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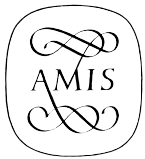

The Clavichord in Christian Friedrich Gottlieb Thon's Keyboard Manual, *Ueber Klavierinstrumente* (1817)

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IN 1817 Christian Friedrich Gottlieb Thon published a work entitled *Ueber Klavierinstrumente* [On keyboard instruments]. An outstanding document on early keyboard instruments and a witness to the clavichord's continued role in the musical life of the early nineteenth century, this work is of notable importance. Before examining Thon's material, let us briefly review the clavichord's evolution up to his time.

Throughout the Renaissance and early Baroque Era the clavichord held an acknowledged position of importance in the northern European countries, as well as in Germany, Spain, and Portugal. Innumerable documents (inventories, wills, iconography, literature, etc.) prove that this was also true in England, France, and Italy, though the contrary has often been assumed. However, during the seventeenth century, the clavichord rapidly declined in popularity in these three countries, where composers were developing a style exploiting the harpsichord's technical possibilities. In northern Europe, Germany, and on the Iberian peninsula, music written for stringed keyboard instruments never diverged far from music composed for the organ, and, consequently, a separate style never evolved for each individual keyboard instrument. With few exceptions, baroque keyboard music in these countries was composed indiscriminately for any of the keyboard instruments. Thus, the clavichord continued to flourish as a practice instrument as well as an ideal instrument for *Hausmusik*.

The second half of the eighteenth century gave rise to a new development in keyboard writing: polyphonic style was progressively replaced by a homophonic texture, with an upper voice carrying the melody, supported by a more or less elaborate chordal accompaniment. The clavichord, with its possibility of bringing out one line more than another and its ability to shape music dynamically by the use of crescendos and decrescendos, was better suited for such a musical texture than the harpsichord. Though the fortepiano was eventually to excel in these traits, it was, at the time, in the first stage of its development and considered by most composers as an instrument not yet perfected,

still inferior to the clavichord. Moreover, musicians of the *Empfindsamer Stil*, a product of the new philosophical belief that individual feelings should be the center of preoccupation, found in the clavichord, with its unique *Bebung* (vibrato), an ideal vehicle for a music intensely expressive and depicting the most contrasting emotions. Most of the keyboard treatises dating from the second half of the eighteenth century cite the obvious advantage of the harpsichord and fortepiano in having a much louder sonority, but nonetheless they continued to give preference to the clavichord, for the reasons discussed above.

Thus, the beginning of the fortepiano's development at the end of the seventeenth century did not instigate the immediate decline of the existing stringed keyboard instruments, the harpsichord and clavichord. Indeed, a century was to pass before the piano superseded the harpsichord, and many makers continued to produce clavichords in northern Europe, Germany, and the Iberian Peninsula well into the nineteenth century, as shown by the contents of musical instrument collections today. A partial list of these clavichord builders can be established from the work of Donald H. Boalch:[1]

Broedler (1809, Nuremberg)
Conrad, Johann Gottlieb (1804 and 1806, Berlin)
Hennefus, J. L., Junior (1802, Berlin)
Höltzel, Peter (1804, Steyer Gersten)
Jaras (1809, Belorado, Spain)
Kraft, Mathias Peter (1806, Stockholm)
Kunz, Ignaz (1821, Jaromer, Bohemia)
Krämer, Johann Paul (1800, 1801, and 1803, Göttingen)
Lehner, Gottlieb (1816, Pressburg/Bratislava)
Lindholm, Pehr (1803, Stockholm)
Lusser, Joseph (ca. 1800, Brixen/Bressanone, Austria)
Nordquist, Carl Jac. (1818, Stockholm)
Schmahl, Georg Friedrich, the Younger (1807, Ulm)
Schmahl, Christoph Friedrich (1812, Regensburg)
Schmahl, Jakob Friedrich and Christian Friedrich (1812–15, Regensburg)
Schmahl, Christian Carl (1805 and 1815, Regensburg)
Stumpff, J. G. (1816, Ruhla bei Eisenach)
Tieffenbrun, Otto Joachim (1801, Copenhagen)
Voit, Johann Michael (1811 and 1812, Schweinfurt, Bavaria)

A Portuguese maker, whom Gerhard Doderer mentions in his study

1. Donald H. Boalch, *Makers of the Harpsichord and Clavichord, 1440–1840*, 2d ed. (Oxford: Clarendon Press, 1974).

of Portuguese clavichords[2] as having constructed a clavichord in Braga in 1841, might be added to this list. Yet another clavichord, dating from the late eighteenth or early nineteenth century, was repaired by Inácio Gonsalves in Coimbra in 1855.[3] Further evidence of the clavichord's presence on the Iberian Peninsula during the first half of the nineteenth century can be found in the catalogue of the musical archives of the Sanctuary of Aránzazu, recently studied by Jon Bagües.[4] Located near San Sebastián, this convent had a permanent music chapel and was an important cultural and musical center during the seventeenth and eighteenth centuries. In 1827 an inventory of the musical instruments owned by the convent included a harpsichord, an unplayable spinet, a five-octave piano, and five clavichords, of which three were playable.[5] Expenses entailed in the purchasing and maintenance of the clavichords are recorded in the monastery's *Libros de Economía*, and the accounts for the years 1814–40 indicate the repair—and therefore the continued use—of a clavichord as late as 1839.[6] Finally, a recent article by José-Antonio Guzmán-Bravo gives evidence that clavichords were still being sold in Mexico as late as 1815.[7]

The most revealing document showing the survival of the clavichord through the early years of the nineteenth century is Christian Friedrich Gottlieb Thon's keyboard manual, *Ueber Klavierinstrumente*. About the author's life hardly anything is known,[8] nor are any other publications by him known, although his preface mentions a study of the organ that he appears to have been working on. Thon's book was published in 1817 by Bernhard Friedrich Voigt in Sondershausen, Germany. A second, identical edition appeared in 1825, again published by Voigt, but in the city of Ilmenau.[9] The full title of these editions is:

2. Gerhard Doderer, *Portugiesische Klavichorde des 18. Jahrhunderts* (Lisbon: Calouste Gulbenkian Foundation, 1971), p. 29.

3. Ibid., p. 100.

4. Jon Bagües, *Catalogo del Antiguo Archivo Musical del Santuario de Aránzazu* (San Sebastián: Caja de Ahorros Provincial de Guipúzcoa, 1979).

5. Ibid., pp. 349–50.

6. Ibid., pp. 357–60.

7. José-Antonio Guzmán-Bravo, "Mexico, Home of the First Musical Instrument Workshops in America," *Early Music* 6, no. 3 (July, 1978): 354–55.

8. Thon is listed as a German author (*polygraphe*) born in Saxony about 1780 by François Joseph Fétis, *Biographie universelle des musiciens*, 2d ed. (Paris: F. Didot Frères, Fils et Cie, 1870), p. 219. This information is repeated without further elaboration by Robert Eitner, *Biographisch-Bibliographisches Quellen-Lexikon* (Leipzig, 1898–1904), 2d ed. rev. (Graz: Akademische Druck- und Verlagsanstalt, 1959), 9: 401.

9. Unless otherwise indicated, all descriptions of and quotations from Thon's *Ueber*

Ueber Klavierinstrumente, deren Ankauf, Behandlung und Stimmung. Ein nothwendiges Handbuch für ieden Besitzer dieser Art Metallsaiteninstrumente.

(On keyboard instruments, their purchase, care, and tuning. An indispensible manual for every owner of this kind of metal-strung instrument.)

A third edition was published by Voigt in 1843, in yet another city, Weimar.[10] This last printing was revised: the text concerning both the clavichord and the harpsichord was simply reprinted without modifications, but new considerations were added on the subject of the fortepiano, reflecting its evolution and increasing importance in the music of that time. The third edition bears the title:

Abhandlung über Klavier-Saiten-Instrumente, Insonderheit der Forte-Pianos und Flügel, deren Ankauf, Beurtheilung, Behandlung, Erhaltung und Stimmung. Ein nothwendiges Handbuch für Organisten und Schullehrer, Orgel- und Instrumentenmacher, überhaupt für jeden Besitzer und Liebhaber dieser Art Metall-Saiten-Instrumenten.

(Treatise on stringed keyboard instruments, in particular fortepianos and harpsichords, their purchase, evaluation, care, maintenance, and tuning. An indispensible manual for organists and school teachers, organ and instrument makers, especially for every owner and lover of this kind of metal-strung instrument.)

In the preface to the first edition of his book, Thon indicates that his work is intended primarily for amateurs, friends of music, and above all for those living far from cities. His aim is to assist the novice in knowledgeably choosing and maintaining an instrument and, when necessary, in making minor repairs and improvements. Displaying a remarkable degree of common sense, Thon's text presents generalities concerning the family of stringed keyboard instruments and more specific comments on each individual instrument. In its entirety, *Ueber Klavierinstrumente* is made up of 142 pages and comprises four chapters: 1) stringed instruments in general, and instruments with metal strings in particular; 2) the purchasing of metal-strung instruments and the proper judging of the quality of their various parts; 3) the proper treat-

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Klavierinstrumente in the present article refer to the copy of the 1817 edition in the Eda Kuhn Loeb Music Library of Harvard University. The same library also owns a copy of the 1825 edition.

10. A copy of this edition is found in the New York Public Library.

ment and maintenance of metal-strung instruments; and 4) the tuning of metal-strung instruments.

The first chapter begins with the classification of musical instruments into four categories: wind, string, percussion, and friction instruments—this last group being an addition to the old, three-fold division of Sebastian Virdung.[11] Among the string instruments a further distinction is made between those having metal strings and those having gut strings, including among the former:

1. The clavichord (*Klavichord* or *Klavier*)
2. The fortepiano or pianoforte
3. The grand fortepiano (*Flügelfortepiano*)
4. The harpsichord or clavicimbalon (also *Flügel*)
5. The spinet
6. The zither

Thon adds to this list numerous instruments invented during his lifetime:[12]

7. The *Animo-corde*, of Johann Jacob Schnell
8. The *Bogenhammerklavier*, of J. C. Greiner
9. The *Cembal d'Amour*, of Silbermann
10. The *Clavecin-Royal*, of Wagner (Dresden)
11. The *Dittanaklasis*, of Müller (Vienna)
12. The *Orchestrion*, of Thomas Anton Kunz and Abbot Vogler
13. The *Orphika*, of C. L. Röllig (Vienna)
14. The string harmonica, of J. A. Stein (Augsburg)
15. The *Tangentenflügel*, of Schmal and Spät (Regensburg)

A short description follows, in paragraph 3, of the four most common instruments, that is, the clavichord, the fortepiano, the grand fortepiano, and the harpsichord. In respect to the clavichord, Thon explains:

> Das Klavier oder Klavichord, welches seine Entstehung dem Monochord zu verdanken hat, am gemeinsten und bekannt genug, um eine weitläuftige Beschreibung davon zu geben.[13]

11. Sebastian Virdung, *Musica getutscht* (Basel, 1511), facs. ed., ed. Klaus Wolfgang Niemöller (Kassel: Bärenreiter, 1970).

12. A similar list of unusual instruments is given by Daniel Gottlob Türk in the introduction to his *Klavierschule* (Leipzig and Halle, 1789), facs. ed., ed. Erwin R. Jacobi (Kassel: Bärenreiter, 1962), pp. 2–3.

13. Thon, *Ueber Klavierinstrumente*, p. 3. Thon sometimes uses the term *Klavier* to refer to all stringed keyboard instruments in general, but at other times he employs it quite specifically to designate the clavichord. In this usage, he follows a practice common in eighteenth-century Germany, which has led to many modern misinterpretations.

(The *Klavier* or clavichord, which originated from the monochord, is the most common [among the metal-strung instruments] and is well known enough to deserve a detailed description.)

This statement is sufficient evidence of the widespread use of the clavichord, at least in Germany, as late as 1817. Moreover, this might be held valid as late as 1843, as neither of the two later editions of the work contains any modification of the text related to the clavichord.

A description of the clavichord's unique vibrato (*Bebung*), which the author deems particularly useful in the interpretation of adagios, then follows. He goes on to say:

Zu ieder Taste gehören in der Regel zwei Saiten, wodurch nicht allein ein stärkerer Klang hervorgebracht werden, sondern der Bezug auch grössere Haltbarkeit bekommen soll, indem die Kraft des Drucks dadurch auf zwei Körper gleichmässig vertheilt wird. Hat ieder Klavis sein eigenthümliches Chor Saiten, so ist das Klavier *buntfrei*; wenn hingegen iede Obertaste an das Saitenchor der nächst tiefern Untertaste schlägt, so ist es *gebunden*.[14]

(For each key there are generally two strings, and thereby not only a louder sound is produced, but also the strings last longer as the pressure is equally distributed on the two strings. When each key has its own course of strings, the clavichord is "unfretted"; when, to the contrary, each sharp key strikes the string course of the next lower natural key, then it is "fretted.")

No reference is made to instruments with more than two tangents per pair of strings, such as were common until at least the first half of the eighteenth century. This would seem to indicate that triple-fretted clavichords were no longer in use by the beginning of the nineteenth century. Thon ends this paragraph with the following definitions:

Die vorzüglichsten Stücke eines Klaviers und ähnlicher Instrumente, sind der *Kasten* oder *Korpus*; die *Decke*; der *Boden*; die *Tastatur*; der *Wagebalken* mit seinen Stiften; die *Einschnitte*; der *Resonanz-* oder *Schallboden*; der *Steg* mit seinen Stiften; die *Schlingenleiste* mit ihren Stiften und der *Wirbelstock* oder *Balken* mit seinen Wirbeln.[15]

(The principal parts of the clavichord and similar instruments are the case, the lid, the bottom, the keyboard, the balance-rail with its pins, the slots, the soundboard, the bridge with its pins, the hitchpin-rail with its pins, and the wrestplank with its tuning pins.)

The author then briefly describes the fortepiano or pianoforte, invented, he says, by Christoph Gottlieb Schröter in 1717. Though Thon

14. Thon, *Ueber Klavierinstrumente*, p. 4.
15. Ibid.

attributes the invention of the fortepiano to this German organist from Nordhaussen, the instrument had, in fact, been invented in the last decade of the seventeenth century by Bartolomeo Cristofori of Padua.[16] Schröter took credit for the invention after it had been introduced in Germany through an article written by Francesco Scipione, Marquis of Maffei. This article, the first to mention Cristofori's instrument, was translated into German and published in 1725 in the *Critica musica* of Johann Mattheson.[17]

In continuing, Thon mentions the grand fortepiano, both horizontal and vertical ("giraffe" piano), and the harpsichord, which he violently condemns for its mechanical imperfections. He adds that the latter has almost completely disappeared, having been replaced by the grand fortepiano, now also known as the *Flügel*. Thon clearly denotes an interesting fact here: by the beginning of the nineteenth century, the fortepiano had already superseded the harpsichord, while the clavichord was still commonly used and appreciated.

In the second chapter, dedicated to the manner in which one must judge the quality of an instrument, the author first remarks that often a very beautiful exterior may hide the imperfections of the interior. He adds that among all metal-strung instruments, the grand fortepiano is the finest but is very expensive, its price ranging from 18 to 40 karolins, depending on the woods employed in its construction. Square pianos follow, costing between 10 and 20 karolins. Comparing the clavichord to these instruments, Thon says:

> *Klaviere*, die überhaupt von viel mehr verschiedener Güte und seltener vorzüglich angetroffen werden, haben einen noch wandelbarern Preiss, der sich kaum namhaft machen lässt und bald zu Zwei bis Vier, bald zu Vier bis Sechs Karolin gefunden wird.[18]
>
> (Clavichords, which are generally found to vary much more in quality and are more rarely outstanding, have an even more variable price, which can hardly be specified, sometimes being quoted at 2 to 4 karolins, and sometimes at 4 to 6.)

Thon's statement on the quality of clavichords unfortunately still holds

16. Mario Fabbri, "Il primo 'pianoforte' di Bartolomeo Cristofori," *Chigiana rassegna di studi musicologici* 31, no. 1 (1960): 162–72. See also Sybil Marcuse, *A Survey of Musical Instruments* (New York: Harper & Row, 1975), p. 319.

17. Johann Mattheson, *Critica musica* (Hamburg, 1722–25), facs. ed. (Amsterdam: Frits A. M. Knuf, 1964), p. 335ff.

18. Thon, *Ueber Klavierinstrumente*, p. 13.

true today. As for the harpsichord, he quite simply counsels against its purchase.

The author goes on to assert that the grand fortepiano is intended for big audiences and as an accompaniment for large instrumental and vocal groups, while the square piano is ideal for solo music, in a family setting, and for accompanying a sweet feminine voice (*zur Begleitung des sanften weiblichen Gesangs*). The clavichord, he says:

> . . . haucht angenehme Gefühle und liebliche Melodien aus und unterstützt mit Ausdruck die Schwärmerische Stimmung der Seele, die sich so gern im Adagio hören lässt.[19]
>
> (. . . breathes agreeable sentiments and sweet melodies and sustains with expression the rapturous moods of the soul that are so often found in adagios.)

Contrary to the widespread belief that a novice should be content with a mediocre instrument in order not to damage a better one, the author insists that a good clavichord is never too expensive. He contends that only on a good instrument can one make rapid improvements, and that an instrument of good quality will never suffer in the hands of a beginner.

Following this section, Thon describes in detail the various parts of metal-strung instruments and indicates how to judge their quality. Since these remarks apply to the clavichord as well as to the other keyboards, they constitute one of the few sources of technical information on the construction of the instrument.

Thon begins with the case of the instrument, which can be made of oak or maple, veneered or inlaid, especially when it appears to be constructed of rare wood. (This description pertains mainly to clavichords of the eighteenth and nineteenth centuries, as the older instruments were generally of a more simple construction.) The choice of wood has little influence on the sound, provided that it is: old, dry, and healthy; clean and without knots or cracks; smooth and well worked; and well assembled and solidly glued. Further on, Thon again states that clavichords which are the most beautiful in appearance are often bad musical instruments. To the contrary, the instruments of the maker Schüttmeier (of Erlangen), for example, are rather simple looking but excellent.

The bottom of the instrument must not be too weak, or the instru-

19. Ibid., p. 14.

ment will warp easily. Nor must it be cracked or split, for the overall durability of an instrument depends on the integrity of all its parts.

The soundboard is the most important part because it dictates the quality of sound. The wood must be: of pine (*Tannenholz*), dry and old, with close grain (curiously, the author makes no mention of spruce [*Fichte*], which was used in numerous instruments of his time); without knots, cracks, or irregularities; well fitted and solidly attached on all sides; and of a regular, even thickness. One easily recognizes a damaged soundboard if it has sunk and presents a concave surface; in this case, the bridge is no longer in perfect contact with the soundboard, and some of the vibrations emitted by the strings are lost.

The bridge must be placed with precision, according to the scaling of the string lengths, and must be in perfect contact with the soundboard over its entire length. As soon as the bridge becomes partially unglued, the instrument loses some of its sonority. Moreover, a wise choice of string-length ratios is of primary concern for the retention of the tuning. Thon condemns those builders who mechanically use their monochord for the choice of these ratios with no thought for the peculiarities of each instrument.

Thon states that makers of his time have quite justly abandoned the practice of placing a rose in the soundboard, as such an opening is acoustically useless and exists only because of the aesthetic tradition. In this opinion, Thon was in direct contradiction to Jacob Adlung, who insisted that an opening in the soundboard or in the belly-rail was necessary.[20] Most probably, Thon forgot to mention the belly-rail opening, which is absolutely indispensable if there is no other opening in the soundboard, as the enclosed air must be able to vibrate freely.

The keys are of limewood, for it is a light and very stable wood. They are generally covered with ivory and ebony, or sometimes with boxwood or bone for the naturals and stained pear wood for the sharps. The author warns against this last choice, for boxwood gets dirty rapidly, and stained wood wears out and loses its color. All the keys must be of equal height and have a suitable length, width, and clearance. Thon mentions that certain builders make slightly convex key-tops, rendering the execution of parallel octave runs (even including the inner third) easier in the tonality of C major; but, he says, until one grows accustomed to them, they increase the difficulty of playing.

20. Jacob Adlung, *Musica mechanica organoedi* (Berlin, 1768), facs. ed., ed. Christhard Mahrenholz (Kassel: Bärenreiter, 1961), p. 150.

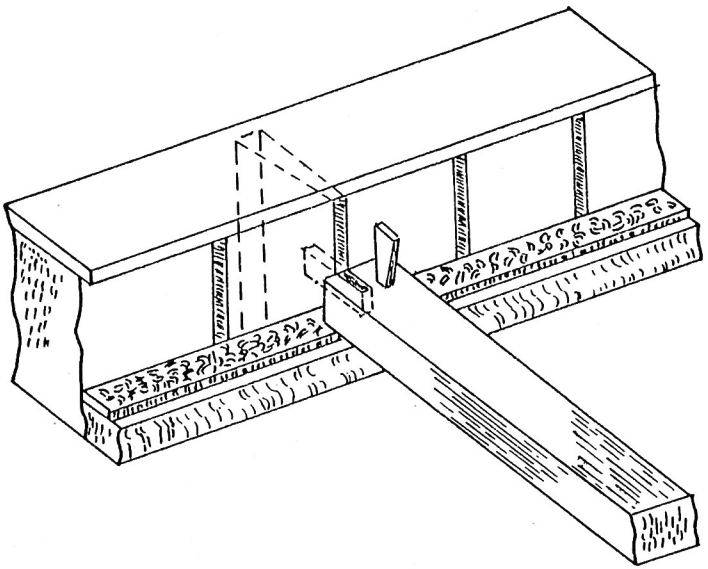

FIGURE 1. Drawing illustrating Thon's first type of key-guiding mechanism.

Thon describes two types of key-guiding mechanisms: the first consists of a slotted rack at the back of the instrument, with corresponding blades of brass, baleen, or other material fixed at the far end of the keylevers (see fig. 1[21]); the second has the keys held in position by pins, inserted in the backrail of the instrument, between which the levers slide (see fig. 2). The holes made in the keys for the balance-pins must be extremely precise, for if they are too wide, the keys will be noisy, while if they are too tight, the keys will stick.

The keys must be light and silent and must respond rapidly (the lightness of the keys was a subject of great importance, upon which many eighteenth-century authors strongly insisted[22]). To avoid any me-

21. The drawings given here as figs. 1–4 do not come from Thon's work, but are provided here to illustrate his discussions of mechanical aspects of the clavichord.

22. Adlung, *Musica*, p. 155. C. P. E. Bach, *Versuch über die wahre Art, das Klavier zu spielen* (Berlin, 1753 and 1762), ed. Walter Riemann (Lindau: C. F. Kahnt, 1965), p. 6; facs. ed., ed. Lothar Hoffmann-Erbrecht (Leipzig: VEB Breitkopf & Härtel Musikverlag, 1969), p. 9.

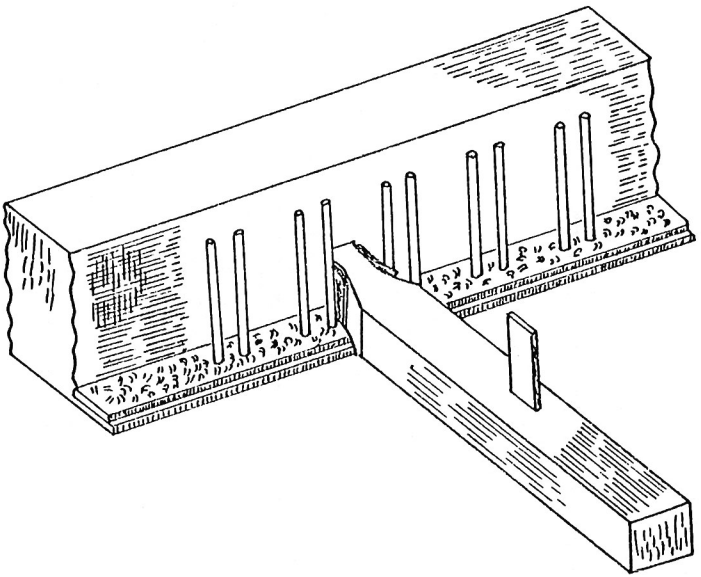

FIGURE 2. Drawing illustrating Thon's second type of key-guiding mechanism.

chanical noise, a strip of felt must be glued on the balance rail, and another on the backrail. Moreover, with the second guiding system (fig. 2), the sides of the keylevers must also be covered with felt where they touch the pins.

At this point Thon once again gives specific attention to the clavichord:

> Was bei einem Klavier die *Tangente* anlangt, so hat man darauf zu sehen, dass die Messingstreifen, woraus sie bestehen, die gehörige Stärke und Steifheit haben und nicht brüchig sind; dass iede obere Fläche, womit die Saiten berührt werden, vollkommen eben und genau eckförmig abgefeilt ist und endlich so gerade stehen, dass das Messingblatt die Saiten mit seiner Mitte gleichmässig berührt, damit durch keinen verstärkten Druck die Tangente abgleiten und zwischen zwei Seitenchöre [*sic*] durchbrechen kann.[23]
>
> (Regarding the clavichord's tangents, one must be careful that the brass blades, of which they consist, have the proper thickness and rigidity and not be brit-

23. Thon, *Ueber Klavierinstrumente*, p. 32.

tle; and that each upper surface, by which the strings are struck, be filed down perfectly even and exactly square; and finally, that they stand so straight that the brass blade touches the strings equally at its midpoint, so that the tangent cannot slip off and slide between two courses of strings because of any increase in pressure.)

Following a discussion of the hammers on the fortepiano, Thon returns to the clavichord and gives a full description of the damping cloth. This text is of special interest as, to my knowledge, no other treatise deals with this subject, which is a determining factor in the quality of the sound:

Bei dem *Klaviere* besteht die Dämpfung in dem Tuchgeflechte, das sich längs der Hinterswand desselben hinzieht, vollkommen die Gestalt eines Damenbretes hat und so eingerichtet ist, dass iedes verschiedene Chor Saiten durch eine eigene Reihe Tuchschlingen läuft, wodurch ieder Ton, wenn er den Zweck erreicht hat, schnell in sein voriges Nichts zurückgebracht wird. Man hat dabei folgendes zu beobachten: a) Zu dem Bebändeln müssen Tuchstreifen von gleicher und gehöriger Breite, von etwa einem schwachen Viertels- oder starkem Achtelszoll genommen und b) überall in gerader Linie über die Saiten hingeflochten seyn, dergestalt, dass sie bei dem einen Chor über die Saiten, in beständiger regelmässiger Abwechselung, hinziehen; c) die Tuchlinie mit ieder Saite einen rechten Winkel und liege dicht an der benachbarten an; d) dürfen die Tuchstreifen weder zu locker liegen, noch zu stark angezogen seyn; im ersten Fall sie um die Saiten herumschlottern und nicht gehörig dämpfen; im zweiten die Saiten des Chors zusammenpressen und die natürliche Lage gegen einander verrücken und dadurch den Klang verhindern; endlich müssen e) die Stellen, bei iedem Chore, welche die Tangenten bei dem Spielen berühren, um einen guten Zoll von der nächsten Tuchschlinge entfernt und völlig frei liegen, damit kein Aufschlagestift die Dämpfung unmittelbar berührt.[24]

(The clavichord's damping mechanism consists of a mesh of cloth which is drawn along the spine of the instrument, closely resembling a checkerboard and set up so that each individual string course runs through its own row of cloth coils, and thereby each sound, once it has achieved its duration, is quickly returned to its former silence. One must observe the following: a) in installing the ribbons, strips of cloth of equal and adequate width must be used, approximately a small quarter of an inch or a large eighth of an inch, and b) they must be woven in a straight line over the strings in such a way that they pass over the strings of one course [and under those of the next], in continuous, regular alternation; c) the lines of cloth must form a right angle with each string and lie close to each other; d) the strips of cloth must neither lie too loose nor be too tightly stretched; in the first instance they will slide about and not damp the sound adequately; in the second instance the strings

24. Ibid., pp. 36–37.

of a course will be pressed together and displaced from their natural position next to each other, thereby impeding the sound; finally, e) the places on each course which the tangents strike during playing must lie a good inch away from the adjacent cloth coil and must be completely free so that no tangent touches the damping cloth directly.)

Thon next describes the damping mechanism on the fortepiano and then returns to his discussion of parts of keyboard instruments in general. He starts with the wrestplank, which must be made of a hard, dry wood, solidly fixed to the case of the instrument in order to resist the tension of the strings. The holes made for the tuning pins must be carefully drilled and of equal depth and diameter. The wrestplank is an essential part of keyboard instruments, for should it be faulty, the instrument will be a failure. Thus, makers must be especially meticulous in constructing this part.

The tuning pins are made of iron, conically shaped at their lower end and flattened at their top end. Thon mentions the existence of both inserted pins (the most commonly used system for the clavichord) and threaded pins which are screwed into the wrestplank. He advises against the use of the latter, as they are difficult to keep all at the same level. Some tuning pins have a hole, through which the end of the string passes. Thon believes that this system, while making it easier to attach the string, is not worth the supplementary work required of the builder. In order to facilitate the extraction of unthreaded pins, it may be useful to mark helical lines into the lower part of the pins with a file (in fact, creating a widely spaced thread).

The wrest pins must be of absolutely equal height and able to maintain the tension of the strings. Their diameter can vary from the bass to the treble.

Strings are then discussed, with special attention being given to the clavichord:

Zu iedem Ton gehören in der Regel zwei Saiten, daher ist bei einem *Klavier* vornämlich auf ein *bundfreies* zu achten; denn *gebundene* sind in ieder Hinsicht verwerfbar, da immer, wenn eine Untertaste mit der zunächst höhern zugleich angeschlagen wird, das Klirren unvermeidlich ist. Schon dieser Umstand ist hinlänglich, die Unvollkommenheit der gebundenen Klaviere in vollem Licht zu zeigen, obgleich noch andere Gebrechen damit verbunden sind. Es ist ein unbedeutender Vortheil für den Arbeiter, wenn zwei verschiedene Töne durch ein einziges Chor Saiten geschaffen werden sollen und der dadurch erzielte geringere Preiss wiegt die Nachtheile nicht auf, welche sowohl hieraus für das Spielen, als auch für die Stimmung hervorgehn. Selbst das ungebildete Gehör des ersten Anfängers leidet, nicht zu gedenken, dass durch

die öftere Biegung der Tangenten öftere Reparaturen vorfallen, da die Stifte bald brüchig werden, zu Grunde gehen und mit Neuen ersetzt werden müssen.[25]

(For each note there are usually two strings, and thus, when it comes to the clavichord, one should primarily consider the unfretted type; for fretted clavichords should be rejected from every point of view, because every time a natural key is struck at the same time as its adjacent key, a buzzing effect is unavoidable. This detail alone is sufficient to bring the imperfections of the fretted clavichord into full light, although still other defects are associated with it. The fact that two different sounds can be produced by a single course of strings is an insignificant advantage for the maker, and the somewhat lower price thus gained does not compensate for the disadvantages it produces in playing and also in tuning. Even the untrained ear of the beginner suffers from it, without mentioning that through the frequent bending of the tangents, frequent repairs are necessary, because the tangents soon become brittle, are ruined, and must be replaced with new ones.)

Thon's remark about the bending of tangents may indicate that, at least at the beginning of the nineteenth century, it was common to alter the tuning of the fretted clavichord by adjusting the tangents to fit the requirements of various tonalities. It is also possible that Thon erroneously believed it necessary frequently to correct the striking point of the tangents on a fretted instrument. The author also mentions an additional difficulty associated with fretted instruments: rapidly playing two notes in succession, both of them produced by the same pair of strings. He continues:

Bei manchen Klavieren bestehen die Basschöre, um den Resonanz zu verstärken, auch wohl aus drei Saiten und die dritte und feinere, welche um eine Octave höher, als die beiden Hauptsaiten steht, führt den Namen *Octävchen*.[26]

(On many clavichords the bass courses are made up of three strings, in order to reinforce the resonance. The third, thinner string, which is tuned one octave higher than the two main strings, is called the "small octave.")

The author goes on to stress that the material of the strings is of importance as the sound of steel strings is distinctly different from that of brass. He adds:

Der Bezug eines *Klaviers* besteht meistens aus gelben oder messingenen Saiten, die von der Tiefe in die Höhe eine, nach dem Verhältniss der Tonlehre, abfallende Stärke haben. In den Tiefsten Tönen des Basses werden die Sai-

25. Ibid., pp. 44–45.
26. Ibid., p. 45.

ten, um die gehörige Kraft und Stärke zu entwickeln, mit weissem feinem sogenannten Silberdraat, mittelst einer eigenen Maschine, übersponnen.[27]

(The set of strings on a clavichord is made up principally of yellow—that is to say, brass—strings, which, according to the relationships of acoustics, diminish in thickness from the bass to the treble. To obtain adequate strength and thickness, the strings of the lowest bass notes are overspun, by means of a special machine, with a thin, white, so-called "silver" wire.)

Adlung had also mentioned the possibility of using overspun strings, although he warned that they tend to go out of tune easily.[28]

Thon then proceeds to some general comments on stringing. Strings must be neither too thick nor too thin, he says. In the first case, the sound is displeasing; in the second, the sound is round and full, but the strings break easily. Moreover, they must be chosen in a manner which assures equal sonority throughout the entire compass of the keyboard. Their position must be horizontal and their height uniform throughout. Careful attention must be paid to the angle formed by the strings passing over the bridge (Adlung had also called attention to this aspect[29]). In addition, the coil formed by the string on the tuning pin must be at a suitable level. If it is too high it will interfere with the tuning hammer; if it is too low the end of the winding will scratch the surface of the soundboard. The coils must be tightly wound, must not overlap, and the final coil must not pass over the end of the string (see fig. 3).

At the end of his description of the various elements of the clavichord, Thon mentions that stops altering the quality of the sound can occasionally be found on keyboard instruments, but rarely on the clavichord.

Finally, the author enumerates several rules for judging the quality of the sound, this estimation, of course, depending on personal taste. Generally speaking, Thon distinguishes two categories of sonorities: the full and round (*voll und rund*) sound, which exalts the soul, and the gracious (*anmuthig*) sound, which charms the soul. He again insists that the sound must be equal in all the ranges of the keyboard. Thon's rules for judging an instrument's sonority must first be applied while one is actually playing on the instrument. However, he adds that this is not sufficient, as the player can be the victim of his own imagination and

27. Ibid.
28. Adlung, *Musica*, p. 151.
29. Ibid.

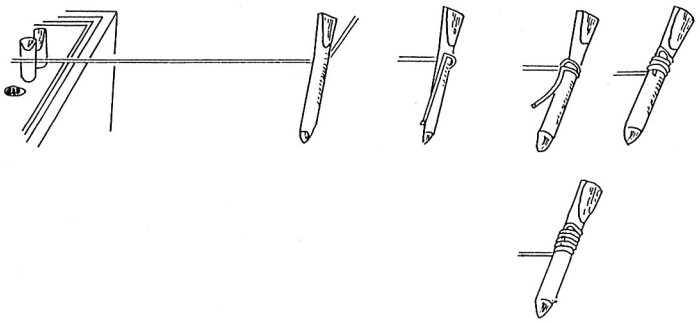

FIGURE 3. Drawing illustrating Thon's description of winding the string on the tuning pin.

thus be deceived in his judgment. Therefore, one must listen carefully while another plays, taking heed not to be deceived by the talent of the player. The sound must be: 1) absolutely equal throughout the compass of the keyboard with no note louder than another; 2) pure, without any extraneous noise to disturb the ear; 3) loud enough to stir the listener emotionally; 4) neither too hard (*hart*) nor overly soft (*weich*); nor too shrill, nor too weak; neither groaning nor overly singing; ringing like steel or silver; and 5) stable, independent of all changes in natural conditions. Thon's description of the ideal sound of a clavichord corresponds exactly to descriptions given by other theorists and composers of that period. One element which is more strongly emphasized in other treatises is that of a long-sustaining sound. This extremely important characteristic is stressed by both C. P. E. Bach[30] and Daniel Gottlob Türk.[31]

Thon adds that a good instrument improves with use—contrary, he says (with a somewhat misogynous mind), to a sweet bride who, once married, often reveals her true self to be a nagging, cantankerous wife. The second chapter is concluded with a warning that one should always ask the advice of a professional before purchasing a keyboard instrument and that the full price should never be paid at once, but a portion retained for a determined amount of time, in order to insure that the instrument is capable of holding a tuning.

30. Bach, *Versuch*, p. 6.
31. Türk, *Klavierschule*, pp. 4–5.

Thon then gives the following list of over a hundred organ and keyboard instrument makers, most of whom he had met during his many travels. He uses a dagger (†) to denote deceased makers whose instruments were worth mentioning, and an asterisk (*) to signify those makers whose work he especially esteemed:[32]

1. Bertsche, in Vienna*
2. Blersch, in Straubingen*
3. Brodmann, in Vienna*
4. Krämer, in Heidelberg
5. Donal, in Vienna*
6. Ehrlich, in Bamberg*
7. Eichmüller, in Kloster Heilbrun
8. Errlich, in Mergentheim
9. Friderici, in Gera
10. Gärtner in Tachau, Bohemia
11. Gatto, in Krems
12. Gehrhard, in Lindig near Kahla
13. Gessinger, in Rothenburg an der Tauber
14. Gries, in Graz, Steiermark
15. Grünberg, in Halle, Saxony
16. Guth, in Tschisdan, Bohemia
17. Hänert, in Arnstadt, Thuringia
18. Hansin, in Bamberg
19. Heidenreich, in Hof
20. Heilmann, in Erfurt*
21. Henne, in Hildburghausen
22. Hesse, in Ochsenhausen
23. Hofmann, in Neustadt an der Halde
24. Hofmann, in Vienna*
25. Hofmeister, in Leipzig
26. Holland, in Schmiedefeld near Suhl
27. Holzheu, in Ottobeuren and Kaufbeuren
28. Horack, in Kuttenberg, Bohemia
29. Horack, in Zwettel, Austria
30. Hugo, in Aschaffenburg
31. Jäckisch, in Vienna*
32. Kaiser, in Dresden*
33. Kalb, in Prague
34. Katholnig, in Vienna*
35. Kessler, in Eger, Bohemia*
36. Kleblatt, in Edinburg, Hungary
37. Klemm, in Leipzig
38. Klügel, in Ginz, Hungary
39. Köber, in Vienna*
    König, in Ingolstadt†
40. Krech, in Meiningen
41. Kummer, in Erfurt
42. Kupler, in Nuremberg
43. Kurz, in Halle, Saxony
44. Machalett, in Schmiedefeld near Suhl
45. Marschal, in Vienna*
    Moss, in Herpf near Meiningen†
46. Müller, in Vienna*
47. Müller, in Eger, Bohemia
48. Noli, in Pilsen, Bohemia
49. Noser, in Anspach
50. Oberdörfer, in Seeheim an der Bergstrasse*
51. Pfähler, in Schneeberg, Erzgebirge
52. Pfeifer, in Stuttgart
53. Podechtel, in Nuremberg
54. Puppe, in Roba near Jena
55. Rausch, in Leitmeritz, Bohemia
    Reuss, in Prague†

32. The numbers given here are Thon's. Makers listed in Boalch, *Makers of the Harpsichord and Clavichord*, (all of whom made clavichords) are identified here by the following numbers: 4, 9, 13, 15, 18, 24, 42, 47, 50, 62, 63, 64, 65, 66, 76 (Silbermann), 79, 83, 86, 90, 91 (Wagner), and 92.

56. Riebele, in Mainz
57. Rommel, in Linz
58. Rott, in Prague
59. Rosenberger, in Vienna*
60. Sauer, in Prague
61. Schädlich, in Hohenleim
62. Schanz, in Vienna*
63. Schenk, in Weimar*
64. Schmal, in Ulm*
65. Schmal, in Regensburg*
66. Schmidt, in Salzburg
67. Schmidt, in Ellbogen, Bohemia
68. Schneider, in Vienna
69. Schott, in Bamberg
70. Schübele, in Günzburg
    Schüttmeier, in Erlangen†
71. Schwarz, in Salzburg
72. Schwarz, in Graz, Steiermark
73. Schweinacher, in Landshut
74. Seidel, in Vienna*
75. Seiffert, in Würzburg
76. Seuffert, in Vienna *
    Silbermann, in Dresden†
77. Staudinger, in Brünn, Moravia*
78. Staudinger, in Engelsberg, Silesia*
79. Stein, in Vienna*
80. Stiefel, in Rastadt
81. Streicher, in Vienna*
82. Stumm, in Hundsrück
83. Stumpf, in Ruhl near Eisenach
84. Teutschmann, in Vienna*
85. Trampeli, in Adorf, Vogtland
86. Venski, in Dresden
87. Voigt, in Liebenstein near Salzungen*
88. Voigt, in Uhlstädt near Kahla
89. Vogel, in Naumburg
90. Voit, in Schweinfurt
91. Wachtl, in Vienna*
    Wagner, in Schmiedefeld near Suhl
92. Walther, in Vienna*
93. Weisse, in Prague*
94. Weisse, in Nabburg near Amberg
95. Wigleb, in Bayreuth
    Wimula, in Vienna
96. Wimula, in Brünn, Moravia
97. Wirth, in Augsburg*
98. Wist, in Vienna*
99. Zedler, in Kitzingen
100. Zeusisch, in Wiener Neustadt

Chapter 3 begins with general advice pertaining to the upkeep of keyboard instruments. Among various points Thon mentions his fear of moisture (*Nässe*) (certain people, he adds, women in particular, are easily capable of spilling a glass of wine, cup of coffee, or glass of beer on a piano; but, if a drop of wine were to fall on a tablecloth they would jump and shout cries of horror and distress), drafts, the heat of ovens, changes in temperature, dust, etc.—all conditions which lower the resistance of the glue joints and are detrimental to the wood.

He insists on the importance of retaining the diameters of the original strings, for if they are changed the new strings will have a tendency to break, thereby constantly enlarging the holes in the wrestplank through repeated removal and insertion of the tuning pins. Inappropriate strings have the further disadvantage of modifying the pressure exerted on the bridge and soundboard, thus unbalancing the instrument.

The clavichord must be consistently kept at the same pitch. On this

subject Thon refers to the existence of several different pitches still in use in his time (*Chorton, Kapellenton,* and *Kammerton*). He expresses no preference among these various pitches, insisting that one must conform to the original choice of the builder. However he does state his preference for a tuning fork over a pitch pipe because the latter is too easily subject to changes in temperature.

There follows an enumeration of various problems which one might possibly encounter with a keyboard instrument. Thon distinguishes between those repairs which can be made by the owner himself, and those which require a professional maker. Among the latter are: 1) should the key tops become too worn and it is necessary to replace the keyboard; 2) should the bridge be broken or unglued and must be replaced; 3) should the soundboard have, through deformation, become convex or concave; 4) should the hitchpin rail have become loose (if it is only partially loose, the owner can release the strings and add some glue and a few metal screws himself); 5) should the instrument warp, in which case it would be necessary to glue a diagonal rib to the bottom; and 6) if the wrestplank is either split or loose.

Among the repairs which an owner can do himself, the most interesting listed are: 1) when a bridge pin, balance pin, or hitchpin has become too loose, it can be replaced with a longer one, after the hole is predrilled; 2) when tuning pins become too loose, one should have thicker ones made (all other solutions would only be temporary); 3) when there is a crack in the soundboard or any other part of the instrument, it can be filled with a shim; 4) when the strings are rusty, they can be rubbed with a pumice-stone or a little piece of lead to clean them; 5) when the holes of the balance pins become enlarged, they must be even further enlarged in a square shape, after which a small cube of wood can be inserted, which one would drill anew; and 6) an imperfect sound from any particular note could be due to an error in a string diameter, or to two strings touching one another, or if a string is resting badly on the bridge, which is usually caused by the tuning pin's coil being too high. When repairing, Thon advises, one should never be violent, even if a piece is warped. If pieces must be replaced, their original size and shape must be respected. All gluing must be done with fresh English woodworking glue.

In his fourth and final chapter, Thon discusses tuning. He divides this subject into two sections: the practical technique of tuning and the theoretical rules of tuning. Under the first of these sections Thon explains the replacement of a broken string. This necessitates the extraction of the tuning pin. A loop would then be made at the hitchpin end

of the new string, the number of coils depending upon the gauge of the string (see fig. 4): for bass strings between ten and twelve turns, for treble strings not more than sixteen to eighteen. Once this has been done, the string can be cut to the desired length (if one breaks a string while forming the hitchpin loop, having previously cut the string to length, there may not be enough remaining string to make an adequate number of coils on the tuning pin). Thon then adds more specifically, about the clavichord:

> Ist die Schlinge fertig, so zieht man solche bei einem Klaviere mittelst eines dünnen Draates, an dessen Spitze ein kleiner fast geschlossener Haken befindlich ist, durch das Tuchgeflechte hindurch, hänge sie sodann in den zugehörigen Stift ein und führt die Saite bis an den Wirbelbalken hin, lässt solche ungefähr Sechs Zoll weit über die Einsatzöffnung des Wirbels hinausreichen, klemmt den Rest auf der Rolle, zwischen dem Einschnitte, wieder fest und bricht die Saite dann ab.[33]
>
> (When the loop is prepared, then, on the clavichord, one draws it through the cloth mesh by means of a thin wire whose end has a small, almost closed hook; then attaches it to its corresponding hitchpin; then leads the string back to the wrestplank, letting it extend approximately six inches beyond the hole into which the tuning pin is inserted; pinches the remainder tightly in the slit on the spool of wire; and then breaks the string off.)

After an angle bend is made near its end, the string is tightly wound onto the tuning pin from left to right, neither too high nor too low, and with the turns of the coil close to one another. The bottom turn around the pin should not go beyond the folded part of the string; it is for this reason that it is necessary to cut the string before the last full turn (see fig. 3). Once again, the level of the coil is extremely important, because if it is too high on the tuning pin, the string will not rest well on the bridge and may slide over its bridge pin, and if it is too low, the strings will touch the soundboard and exert unnecessary pressure on the bridge. Before tightening the strings, one returns the tuning pin to its hole, taking care to insert it to a depth equal to that of the other pins. The string is then ready to be tuned either while playing the corresponding key, or by keeping the key depressed while plucking the string. It is advisable always to tune the string from a lower pitch up to the desired pitch, for in this way the beats can be better perceived. The string must be brought to a half-tone below the desired pitch, even if it is already almost in tune, and only slowly brought up to pitch by eliminating the beats.

33. Thon, *Ueber Klavierinstrumente*, p. 111.

FIGURE 4. Drawing illustrating Thon's description of the loop made at the hitchpin end of the string.

A brief description follows of the harmonic and physical properties of sound. Problems related to temperament are covered, and the author specifically emphasizes that the most commonly employed tuning systems of his time were those of Johann Philipp Kirnberger and Friedrich Wilhelm Marpurg. He gives his personal preference to the system of Marpurg, because it can be applied without the aid of a monochord. Nonetheless, he goes on to say that both of these methods will prove too complicated for the amateur, and that it is much simpler to tune an instrument by slightly diminishing the perfect fifths, relying on one's ear. It is necessary only to be alone and to play very softly. The purity of an interval can be judged by listening for the beats and eliminating them. By diminishing slightly each fifth in the cycle of fifths, starting with either C or F, one can obtain a satisfactory tuning. If not, one must begin again, diminishing the fifths either more or less. Thus, Thon recommends a purely empirical method, which must certainly have been used by the majority of musicians during more than three centuries, parallel to the more complex systems established by theorists. C. P. E. Bach gives the same advice and, like Thon, does not bother to go into more complicated methods.[34]

* * *

Ueber Klavierinstrumente stands as evidence of the clavichord's popularity well into the nineteenth century, despite the fact that most histories of the music of this period assume it to have been extinct and mention only the fortepiano. Indeed, the piano did eventually supplant the clavichord, but only after decades of rivalry. Moreover, this work is one of the very few treatises that deal with the technical elements of the clavichord. With thoroughness, logic, and common sense, Christian Friedrich Gottlieb Thon has left us a manual as useful and pertinent to clavichord owners today as it was in his time.

Belmont, Massachusetts

34. Bach, *Versuch*, p. 7.