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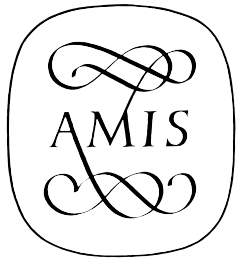


A Small Upright Piano from Pennsylvania: Relic from the Origins of the Piano and Made by John Clemm(?)

John R. Watson

An unusual four-octave upright piano has a long history among the Moravians in Nazareth, Pennsylvania.[1] Many believe it was already in its present location as early as 1746.[2] As the following pages will show, the instrument is constructed of woods native to Pennsylvania and is considered probably the earliest made in America, with much to tell us—not only about the earliest beginnings of the American piano industry, but also about its much earlier European roots. Following encouragement from Laurence Libin that a playable copy of the instrument should be made, Tom and Michele Winter invited me to collaborate in fulfilling that goal. Now completed, the reproduction stands on exhibit with the original instrument at the Moravian Historical Society (MHS) in Nazareth, Pennsylvania. This article describes the original piano, proposes an attribution of its maker, offers brief comments about the replication process, and most importantly, explores what the project uncovered about the instrument's significance in keyboard history.

A Description

The piano's walnut case, with its domestic (American) tulip poplar baseboard and a molding around its base, stands 6′ 4½″ (194.3 cm) tall, including its separate contemporaneous stand also of walnut (figs. 1a and

1. Laurence Libin first called attention to the instrument in his 1988 article "Nazareth Piano May Be Among America's First," *Moravian Music Journal* 33, no. 1 (Spring 1988): 1–6.

2. According to a much-repeated story based on an 1888 account by Rev. Levin Theodore Reichel, derived in turn from original sources in the Moravian Archives, the instrument was first played in 1746 by Brother Pyrlaeus to sooth young girls afflicted with smallpox. See Levin Theodore Reichel, "The Early History of the Church of the United Brethren (Unitas Fratrum) Commonly Called the Moravians, in North America, A.D. 1734–1748," *Transactions of the Moravian Historical Society* 3 (1888): 200.

(a)

FIGURE 1a. Overall view of the original piano. Photograph by John R. Watson.

(b)

FIGURE 1b. Detail photo of the keyboard; scroll-molded end block with sliding upper section serving as hand stop; tuning pins; pin block; nut; and removable batten over strings. Just visible are some dampers under the removable batten. Photograph by John R. Watson.

1b). The unusual scaling of string lengths (described below) results in a minimally curved bridge and distinctive bentside profile with separate bent and straight sections joined at a nearly straight 173-degree angle. The tailpiece forms a flat molded cornice that slightly overhangs at the top, and a hinged door and flap cover the interior and keyboard when the instrument is not in use. A removable horizontal batten in front of the strings and just above the hammers may be slightly later and could have been a practical means of hanging a now-missing music desk. A tinwork bracket on the same batten may have held a tin sconce to illuminate the desk. The lack of wear marks around a second later, non-matching metal bracket on the opposite end indicate that it may never have been used. The case has a permanent back of Atlantic white-cedar and an opening below the soundbox with a removable cover, revealing the action well (fig. 2).

The strings rise vertically from the pin block just above the keys. The use of bone-topped sharps and ebony natural keys on the keyboard is indicative of continental European heritage, most likely German (fig. 1b). The four-octave C–c‴ keyboard has natural heads, stained red on the fronts, with two decorative scribe lines parallel to the head-tail seam. Moderate signs of wear indicate that the instrument saw use, but not heavy use, over an extended period. The end blocks have a lively ogee-and-bead

FIGURE 2. Detail of the mechanical action viewed from behind with cover removed. The vertical trundle that shifts motion of the hammer register is on the left. Also visible are the hammer squares topped by the hammers (showing back end opposite the striking end) secured with taper pins and with fixed spacers between the squares, and the up-stop rail. Photograph by John R. Watson.

profile, part of which can be pulled forward on each side as functional hand stops. The hand stop at the left lifts the dampers, while the right shifts the hammers slightly, giving a choice of timbres. In one position, a brass-tipped half of the hammer causes an incisive harpsichord-like timbre. The other position of the hand stop shifts the hammers so that a leather-covered half strikes, giving a more mellow, piano-like tone (see fig. 8). The front-back motion of the hammer hand stop is transferred to the left-right motion of the hammer register by means of a trundle (visible on the left in fig. 2), more typically found in organs than pianos. The instrument has two strings per note except for the bottom seven notes, which are single-strung and likely originally overspun.

The key levers are guided by balance pins and, in the rear, by slips of a hard bamboo-like material wedged vertically in the keyframe back rail. Key dip is limited at the rear by a removable up-stop rail. The upright piano's action is without escapement and functions through the motion of the player's hands and gravity, without any need for springs, and is capable

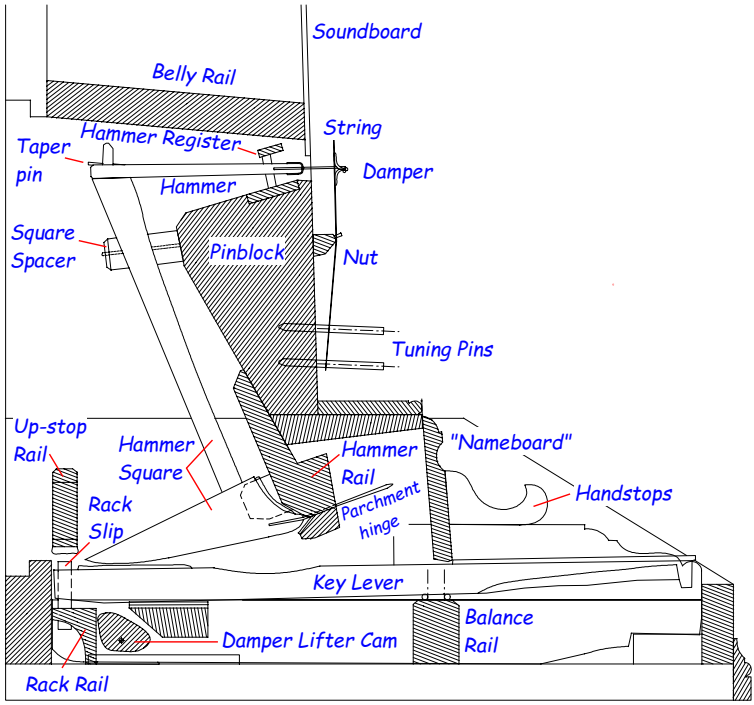


FIGURE 3. Elevation drawing of the keyboard, action, and pin block. Drawing by John R. Watson.

of a surprising rapidity. The vertical motion of each key lever is transferred to the horizontal motion of the hammer by means of a "square" that pivots on a piece of doubled-over parchment and fixed to a rail under the pinblock with wire pins. The hammers consist of solid shafts of hardwood, the ends of which are tipped in brass on one half and covered in leather on the other half (see figs. 3 and 7). Each hammer is fixed to the square with a wooden taper pin, the fit just loose enough to allow the hammer head to swivel slightly, to align brass or leather tips to the strings by the movement of a hammer register. The first nineteen hammers in the bass carry an iron wire, which holds a corresponding damper. Eleven more hammers were only partially prepared for damper wires that were never installed. Old ink labels on the hammers follow German practice, with *b* indicating b-flat and *h* for b-natural. Capital letters denote the first octave plus the next seven damped notes, then all lower case with suffixes "2",

FIGURE 4. The reproduction case showing the soundbox interior before addition of the soundboard. Note the single serpentine strut, heavy liners on the bentside, and normally hidden S-shaped holes cut into the belly rail, all features based on the original instrument interior as observed through a borescope. Photograph by John R. Watson.

"|" and "||" to indicate the second, third, and fourth octave respectively.[3]

The thin (2–2.5 mm) soundboard of quartersawn Atlantic white cedar, has grain parallel with the vertical spine and is covered on top and sides by a molding, which serves as a hitch-pin rail where the strings terminate. The inner framing (as observed through a borescope) consists of a solid knee supporting the cornice/tail, heavy walnut liners under the hitch-pin rail, and a single serpentine brace running diagonally from the bass end of the belly rail to the seam between straight and curved sections of the bentside (see fig. 4, showing the soundbox of the reproduction before attachment of the soundboard). Notably, the belly rail is vented with two symmetrical S-shaped holes, normally only seen from behind the instrument when the action has been removed. They are somewhat visible in fig. 4. The purpose of this largely hidden decorative detail may speak more of Moravian piety (in which God oversees the artisan's labors) than of acoustical practicalities or decorative display, though traditional assumptions aside, it cannot be said with certainty that the instrument was made within the Moravian community.

3. The use of capital letters for the first octave was carried into the second octave until the end of the dampers. This analysis of the hammer markings is by Michele Winter. The scheme is thought to be the original intention, although there has been later swapping around of hammers.

Physical Clues About the Maker

The most compelling question to be asked of the instrument is who made it, and there can be no more authoritative source than the physical clues left behind in the artifact, including materials, scale, apparent Germanic influences, the use of organ-building methods, and general craftsmanship.

Materials. John Koster determined through microscopic wood identification that the maker used Atlantic white-cedar (*Chamaecyparis thyoides*) for soundboard and back boards, red oak (*Quercus sp.*) for the pinblock, and yellow poplar (*Liriodendron tulipifera*) for the baseboard. These are American woods, not known to have been exported to Europe.[4]

Scale. Although eccentric, the scaling of the string lengths indicates orientation to archaic (pre-1760) concepts of organ-pipe scaling (see discussion below), suggesting a maker who learned organ building before the mid-eighteenth century.

German influence. Especially when compared to English design styles, there is evidence of continental/German influences, including the application of thick, molded inner-rim veneer, reverse keyboard (black naturals and white sharps), and molded end blocks.

Organbuilding methods. Characteristics of the instrument suggest that the maker was primarily an organ builder. These include especially the scaling of the string lengths mentioned above and, to a lesser degree, the employment of a trundle and squares in the mechanical action design. This conclusion is not surprising, since in the period, and certainly in Pennsylvania, nearly all known organ builders also made stringed keyboard instruments.

Workmanship. Of the several examples of homespun keyboard instruments from the eighteenth and early nineteenth century known to me, all bear multiple earmarks of their makers' inexperience. The MHS upright

4. John Koster "Woods in Early American Keyboard Instruments as Evidence of Origins" in WAG Postprints. Wooden Artifacts Group, American Institute for Conservation (1995). http://www.wag-aic.org/1995/WAG_95_koster.pdf/.

does not fit that mold. The instrument is clearly the work of a professional instrument maker with extensive experience, skill, and judgement. The workmanship is straightforward, careful, and precise, without being unduly fussy, as if working accurately and with confidence. Correct woodworking principles are followed, so that the casework would accommodate the peculiarities of humidity-driven expansion and contraction of wood. This kind of knowledge is not universal even among professional makers, and must come either thorough training, or through many years of experience. Remarkably, every joint in the instrument appears perfectly intact, with no signs of distortion or repair. There is very little evidence of reworking in compensation for mistakes. Two rare exceptions are the abandonment of a scheme for pivoting the hammer squares, and the preparation for bichord stringing throughout, finally opting for one string per note for the bottom seven unisons.

With its curved and mitered straight sections, the bentside design is unusual but not unique or naïve. It suits the surprising but deliberate scaling of string lengths and produces an appropriate area of soundboard between bridge and side. More importantly, it offers clues about the constellation of influences in which original maker presumably learned his craft. A harpsichord thought to be from early seventeenth century southern Germany or Austria and now at the Hungarian National Museum has a strikingly similar bentside profile with straight and curved segments.[5]

Still, the joint between the straight and bent portions of the bentside is far more challenging to make, than if using one double-bent side. The necessary joint needs to be strong, but is too obtuse for dovetails, and the location of the soundboard and inner rim precludes the use of corner blocks.

The Questions

Coming from an era before standards and traditions of piano design had developed into recognizable patterns, it is unsurprising that this example has many peculiarities that are difficult to place in a more expected piano

5. Hungarian National Museum, Budapest, accession no. 1875.143. This harpsichord is illustrated and described in Edward Kottick, *A History of the Harpsichord*. Indiana University Press, 2003 (179–86) and also in Alfons Huber, *Das österreichische Cembalo: 600 Jahre Cembalobau in Österreich ; im Gedenken an Hermann Poll aus Wien (1370–1401)* (Tutzing: Hans Schneider 2001), 142.

context. But the extra effort to identify distinguishing characteristics and look for their sources promises to shed much light on a period before piano making traditions had developed.

Obvious at the outset is that this instrument does not fit the norms we first expect in early American pianos. First, even without knowing precisely when it was made, it is by any measure astonishingly early in the history of piano making. Second, it is in a most unexpected upright form, decades before upright pianos even started their period of popularity. Third, its mechanism is designed to offer two radically different sounds, as if to be two instruments in one. And, although piano historians have shown some of these characteristics to have developed in Germany by the mid-eighteenth century, and although the Pennsylvania Moravians certainly ordered musical instruments through their still-fresh European connections, this piano was discovered to be made of local woods and apparently made right there, in Pennsylvania.

Being neither a grand nor a square piano, this instrument's resistance to the usual taxonomy of early American pianos meant it has raised more questions than answers, causing it to be relegated to a curiosity rarely mentioned in the literature. From at least 1890, the earliest piano of any sort made in America was said to be the one advertised in 1775 by John Behrent in Philadelphia.[6] The remarkable re-emergence of what can be presumed to be that instrument is detailed in the article "An Extraordinary Fine Instrument: The Grand Pianoforte of John Michael Berent" by Thomas Strange and Alexandra Cade, elsewhere in this journal. The first *upright* pianos have long been identified to be those made by John Isaac Hawkins beginning in 1800, also in Philadelphia.[7] As the evidence below suggests, the MHS upright piano may take its place among these superlative examples, as the oldest surviving piano of any type made in North America or in the English-speaking world.

Guiding the research were these intriguing questions raised by the instrument:

6. Daniel Spillane, *History of the American Pianoforte; Its Technical Development, and the Trade* (Daniel Spillane, 1890) 72. Also, Alfred Dolge, Pianos and their Makers 1 (Covina, CA: Covina Publishing Co. (1911), 48–49, also citing Spillane and mistaking the 1775 instrument to be a square piano.

7. Spillane, *American Pianoforte*, 29, and Dolge, *Pianos*, 53.

1. *Who made the instrument?* As already established, the instrument was made in America. That is a major clue, but it also eliminates the most likely Saxon maker of such instruments, Christian Ernst Friederici.[8]

2. *When was it made?* The belief in a 1746 first appearance of the piano in Nazareth (see footnote 2) seemed highly improbable, considering that in 1746, harpsichords and clavichords were far and away the dominant stringed keyboard instruments in German enclaves, and the number of pianos in the world would have been miniscule, mostly to be found in the courts of Europe, not the backcountry of colonial America. But as noted above, the instrument's resistance to what would become the norms of piano design could suggest it simply was made before those norms developed.

3. *Can there be an explanation how a piano could be made in Pennsylvania decades earlier than expected?* Had one of Friederici's upright pianos been imported and copied by the mystery maker? While that is theoretically possible, it adds another degree of improbability: that there had to be at least two such instruments in Pennsylvania long before any other recorded appearance of a piano on this side of the Atlantic.

4. *Why was the piano designed to provide two different sound options?* Pianos with stops capable of changing tone quality became fashionable in later continental Europe, but what put the idea into this exceptionally early Pennsylvania maker's mind?

5. *Why are there so few dampers, and why provide a stop that disengages them entirely?* Only about a third of the compass has any dampers at all, and even though they are only semi-effective, the maker went to considerable trouble to provide a hand stop to disable them.

Two more mysteries turned up during our closer examination and analysis of the original piano:

8. Christian Ernst Frederici (1709-1780) worked in Gera in the German state of Thuringia, about 75 miles west of Dresden. Three surviving pyramid pianos by him survive, and a fourth is attributed to him, all from 1745–1755. See Clinkscale Online (www.EarlyPianos.org) nos. CEP-1191, CEP-1192, CEP-1189, and CEP-4537.

6. *How did the maker acquire the high level of knowledge and skill evident in the original instrument?* This was clearly not the workmanship or mechanical design we would expect of a dabbler on the American frontier, as most of Pennsylvania was at the time. The Winters and I have been copying early keyboard instruments for nearly fifty years, yet matching the workmanship of the original instrument was a worthy challenge. Its straightforward, clean, and accurate craftsmanship indicates the artisan was confident and deeply experienced in the trade.

7. *Why did the maker employ even much earlier principles in planning string lengths?* Even if it is accepted that the piano was made as early as the middle of the eighteenth century, the principles used in planning string lengths, described above, were from an earlier era.

An Archaic Scale Design

That last question leads to one of the strongest clues about the instrument's maker. In stringed keyboard instruments, lower pitches require longer strings, and all string lengths follow a logical scheme that can be calculated mathematically or geometrically. According to the ancient theory of strings traditionally attributed to Pythagoras, string lengths should be doubled for each octave lower; according to which, if the top string is 5 inches long, the string one octave lower will be double that length, 10 inches long. Most harpsichords and clavichords in the eighteenth and early nineteenth century followed this rule, within some margin of error, at least for approximately the top half of the compass, below which maintaining the scheme would demand impractically long casework. Because of this, makers of nearly all stringed keyboard instruments increasingly foreshorten the lengths of strings in the lower half of the compass.

The MHS upright conspicuously deviates from the norms of string scaling, especially that normally associated with the early history of the piano. At first glance, it may seem the maker was simply ignorant of common Pythagorean scaling, and estimated a scale without a clear theoretical concept. The closer one looks at the numbers, however, the more one sees the thinking and the training of the original maker. The first observation is that the maker apparently started with the length of

his standard organ pipe sounding c˝, nominally a "one-foot" pipe but actually only 11-½" long,, then added an inch before dividing by 2 to get a 6 ¼" length for c˝˝. Then, going downward from c˝, doubling its length before subtracting 3", for a length of 21".

John Koster's article in this volume picks up the interpretation of the MHS upright scaling, showing these numbers to be part not of an arbitrary or naïve guess, but of a deliberate application of earlier principles of scaling by a trained instrument maker, very likely one with organ building expertise.[9] Of most significance for the present article is that string scaling serves as a significant clue in identifying the maker of this instrument.

An Attribution to John Clemm

A single hypothesis, if correct, offers plausible answers to all these questions: that the maker of the MHS upright piano was Johann Gottlob Klemm (1690–1762).

John Clemm, as he spelled his name after emigrating to America, is already a familiar name in both Moravian and American musical history. Born near Dresden in 1690 and employed as a keyboard instrument maker, Clemm knew Count Nicholas Ludwig von Zinzendorf, who had given refuge to members of the Unitas Fratrum, a persecuted Christian sect known as Moravians. Clemm made a harpsichord for Zinzendorf shortly before joining the Moravians in Berthelsdorf, Zinzendorf's estate in Saxony. Clemm was present at the August 13, 1727, "renewal service," considered the genesis of the Renewed Moravian Church. Although he would soon break with the Moravians, Clemm eventually rejoined the United Brethren in Pennsylvania later in life.[10]

At the age of forty-three and already established as a keyboard instrument maker in Saxony, Clemm emigrated to America and settled in Philadelphia as British North America's first professional maker

9. For a full discussion about the involvement of organ builders in the making of stringed-keyboard instruments, including the application of organ scaling concepts in the earliest stringed-keyboard instruments, see John Koster, "Some Remarks on the Relationship Between Organ and Stringed-Keyboard Instrument Making," *Early Keyboard Journal* 18 (2000), pp. 95–137.

10. For more about John Clemm, see Laurence Libin, "New Facts and Speculations on John Clemm" *The Tracker* 31, no. 2 {1988}, 19—23.

of keyboard instruments. His spinet of 1739, in the collection of the Metropolitan Museum of Art, has been considered his only surviving instrument, although much documentary evidence also survives of the now-lost organ he made for Trinity Church in New York.[11] If Clemm's authorship of the MHS upright piano is accepted, that instrument stands as the best-preserved survivor of his work.[12]

After rejoining the Moravians, some of whom had emigrated to Bethlehem, Pennsylvania, as missionaries, Clemm became best known for training the young David Tannenberg, who became the most celebrated organ builder in early America. As usual in the period, organ builders also made stringed keyboards; recent research by Laurence Libin has turned up three bentside spinets and a clavichord made by Tannenberg.[13] For part of the time Tannenberg was with Clemm, they lived in the Whitefield House, the only known home to the MHS upright piano and today headquarters of the Moravian Historical Society.

With all his celebrity in both Moravian and American keyboard history, and this proximity to the likely origins of the MHS piano, a Clemm attribution might have been suggested much sooner. Yet writers have conspicuously avoided doing so.[14] Clemm, after all, had already died in 1762, well before any pianos are otherwise known in North America. Even considering his earlier decades as a keyboard maker in Dresden, Clemm left Saxony before extensive piano making activity had developed even there. At first look, Clemm simply predates the era of the piano, and attributing the instrument to him is an extraordinary claim that that demands compelling evidence.[15]

11. The spinet is museum accession No. 44.149, described and illustrated in Laurence Libin, *American Musical Instruments in The Metropolitan Museum of Art* (New York: The Metropolitan Museum of Art, 1985) 156–158. For more about Clemm's organ for Trinity Church, see Laurence Libin, "New Facts and Speculations on John Clemm," *The Tracker* 31 no. 2 (1987): 19-23.

12. Comparisons between the surviving Clemm spinet and the MHS piano reveal matching choices of case and soundboard woods and more promising, the same design and size of the case molding. The loss of the spinet's original keyboard, bridge and nut, however, prevent comparisons of those signature details.

13. Libin, "Three Spinets from the Workshop of David Tannenberg," forthcoming in *Early Keyboard Journal*.

14. See for example Libin, "Nazareth Piano," and Koster "Woods."

15. John Koster, however, notes the work of Christoph Gottlieb Schröter, Wahl Friedrich Fickert, and of Gottfried Silbermann, who was beginning to make his first piano a year or so before Clemm emigrated. It is also possible that a piano, among the possessions acquired before 1733 by Christian Heinrich von Watzdorf, might well have been

A Timeline of Influences

The seven questions above and the timeline (fig. 6) provide a framework for understanding the role John Clemm might have played in both the MHS piano and in its place in keyboard history. A timespan of 1690 to 1762 encompasses the first half of the eighteenth century, the life of John Clemm, the beginnings of piano history, and the period when the Renewed Moravian Church formed in Saxony and established settlements in Pennsylvania.

The keystone of this hypothesis is in the seminal events to which Clemm could have been exposed during his formative years in Saxony. Dresden in the early eighteenth century is a time and place mentioned in nearly all histories of the piano.[16] It was the home of Pantaleon Hebenstreit, a flamboyant and wildly popular performer on an outsized version of a hammered dulcimer called in his honor, a *pantalon*. Many wished they could play such an instrument, but too much skill was required. Through his ability to elicit a variety of sounds from his pantalon by using hard or soft mallets, among other techniques, Hebenstreit has been widely credited with influencing the first generation of Saxon piano makers.

In the orbit around Hebenstreit were some familiar musical names. Johann Kuhnau (1660–1722), predecessor of J.S. Bach at *Thomaskirche*, was one of the few who also gained proficiency on the pantalon and left a rare description of Hebenstreit's performances. Famed organ builder Gottfried Silbermann (1683–1753) in nearby Freiberg made pantalons for Hebenstreit. Also in Dresden during the 1720s lived Christoph Gottlieb Schröter (1699–1782), who claimed to have first presented at court, in 1717, the idea of providing a mechanical action to make a pantalon playable from a keyboard. That would make Schröter *ipso facto*, an independent

brought back to Saxony in 1726, after his two-year stay in Florence (see Nicola Schneider, "Christian Heinrich von Watzdorf als Musikmäzen: Neue Erkenntnisse über Albinoni und eine sächsische Notenbibliothek des 18. Jahrhunderts," *Die Musikforschung* 63 [2010]: 20–34). Eva Badura-Skoda, in *The Eighteenth-Century Fortepiano Grand and its Patrons* (Bloomington: Indiana University Press, 2017): 141 ff., has plausibly suggested that this provided the model for Gottfried Silbermann's pianos. (Private communication from John Koster to the author in January 2022).

16. Schröter's claim of inventing the piano in Dresden has been consistently reported throughout piano history. In 1802 in Heinrich Christoph Koch, Musikalisches Lexikon (Frankfurt; R Hildesheim: Olms, 1964); in 1860 by Edward F. Rimbault, *The Pianoforte, its Origin, Progress, and Construction* (London: Robert Cocks and Co.), 108–11; in 1933 by Rosamond E. M. Harding, *The Piano-Forte: Its History Traced to the Great Exhibition of 1851* (Cambridge, England, 1933) 17–23; and continuing in most newer histories.

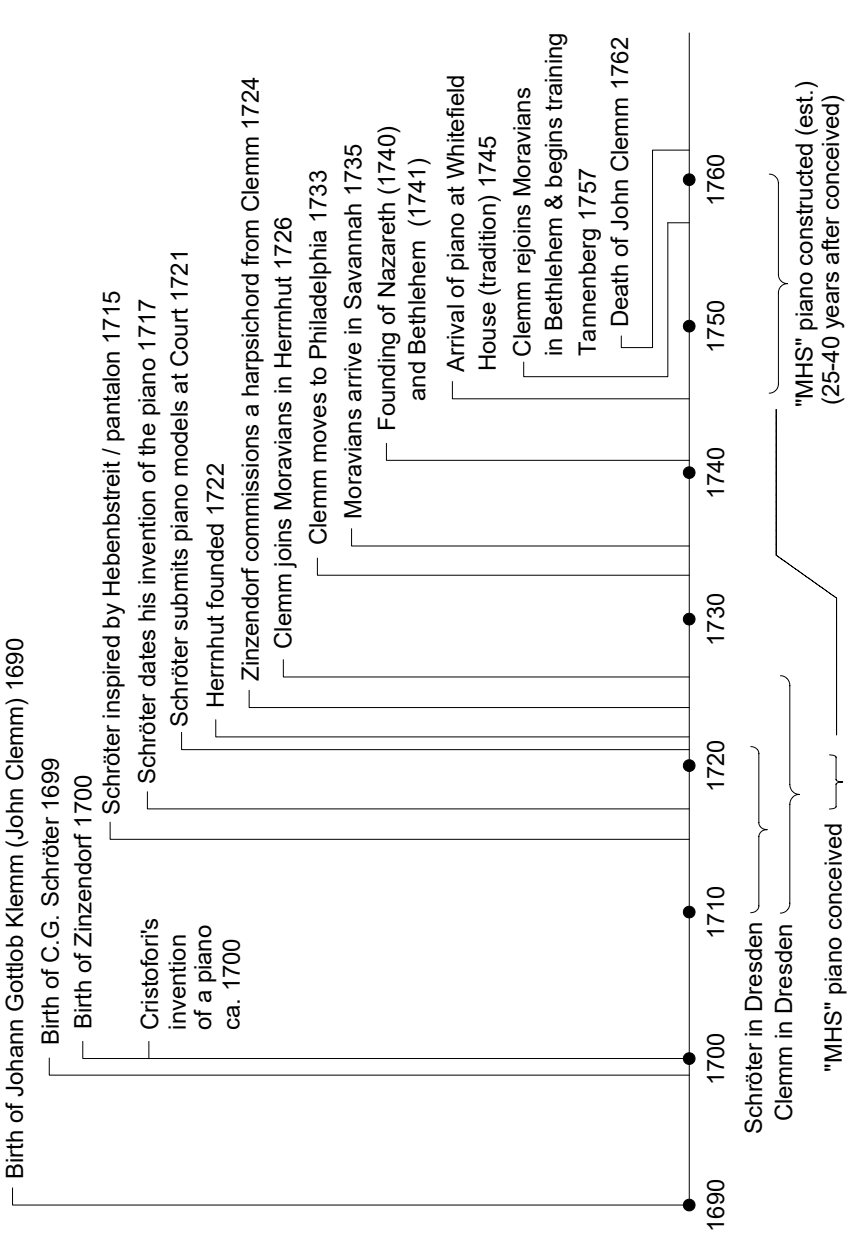


FIGURE 5. Selected dates in piano and Moravian history.

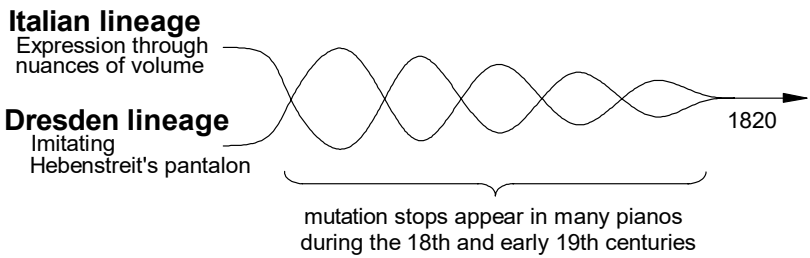


FIGURE 6. Two strands in the development of the piano, based on a thesis proposed by John Koster and greatly developed by Michael Latcham. Diagram by John R. Watson.

inventor of the piano, or so he claimed forty-six years later, adding that his idea had been copied in more than twenty towns already by 1721.[17]

Although it is widely understood, and correctly so, that the piano was invented sometime around 1700 by Italian harpsichord maker Bartolomeo Cristofori, most histories of the piano mention Schröter among others who attempted to claim credit for doing so independently. Dresden, the home base of Hebenstreit, was one of the centers of keyboard instrument making. Whether or not Schröter's claim was based in truth, the pieces were in place in 1720s Dresden to make the idea of a keyboard-controlled pantalon (a piano) almost inevitable, with or without news of Cristofori's invention.[18] By 1731 (about a year before Silberman's first piano), such an instrument, constructed by Wahl Friedrich Ficker of Zeitz (also in Saxony), was announced as having "the character of the *Cymbel* invented by the famous Pandalon [i.e., Pantaleon Hebenstreit] and [it] has been admired and approved by many virtuosi."[19]

17. All of this is detailed with primary sources in Michael Latcham, *Towards a New History of the Piano* (Unterwössen: Musikverlag Katzbichler, 2019): specifically concerning Kuhnau, 13–14; Schröter, 18, 85–86; and Silbermann, 100–02, 124–25. Most current writers are dismissive of Schröter because he was not actually a maker and because his self-aggrandizing claim of inventing the piano came only after the piano became much better established. However, John Koster is not so quick to disregard Schröter's importance, given his presence in 1720s Dresden and other circumstances of his life and experience. Koster's deeper study of Schröter's work and possible contribution is in "Pianos and Other 'Expressive' Claviere in J.S. Bach's Circle," part 3, *Early Keyboard Studies Newsletter* (April 1994): 8–15.

18. After writing these words, I was pleased to discover the same thought, perhaps better articulated by John Koster: "Historically, makers have tended to apply the keyboard to every conceivable source of sound. Attempts to apply a keyboard to the Pantaleon were, then, almost inevitable in Dresden, where Hebenstreit worked." Koster, "Pianos and Other 'Expressive' *Claviere* in J.S. Bach's Circle," part 1, *Early Keyboard Studies Newsletter* (October 1993): 6.

19. John Koster, "The Quest for Bach's Clavier: An Historiographical Interpretation," *Early Keyboard Journal* 14 (1996) 78–79.

Some definition of terms is required. Even since the eighteenth century, writers have occasionally chosen to call these Hebenstreit-inspired pianos *pantalons*, sometimes going to lengths to differentiate what characteristics are always or usually found in pianos, versus pantalons.[20] Pointless debate ensues as the lines between these types shift and blur. The present article adopts the term *piano* for any keyboard instrument that makes its sound by striking the strings with hammers, and the term *pantalon* denoting a type of large, hammered dulcimer without keyboard.

Two Lineages

Most older histories of the piano treat the pantalon-inspired piano as a short-lived experiment, soon overtaken by Cristofori's superior invention. More-recent histories have given greater significance to pantalon-inspired pianos, such as John Koster's research into the instruments known to J. S. Bach. Koster suggested that any such consideration needed to accommodate "two major, basically unrelated, categories of hammer-action instruments, that of the keyed Pantaleon and that represented by Gottfried Silbermann's piano et forte," the latter being based partly on Cristofori's model.[21] In an earlier article, Koster introduced Hebenstreit's role in the development of the piano, noting "a tributary stream which was present in Germany before the Italian maker's work became known there and which long remained influential."[22] The idea of Cristofori as originating the main stream of piano development, with the pantalon-inspired type as a tributary stream, was independently developed and taken further by Michael Latcham, who considers the influence of the pantalon-inspired piano to be a long-lived second lineage that intertwined with the Cristofori concept. This distinct German point of origin remained influential in piano design into the second decade of the nineteenth century, interpreted graphically in fig. 7.[23]

20. See, for example, Michael Cole, "The Pantalon—and What it Tells Us," *Keyboard Instruments–Flexibility of Sound and Expression*, ed. Thomas Steiner (Publications de la Société Suisse de Musicologie, ser. II, vol. 44): Peter Long, 2004), 63–88.

21. Koster, "Quest for Bach's Clavier," 76.

22. Koster, "Pianos and other 'Expressive' Claviere in J.S. Bach's Circle" Part I, 3.

23. Latcham, *New History*. That Latcham mentions Hebenstreit nine times within his three-page epilogue illustrates that Latcham traces Hebenstreit's influence throughout that history.

FIGURE 7. Detail of hammers and dampers in the reproduction. The top damped note (f#) is shown striking the strings, as the brass-tipped side of the hammer makes contact. The dampers are held by stiff wires attached directly to the hammers. Photograph by John R. Watson.

Besides introducing the possibility of dynamic nuance through touch, as did Cristofori, the pantalon parentage contributed two characteristics to pianos in the eighteenth century. First, in imitation of Hebenstreit's variety of hard and soft mallets, was the ability to select from more than one type of sound using hand stops, knee levers, or pedals. The other pantalon characteristic adopted by pianos was to provide the option of no damping, whether or not dampers existed for optional use.

The pantalon lineage thus intertwined with the Cristofori lineage over the next hundred years before musical taste settled on Cristofori's concept: that pianos offer expressiveness through dynamic nuance and not through a variety of sounds. Yet perhaps the survival of a pedal to eliminate all damping, not envisioned by Cristofori, could be considered a remnant of the Dresden strand, still alive in the modern piano.

The stage is now set: Dresden was the nexus in the 1720s of the highly popular and influential virtuoso Pantaleon Hebenstreit; and a cohort of keyboard instrument makers and players including Gottfried Silberman, the Gräbner family, Christoph Gottlieb Schröter; and a thirty-year old keyboard maker named Johann Gottlob Klemm. It is my thesis that, in

FIGURE 8. The playable reproduction shown on exhibit in the Whitefield house with the original instrument visible in the next room. Photograph by Grace Boak, used by permission.

this constellation of circumstances the idea for such an instrument was conceived, and found its way, within Clemm's mind, to the Pennsylvania frontier.

Clemm Makes a Piano

Twenty years after his formative period in Dresden in the 1720s, Clemm was still an active keyboard instrument maker, now relocated to Pennsylvania and having connections to the Moravians. As early as 1745 or early 1750s, a decade or two after leaving Saxony, Clemm could have gotten around to making a Hebenstreit-inspired keyboard instrument (piano) in the only way he understood such an instrument. He achieved Hebenstreit's variety of sound types by giving the player the ability to change whether the hammers strike the string with a soft leather tip, or with their hard brass tip (see fig. 8). Clemm would already have been

familiar with the *Lautenzug* stop in clavichords, in which brass tangents are half covered with leather; a shift of the keyboard then aligns one or the other half of each tangent to touch the strings. He was not sure about whether to include any dampers (Hebenstreit's pantalon did not have any), and although he also designed many more of the hammers to accommodate dampers, he ended up only installing dampers on less than half, being sure to provide a hand stop to eliminate their effect.

When it came to laying out the string lengths, the old artisan used design principles he had learned in his youth in the early part of the century—principles that were already old-fashioned. Here we encounter a particularly intriguing and telling clue about the maker of the MHS upright piano.

Attribution of the piano to John Clemm provides plausible answers to all seven questions posed above, and I find no other candidate scoring so high by that criterion.[24] Still, none of the physical and circumstantial evidence presented above constitutes proof, nor does anything serve as proof that Clemm could *not* have made the instrument. If attribution to Clemm is correct, the instrument sheds much light on America's first professional keyboard instrument maker. Moreover, a construction date before 1762 (the year of Clemm's death) makes the MHS piano the oldest known surviving piano of any form made in England or America, and one of the very few surviving progenitors representing the beginnings of the Dresden lineage of the piano.[25]

24. It is beyond the scope of this article to consider alternatives to a Clemm attribution for the MHS piano, and it is hoped these findings will be scrutinized in the future. A sixty-page "Report on the Research and Reproduction of the Early Upright Piano in the collection of the Moravian Historical Society," by this author with Tom and Michele Winter, is on file at the MHS. It offers measured drawings and many more technical details about the original instrument and explores a number of alternative attributions, though none emerged more plausible than Clemm.

25. The only possibly earlier such example is also in upright form and rather similar to the MHS piano. It is accession no. 106 in the Grassi Museum für Musikinstrumente der Universität Leipzig, via the Paul de Wit and Heyer collections. The veracity of the 1735 date marked on its top key has sparked some debate but cannot be discounted. The instrument is illustrated and described in Koster, "Pianos and Other 'Expressive' *Claviere* in J.S. Bach's Circle" Part II (January 1994): 5–6. That passage proceeds directly to Koster's brief description of the MHS upright and mentions parenthetically a circumstantial relationship with the Saxon immigrant, John Clemm. Koster thus assembled already in 1994 the circumstances further connected in the present article, but stopped short of suggesting attribution to Clemm.

The Reproduction and Conclusion

There are many reasons for making a reproduction of a non-playing original instrument, even beyond the obvious and compelling benefits of experiencing all the sensations such an object has to offer our ears, hands, and eyes. The process of making a close copy of an instrument from another time and culture also forces a level of perception and experimental analysis of the original that is impossible by measuring alone. Any artifact is a physical result, not only from an a priori plan of the maker, but also from the negotiation between makers and their tools, materials, experience, and skill, all within the economic and cultural world in which they worked. We can only have access to surrogates of some of those elements. Making a close copy can reveal clues about the other elements that cannot be understood simply by observation, creating a new and surprisingly detailed perspective on the past. Some unexpected design details, for example, may become understandable only after attempting what we might think is a more logical approach. Moreover, putting oneself in the shoes of an unnamed artisan of the distant past, and struggling to solve the same practical workshop challenges she or he confronted centuries earlier cannot help but energize our curiosity and perhaps provide some insight into their world, and perhaps also who they were and how they thought.

After a two-week, on-site examination in November 2019, and over the course of 2020, Tom Winter and I made that reproduction, with Tom constructing keys and mechanical parts and I the remainder of the instrument. The new reproduction now gives voice, virtually, to the original instrument, which stands a few feet away on exhibit at the Moravian Historical Society in Nazareth (fig. 9). The satisfaction of completing the project brought to mind the first encounter many members of the American Musical Instrument Society had with the MHS upright. It was the 1991 meeting of the AMIS and a presentation about the instrument by Laurence Libin while standing in front of the original instrument at the Whitefield House. After hearing so much fascinating detail about the instrument, the inevitable question thought by all and asked by one: "What does it sound like; can you play a few notes?" I distinctly remember the answer, because it taught me, a fledgling curator at the time, something about respect for historic instruments. Libin demurred, insisting that a few feeble notes from an unrestored instrument would give the wrong impression, and be unfair to the instrument and its maker. It

has taken thirty years, but we now can hear how it might have sounded in its prime.

We can only imagine the impression the instrument might have made on the group of eighteenth-century Pennsylvania Moravians hearing a piano for the first time. Its close relationship with the hammered dulcimer would have given it similarities of timbre. At times, it would have sounded somewhat like a harpsichord with a similar volume, sustain, and incisiveness of attack, but capable of dynamic nuance and playing with little or no damping. At times it could sound like a clavichord, but louder and without the immediate and extreme damping of a clavichord. With the leather-covered part of the hammer set to sound, the instrument would have sounded like the rarer type of clavichord with *Lautenzug* stop (leather covered tangents) but without damping. In any case, the instrument must have been even more a curiosity and a revelation to them as it is for us.

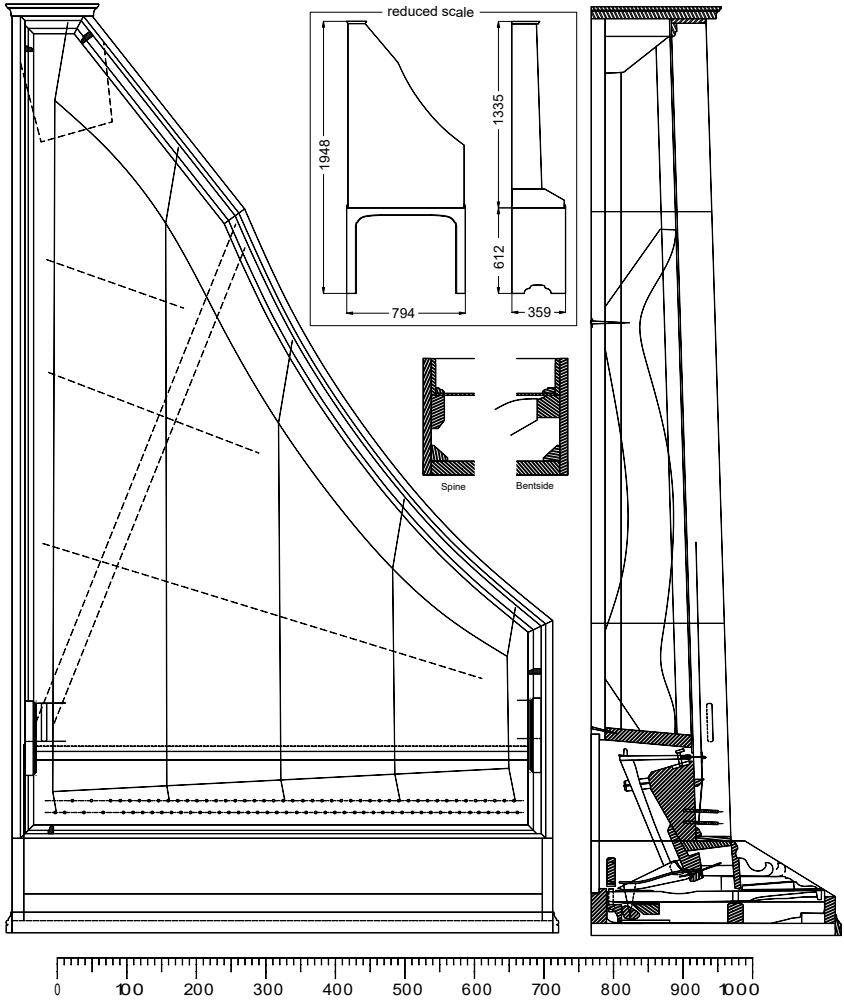
We think we have uncovered much new about the oldest known American-made piano and its likely authorship by John Clemm. We hope, however, that more will be learned, and that our various research reports will aid future investigators. Much may emerge from the Moravian archives, where the instrument is sure to have been mentioned more than once, and more may be learned in the future with clues from dendrochronology.[26] Meanwhile, the new reproduction stands ready to help us discover more about the uses to which the original instrument might have been put.

I thank Tom and Michele Winter for their documentation of the mechanical action and for involving me in the reproduction project and for their camaraderie throughout. Moravian Historical Society Executive Director Susan Ellis has been a strong and faithful supporter of the research. I thank Michael Latcham and John Koster, who encouraged the preparation of this article and whose works on keyboard history gave the context that most illuminate the meaning and origins of the MHS upright piano. As already mentioned, the warmest thanks goes to Laurence Libin for his encouragement and guidance throughout the project.

26. With the assistance from dendrochronologist Michael Worthington, we attempted to date the instrument using tree-ring growth evidence from the soundboard and backboard wood. Dendrochronology relies on tree-ring databases specific to given species in specific regions. Our attempts were thwarted by the lack of sufficient historical tree-ring growth data for Atlantic white-cedar in the region.

Appendix 1

Overall front and side elevations of the MHS piano, showing internal elements. All drawings are to scale as shown at bottom, except the smaller inset drawing on which overall dimensions are marked.



Appendix 2

Table with the sounding length of all strings and their strike points. All measurements are in millimeters.

Note Number	Note Name	String Length	Strike Point
1	C	994.5	50.1
2	C♯	984	50
3	D	972	49.3
4	D♯	960	48.6
5	E	946.5	47.9
6	F	933	47.2
7	F♯	917.5	46.5
8	G	901	45.8
9	G♯	886	45.1
10	A	868	44.4
11	B♭	848.5	43.7
12	B	829.5	43
13	c	807.5	42.3
14	c♯	786.5	41.6
15	d	762.5	40.9
16	d♯	739	40.3
17	e	711.5	39.6
18	f	684.5	38.9
19	f♯	657	38.2
20	g	629.5	37.5
21	g♯	603.5	36.8
22	a	579	36.1
23	a♯	556	35.4
24	b	532.5	34.7

Note Number	Note Name	String Length	Strike Point
25	c^1	510.5	34
26	$c\sharp^1$	488.5	33.3
27	d^1	467	32.6
28	$d\sharp^1$	448	31.9
29	e^1	429.5	31.2
30	f^1	410	30.5
31	$f\sharp^1$	392	29.8
32	g^1	376	29.1
33	$g\sharp^1$	359	28.4
34	a^1	341	27.7
35	$a\sharp^1$	324.5	27
36	b^1	309.5	26.3
37	c^2	292.5	25.6
38	$c\sharp^2$	278	24.9
39	d^2	265	24.2
40	$d\sharp^2$	251.5	23.5
41	e^2	239.5	22.8
42	f^2	226.5	22.1
43	$f\sharp^2$	215	21.4
44	g^2	206.5	20.7
45	$g\sharp^2$	196	20
46	a^2	186	19.3
47	$a\sharp^2$	176	18.6
48	b^2	168	17.9
49	c^3	159	17.2