# The Israel Gellinger 1670 clavichord

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Presented at the *44. Clavichordtage* ·of the *Deutsche Clavichord Societät* in co-operation with the *Musikwissenschaftlichen Seminar der Georg-August-Universität Göttingen*, Göttingen, 2–4 November 2018.

A study first published (in French) at the *Journées 2009 de Clavecin en France (CLEF), au Conservatoire National Supérieur de Musique et de Danse, Paris 20-22 mars 2009* and (in English) at the International Symposium on Clavichords, Magnano, Italy, 2013.

There are four musical instruments within the collections of the Museum of Groesbeeck-de Croix in Namur (Belgium), a harpsichord by Andreas Ruckers, a virginal, a harp and a clavichord. This paper presents the main outcomes of a study of the clavichord. For this study, which was preliminary to the realization of a replica, we have disassembled the clavichord as far as it was possible without removing the soundboard or taking off glued pieces. This was followed by detailed visual examination and by dimensional measurements. The instrument, in spite of the damages it has endured (fig.1), is a valuable witness of keyboard instruments making in Germany during the middle of the seventeenth century. It is one of the rare extant historical keyboard instruments made in Frankfurt am Main. It has not been modified in its essential parts since its construction.

This clavichord belongs to the Archaeological Society of Namur, with inventory number 2003. We have been unable to trace back the history of the clavichord since its construction until the unknown date at which it has been donated to the Archaeological Society. Research in the town's and State's archives led to no conclusion in this respect. The museum itself has no file on this clavichord. Incidentally, the museum doesn't keep files on any of the four instruments, including the Ruckers harpsichord.

At the end of the nineteenth century, the musicologist Edmond Vander Straeten indicated, in a footnote of Volume 7 of his monumental work on the Music in Netherlands, dated 1885: " *an interesting specimen of clavichord, wearing the date of*

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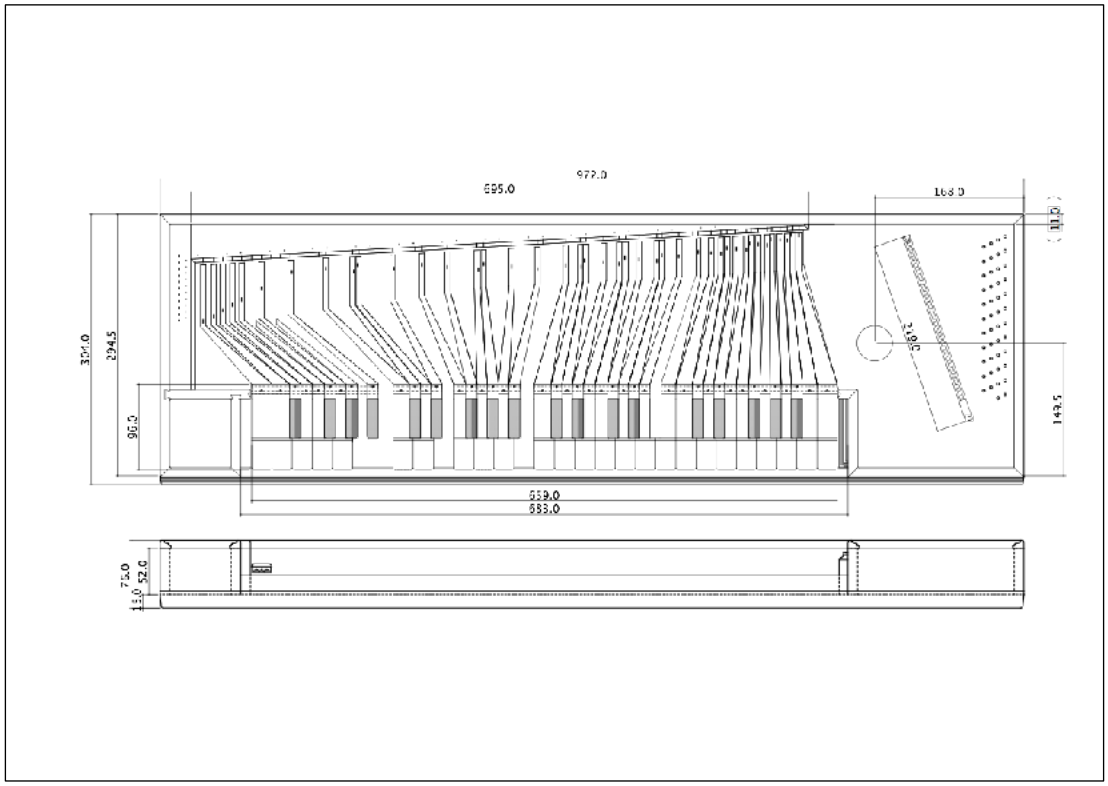
*1670, and kept at the archaeological Museum of Namur, would deserve to be the object of a detailed study, as much for its mechanism as for its origin*" [2]. A century later, in 1998, this instrument is mentioned with a photograph dating from about 1984 in the monograph[3] which Bernard Brauchli dedicated to the clavichord.

**Methodology**

The examination of the Namur instrument was organized according to the methodology of Koen Vermeij[4]. The clavichord was not exposed to the public at the time of the examination. It was taken out of the reserves – namely the attic of the museum - for the purpose of the examination. Accurate measures were taken, as well as several dozens photographs in colours and in black & white. Figure 2 gives a simplified technical drawing of the instrument.




**General state**

The general state of the cabinetwork of the clavichord is bad. Some keys are missing (A, B, e, b, b$^{b}$1), others are broken (F#, G#). The nameboard is missing. The rose has disappeared. It is likely that the instrument has been subject to violence during the last part of its existence, as testified e.g. by the fact that tuning pins still keep rolled-up

[2] Edmond Vander Straeten, *La Musique aux Pays-Bas avant le XIXe siècle. Documents inédits et annotés, etc*., Tome Septième (*Les Musiciens Néerlandais en Espagn*e), 1ère partie, Bruxelles, 1885, p. 464. This reference was kindly communicated to me by Lothar Bemmann: L. Bemmann, personal communications, February 20th and November 2nd, 2006.

[3] Bernard Brauchli, *The Clavichord*, (Cambridge Musical Texts and Monographs) Cambridge UK, 1998, p. 106.

[4] Koen Vermeij, *The Hubert Clavichord Data Book, A Description of All Extant Clavichords by Christian Gottlob Hubert 1714-1793*, Clavichord International Press, Bennebroek, Netherlands.

fragments of piano strings. The bridge is untied from its base, probably torn away with force. Since the photography of *ca.* 1984 reproduced by B. Brauchli, the instrument underwent no visible modification: it is today exactly in the same visual state.

**Case**

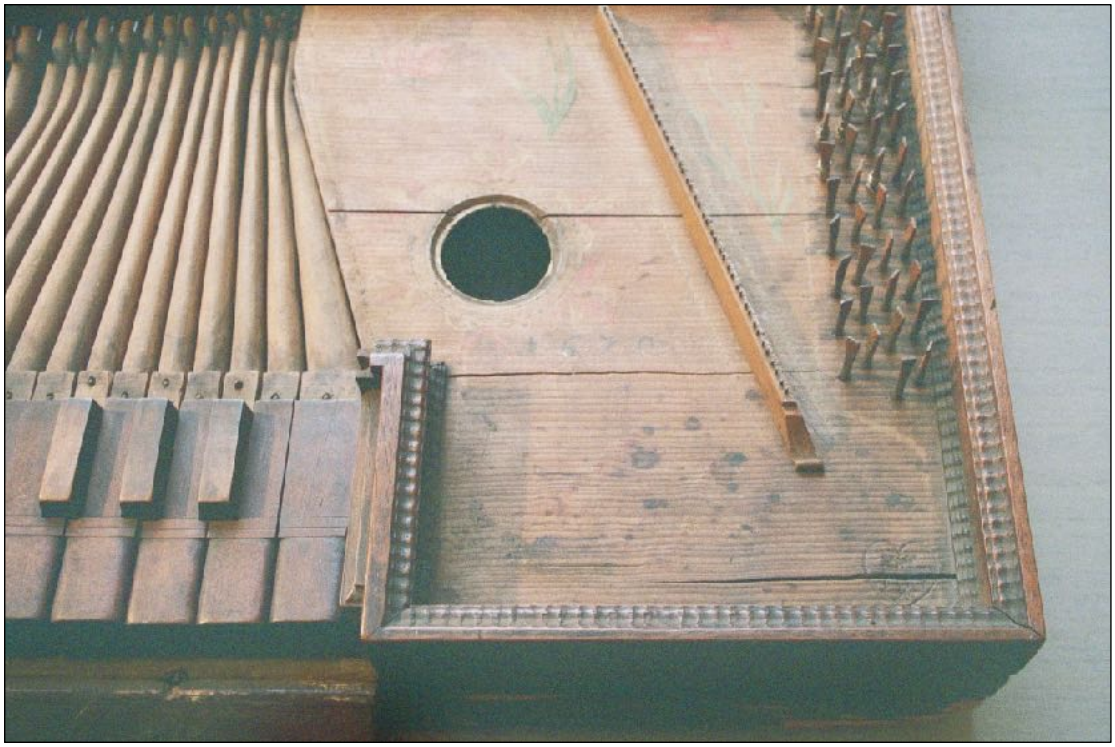
The species used for the case, the lids, the baseboard and the balance-rail is a conifer, very probably fir - *Pinus sylvestris* L. The structure of the case is undamaged for the most part. In a recent time, probably early 20th c., the baseboard was screwed to the case. One of the screws has removed some wood off from the back rail. The distortion, always present on a clavichord because of the differential stress, is particularly small. The outside is painted with a black coating that has faded out by places. The inside remained natural.

The case outer dimensions, including the protruding moulding at the front of the instrument and the top moulding but not including the lid, are 972 mm long, 296 mm wide and 76 mm deep. The thickness of the case is about 11 mm. The thickness of the baseboard, on which the case rests, is about 15 mm.

The assembly of the baseboard to the case is probably strengthened by treenails, but they are not visible. Assembly of the back-rail and of the front-rail to the lateral faces, to the cheekpieces and to the returns towards nameboard are dovetailed. The assembly between the missing nameboard and the returns of cheekpieces have been made with the same accuracy as for the whole instrument.

The joining between the baseboard and the front of the case is hidden by a protruding frontal moulding, with a height of about 19 mm and a width of about 8 mm. The left and right lower corners of this moulding are damaged. A moulding (see fig. 3) is glued to the top of the frame around the case. This moulding, 9 mm high and 12.5 mm wide, presents a sophisticated profile, with a longitudinal wave-style contour with regular undulations, *mit geflammtem Profil*[5].

[5] These waved mouldings (*moulures guillochées*) were obtained by means of a special tool, such as the one described in Denis Diderot et Jean Le Rond d' Alembert, *Encyclopédie ou Dictionnaire Raisonné des Sciences, des Arts, et des Métiers*, Paris, 1751-1758 : *Recueil de Planches sur les Sciences, les Arts Libéraux et les Arts Mechaniques, avec leur Explication, Ebénisterie - Marqueterie*, Planche IX, Fig. 64.



Frame mouldings are missing on half of the left lateral face as well as around the toolbox. The mitre between the moulding of the back rail and that of the right face is opened. A second row of mouldings (6x6 mm and 4x4 mm) makes the internal tour of the frame at the level of the soundboard.

The lid, in two parts, is attached to the case by a single small iron wire, two others being broken. A lid stick of conifer wood was found on the soundboard: it was also shown on the photography of ca. 1984 mentioned above. There is no track of any cord to the left or to the right, but two holes for fixation screws remain seen respectively over the left hitchpin-block and into the lid. Two iron wires fasten the fallboard of the keyboard to the main lid.

It is well known that clavichords generally show distortion and twisting of their case because of differential stresses on bass and treble strings. The distortion results in the sides failing to remain perpendicular the baseboard. The twisting tends to bring closer to each other the back left and front right corners. It is remarkable to notice that the clavichord of Namur presents only very weak abnormalities compared to a regular parallelepiped shape. For example, both external major diagonals are respectively 1016 mm and 1012 mm, in excellent mutual agreement. The sides of the clavichord and the baseboard are perpendicular to each other, without deviation.

**Internal details: rack, hitch-pin block, balance-rail, belly-rail**

The species of the hitch-pin block and the rack is oak, probably the sessile oak - *Quercus petraea ( Matt)*. Liebl. = *Quercus sessiflora* Salisb. The realization of the hitch-pin block and the rack is precise. For example the width of the individual slots in the rack serving as slides for the tails of keys is smaller than half a millimetre.

The sides of the toolbox are assembled with dovetails (fig. 4). These assemblies are now visible because top mouldings have been removed at that place. A block in oak,

decorated with mouldings, strengthens the right cheekpiece. The left cheekpiece was probably strengthened similarly, but the block is missing. Some traces of glue indicate its initial presence.

The balance-rail is covered with a strip of parchment recycled from an unidentified manuscript, with letters in black and red ink, illegible[6]. The balance-rail pins, made of iron, are 2.2 mm in diameter. The lines of mortises were indicated on the panel of keys before division: a line for the naturals and a line for the accidentals, separated by approximately 10 mm. The balance mortises do not show strong wear, which suggests that the instrument was not much played.

The belly-rail is in three parts. The median part is openwork by small motives of a heart and a half-circle. The heart shape is unusual. It might be a reminder of the IG monogram engraved on the soundboard.

**Toolbox**

The lid of the toolbox, with a wooden central button, has been added to the instrument much later that the seventeenth century. The toolbox contains (see fig. 5):

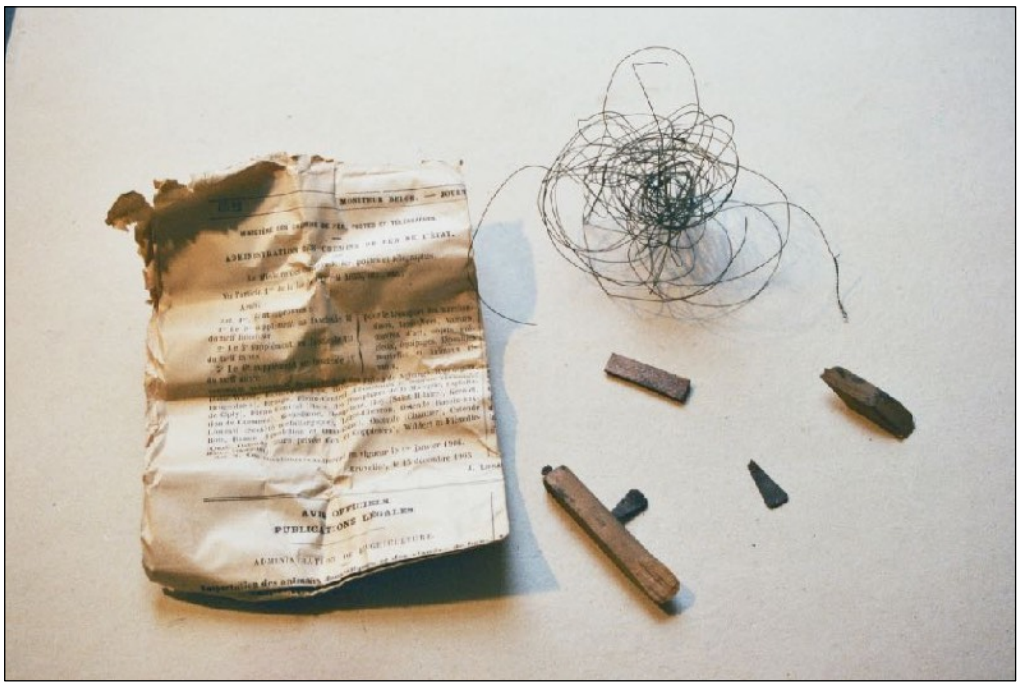
- Some thin strings in brass, probably original[7], wound around a sheet of printed paper from the *Moniteur Belge* of December 15th, 1905, pages 6519 – 6522. It is likely that the instrument was put away "definitively" at that time and that

[6] The reuse of parchment resulting from medieval antiphonaries in the making of clavichords is attested e.g. in the clavichord made in 1756 by Christian Gottlob Hubert in Bayreuth, kept at the Museum of Decorative Arts in Strasbourg (Koen Vermeij, *op. cit.*, p. 48-49).One may also quote a similar reuse in the harpsichord by Giovanni Baffo of 1574 kept in the Victoria and Albert Museum London, on the reverse of the nameboard.

[7] No metallographic or chemical examination of the wire specimens has been made so far. Such an examination would be most interesting to reveal the existence of impurities, mechanical properties, existence and effect of work hardening, production process and more.

the state in which we discover it today is the same as that in 1905. Those string residues support the assumption that it would be at the beginning of the twentieth century that the last strings have been removed of the instrument and that one had tried to replace them with piano strings.

- Two fragments of broken keys, one of which with its tangent, the si*b* key of the third octave *($b^b1$)*.
- A rusty tangent in iron.
- A small piece of wood, which was probably intended to compensate any twisting of the case when the clavichord was put on a flat surface.



**Soundboard**

One of the peculiarities of this clavichord is the length of its soundboard, just 237.5 mm. The soundboard is particularly short compared to the total dimension of the instrument. Other instruments of seventeenth and eighteenth centuries present the same characteristic, for example an anonymous clavichord of 1675 kept in Stuttgart, an anonymous clavichord of the middle of the eighteenth century at the *Musée de la Musique* at La Villette Paris (inventory number E.366) or an instrument built by Christian Gottlob Hubert in Ansbach in 1776, which was kept in Berlin before its destruction during World War II.

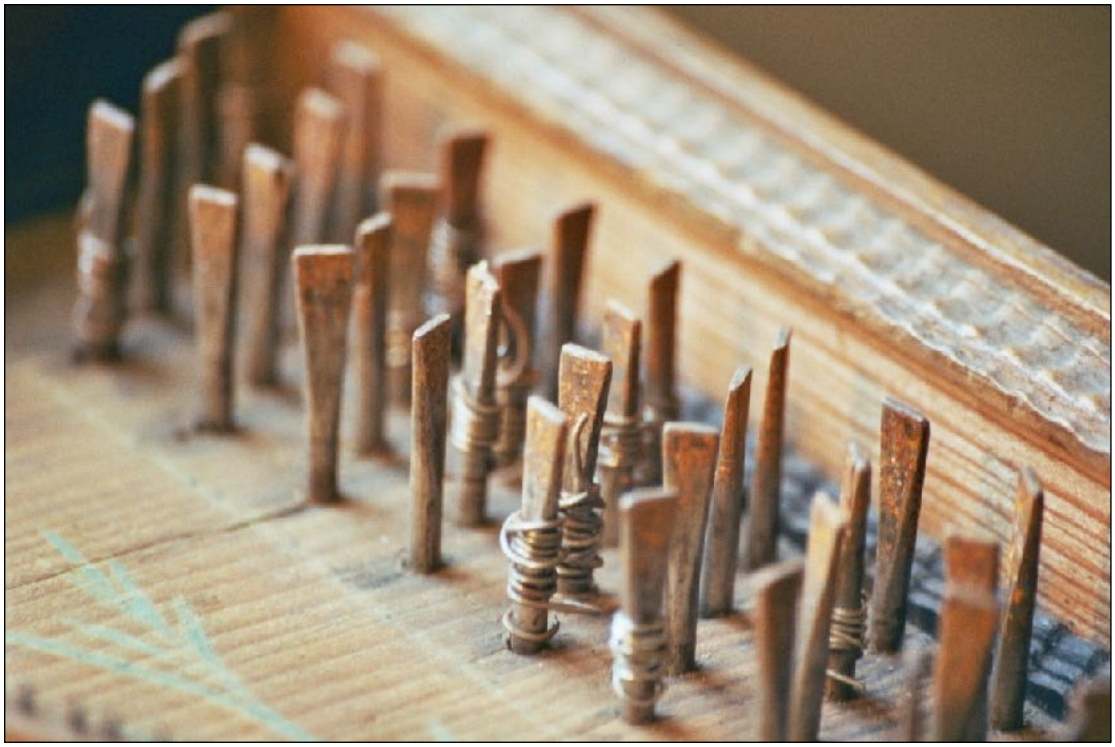
The species of the soundboard is spruce - *Picea abies* L. The soundboard is made of a single piece of wood, 274 mm wide. The texture of the wood is relatively wide, with fibres showing a density of around five rings per centimetre. It is approximately two millimetres thick. The grain direction of the soundboard is parallel to the back rail.

The rose is missing. Its diameter was approximately forty millimetres. The soundboard shows a circular polychromatic drawing around the rose with six stylized flowers, following a hexagonal symmetry (fig. 6). The soundboard is decorated, on both sides of the bridge, with two painted flowers, freely inspired by a tulip - *Tulipa*

*sylvestris* - and by a chrysanthemum - *Chrysantemum segetum* L. The soundboard presents three longitudinal cracks which follow the spring growth rings.

The species of the bridge is pear tree - *Pyrus communis* L. The bridge is straight. It is beautifully made, and still has all its bridge pins. The back extremity, towards the treble, is cut in the shape of an octahedral diamond. The other extremity, towards the bass, has been engraved with a knife. The bridge is now unglued from the soundboard, probably torn away with violence at a given point in time. Splinters of the soundboard remain stuck on the bridge. The exact place of the bridge is recognizable on the soundboard by a change of colour, the surface exposed to light being darker than the surfaces initially covered by the bridge.

The tuning pins are of iron (fig. 7). Some of them wear rests of thick piano strings rolled up roughly. It is noteworthy that in spite of this attempt, the instrument remained structurally intact.



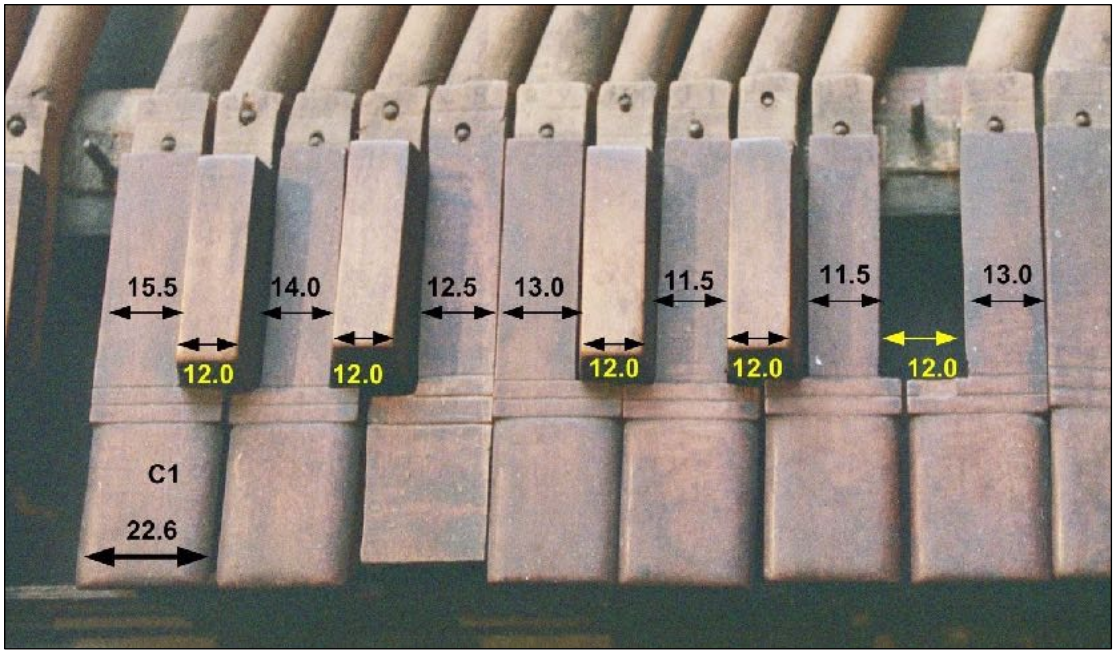
At the internal face of the soundboard a rib is glued parallel to the bridge, as usual for the clavichords of the seventeenth century[8]. The rib is about seven millimetres high and two to three millimetres thick.

Fragments of window glass and fragments of brick were found under the soundboard.

**Keyboard**

The species of the keyboard is lime- *Tilia vulgaris* Hayne. The keyboard is cut from a panel. The line of cut between g and g# (second octave) is straight and perpendicular to the case and to the balance-rail. All keys are numbered with black ink. The compass is 48 keys i.e. four octaves from C to *c3*, C sharp not included. The keyboard width is 659 mm, which entails a three-octave span (*Stichmass)* of 477 mm. Interkey distances are smaller than one millimetre in most of the cases. Details are given on fig. 8. The keytops made of boxwood and pear tree show almost no tracks of wear.

[8] Bernard Brauchli, *op. cit.*, p. 105.




The keyboard is incomplete and damaged:

- Two keys are broken (or unglued) *F#* and *G#*.
- Five keys are missing, *A*, *B*, *e*, *b*, *b*$^{b}$*1*.
- Two natural keys have lost their keytops, *g*, *e1*; the corresponding places received a layer of dark paint.
- The accidental key *f#* has lost its block of pear tree; the place of the block was stained, maybe with pen ink.

Several keys keep traces of former repairs, in particular in the bass, where the keys are most fragile. These repairs were generally a gluing of parts of broken keys. The keys received their keytops after the cut of the keyboard panel. The keytops of naturals are made of boxwood - *Buxus sempervirens* L. Their thickness is approximately three millimetres. The species of the accidentals' tops is black-stained pear tree - *Pyrus communis* L.

The keys are well balanced. The weight exerted is about 4 grams. The width of the keylevers in tail range from 6 to 8 mm. Small iron plates, 4 to 5 mm long, slide in the slots of the rack. The tangents, set in the lime of the keylevers and not glued, are all original. The tangents are of iron, with standard dimensions on the whole compass of the instrument, 1 mm thick, 14 mm high and 7 mm wide (fig. 9). The running of the tangent, i.e. the vertical distance between the summit of the tangent at rest and the string, is about 10 mm, which entails a push of about 6 mm for the keys.

## Stringing, fretting

The strings are absent, except for an original loop still attached to one of the hitch-pins and the brass strings found in the toolbox (see above). The instrument is double strung. The fretting pattern is shown on table 1.

***Table 1***: *Fretting pattern of the clavichord I. Gellinger (unfretted in the first octave, then double- and triple-fretted)*

| ***octave 1*** | ***octave 2*** | ***octave 3*** | ***octave 4*** |
|---|---|---|---|
| C | c - c# | b – c1 – c#1 | b2 – c2 – c#2 |
| D | d – eb – e | d1 – eb1 – e1 | d2 – e2b – e2 |
| Eb | | | |
| E | | | |
| F | f – f# - g | f1 – f#1 - g1 | f2 – f#2 - g2 |
| F# | | | |
| G | | | |
| G# | g# - a - bb | g#1- a1 – bb1 | g#2- a2 – bb2 |
| A | | | |
| Bb – B | | | b2 – c3 |

The measures of sounding lengths can be extremely accurate on this instrument. Indeed, under the very likely assumption that the position indicated by the change of colour on the soundboard is the initial position of the bridge, it is possible to

reposition the bridge correctly. Further, the division of the rack is very useful for estimating the positions of the missing tangents. The absolute measurement errors are estimated to be no larger than 1 to 2 mm. The relative errors, i.e. the *differences* of string lengths, are even smaller; these differences can be estimated with an accuracy better than one millimetre. Our measurements are given in detail in table 2. The sounding length of the note *c2* of the third octave is approximately 234.0 mm.

***Table 2***: *Sounding string lengths (millimetres): (1) measured between each bridge pin and top of tangent (for the string closest to the back-rail) and (2)* ***calculated*** *from the rack.*

| Course | Note | (1) sounding length measured (mm) | *(2) sounding length calculated from the rack slots (mm)* |
|---|---|---|---|
| 1 | C | 856.0 | *856.0* |
| 2 | D | 841.0 | *841.5* |
| 3 | E$^{b}$ | 832.0 | *828.5* |
| 4 | E | 816.0 | *815.0* |
| 5 | F | 804.0 | *801.5* |
| 6 | F$^{\#}$ | - | *788.0* |
| 7 | G | 775.0 | *774.0* |
| 8 | G$^{\#}$ | - | *760.5* |
| 9 | A | - | *747.0* |
| 10 | B$^{b}$ | 733.0 | *731.5* |
| 10 | B | - | *701.5* |
| 11 | c | 688.0 | *690.5* |
| 11 | c$^{\#}$ | 658.0 | *659.0* |
| 12 | d | 649.0 | *652.5* |
| 12 | e$^{b}$ | 608.0 | *611.0* |
| 12 | e | - | *587.0* |
| 13 | f | 576.0 | *577.0* |
| 13 | f$^{\#}$ | - | *548.0* |
| 13 | g | 511.0 | *513.0* |
| 14 | g$^{\#}$ | 503.0 | *504.0* |
| 14 | a | 470.0 | *472.5* |
| 14 | b$^{b}$ | 441.0 | *443.5* |
| 15 | b | - | *434.5* |
| 15 | c1 | 407.0 | *409.0* |
| 15 | c$^{\#}$1 | 386.0 | *391.0* |

| Course | Note | (1) sounding length measured (mm) | *(2) sounding length calculated from the rack slots (mm)* |
|---|---|---|---|
| 16 | d1 | 383.0 | *386.0* |
| 16 | e$^{b}$1 | 360.0 | *364.0* |
| 16 | e1 | 342.0 | *345.5* |
| 17 | f1 | 339.0 | *336.5* |
| 17 | f$^{\#}$1 | 324.0 | *321.0* |
| 17 | g1 | 301.0 | *300.0* |
| 18 | g$^{\#}$1 | 289.0 | *292.0* |
| 18 | a1 | 276.0 | *272.5* |
| 18 | b$^{b}$1 | - | *257.0* |
| 19 | b1 | 247.0 | *248.0* |
| 19 | c2 | 234.0 | *233.5* |
| 19 | c$^{\#}$2 | 220.0 | *222.5* |
| 20 | d2 | 214.0 | *213.0* |
| 20 | e$^{b}$2 | 204.0 | *202.0* |
| 20 | e2 | 194.0 | *191.0* |
| 21 | f2 | 185.0 | *184.0* |
| 21 | f$^{\#}$2 | 176.0 | *175.0* |
| 21 | g2 | 165.0 | *165.0* |
| 22 | g$^{\#}$2 | 159.0 | *158.5* |
| 22 | a2 | 149.0 | *148.0* |
| 22 | b$^{b}$2 | 140.0 | *139.5* |
| 23 | b2 | 132.0 | *132.0* |
| 23 | c3 | - | *124.0* |
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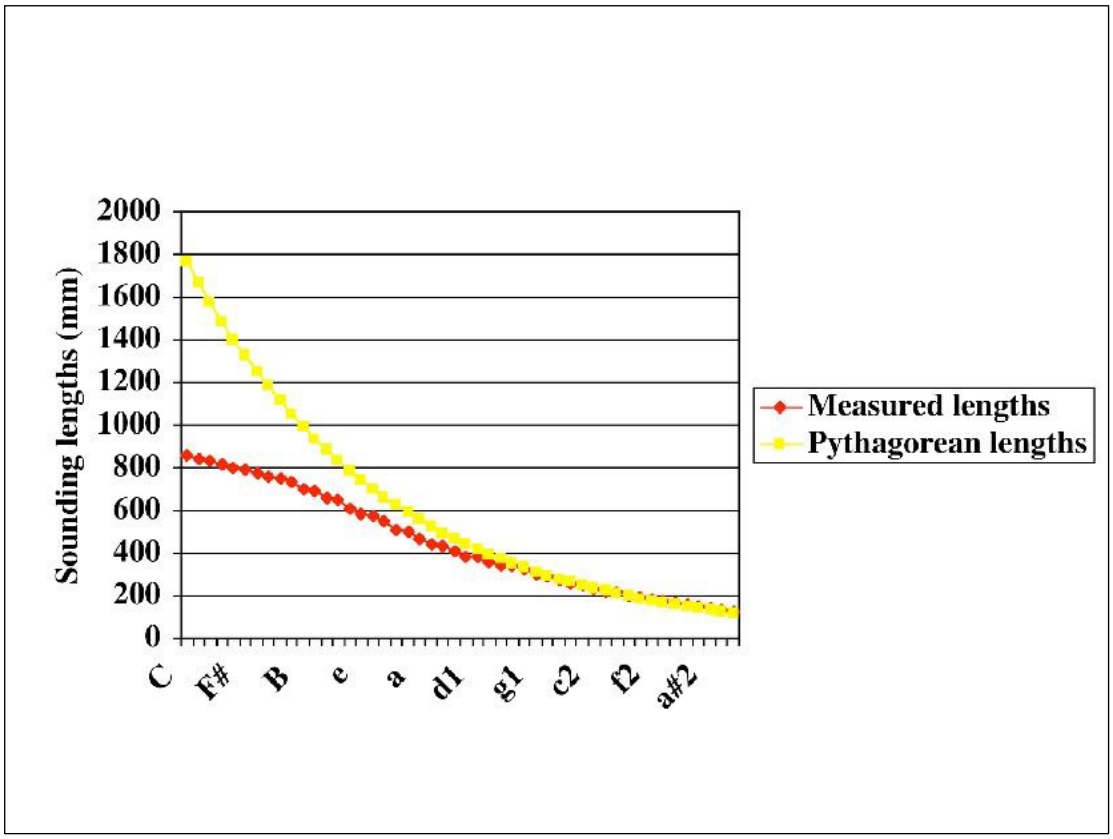
| | | | |

Because of the small size of the instrument, the lengths are Pythagorean only in a limited range, covering approximately the last two octaves towards the treble, as illustrated on figure 10.




In spite of its small size, this clavichord is not an octave instrument. Its dimensions are compatible with a tuning at a pitch close to the current 440 Hz for the note *a2*. Table 3 gives a suggestion of stringing pattern (in brass[9]) which would match with the practice of the seventeenth century, as reported in the treaty of Claas Douwes[10].

[9] The sum of all strings tensions, using the string pattern suggested here, is approximately 1400 N, assuming 'reasonable' mechanical properties for the material used. Individual string tensions range between 26 and 30 N.

[10] Bernard Brauchli, *op. cit.*, p. 126-127.

***Table 3***: *Proposed stringing pattern, compatible with a pitch A= 440 Hz.*

| Course | Note | Diameter (mm) | Material | Course | Note | Diameter (mm) | Material |
|---|---|---|---|---|---|---|---|
| 1 | C | 0.56 | 'red' brass | 13 | f – f# - g | 0.33 | brass |
| 2 | D | 0.56 | id. | 14 | g# - a – b♭ | 0.33 | id. |
| 3 | E♭ | 0.52 | id. | 15 | b- c1 – c#1 | 0.30 | id. |
| 4 | E | 0.52 | id. | 16 | d1 – e♭1 – e1 | 0.30 | id. |
| 5 | F | 0.48 | brass | 17 | f1 – f#1 – g1 | 0.30 | id. |
| 6 | F# | 0.48 | id. | 18 | g#1 – a1 – b♭1 | 0.27 | id. |
| 7 | G | 0.44 | id. | 19 | b1 – c2 – c#2 | 0.27 | id. |
| 8 | G# | 0.44 | id. | 20 | d2 – e♭2 – e2 | 0.27 | id. |
| 9 | A | 0.40 | id. | 21 | f2- f#2 – g2 | 0.25 | id. |
| 10 | B♭ - B | 0.40 | id. | 22 | g#2 – a2 – b♭2 | 0.25 | id. |
| 11 | c – c# | 0.36 | id. | 23 | b2 – c3 | 0.25 | id. |
| 12 | d – e♭ - e | 0.33 | id. | | | | |

## Determination of the tuning system

With the knowledge of string lengths, the original tuning system of the instrument can be estimated confidently. The discussion that follows suggests that it is the meantone temperament to the quarter of syntonic comma, the temperament which one would indeed expect to find on an instrument of the seventeenth century[11].

[11] This conclusion coincides with that of Peter Bavington, with some minor qualifications, for another German clavichord of *ca.* 1700, the Johann Jacob Donat's clavichord presently kept in Leipzig; cf. Peter Bavington, *The Temperament of the Donat Clavichord*, 20 July 2002, http://www.bavington.nildram.co.uk/donat.htm.

***Table 4***: *Sounding string lengths (mm), comparison between the intervals of the fretted notes and the intervals of the ¼ comma meantone temperament (in cents).*

| Course | Note | Sounding length (mm) | Ratio of frequencies of fretted notes (cents) | Ratio of semitones in the meantone tuning system (cents) |
|---|---|---|---|---|
| 1 | C | 856.0 | - | - |
| 2 | D | 841.0 | - | - |
| 3 | E$^{b}$ | 832.0 | - | - |
| 4 | E | 816.0 | - | - |
| 5 | F | 804.0 | - | - |
| 6 | F$^{\#}$ | 789.0 (estim.) | - | - |
| 7 | G | 775.0 | - | - |
| 8 | G$^{\#}$ | 762.0 (estim.) | - | - |
| 9 | A | 749.0 (estim.) | - | - |
| 10 | B$^{b}$ | 733.0 | - | 117 |
| 10 | B | 703.0 (estim.) | 72 | 76 |
| 11 | c | 688.0 | - | 117 |
| 11 | c$^{\#}$ | 658.0 | 77 | 76 |
| 12 | d | 649.0 | - | 117 |
| 12 | e$^{b}$ | 608.0 | 113 | 117 |
| 12 | e | 587.0 (estim.) | 61 | 76 |
| 13 | f | 576.0 | - | 117 |
| 13 | f$^{\#}$ | 548.0 (estim.) | 86 | 76 |
| 13 | g | 511.0 | 121 | 117 |
| 14 | g$^{\#}$ | 503.0 | - | 76 |
| 14 | a | 470.0 | 117 | 117 |
| 14 | b$^{b}$ | 441.0 | 110 | 117 |
| 15 | b | 434.5 (estim.) | - | 76 |
| 15 | c1 | 407.0 | 113 | 117 |
| 15 | c$^{\#}$1 | 386.0 | 92 | 76 |

| Course | Note | Sounding length (mm) | Ratio of frequencies of fretted notes (cents) | Ratio of semitones in the meantone tuning system (cents) |
|---|---|---|---|---|
| 16 | d1 | 383.0 | - | 117 |
| 16 | e$^{b}$1 | 360.0 | 107 | 117 |
| 16 | e1 | 342.0 | 89 | 76 |
| 17 | f1 | 339.0 | - | 117 |
| 17 | f$^{\#}$1 | 324.0 | 78 | 76 |
| 17 | g1 | 301.0 | 127 | 117 |
| 18 | g$^{\#}$1 | 289.0 | - | 76 |
| 18 | a1 | 276.0 | 80 | 117 |
| 18 | b$^{b}$1 | 257.0 (estim.) | 123 | 117 |
| 19 | b1 | 250.0 | - | 76 |
| 19 | c2 | 234.0 | 115 | 117 |
| 19 | c$^{\#}$2 | 220.0 | 107 | 76 |
| 20 | d2 | 214.0 | - | 117 |
| 20 | e$^{b}$2 | 204.0 | 83 | 117 |
| 20 | e2 | 194.0 | 87 | 76 |
| 21 | f2 | 185.0 | - | 117 |
| 21 | f$^{\#}$2 | 176.0 | 86 | 76 |
| 21 | g2 | 165.0 | 112 | 117 |
| 22 | g$^{\#}$2 | 159.0 | - | 76 |
| 22 | a2 | 149.0 | 112 | 117 |
| 22 | b$^{b}$2 | 140.0 | 108 | 117 |
| 23 | b2 | 132.0 | - | 76 |
| 23 | c3 | 124.0 (estim.) | 108 | 117 |
| | | | | |
| | | | | |

Table 4 shows the sounding lengths between tangents and bridge pins. On this table, the frequency ratios of fretted notes are expressed in cents, an octave representing

1200 cents and a semitone of the equal temperament 100 cents[12]. Table 4 compares the ratio of frequencies measured on the clavichord with the theoretical ratios in the meantone tuning system. The comparison shows a good convergence. Note that this convergence occurs on whole the compass. Usually, the intervals beyond note *c2* are not useful to determine the temperament, given the extreme sensitivity of the pitch to small lateral deviations of the tangent in this domain of frequency. The data on table 4 show that, in the clavichord of Namur, the precision was excellent even in the high octave. The maker or the performers have corrected inaccuracies by bending the tangents as necessary (see fig. 11 and 12).

[12] Among an extremely large literature on this subject, see for example: Paul Poletti, *Scale Analysis - Purpose and Methodology*, Reading at the Accademia Bartolomeo Cristofori, Florence, December 1997 or Jean Bosquet, *Les deux tempéraments de dom Bedos de Celles et l'accord des instruments à clavier*, dans *La Facture de Clavecin du XVe au XVIIIe siècle*, Publications d'histoire de l'art et d'archéologie de l'Université Catholique de Louvain – XXIII, Musicologica Neolovaniensa, Studia 1, Actes du Colloque International de Louvain, 1976, Louvain-la-Neuve, 1980.

**Module of measure**

Based on the main dimensions of the instrument, we can propose a guess about the module of measure used by its maker, the inch (*Werkzoll*). According to the recommendations of Stephen Birkett and William Jurgenson[13], the important dimensions for a "perpendicular" instrument as the clavichord, i.e. whose strings the are approximately perpendicular to the keys, are the total length and width of the baseboard, the width of the keyboard place and the height of case without the baseboard. We could consider as good candidate a *Werkzoll* of 25.36 mm, which, according to Darryl Martin[14], was a common measure in Southern Germany during the seventeenth century. Table 5 below presents the main dimensions of the clavichord according to this estimate of the inch.

[13] Stephen H. Birkett and William Jurgenson, *Why Didn't Historical Makers Need Drawings ?, Part II – Modular Dimensions and the Builder's Werkzoll*, Galpin Society Journal LV: 2002, p. 183-239.

[14] Darryl Martin, *Tangent Layout and Triple Fretted Clavichord Tuning*, *IV Congresso Internazionale sul Clavicordo*, Magnano, Italia, 8-11 Settembre 1999.

***Table 5:*** *Some dimensions of the clavichord I. Gellinger, measured and nominal, expressed in terms of a plausible module –* Werkzoll- *of 25.36 mm.*

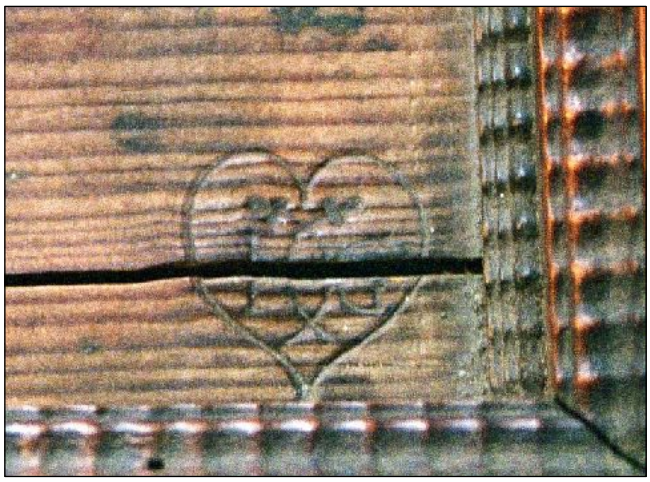
| **Item** | **measure in mm** | **measure in inches** | **nominal plausible value possible in inches** |
|---|---|---|---|
| Length of bottomboard | 972 | 38.33 | 38 ½ |
| Height of case without bottomboard and without top moulding | 52 | 2.05 | 2 |
| Emplacement of keyboard, including left and right blocks | 683 | 26.93 | 27 |
| Emplacement of keyboard, excluding left and right blocks | 659 | 25.99 | 26 |
| Width of keyboard (N.B.: negligible gap) | 659 | 25.99 | 26 |
| Span for three octaves (*Stichmass*) | 477 | 18.81 | 19 |

## Date

The instrument is dated 1670 in two places: (a) on the soundboard just below the rose and (b) on the *c3* key, between the keytop and the balance mortise (fig. 13 and 14). In both cases, the writing is cursive. The date on the soundboard, in discoloured black ink, can be read either "*A [ nno ] 6 7 0* ", in which case the figure *"1"* would be missing, or simply *"1670"*, the figure "1" having an ornamented written form. A date around 1670 for the instrument building seems assured[15].

The clavichord is signed 'IG' in a 30 mm wide monogram: an engraved heart located at the front-right corner of the soundboard (fig. 15). Two crossed tree-leaf clovers separate the initials "I" and "G", in capitals. As mentioned above, one finds the same heart motive on the belly-rail.

[15] This conclusion is in agreement with Jean Tournay, *Comments on German Clavichord Sources*, in *De Clavicordio I*, *Proceedings of the International Clavichord Symposium,* Magnano September 1993, Turin, Istituto per i Beni Musicali in Piemonte, 1994, p. 99-104.



**Author**

The identification of "IG" with Israel Gellinger is assured, as demonstrated by a comparison with the Israel Gellinger's *Oktav-Querspinett* with two keyboards dated 1677 that is kept at the *Musikinstrumenten-Museum der Universität Leipzig*[16] (fig. 16). The top and soundboard mouldings of the clavichord show patterns similar to those of the spinet[17]. One both instruments, the date of construction is mentioned one the last key at the right of the keyboard: the *c3* key for the clavichord and the *d2* key for the spinet. The spinet of Leipzig carries the mention "*fecit in francoforts am Meyn on 1677 Iβrael Gellinger*" on the reverse of the soundboard. The monogram IG inserted into a heart is similar in both cases: in the clavichord it is engraved, in the spinet it is burnt.

[16] Hubert Henkel, *Kiel-Intrumente*, *Musikinstrumenten-Museum der Karl-Marx-Universität Leipzig Katalog Band 2*, VEB Deutscher Verlag für Musik, Leipzig 1979, p. 33-34, *Schriftenreihe des Musikinstrumenten-Museums, Leipzig, Aufsätze und Jahresbericht 1976, Heft 3*. I owe to Lothar Bemmann, Chairman of the *Deutsche Clavichord Societät*, to have drawn my attention on these references.

[17] Hubert Henkel, *ibid.*, Tafel I.

**Israel Gellinger: organist in Frankfurt am Main[18]**

Peter Epstein published in 1924 a list of the organists of the St. Katharinenkirche of Frankfurt am Main in the seventeenth century[19]. Isaac Göllinger (or Gellinger), the father of Israel, is listed as organist until 1649. From a communication to the Municipal Council, *Rats-Supplikation*, of April 26th, 1653[20], we can infer that Israel Gellinger came to Frankfurt am Main in 1649, perhaps from Strasbourg. He was appointed as organist that year, and remained in charge until his death in 1687[21].

A small poem, quoted from Gellinger's obituary in 1687, suggests that the character of our organist was not always easy:

*Das war ein Mann, der dreiundfünfzig Jahr*
*Mit seiner Hand ganz angenehm gespielt,*
*Doch mit dem Mund nie wahren Frieden hielt,*
*Die wahre Harmonie vergaß er also gar.*

*Steht beides, Hand und Mund in einer Harmonie,*
*So sündigt man an Gott und seinem Nächsten nie,*
*Hier spielte zwar sehr wohl der Allgeliebten Hand,*
*Hingegen war sein Mund zum Mißlaut stets gewandt.*

The fifty-three years referred to in the poem must probably cover the whole of his organist's activity, both in Strasbourg and in Frankfurt am Main.

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[18] I owe to the friendship of Prof. Dr. Peter Cahn, Professor at the Musikhochschule Frankfurt am Main, to have researched and reported on the mentions of the Gellinger family in the sources of the general and musical history of the city of Frankfurt am Main. See e.g. Caroline Valentin, *Geschichte der Musik in Frankfurt am Main vom Anfange des XIV. bis zum Anfange des XVIII. Jahrhunderts*, Frankfurt/M. 1906; Theodor Peine, *Der Orgelbau in Frankfurt am Main und Umgebung von den Anfängen bis zur Gegenwart*, Diss. Frankfurt am Main 1956, p. 81ss.; Peter Epstein, *Die Frankfurter Kapellmusik zur Zeit J. A. Herbsts*, Archiv für Musikwissenschaft, VI [1924], p. 58 -106.

[19] Peter Epstein, *art. cit. = Das Musikwesen der Stadt Frankfurt am Main zur Zeit des Johann Andreas Herbst*, Diss., Breslau, 1923.

[20] Peter Epstein, *art. cit.,* footnote on p. 88

[21] Peter Cahn, personal communications, March 18th and 24th and December 13th, 2006. The Prof. Dr. Peter Cahn found the obituary notice of Israel Göllinger in the volume nr 1687 of the register of deaths kept at the *Institut für Stadtgeschichte* of Frankfurt am Main. On the page 215, he found among the persons who passed away on November 22nd, 1687: "*Israel Gellinger, Organist*". The date of birth was not indicated, as was customary at that time. It should be noted that Caroline Valentin (*art. cit.*) mentions as date of death July 5th, 1687. The reason for this discrepancy is unknown.

The position at Saint-Catherine was a relatively important function, involving the second church of the city in importance. Half a century later, Georg Philipp Telemann became *Musikdirektor* in the same church from 1712 till 1721. The son of Israel, Andreas, became *Großorganist* in the Barfüßerkirche[22].

**Israel Gellinger: maker and restorer of instruments**

Israel Gellinger was not only organist but also instrument maker, an activity that he has exercised from 1639[23]. He obtained the citizenship in Frankfurt am Main on April 23rd, 1653 and became the same year member of the corporation of carpenters. His membership to the corporation is attested until 1677.

In 1658 Israel Gellinger was requested to repair the organ of the *Stadtkirche* of Darmstadt[24]: "*(...) 2 fl. 7 1/2 alb. (...) vor Zehrung Israel Gellingers alß er die orgel reparirt hat" (...) "8 fl. 7 1/2 alb. an 11 Reichsthaler zu der Statt helfft bemeltem orgelmacher zu lohn zahlt*". The reputation of Gellinger as organ maker thus extended from this date beyond Frankfurt am Main.

In 1670, Gellinger built the small clavichord of Namur.

In 1677, Gellinger made the *Oktav-Querspinett* with two keyboards of the *Musikinstrumenten-Museum der Universität Leipzig*[25].

In 1678-81, during the restoration of the St. Katharinenkirche of Frankfurt am Main, I. Gellinger dismantled Lorenz Ettlin's former organ[26], which dated from 1626 (or 1628), and rebuilt it with improvements. This work is documented in the accounts of the church[27]: "*Orgelmacher Israel Gellinger vor die Verbesserung der alt Orgel 490 fl. - p.* =[plus] *ein Recompens (...) 30 fl. - Summa 520 fl* " [fl. = guilders]. The instrument of the St. Katharinenkirche repaired by Gellinger was sold in 1779 to the small municipality of Sulzbach near Frankfurt am Main, for 225 guilders. The case of the organ is still there nowadays (2007). In the St. Katharinenkirche was then built an organ of the brothers Stumm[28].

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[22] Peter Cahn, personal communication, March 18th, 2006.

[23] Hubert Henkel, *op. cit.*, p. 114.

[24] Peter Cahn, personal communication, March 18th, 2006, quoting E. Noack, *Musikgeschichte Darmstadts*, Mainz 1967, p. 110.

[25] Hubert Henkel, *art. cit.*; Lothar Bemmann, Chairman of the *Deutsche Clavichord Societät*, personal communication, November 2nd, 2006.

[26] This organ had been built in 1626 by Lorenz Ettlin of Esslingen. It was about the largest instrument that had ever been built in the time in Frankfurt am Main.

[27] *Kirchenbaurechnung zu St. Catharinen über Einnahm und Ausgab von Anno 1677-1682*, quoted by P. Cahn after Ingrid Stieber, *Die Orgeln: von Ettlin bis Walcker* in *St. Katharinenkirche zu Frankfurt am Main*, herausgegeben von Joachim Proescholdt, Frankfurt/M. 1981, vermehrte 2. Auflage 1993, p. 226-240.

[28] The organ of the brothers Stumm was replaced in 1856 by an instrument by Walcker. In 1909, an organ by Steinmeyer was installed in its place. Since 1990, the church has an instrument of Rieger (Peter Cahn, personal communication, March 24th, 2006). See on this subject the work published by Joachim Proescholdt, with descriptions and representations of the successive organs of the St. Katharinenkirche, *op.cit* ., in particular the communication of Ingrid Stieber already quoted and that of Peter Cahn, *Musik an St. Katharinen*, p. 293-315.

Thus, only three instruments made by this maker are known so far, the clavichord of Namur, the spinet of Leipzig and the organ case of Sulzbach. In particular, no other clavichord is identified. In this regard, D.H. Boalch[29] indicated the possible existence of a second clavichord by Gellinger, ' very similar ', also dated 1670, which would have belonged to Vander Straeten's collection. According to Bernard Brauchli[30], this could simply be due to a double counting. Double references to the same instrument seem to appear sometimes in the *Boalch*[31]. Although it is plausible in theory that Edmond Vander Straeten owned some instruments, considering his works and his publications, it seems however more likely that some sort of mistake was made. The book of Edmond Vander Straeten, quoted in footnote 2 above indicates expressly that the clavichord of Namur belonged to the collection of the town's Archaeological Society and not to his private collection[32].

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[29] Donald H. Boalch, *Makers of the Harpsichord and Clavichord 1440-1840*, Oxford, UK, 3rd edition, 1995.

[30] Bernard Brauchli, personal communication, October 23th, 2005.

[31] Jean-Michel Renard, personal communication, October 8th 2006.

[32] The author wishes to thank the persons whose names follow, for their contribution to this project: Jacques Toussaint, curator of the collections of the Archaeological Society of Namur, Prof. Dr. Peter Cahn, Professor at the *Musikhochschule Frankfurt*, Lothar Bemmann, Chairman of the *Deutsche Clavichord Societät*; Bernard Brauchli, Chairman of the International Centre for Clavichord Studies, Marie Verbeek, archaeologist at the Ministry of the Walloon Region, Josine de Fraipont-de Francquen, curator of the Museum de Groesbeeck-de Croix, Jean-Louis Antoine, curator of the Archaeological Museum of Namur, Jean-Michel Renard, expert at the French National Chamber of Specialized Experts, the Prof. Martin Lücker, organist in 2006 at the St. Katharinenkirche in Frankfurt am Main.