyboard. The disposition of these holes must contain a key to the arrangement of the nut or nuts at this time. However, supposing the usual clockwise tightening of the pins, there is no apparent explanation for their layout. An anti-clockwise movement is improbable, but would give a plausible disposition of the strings..."



Fig 1 The wrest-plank showing the 3 rows of original wrest pin holes, subsequently plugged.]

Here modern technology gives us an advantage over our predecessors, and as during part of the restoration a complete

technical drawing has been made using a CAD (Computer Assisted Design) showing the instrument in both its present state and a possible original one. This shows that an arrangement of three strings to each note can work with the original wrest-pin positions and without any unusual methods of winding the coils on the pins as suggested by Beckerleg. The report continues:

"The Jacks, Guides and Stop Mechanism

The two rows of jacks removed from the harpsichord during the restoration, except for 10 or so pearwood replacements, are of maple, with brass leaf springs. The majority bear apparently uniform and old numbering and were mostly in their appropriate positions. There is also one badly made old jack of walnut (26-2) which seems to be numbered in the same hand. One row has numbers of the position of each jack and the other has the addition of the figure 2 beneath the number. Of the four jacks with the numbers 46 and 47, three are in this hand and the other (46-2) has thin pieces of mahogany glued to the back to make it thicker, so that it is clear it was not originally made for that slot. The new mortices have been roughly cut in the bass end of the guides and there are no old jacks numbered 1 or 2. The jacks are fitted with leather plectra, but the uneven cutting of the holes indicates that they were not originally so, and while the jacks would have worked well enough with quill, the rather loose fit in less than perfect mortices makes it impossible to achieve a regular touch with leather. This is the main reason for the fitting of new jacks; moreover the leather did not sound well.

The evidence suggests that the maple jacks belong to the original 45 note instrument and were either not numbered or were re-numbered when the compass was extended. They would occupy their original slots. Three of the newly cut mortices are much wider than the norm and it may be that the extra jacks made for them were later discarded

because they fitted badly. A man who cuts a bad mortice does not make a good jack."

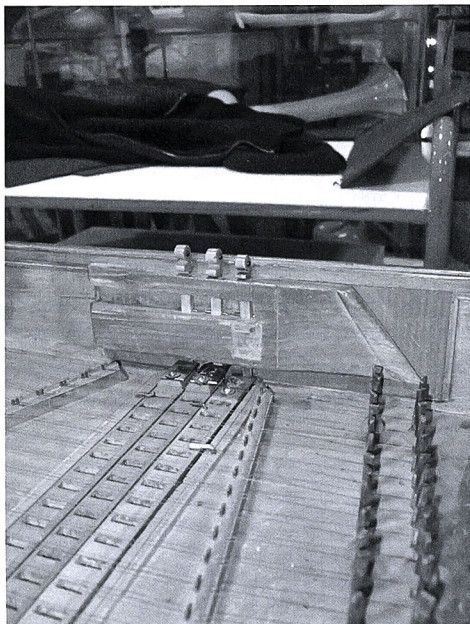


Fig 2: The three original registers and the stop mechanism in the treble end jack rail scroll.]

"A mechanism to move the two further guides is provided in the scroll at the treble end². The mechanism for the nearest guide had been removed and the hole filled in; a device similar to the other two has now been fitted. The system here is perhaps much older than the existing fittings which seem to have had expended upon them some of the ingenuity to be found elsewhere about the instrument—the method of removing the keyboard, the device to harness the jack rail, and the maple caps for the carriage bolts³. The nearest guide may be removed through a hole in the spine; the other two can be removed subsequently by the same route. This is unusual in Italian harpsichords and certainly not original. Although it is probable that an instrument with three registers, even if they were unisons, would have had moveable guides, it is unlikely that they could have been taken out without unstringing.

The Inside of the Soundbox and Underside of the Soundboard

There is a hole in the underside of the soundbox, perhaps made to gain access to the rose. If so, it was lucky that the rose survived, for it seems that the repairer, having turned the harpsichord upside down and lowered a light into it, went to lunch. The lesson is writ in charcoal on the bottom."

In fact we have found scorch marks in numerous places inside the case, and we believe that these can be attributed to a common expedient that Italian makers are known to have used to help with the installation of the soundboard: in order to ensure that all the surfaces to be glued were warm, they used to arrange a small pile of shavings all around the inside of the case below the liners (experience would tell them how much), and then set fire to it. As the flames died down they would apply glue to all the surfaces and quickly put in the soundboard, instantly extinguishing the remaining fire. Naturally the ashes and scorch marks would remain there forever, and we have actually found some ash.

"Through the hole it has been possible to obtain fairly accurate measurements of the internal structure. This is entirely original and there is no sign of the soundboard ever having been removed. Nine buttresses with feet only 3" deep and spaced from 3" to 7" apart support the bentside; a tenth is placed in the middle of the tail; five more are equally spaced along the spine. Two lightly tapered members...are glued diagonally to the bottom, one from right of centre of the belly rail to the spine, the other, almost parallel to it, from the middle of the bentside to the spine. There is only one brace, jointed into the top of the belly rail about 13" from the spine and having no evident function.

The unusually light and hollow structure is

complemented in the barring of the soundboard: there is only the cut-off bar...untapered, and passing... to the right of the rose aperture. It is astonishing that this structure bore the tension of three sets of strings running directly to the bentside. Unfortunately there are no clues within the instrument to earlier bridge positions. The bridge, or bridges, were not nailed on from beneath in the usual manner, and the underside of the soundboard seems quite clear of any marks.

The Soundboard and Bridge

The soundboard, of cypress, was not quarter sawn; it was found to be approximately 0.15" (3.8mm) thick at the crack to the left and a little thinner (0.13" to 0.15", or 3.3 to 3.8mm) at the crack passing beneath the bridge in the treble... It harbours an exceptional rose consisting of an elaborate ground of thin veneer, glued to parchment so that it would not split in cutting, with two simplified versions of the same pattern superimposed. It is bordered with rings of moulded wood and patterned parchment and has in its own miniature sphere the central beauty of a rose window in a gothic cathedral."

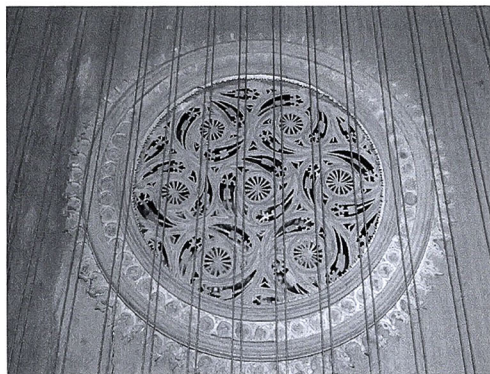


Fig 3: The rose.

"The pear-wood bridge is the most puzzling feature of the whole instrument. It is too long to have been moved from the other position clearly visible on the soundboard, and it overruns the

older bridge in the bass. Its mitred tail, also of pear, seems to have been moulded with the same blade and is at a different angle to the earlier position. It certainly did not belong to the 45 note instrument and it seems most likely that it and the present nut were introduced when the harpsichord became a two unison instrument in the seventeenth or eighteenth century...the method of bending by making cuts on the concave side would make it easier to fix to a soundboard already in position. It is possible that the cobbling of the bridge at A and Bb, where the old pin holes seem correctly positioned, was an attempt to avoid some falsity of tone, but the condition of the tail defies even such halting explanation."



Fig 4: The bass end of the "cobbled" bridge with the strange extra pieces glued to the front.]

Beckerleg is referring here to two short pieces of bridge material which have been glued to the front face of the bridge and provided with bridge pins in the usual way. When we received the instrument, as strung by Beckerleg, the strings had been positioned on these pins with the pins on the main part of the bridge used as "back pins". Like him, we were mystified by this arrangement and originally intended to remove the extra pieces. Even more mystifying was the fact that these extra pieces had been pared away to allow the strings to pass over where they were not made to bear on pins in them, and I initially thought that they might have been re-used parts of an original bridge or nut with the pared away sections being evidence

of the difference in level of one of the sets of strings in relation to the others. However, careful examination shows that the moulding is the same as the one of the present bridge which is characteristic of Cristofori's work (I am indebted to Christopher Nobbs for this information), and that therefore these pieces are probably contemporary with the present bridge.

Back to Beckerleg: *"If, as seems likely, this bridge occupies an entirely new position on the soundboard, then it may be that the original instrument had a single bridge and the different levels and possibly different lengths of the strings were provided at the nut end."*

Again, the CAD drawing has helped to elucidate the problem here. In preparing the second version (showing a possible original set-up) two assumptions have been made, firstly that the line of pin holes along the old nut line are from the pins belonging to the lower level string (a pin of the same length driven further into the nut and through into the wrest-plank), and secondly that Beckerleg was correct in suggesting that the two first pins in the bass were added later when the compass was first enlarged. The strings of the third choir are at a lower level at the nut, and run obliquely across the gap under the other strings, arriving at the bridge at the same level but offset to the right of the other two. The precise offset between the oblique string and the other two is, obviously, conjectural but that is the kind of detail that an experienced maker would finalise during the process of actually stringing the instrument. It is also possible that there would need to be a very small lowering of the offset string at the bridge, and again this would probably have been done as part of the final set-up. Any such adjustment would be small, since

the excursion of the string near the bridge is also small.

Our restoration work on the soundboard consisted mainly in cleaning it, and re-doing most of Beckerleg's repairs which had failed over the years, probably as a result of the instrument being kept in excessively dry conditions. His old shims were removed and replaced with new ones which were then stained down to a shade nearer to the original cypress. The rose had lifted in some places and these were re-glued using fish glue. While there were no strings in place we examined every surface we could to try to find evidence of earlier states. We concluded that there were only ever one nut and one bridge, and that the soundboard had never been removed – in other words the present bridge had been put on with the soundboard in place. This will have been facilitated by the trap door which had been cut in the bottom in order to give access to the underside of the soundboard for temporary supports to be put in. The trap-door in the bottom was closed, but not glued.

When it came to re-stringing the harpsichord I calculated a new scheme using Malcolm Rose's English Brass wire throughout. However, we subsequently entered into discussions with Stephen Birkett of Waterloo University, Ontario, with a view to using his new brass wire which will be produced in accordance with historical methods which he has been researching for some time. (His iron wire – so-called P-wire – is already in widespread use in our field and has attracted many approving comments.) He has produced a small, non-commercial quantity of his brass wire for us prior to his setting up in commercial production. His research results are as yet unpublished, but they have thrown light on the strange extra pieces of bridge material glued to the front of

the present bridge towards the bass end, and consequently we have decided to leave these in place and to use them and their pins in the new stringing. Of course we don't know what pitch was intended by whoever brought the instrument to its present state, but the scaling of *most* of the string band seems to imply a pitch of around A 440 which would put the strings under sufficient tension for them to sound well.

However some notes in the bass do not conform to this scaling, and this is where things became interesting. Birkett's research into historical wire suggests that, contrary to the thinking that has prevailed for the last 30 years or so, the effect of "tensile pick-up" is not confined to iron wire but is also present in brass. This is the phenomenon whereby as the wire is drawn down to smaller diameters it gets progressively harder unless it is annealed in between drawings, so that the thinner gauges are proportionally stronger than the thicker ones. From the point of view of stringing harpsichords this is a beneficial effect since it means that the thicker gauges can be tensioned closer to their breaking point than would otherwise be the case, as the overall scaling of the string band becomes foreshortened towards the bass. Consequently they will give us a better sound. We have in fact found that at a pitch of A=440, the strings for notes F, G, and A can only be strung safely with historical brass wire using the pins on the extra pieces of bridge mentioned above, implying that Birkett's suggested shape to the tensile pick-up curve is fairly well in line with historical practice.

Once stringing was complete, the harpsichord went to Fergus Hooey's workshop for him to voice the jacks and finalise the set-up. Although one sometimes comes across a third register used to give a double pluck and thereby a louder sound,

in practice this turned out not to be feasible in this case. In order to work in this way, the two plucks have to be simultaneous and whilst that could have been set up, it would have been almost impossible to maintain, so the third register has been staggered like the others, and can be used to give a different colour to the sound, either with the other set of strings or on its own. Most of Trevor Beckerleg's work was serviceable and in fact some of the quills put in by him simply needed a bit more cutting to give them a good sound. After its return to the museum, it has been kept in carefully controlled conditions away from its outer case until May this year when it was used for a lunch-time recital by Gerald Gifford in conjunction with the museum's exhibition on domestic religious observance in renaissance Italy, entitled "Madonnas and Miracles: The Holy Home in Renaissance Italy; Italian keyboard music for devotion and contemplation". This memorable occasion gave the audience a chance to hear this fascinating instrument and also to admire the exquisite outer case described in Sotheby's catalogue. This is even painted underneath in grisaille. The stand they described is almost certainly not original, since it is slightly too wide, but it is certainly old and does not look out of place.



Fig 5: The harpsichord re-united with its outer case ready for the recital. Dan Tidhar is pictured playing. Photo by Victoria Avery.

Some concluding words

It has been very gratifying to be able to return this extremely interesting instrument to playing condition, and to hear it sounding perhaps as sweet as it originally did. Unfortunately, to have returned it to its original state (insofar as that can be elucidated) would have meant sacrificing a good deal of historical evidence and would therefore not have been acceptable, but it

is to be hoped that at some point in the not too distant future, somebody may make a modern reconstruction. I would also like to record here my gratitude to Christopher Nobbs and Miles Hellon for the advice and information they have generously given us.

Paper copies of the drawing are available for purchase directly from the author for £50 plus shipping via www.harpsichordmaker.co.uk

¹ Denzil Wraight, *The stringing of Italian keyboard instruments c. 1500 - c. 1650 From part two, Catalogue of Instruments*. PhD Diss. Queens University, Belfast, September 1996. Revised version 1997)

² This consists of a boxwood plunger attached vertically to a strip of bent brass which works in a slot in a brass plate attached to the top of the register, so that vertical movement of the plunger translates into sideways movement of the register – a very ingenious and unusual arrangement.

³ The method for removing the keyboard, which has foxed more than one previous scholar looking at the harpsichord, is undoubtedly ingenious and parts of it are old, but it is probably a combination of expedients that have been added to over the years. The name board is first removed and this gives access to a pair of screws at the back of the key-blocks. These are next removed and give access to a pair of pins with hooks on their upper ends. These are removed and in their turn release a pair of wedges pushed in from the front, each with a section of moulding on the front which actually fixes the keyboard in position.

The “device to harness the jack-rail” is in fact a mysterious remnant, probably once belonging to some kind of stop mechanism. It consists of a brass rod which passed at an angle through the wrest-plank, keyboard (actually passing through a key), and bottom of both the instrument and its outer case. At the top it is bent into a crank which engaged with a flat brass lever screwed to the front underside of the jack rail at about its mid-point. It is impossible to guess how it was originally meant to work or on what, but it may have been linked to a knee lever or pedal. The jack-rail needs no such anchorage since it is held tightly in the usual way by sliding forwards into mounting blocks.

The maple caps for the carriage bolts are simply capping pieces that fit snugly over the carriage bolts which have been fitted at some stage to secure the wrest-plank to its supports. These bolts are obviously not especially old and the workmanship of the capping pieces is similar to that of the various cross grained cleats that have been glued to the outside of the case in various places in an attempt to close or consolidate some splits in the cypress.