

# Bach on the harpsichord – some personal reflections

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A glance at YouTube shows how today's harpsichordists everywhere are collaborating with instrument makers, to explore all areas of the repertoire, including previously neglected ones. Quite obscure requirements, such as keyboards with multiple divisions of the octave, are being met. My impression is that well-known composers who were once at the heart of this exciting exploration (for example, François Couperin, Scarlatti, Handel) may now be of less interest, and that performances of their music are less often to be seen. The exception is Bach.

It is arguable, on the one hand, that any harpsichord is suitable for Bach, and on the other, that his music can in any case be described as less 'instrument-specific' than that of most other composers. Yet as a harpsichord-maker I have been asked my specific recommendations many times over the years. I suspect the reason, for many new customers, is that they have been or still are pianists, for whom Bach's music is a central concern. For these players, ironically, the question is more pertinent than for harpsichordists who want to cover a wider range of period music.

Fortunately, *Harpsichord & Fortepiano* is not a medium in which to engage in the old debate concerning the use of the modern pianoforte. Nor, if the title is to be the criterion, need we spend much time discussing the clavichord, although this instrument will naturally be mentioned. Again, there is a gulf between the relatively static nature of today's instrument manufacture (who, for example, would think it valid to create a brand-new kind of keyboard instrument for use in Baroque music?), and the whirlwind of invention which prevailed in 18<sup>th</sup> century Germany. So, mention must be made of some of the remarkable array of instruments which Bach probably met.

Returning to the harpsichord, I would suggest that Richard Troeger's article 'Varied Dispositions', in *Harpsichord & Fortepiano* (Autumn 2019), could form a generous prologue to this contribution of my own. His consideration of the facilities offered by harpsichords in their varied forms, will set the scene, albeit incorporating more technical detail than I will include. The present article is for the general reader, rather than the informed organologist, and falls into three parts: first, a survey of keyboard instruments available to Bach, with an emphasis on the harpsichord. Second, a brief look at the responses of some of today's leading performers, to the

kinds of instrument which they have found suitable for Bach's music. This brief selection will incorporate a short survey of the types of harpsichord popular in our own day. Over the last half-century tastes have changed, and continue to do so. Finally, I will outline characteristics which I have found important when recommending instruments to potential owners who want particularly to play the music of Bach.

## Bach's keyboards

J. S. Bach's main instrument was the organ. It was this medium which established his reputation as a performer, since it was and is essentially a public instrument. Composing for the organ was often done at home, using a harpsichord or clavichord with pedals. Such instruments were commonly used by organists, due mainly to two disadvantages of organs housed in churches: the temperature in winter, and the need for at least one person to work the bellows, who usually had to be paid. Very few organists could afford a practice organ in their home, as a number of organists can, today. Several pedal clavichords have survived: a two-manual instrument with full pedalboard and even an original bench, is in the Leipzig collection. Signed by Johann David Gerstenberg and dated 1760, it consists of two almost identical medium-large clavichords housed one above the other, with the lower one projecting. This can be removed for tuning. Both lie on top of an even larger clavichord with strings at several pitches, connected to the pedalboard by pull-downs. We have no evidence that Bach owned such an instrument.<sup>1</sup>

Tuning will have been time-consuming, and the same applies to pedal harpsichords, which Bach did own. None has survived, but we have a description from Bach's pupil Jacob Adlung. He mentions two sets of strings at 8-foot pitch and one at 16-foot pitch, housed in a separate instrument placed under a two-manual harpsichord:

The most beautiful harpsichord and, at the same time, the most beautiful pedal harpsichord that I have seen are those that Mr. Vogler, burgomaster in Weimar (a former pupil of Bach's), allowed me to see and hear, and who had himself given the instructions for their construction... the pedal box had two choirs of unwound 8-foot



strings and one choir of overspun 16-foot strings. The lid (of the pedal instrument) had a door that could be opened to increase the volume. The cases were both artistically covered with veneer.<sup>2</sup>



Illus.1 Pedal harpsichord by Colin Booth (1992).

This description is of a finely decorated instrument: pedal harpsichords (illus.1) were clearly not just plain practice instruments, and we shall see that this has relevance to Bach. There is no clear picture of the exact positioning of the pedal instrument, and modern makers have adopted different approaches. To obtain an even grander sonority, some have fitted couplers, to allow the upper harpsichord to be played from the pedals. This is entirely in keeping with organ-building, but we have no evidence that this was 18<sup>th</sup> century practice, despite the fact that in 18<sup>th</sup> century Germany, the two disciplines of organ-building and harpsichord-making were frequently combined.

In my view, Bach did much of his composing at an instrument with pedals. Apart from works specifically designed for the organ, we have many pieces by him which are 'organistic' in style, where a pedalboard makes performance easier and clearer. In this category we can

place the Eb Prelude of *Well-tempered Clavier*, Book One, and the C major and E major Preludes of WTC, Book Two. One or two other works are unplayable without a pedalboard, but are nevertheless probably intended for domestic use. The Capriccio BWV 993 is almost entirely for manuals, but breaks into a final rhapsodic section where pedals are the natural medium for the bass, and where the final chord cannot be played without them. The best-known example is the A minor fugue from Book One of the *Well-tempered Clavier*, in which the climax is reinforced by a pedal-point lasting many bars. Unlike other 'pedal-points' in Bach's keyboard works, this one cannot satisfactorily be held (and re-struck *ad libitum*) by the left hand.

We can imagine Bach adopting two methods: in some pieces (particularly early works, while he was under the influence of Fischer and Böhm), he was happy to sit at his pedal instrument and instinctively 'put his foot down' where necessary. On the other hand, when compiling teaching material like the '48', he almost – but not quite – always contrived to make the music playable by the hands alone. It clearly took effort to overcome the natural instincts of an organist.<sup>3</sup>

As for the harpsichord itself: it is almost certain that the harpsichords in Bach's household were by German makers. Although a portrait of one of Bach's admired player-composers, Johann Adam Reincken, shows him sitting at a Flemish harpsichord, the importing of foreign instruments to German centres seems to have been uncommon, and Bach purchased instruments by Hildebrandt and, perhaps, Mietke. While an expert can readily identify an original harpsichord as German, it will belong to a rather small eclectic group – smaller and less cohesive, for example, than English or French instruments from the 18<sup>th</sup> century – and will reflect its maker's personal style, and/or its area of origin. The less unified nature of what we today call 'Germany', can be held largely responsible for this. Writing in the 1960s, Frank Hubbard tried to place the surviving instruments in coherent categories:

Even the oldest extant instruments can be divided readily into two schools. The first, and possibly the better, was that of the Hamburg makers, dominated by the Hass and Fleischer families....these almost invariably had round tails, lavish decorations, and elaborate dispositions. The makers of the second school were more scattered geographically, and their product was less ambitious. The most eminent members of this group belonged to the Silbermann and Gräbner dynasties.<sup>4</sup>



Our view today has departed from this in two respects: We no longer talk so often of ‘schools’ of harpsichord-making. Hubbard ‘fell for’ French 18<sup>th</sup> century harpsichords (which can indeed present a unified ‘school’ of making), and compared most other traditions to them, unfavourably. The extant Hamburg instruments are in some respects ‘more French’ than those from elsewhere in Germany. They were made by specialist harpsichord-builders, rather than craftsmen building both organs and harpsichords. There are also more of them: six survive from the Hass family alone. The second departure concerns Hubbard’s omission of the maker Michael Mietke. At the time Hubbard was writing, no firm attribution was available, but the documentation concerning Mietke’s connection to Bach was already known from the account books of the court of Cöthen in 1719, showing Bach’s purchase (or at least, collection) for the court, of a harpsichord – evidently an unusually grand one, going by the price, and from its description as such in a later court inventory of 1784.<sup>5</sup> It is likely that a surcharge was made for fancy decoration, and it is also possible that it had an unusual specification: a 16-foot register seems quite probable, since we know that Mietke built them.<sup>6</sup> Judging by Brandenburg Concerto No.5, Bach was pioneering the use of the harpsichord in a soloistic role, and may have had this in mind, commissioning an instrument designed for power.

Bach developed personal preferences regarding the details: the Hamburg maker Christian Zell used longer keys than most, and while, according to Agricola, the shape of the sharps would have pleased him, as this allowed his fingers to descend between these keys (a relatively uncommon thing, particularly a little earlier, in 17<sup>th</sup> century instruments), their visible length (the playing surface) might not have done (although it was probably stretching to reach multiple manuals on the organ which caused this preference):

The semitones (sharps) must...be narrower at the top than at the bottom. That is how the late Kapellmeister Bach required them to be, and he...also liked short keys on the organ.<sup>7</sup>

Mietke’s work in Berlin echoed features of the Hamburg makers, apparently using a curved tail at all times. He made one-manual simple instruments (two survive) as well as more advanced doubles. No makers in other countries incorporated independent 16-foot registers, which can be seen as a product of the mindset of organ-builders, transferred to a different discipline. Even then, only in north Germany do we find the organistic range of registers which reached their extreme form in large harpsichords by the Hasses. One example

has three keyboards and five registers (not including buff stops) (illus.2).



Illus.2: Hieronymus Albrecht Hass, three-manual harpsichord (Hamburg, 1740).

The inventory of Bach’s possessions compiled at his death contains five harpsichords, with no specific mention of pedals.<sup>8</sup> However, their stated values suggest that four of them were doubles, one single, plus a small spinet. One was valued at nearly twice the other three large harpsichords. The higher value might relate to elegant decoration, where the rest were plainer and more functional. The inventory describes it as ‘veneered’. It might also refer to the fact that it was an organist’s personal prized instrument, in which case it may well have had pedals. It seems pretty certain that Bach owned at least one large harpsichord with this facility at the end of his life, and he had already given away to his youngest son Johann Christian, three harpsichords (*claviers*) ‘with a set of pedals’.<sup>9</sup>

Several of today’s makers and players have found how impressive and satisfying these instruments are, not just for offering great clarity in part-writing, but as a vehicle for arrangements of large-scale orchestral music, like Bach’s own arrangements of concertos by contemporaries like Ernst, Walther and Vivaldi. My personal experience is that the separate pedal instrument, playing a separate bass part, can combine with an ‘upper’ harpsichord to produce a wonderfully grand and balanced sonority. The addition of a 16-foot register to a ‘normal’ harpsichord, however, where it must play all the parts at once, or not at all, gives a far less satisfactory tonal result. It can be impressive, and can work well in ensemble, but the rather confused tone rapidly tires the ear. On an aesthetic level, pedal harpsichords cannot be considered as very satisfactory pieces of furniture, compared with non-pedal instruments, but this may be a prejudice not shared by organists.

Another certainty in Bach’s collection is the Lute-



harpisichord (*Lautenwerk*), since he left two at his death.<sup>10</sup> The maker of lutes and harpsichords, Zacharias Hildebrandt (a pupil of Silbermann, although only five years his junior, and also an organ-builder), worked in Leipzig and built one for Bach in around 1739. But J. C. Fleischer had made them too, in Hamburg, so we can suspect it was quite a common phenomenon. A small harpsichord with gut strings is the simplest description. The lute, although increasingly obsolete, was an instrument still attracting great loyalty and affection, and the keyboard version was a logical attempt to perpetuate its tonal virtues. The number of works which can be posited as Bach's contribution to its repertoire is rather small: one of these, the Prelude, Fugue and Allegro in Eb BWV998 is also highly effective on a resonant conventional harpsichord. Bach composed significant works for the 'real' lute, and we can imagine him and others enjoying these on an instrument designed for someone with only a keyboard technique.

Clavichords are rather contentious. Clearly very popular in Germany, a large number have survived. Most of these have a short octave from C, and most are fretted, both factors rendering them unable to play most of Bach's keyboard works. Large unfretted clavichords (of the type made by Hass, with five octaves within a deeper case) survive in reasonable numbers, but almost all date from after Bach's death, when the clavichord came into its own as a vehicle for the new expressive, melodic style espoused by Bach's sons. Forkel, in his biography of Bach, held that the *clavier* (which in his time, but not in Bach's, had come to mean 'clavichord'), was Bach's favourite instrument to play, but there are reasons to doubt this.<sup>11</sup>

We must, however, mention two of several attempts to produce what were, in effect, harpsichords with dynamic expression through touch: fortepianos and tangent pianos. Examples of both have survived. Bach played the former (on at least two visits to Potsdam, where his second son Carl Philipp was employed by Frederick - later, 'The Great'). On his second visit he approved of the instrument, which Silbermann, the maker, had refined. There is also an intriguing document dated 1739 referring to Bach selling a fortepiano - perhaps acting as agent.<sup>12</sup>

Copies of the Silbermann pianos have been used on recordings, as have both originals and copies of tangent-pianos, where wooden jacks replace an escapement and hammers as the instrument's striking mechanism. There are twenty-odd surviving tangent pianos (in German, *Tangentenflügel*). This instrument was praised by Kühnau, Bach's predecessor at Leipzig; although Bach does not seem to have owned one, one maker who produced them was Silbermann, and Bach's habitual curiosity is likely to have led him to seek out the instrument.<sup>13</sup>

### Today's taste

The upsurge in interest in a new 'authentic' kind of early music performance which occurred from the 1960s coincided, to my own good fortune, with my youthful enthusiasm for the historical harpsichord. Two 'bibles' had appeared: firstly *The Harpsichord and Clavichord* by Raymond Russell, owner of the collection now housed in St Cecilia's Hall, Edinburgh; and a decade later a more technical volume by the American maker Frank Hubbard: two books extremely similar in outlook and organisation. The authors' then-incomplete knowledge means that in some respects these wonderful books must be read today with scepticism. Hubbard loved 18<sup>th</sup> century French instruments, and the tonal qualities of the earlier Flemish harpsichords which had inspired Paris makers like Blanchet and Taskin. Modern makers followed his lead, some beginning their professional activities by building kits produced by the Hubbard workshop. At that time, there was an unconscious search for an 'all-purpose' harpsichord - effectively a rival to the ubiquitous Steinway (which, lest we forget, reached its present-day form around 1885). Before long, expansions of Flemish models were felt to have a more balanced response, as players sought something 'non-French' on which to perform Bach's music. A few examples:

- ▶ In 1992 Kenneth Gilbert recorded early music by Bach on a Flemish Couchet of 1671, transformed into a 'standard' 18<sup>th</sup>-century French double by Blanchet in 1778.
- ▶ Robert Hill has consistently used enlarged Flemish harpsichords made by his brother Keith, in a wide range of Bach recordings.
- ▶ Lars Ulrik Mortensen's recording of the Goldberg Variations used an enlarged Flemish design.
- ▶ Pieter-Jan Belder used an instrument 'after Ruckers', for a number of Bach recordings.

The 'after Ruckers' description is common. The tone quality of early Flemish instruments like those from the revered Ruckers family, could only partly be retained when enlarged and modified by French 18<sup>th</sup> century makers, and this is naturally true of 20<sup>th</sup> century versions too. Gustav Leonhardt preferred to use copies of 18<sup>th</sup> century Flemish instruments by Dulcken, with their existing wide keyboard compasses. Freedom of detail and personal taste inevitably began to infiltrate these 'copies', and Martin Skowronek, who built instruments for Gustav Leonhardt, mentioned this when writing about his philosophy as a maker.<sup>14</sup>





Illus.3: Christian Zell harpsichord (Hamburg, 1728)

The actual repertoire of original Flemish instruments is small, compared with the huge influence of their tonal design. Perhaps with this in mind, players moved to explore instruments more historically appropriate to different areas of the repertoire. Leonhardt himself played Italian instruments and copies for Italian music, but for a long time, remained loyal to his Dulcken as a vehicle for Bach. Then he, followed by his students and others, began to use original German harpsichords. Among the most accessible was the Christian Zell of 1728 (illus.3) in the Hamburg Museum für Kunst und Gewerbe, which I first copied in 1980, using drawings kindly supplied by Martin Skowronek, its restorer. Colin Tilney commissioned a Zell copy in 1983, and continues to use it for Bach's music today, and has recently been recording a set of the Partitas.

Copies of the Zell became quite common, but from the mid-1980s, other German-style instruments attracted attention. Some makers, including Andrea Goble in England, copied the large Hass harpsichords. The New York firm of Rutkowski and Robinette had done so as early as 1970, and Igor Kipnis recorded Bach's Partitas on their grand instrument, with its 16-foot stop, in 1979: the tonal results are powerful indeed, but are in fact only occasionally exploited. In contrast, Bob van Asperen recorded Bach's French suites on the modest single of 1738 by Christian Vater.<sup>15</sup> Singles by both Johann Christoph and Carl Conrad Fleischer expanded the range of copies of originals by Hamburg makers, and singles and doubles derived from these designs have been quite widely produced.

Following the attribution of a two-manual harpsichord in the Berlin collection to Michael Mietke, instruments based upon it rapidly became the new instrument

of choice for Bach: the historical connection was irresistible. However, the condition of the original over time had become so altered, that makers felt confident to 're-interpret' the evidence provided by it (and by the two singles by Mietke), to produce a really quite diverse range of harpsichords. The most fundamental choice facing makers was whether to employ iron or brass stringing. There was evidence that the double-manual had had brass strings at one time, but the case shape suggested this was not the original intention. On the other hand, the two singles were designed for brass wire, and so a conflation of the design of the two types was the choice of some makers. In theory, if string tensions are carefully balanced, the tone of a brass-strung Mietke can be almost indistinguishable from that of a Zell, as I found when listening to Leonhardt playing Bruce Kennedy's pioneering double in a large church in 1986.

In a smaller space, and with only slight alterations to string tensions caused by minor changes to the design, brass-strung Mietke instruments sound less like their iron-strung counterparts. There is an attractive bloom and directness in the tone which has appealed to countless players. The 'Mietke double', when strung in brass, involves an interesting paradox: in the view of myself and some others, it is unlikely that many brass-strung doubles were ever made in Bach's time. Brass strings in the treble are only two thirds as long as iron ones, making the soundboard area in the extreme treble very cramped: it becomes impractical to extend the compass above d3 unless special wire is used. Harpsichord makers in the time of Bach's latter years were increasingly extending the compass to five octaves, FF-f3. As extremely practical people, when building doubles they generally abandoned brass stringing (which continued to be preferred for instruments with no 4-foot, as in virtually all European countries), and used iron-strung designs which allowed better space for the 4-foot. If the Berlin original Mietke instrument was designed for iron strings, then his surviving instruments support this theory, within the extant output of a single maker.



Illus.4: Anonymous German harpsichord (Eisenach).



Two more instruments have excited interest more recently: both have relevance to this article, although to my knowledge neither of them, either as original instrument or copied, has been used for much performance of Bach. The first is the modest, plainly finished one-manual harpsichord preserved in the Bach Museum at Eisenach (illus.4). Its origins are unclear. It appears to have been designed to produce volume rather than subtlety, and possesses a double soundboard (a feature found in some early Italian harpsichords, as well as virginals) and, remarkably, a double-transposing keyboard, so that different pitches are available. It has been posited as a rare survival of a type of harpsichord once common in Bach's native region of Thuringia.<sup>16</sup>

The same area of origin has been suggested for an anonymous five-octave double thought to be from the 'school' of Gottfried Silbermann (whose connection to Bach as organ-builder is well known). A copy made in Paris by Anthony Sidey and Frédéric Bal in 1995, presents a shallow-cased harpsichord, more intimate than soloistic in character. It has attracted a number of ensemble recordings of music by Bach's contemporaries, and Leonhardt recorded a half-hour of Bach's solo music on it in 2003.

### One maker's view

First, a few more questions about Bach himself, whose time was filled, not just with music, but by the duties of his family and professional life. Although he had a number of keyboard instruments in his home, the kind of niceties mentioned in this article were surely beyond his everyday thinking. He will have sat down to the harpsichord when his routine allowed – or dictated – but would not often have pondered about which instrument to choose. He probably had a favourite, and familiarity would help tuning to be done faster. Much of the time, he will not have needed to use pedals, so would he then have chosen to sit at an instrument without pedals, when playing and composing suites or partitas? Nor do we know the circumstances of his teaching: it is easy to imagine him teaching organ-playing seated at the pedal harpsichord, but choosing another harpsichord, probably in another room, for purely keyboard repertoire. Apart from anything else, a chair was used for conventional keyboard playing, and this was more comfortable than an organ-style bench. Today's harpsichord owners, including organists, very seldom have the luxury of a pedal instrument anyway, and most have only one instrument. My own interest led to the building of two pedal harpsichords, one of which can be heard on a rather noisy but impressive recording.<sup>17</sup> But these complicated instruments can now be set on one side.

On a practical level, we can place the music itself into categories. Scarlatti's sonatas have been analysed to produce lists of pieces which a particular keyboard compass can accommodate, and the same method can be applied to Bach. The early Toccatas and almost all the '48', Book One, can be played on a single four-octave keyboard C-c3. Such an instrument will usually have only one or two registers. Many more pieces will be found to 'fit' or almost fit this compass; at the other extreme, virtually all of Bach's keyboard music can be played on a keyboard with a chromatic compass GG-d3. Surviving instruments suggest that 18<sup>th</sup> century players were used to compromising: the Christian Vater single has produced a number of modern 'copies', but whereas today's makers will often extend the bass compass, the original goes down only to GG/BB short octave. Today's players are generally less flexible.

I have often pointed out that a simple single-manual instrument has some advantages over a two-manual, including ease of tuning, portability, size and of course, cost. Very few of Bach's pieces actually require two independent keyboards, but the Italian Concerto and the Goldberg Variations are at the top of some players' wish-list, which makes a double-manual essential. But there are also subjective choices to be made: for example, what kind of tone works best? One reason that instruments chosen by leading harpsichordists for the performance of Bach vary so much, is that he is a composer whose music is tolerant of a wide variety of sound-worlds. Whereas many of today's ears cannot tolerate the music of the Couperins on anything but a French harpsichord, nor that of Frescobaldi on a non-Italian instrument, Bach's music 'works' on many different types – including, in some instances, both of these.

Large harpsichords with a deep case generally have the potential for a very impressive sound, while their single registers may also be very beautiful. But smaller instruments can have a greater intimacy and put the player in closer touch with the music. Even within Bach's oeuvre, different types of music have different ideal requirements: counterpoint (which Bach tended to pack into almost all genres, unlike, for example, his French contemporaries) is clarified best by a tone which has a long sustain but a clear attack, and an interesting decay. Balance of projection over the compass is important: it is easy for the bass of a harpsichord to be accentuated and for this balance, created by careful voicing, to be lost. Some instruments which are intrinsically very beautiful, are less effective in dense contrapuntal music. Some French harpsichords swamp the sound with an almost intrusive resonance, and some may have a tenor register which is rather ill-defined. If pushed to generalise, my experience is that brass-strung instruments, whatever



their origin, often do this job best. A single set of strings always has greater clarity than two, but in forceful music, players will want more drive in the sound. If a player loves the Well-tempered Clavier, an instrument ideally suited to this music will be less perfectly suited to the Partitas – and vice versa. There is no perfect harpsichord, even for a single composer like Bach.

Returning to instruments inspired by the three surviving harpsichords by Michael Mietke: for some, performing Bach on an instrument directly inspired by the work of a maker whose work, and person, were known to him, is emotionally rewarding, and the connection adds an extra frisson to the player's enjoyment. But Bach himself will have used many harpsichords with different characters. Fortunately, for those of us without a Mietke-based instrument, similar tonal qualities can be found in

a number of models, even from 17<sup>th</sup> century France and Italy, all, of course, having their own characteristics, which in many cases will be very 'un-German'. Ultimately, in today's musical environment, we can adopt a concerted stance, and say that for performance of Bach's music, any harpsichord is better than none.

*Harpsichordist and teacher Colin Booth was also a harpsichord-maker for nearly 50 years, producing around 300 instruments. During this time his emphasis was on Italian and German models. He has recorded 14 CDs of solo harpsichord music, and his book Did Bach Really Mean That? has been praised both for its detail, insights and readability. Following a recording of the Goldberg Variations, his complete recording of Bach's Well-tempered Clavier is now available as two 2-CD sets on Soundboard Records. [www.colinbooth.co.uk](http://www.colinbooth.co.uk).*

#### Endnotes

- 1 Hubert Henkel (ed), Leipzig Musikinstrumenten-Museum, catalogue, vol.4, no.23.
- 2 Jacob Adlung, *Anleitung zu der musikalischen Gelahrtheit* (Erfurt, 1758) p.556. This and several other references in Adlung's writings, are given by Frank Hubbard, *Three Centuries of harpsichord-making* (Cambridge, MA, 1965), pp.270-272.
- 3 A compromise was also made with manual keyboard compass, which in Bach's early life usually ended at c3, for all keyboard instruments, including the organ. In the *Well-tempered Clavier*, Book One, Bach took care not to compose above this note. In one instance he was forced to drop a top c# to a lower note (Fugue in D# minor BWV853, bar 16). It is common to hear performances following the score scrupulously here, even though all modern harpsichords offer the top c#.
- 4 Hubbard (1965), pp.172-3.
- 5 Hans T. David and Arthur Mendel (eds), rev Christoph Wolff, *The New Bach Reader* (New York, 1998), p.87.
- 6 David and Arthur Mendel (1998), p.87.
- 7 Adlung, *Musica mechanica organoedi II*, 23-24. Quoted in full by Hubbard (1965), p.189.
- 8 David and Arthur Mendel (1998), p.251.
- 9 David and Arthur Mendel (1998), p.256
- 10 David and Arthur Mendel (1998), p.252; Hubbard (1965), pp.328-329.
- 11 David and Arthur Mendel (1998), p.436
- 12 David and Arthur Mendel (1998), p.239
- 13 An even more obscure variant was conceived by the maker Pantaleon, who gave his name to it. This version had no dampers, and its resonance produced a beautiful sound, which was hard to articulate.
- 14 Martin Skowronek, *Harpsichord Construction* (Bergkirchen, 2003), p.267.
- 15 The unique harpsichord by Christian Vater exemplifies the wrong impression so easily given by the scarcity of surviving German harpsichords. Inside the instrument, the maker inscribed its number in his list thus far: No.193.
- 16 Terence Charlston's CD 'The Harmonious Thuringian' (Divine Arts DDA 25122 ), recorded on a copy of the Eisenach harpsichord by David Evans, includes a thorough essay on the instrument.
- 17 'Pro Cembalo Pleno – Bach on the pedal harpsichord', Douglas Amrine (pedal harpsichord), Priory PRCD 523.