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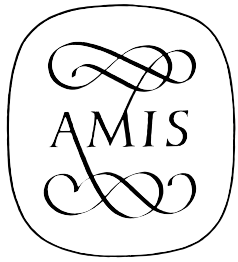

German Square and Harp-Shaped Pianos with *Stoßmechanik* in American Collections: Distinguishing Characteristics of Regional Types in the Eighteenth and Early Nineteenth Centuries*

Sabine K. Klaus

This essay is the continuation of an article published in the 1998 issue of this Journal, in which I discussed the regional distribution of certain characteristics of German square pianos with *Prellmechanik*.[1] Here I will describe several types of German square and harp-shaped pianos with *Stoßmechanik*, an action in which the hammer is pivoted independently from the key on a separate rail (fig. 1).[2] Such pianos fall into two fundamentally different categories, namely instruments in which the hammers point toward the player and instruments in which the hammers point away from the player. Each of these two main types can in turn be subdivided into actions without escapement (i.e., with a rigid jack) and instruments with escapement (in which the jack is movable).

Because some of these action types cluster quite noticeably in certain regions within the German-speaking countries, a description of their particular features can be used as a tool for establishing the possible provenance of unsigned instruments. Also, some action types are often connected with other specific constructional details, which I will describe with particular attention to their value for supporting attributions to specific makers.

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1. Sabine K. Klaus, "German Square Pianos with *Prellmechanik* in Major American Museum Collections: Distinguishing Characteristics of Regional Schools in the Late Eighteenth and Early Nineteenth Centuries," this Journal 24 (1998): 27–80.

2. A glossary of terms used throughout this article can be found in John Koster, *Keyboard Musical Instruments in the Museum of Fine Arts, Boston* (Boston: Museum of Fine Arts, 1994), 333–43.

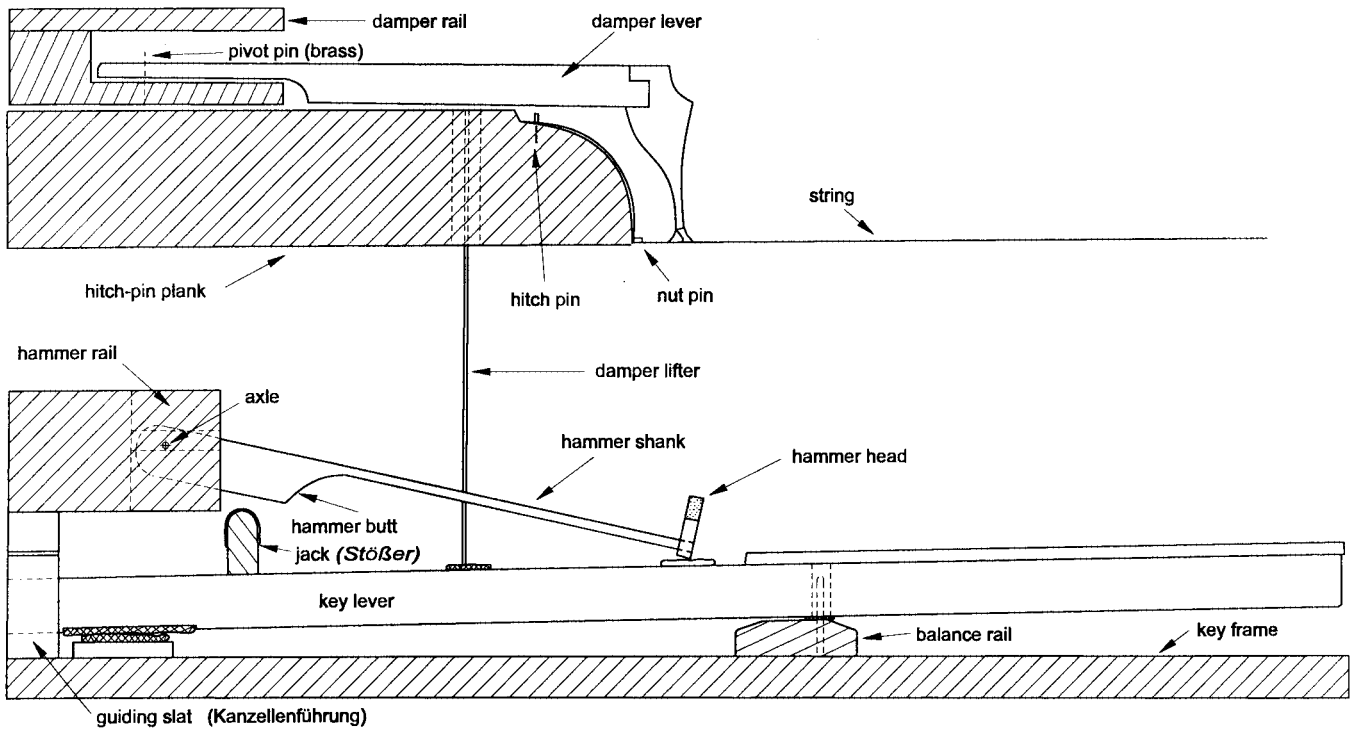

Figure 1. Parts of a *Stoßmechanik*. Drawing: Sabine Klaus, redrawn for publication by John Watson.

The main focus of this article will be on instruments currently located in American museums and private collections, but for comparison, and to provide a better understanding of their context, similar instruments in European collections will also be considered. While the following discussion concentrates on square pianos and their derivatives, a few closely-related grand pianos are also included in order to give a more complete picture of regional characteristics and shine some light onto possible attributions.

The different types of *Stoßmechanik* mentioned above are all in one way or another related to the piano action invented by Bartolomeo Cristofori (1655–1732). This does not necessarily mean, however, that they were all developed directly from Cristofori's concept, either at first-hand or through a sequential line of descent. Instead, it seems more likely that these variant action types were invented and reinvented independently and by many different makers at about the same time, during the first half of the eighteenth century. The principle of building an instrument as simply as possible—both for ease of construction and for the sake of economy—seems to have inspired many makers of unpretentious square pianos, especially in poor, German-speaking areas in the eighteenth century. This was therefore a more important reason for changes in the construction of piano actions than the desire to improve them purely in terms of engineering efficiency, for example by omitting certain parts and constructing them in a more modest manner.

Cristofori's action consists of three main parts (fig. 2): (1) the jack, pivoted on the key, with its bottom end protruding through the bottom of the key; (2) the intermediate lever, pivoted independently from the key on a rail, and pointing toward the player; and (3) the hammer, hinged on a second rail and pointing away from the player.[3] As we shall see, two different simplifications of this system can be observed in German square pianos and related instruments, in both cases using only two main moving parts instead of three. In the first of these, the hammer head itself points toward the player (fig. 3): compared with Cristofori's action, the hammer is omitted and the intermediate lever is

3. The axis of the leverage formed by the key and the jack is the balance point, a. The axis of the intermediate lever is its pivot on the back rail, b. The arc or radius of the movement of both parts is opposed. Therefore, while moving, they touch each other only for a moment, after which they release, because their intersecting arcs no longer coincide.

replaced by the hammer.[4] The second possible method for simplifying the Cristofori action is to omit the intermediate lever entirely (fig. 4), with the result that the hammer head points away from the player.[5]

Pianos with Hammer Heads Pointing Toward the Player, without Escapement

Square pianos having a *Stoßmechanik* without escapement and with hammer heads pointing toward the player were widespread in the last quarter of the eighteenth century, and many such instruments are preserved in museums and private collections (those to be discussed here are listed in table 1). They seem to have been particularly popular in Upper Swabia in southwestern Germany, between the Danube River and Lake Constance (see map, fig. 5).

Often this action is found in an instrument with a harp-shaped case that strictly follows the shape of the string band. Some of these instruments show an amazingly high degree of standardization, suggesting that they might have been made by the same person, although none of them shows a maker's signature. This group of harp-shaped pianos, which I will refer to as the "standard model," has the following characteristics:[6]

- The front part of the case is concave rather than straight, and contains two tool box compartments.
- The front wall is lower than the other walls.
- The soundboard extends all the way through to the left side wall, covering the complete keyboard behind the nameboard (instead of ending to the right of the keyboard at the belly rail, as is otherwise common in eighteenth-century clavichords and square pianos). This requires a gap for the hammers behind the soundboard and in front of the hitchpin plank.

4. The movement of the hammer is therefore the same as the movement of the intermediate lever described above, with the result that the jack releases the hammer butt automatically when their arcs no longer coincide.

5. Although this seems to be the more obvious simplification, the resulting movement is quite different from Cristofori's action. The radii of both the jack and the hammer point toward the back, and there is no moment of automatic release.

6. Three examples of this type of instrument may be found at the Germanisches Nationalmuseum (GNM) in Nuremberg, inventory numbers MINe 162, MIR 1136, and MIR 1137. Pictures of these pianos can be found in Michael Günther, "Wer baute die Tafelklaviere in Form einer liegenden Harfe?" *Musica Instrumentalis* 2 (1999): 83–102.

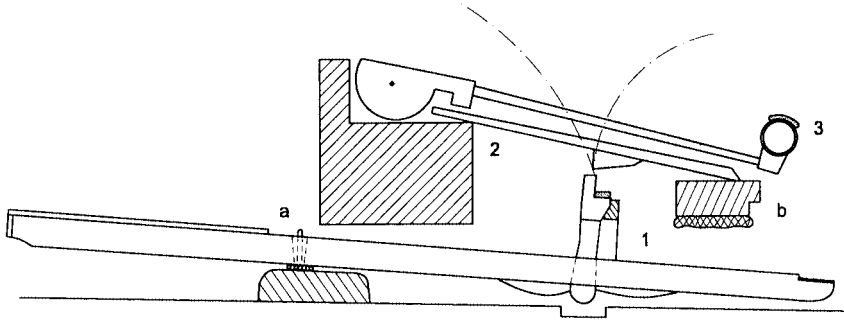

Figure 2. Action after Bartolomeo Cristofori. The arcs show the movement of the jack and the intermediate lever. Drawing: Sabine Klaus, redrawn for publication by John Watson.

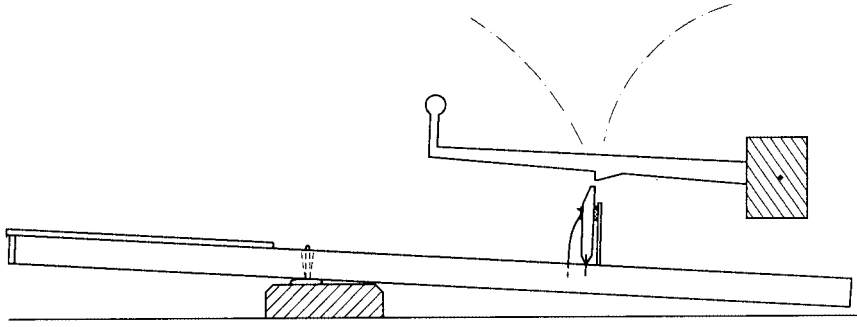

Figure 3. *Stoßmechanik* with hammer head pointing toward the player. The arcs show the opposed movement of the jack and the hammer. Drawing: Sabine Klaus, redrawn for publication by John Watson.

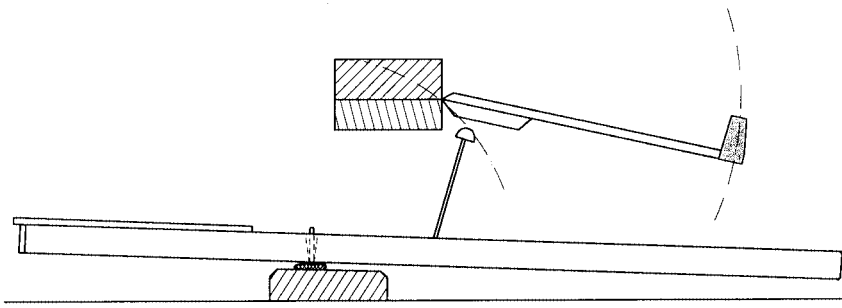

Figure 4. *Stoßmechanik* with hammer heads pointing away from the player. The arcs show the synchronous movement of the jack and the hammer. Drawing: Sabine Klaus, redrawn for publication by John Watson.

Table 1. Harp-shaped, square, and grand pianos with *Stoßmechanik* and hammer heads pointing toward the player, without escapement (in order mentioned)

Maker	Origin	Date	Present Location*
A. Harp-shaped pianos			
unsigned	South Germany	late 18th C.	Nuremberg, GNM, MINe 162
unsigned	South Germany	late 18th C.	Nuremberg, GNM, MIR 1136
unsigned	South Germany	late 18th C.	Nuremberg, GNM, MIR 1137
Maucher	Constance	1797	Vermillion, Shrine, no. 4570
Maucher	Constance	late 18th C.	Constance, Rosgartenmuseum, 1995/101
unsigned	South Germany	late 18th C.	New York, MMA, 89.4.2910
unsigned	South Germany	late 18th C.	Boston, Sigal coll., 1972.2
unsigned	South Germany	late 18th C.	England, Colt coll., M 512 G
unsigned	South Germany	late 18th C.	Munich, Deutsches Museum, 1910-27419
unsigned	South Germany	late 18th C.	Switzerland, private collection
B. Square pianos			
Socher?	Sonthofen?	1742?	Nuremberg, GNM, MINe 156
unsigned	South Germany	c. 1800	New York, MMA, 89.4.3254
unsigned	South Germany	1802	Nuremberg, GNM, MIR 1159
J. ?	Schnezenhausen?	1820?	Nuremberg, GNM, MINe 164
unsigned	South Germany	late 18th C.	Nuremberg, GNM MINe 165
Hassener?	South Germany	1831?	New Haven, Yale U., 4961.00
C. Grand pianos			
Schmahl?	Ulm?	1775?	Lautlingen, no. 46
unsigned	South Germany	18th C.	Washington, D.C., Smithsonian 315.750

**Abbreviations:*
GNM = Germanisches Nationalmuseum; MMA = The Metropolitan Museum of Art

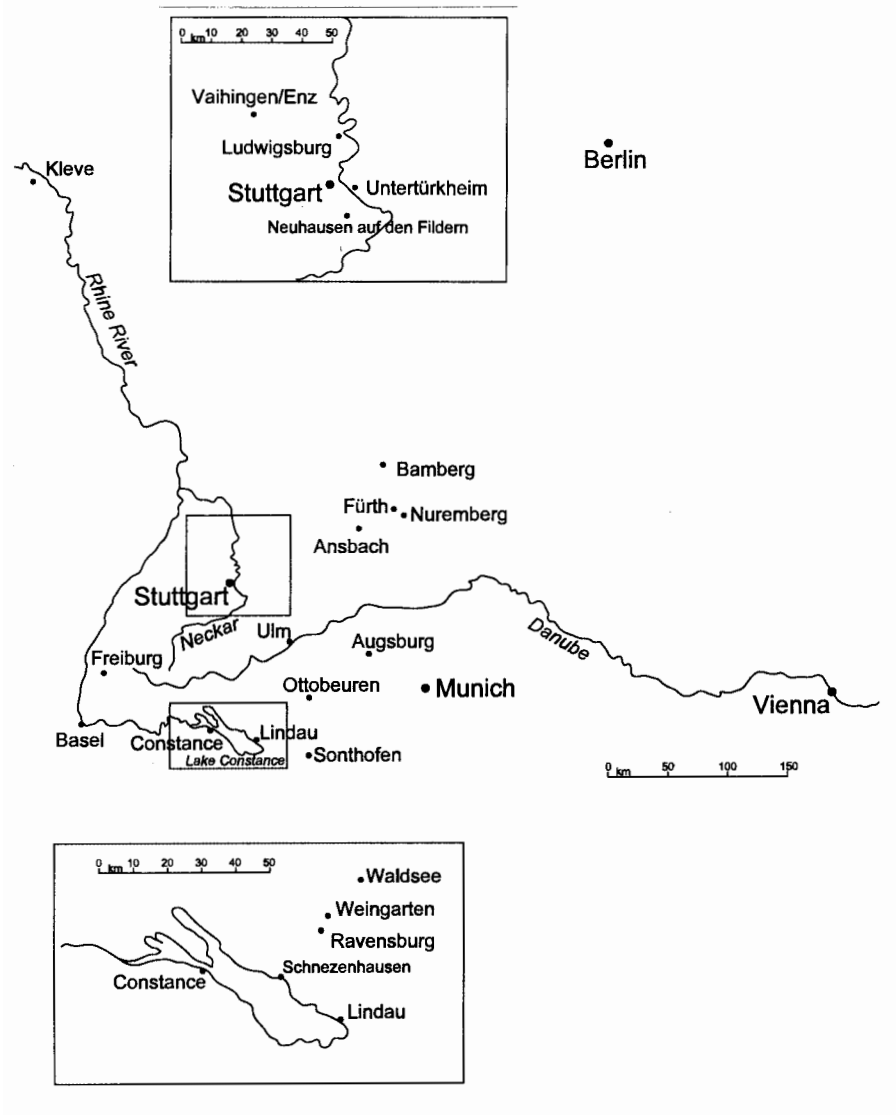

Figure 5. Map showing places of origin of the instruments and makers discussed. Drawing: Sabine Klaus, redrawn for publication by John Watson.

- The action is taken out through an opening in the spine.
- The soundboard bridge is rather flat and has two rows of bridge pins. In the treble the back pins change direction, resulting in a different angle of side bearing at a certain point.
- The instruments are single strung, have a compass from C to f^3, and a c^2 speaking length of c. 285 mm.
- Very characteristic is a thick quarter-round hitchpin plank above soundboard level with hitchpins on its upper edge and a set of pins serving as nut pins at its lower edge.
- The piano's lid is not fastened to the spine but to the above-mentioned hitchpin plank, and is set forward slightly.
- White paper, embossed with diamonds with or without a central dot, is used to decorate the key fronts.
- The key frame has an extremely broad front ledge, extending all the way to the balance rail.
- The keys are guided in a box-guide or *Kanzellenführung*, in which upright wooden slats stand between the rear ends of the keys. These slats are carefully padded with white leather.
- The *Stoßmechanik* is very simple, with all the hammers being pivoted in a comb-like rack by a single strong cord. (This is the most striking feature this group of instruments has in common.)
- The hammer heads have no leather or felt covering, but strike the string with bare wood, giving a bright sound.
- The instruments have no individual dampers, being equipped instead with a so-called "harp stop." This is a curved ledge, fitted on the underside with woolen or cloth fringes which touch the strings in the area of the bridge and mute them.
- A piano stop is often present, which causes a softer sound by introducing a cloth strip between hammers and strings.
- The different stops are operated by hand levers and can therefore only be used for an entire movement, or else changed after a relatively long pause. (Knee levers to allow their operation while playing are found on later instruments, however.)

In addition to this group of standard-model harp-shaped instruments, there is a larger group of pianos having some of the above-mentioned features, but lacking others. At least four instruments of the latter type can be found in American museums and private collections: two at The Metropolitan Museum of Art (MMA) in New York, one at America's

Shrine to Music Museum in Vermillion, S.D. (Shrine), and one in a private collection near Boston (Boston). Each of these four instruments (one of which is square rather than harp-shaped), although following in principle the standard model just described, clearly proves to be by a different maker, as will be discussed in detail. They therefore support the suggestion that the harp-shaped piano was only a pattern (or a concept) used by many different makers and not exclusively by any one person, as has sometimes been claimed.

Harp-shaped Pianos by Gottfried Maucher. Only one of these four instruments immediately reveals its provenance: Shrine 4570, which is signed by the organ and stringed keyboard instrument maker Gottfried Maucher of Constance. Figure 6 shows the paper label glued onto the soundboard in the area of the tuning pins and bearing the handwritten ink inscription "*Gottfrid Maucher / Konstanz. 1.7.9.7.*" A similar inscription as regards both location and writing can be found on an instrument in the Rosgartenmuseum in Constance (1995/101); although the last name and the date are illegible, its signature clearly identifies the same maker.[7]

Gottfried Maucher was born in 1736 or 1737 in Waldsee (today Bad Waldsee, near Ravensburg, Baden-Württemberg).[8] On 28 August 1773 he applied for permission to live in Constance and to work there as an organ maker.[9] He might have been a pupil of Joseph Gabler (1700–1771),[10] or the organ maker Hieronymus Spiegel (1699–c. 1779), who lived in Waldsee from 1772 onwards.[11] We know that by 1781 he had finished a fortepiano for a customer in Freiburg in Breisgau (which was later exchanged for a clavichord from his workshop),[12] and that another new fortepiano by Maucher was offered to the same person in 1785.[13]

7. Marco Tiella, "Un fortepiano firmato Gottlilieb [sic] W [. . .], Constanz [. . .]," *Strumenti per Mozart*, ed. Marco Tiella and Romano Vettori (Rovereto: Longo Editore, 1994), 151–54.

8. Stadtarchiv Konstanz (StadtA KO), CI/28, Ratsprotokoll, 4 September 1773, and J XII/66. However, Gottfried Maucher is not recorded in the Waldsee baptism registers of the years 1736 and 1737, according to information provided by the Pfarramt St. Peter, Bad Waldsee.

9. StadtA KO, CI/28, Ratsprotokoll, 28 August and 4 September 1773.

10. Friedrich Jakob, *Die große Orgel der Basilika zu Weingarten. Geschichte und Restaurierung der Gabler-Orgel* (Männedorf: Kuhn, 1986), 35.

11. Hermann Fischer and Theodor Wohnhaas, *Lexikon süddeutscher Orgelbauer* (Wilhelmshaven: Florian Nötzel, 1994), 397–98.

12. StadtA KO, HX/2418, Blatt 15.

13. Ibid., Blatt 24.

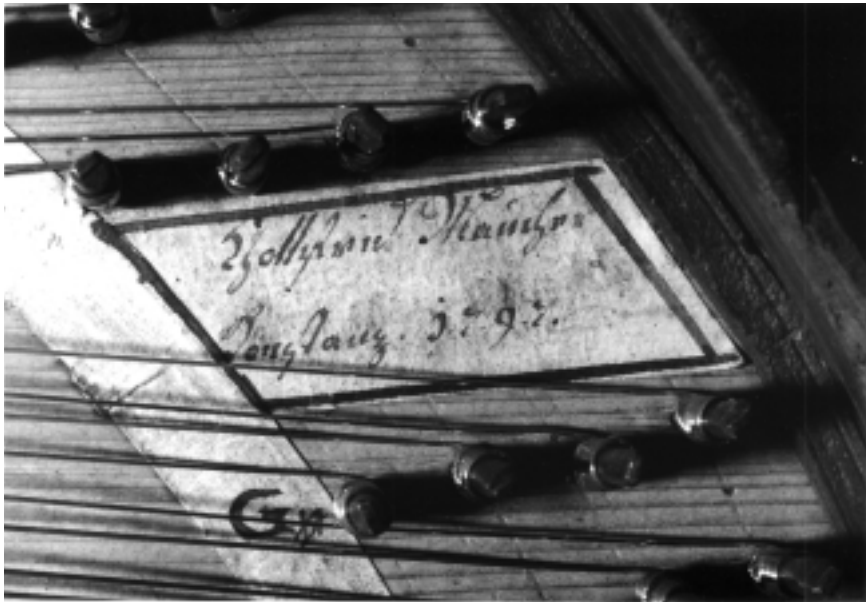

Figure 6. Signature of the harp-shaped piano by Goffried Maucher, Constance, 1797. America's Shrine to Music Museum, The University of South Dakota, Vermillion, no. 4570. Board of Trustees, 1989. Photo: Simon Spicer.

Maucher died at the age of 93 on 23 October 1830.[14] Beyond these sparse archival records, his work as piano builder is documented only through the two instruments mentioned in the previous paragraph, which are illustrated in figures 7 and 8. Both show a clear connection to the standard model, most notably in the use of a harp-shaped case. However, not only do they differ from it in a number of features, but in fact their outlines are not exactly the same, the instrument in Constance having a more elegant curve and the Shrine's piano a clumsier one (see fig. 9).[15]

Both pianos have the characteristically thick hitchpin plank above soundboard level, on which the hitchpins are arranged along a scribe line a few millimeters below its top edge. Only the Shrine's piano shares

14. StadtA KO, JXII/77.

15. The instrument at the Shrine has an even clumsier appearance in its present condition since the bentside is detached from the wrestplank which indicates the original shape of the case.

Figure 7. Harp-shaped piano by Goffried Maucher, Constance, 1797. America's Shrine to Music Museum, The University of South Dakota, Vermillion, no. 4570. Board of Trustees, 1989. Photo: Simon Spicer.

Figure 8. Harp-shaped piano by Gottfried Maucher, Constance. Rosgartenmuseum, Constance, no. 1995/101. Photo: Sabine Klaus.

the single-strung arrangement with the standard model; the instrument in Constance is double strung. Neither of Maucher's pianos has a soundboard extending the whole length of the instrument, as might be expected; and instead of a concave front part, they have a front wall the same height as the other walls. However, the main lid is fixed to the hitchpin plank in both cases, as in the standard model.

Closer examination of the two Maucher pianos reveals that they share a number of workshop characteristics. The bottom board consists of a thick conifer plank, measuring 50 mm in the instrument in Constance and 58 mm in the Shrine's piano, in both cases glued together from two smaller pieces. Both pianos have concave moldings cut into the edges of the bottom board and no braces. Similar and very characteristic is the construction of the case walls, which are of walnut and are glued on top of the bottom board plank, not to its sides. The bentside is extremely thin (2.5 to 3.5 mm in the instrument in Constance and 4 to 5 mm in the one at the Shrine), so it is not surprising that it is now damaged in both instruments. The arrangement of the case joints is the same in both pianos: bentside and front wall are connected by hidden dovetails or finger joints; rabbet joints are found between the front wall, the cheeks, and the left side wall; and the two parts of the spine are connected with each other, with the left side wall, and with the bentside by means of butt joints. Except for the dovetails, all joints are secured by wooden nails or dowels. The lid of the tool box is ornamented in both instruments (fig. 9).

The conifer soundboard covers the wrestplank, with its wood grain running parallel to the front wall, and the ribs are cut out in the area of the bridge. The bridges of Maucher's pianos are slender and tall, considerably different from the rather flat-topped design found in the standard model. Moreover, they are double-pinned only from FF to g^1 (Constance) or from FF to B (Shrine) instead of throughout, with the necessary side-bearing of the strings in the tenor and treble area being achieved by the positioning of the tuning pins. The result is a gap in the field of the tuning pins between the double- and single-pinned areas of the bridge. This gap is large enough for the maker's label in the piano at the Shrine.

Both Maucher pianos have a compass of FF to f^3, with a c^2 speaking length of 271 mm for the longer string and 265 mm for the shorter one (Constance) or 280 mm (Shrine), respectively. Pythagorean scaling is observed only between c^1 and c^2 in the instrument in Constance, while

Figure 9. Plan view of the harp-shaped piano by Gottfried Maucher, 1797. America's Shrine to Music Museum, The University of South Dakota, Vermillion, no. 4570. Board of Trustees, 1989. Photo: Simon Spicer.

the strings foreshorten throughout the entire compass in relation to c^2 in the Shrine's piano (see table 2). Gauge numbers are written in ink onto the key levers of the Shrine's instrument.[16]

Since the soundboard does not extend over the keys in either of Maucher's pianos, there is no need to take out the keyframe through an opening in the spine, and it is therefore taken out at the front. The keys are guided by slips of wood (Constance) or horn (Shrine), moving in a rack with slots at the rear of the key frame, a system which differs considerably from the standard model's box-guiding or *Kanzellenführung*. Maucher's key guiding system is in fact quite ancient, following the German clavichord tradition. The keys' upwards movement is limited by an overrail at the back, whose cloth padding, sewn onto a leather strip, might well be original in the Shrine's instrument.

The next similarity to the standard model is the action found in Maucher's pianos (fig. 10), consisting of a simple, non-escapement *Stoßmechanik* with hammer heads pointing toward the player. But the action of both his pianos deviates from that model in similar ways: the hammer shanks are flat (about 10 mm wide at the back and only 3 mm thick) and are not hinged by means of a common string or cord, but rather by means of individual leather strips. In the instrument in Constance the hammer heads rest on a leather pad glued onto the key

16. FF to AA: 2/00; AA♯: 2 or 3/00; BB: 3/00; C to F: 3/0; F♯ to G♯: 00; A to c: 0; c♯ to a: 1; a♯ to $g♯^1$: 2; a^1 to f^3: 3.

Table 2. String lengths and striking points of the two harp-shaped pianos by Gottfried Maucher (in millimeters)

	Constance*	Shrine†
FF	1146 (63)	1032
C	1048 (63)	919
c	850 (47)	711
c^1	539 (35)	489 (23)
c^2	**271 (27)**	**280**
c^3	127 (16)	125
f^3	106 (13)	91

*Only the longer string per note is given for the double-strung instrument in Constance.

†Only a few exact striking points can be provided for the piano at the Shrine (only one of them in connection with a c-string), since most of the hammers are missing.

Figure 10. Keyboard and action of the harp-shaped piano by Gottfried Maucher. America's Shrine to Music Museum, The University of South Dakota, Vermillion, no. 4570. Board of Trustees, 1989. Photo: Sabine Klaus.

lever (in the bass) or onto a little additional wooden block (in the treble). The Shrine's piano has a hammer rest rail with guiding pins for the hammer shanks, part of a removable action frame. The few preserved hammer heads of the Shrine's instrument show two layers of old leather. Since there is a piano stop, which will be described below, the hammers' padding might not be original.

Neither of Maucher's pianos has individual dampers, or any signs that they ever had them. Hints of the former presence of a harp stop can be seen in the Shrine's piano in a hole at the bentside, an iron hook at the hitchpin plank, and a wedge-shaped device in the soundboard compartment, which is connected with a hand stop at the right keyboard side wall (fig. 9). The harp stop itself, now lost, consisted of a batten following the shape of the bridge, with cloth or plush attached to its underside. The harp stop of the instrument in Constance is a replacement; the original seems to have been operated by a knee lever pivoted in a cutout of the bottom board, meaning that it was possible to operate it while playing. The harp stop caused the damping of all strings at once, thus effectively substituting for lack of individual dampers. The second stop on the Shrine's instrument is a piano or moderator stop, consisting of a cloth strip ending in fringes that are moved between hammers and strings by pulling the left hand stop forward. A similar hand stop attached to the left keyboard side wall can also be found in the instrument in Constance, but the piano stop itself is lost.

Although the two Maucher pianos differ in some features, they share a characteristic workshop style which strongly supports the conclusion that they were indeed built by the same maker, and that their labels are therefore credible. While both instruments clearly belong to the general category of harp-shaped pianos, they deviate in several details from the standard model.

Two Unsigned Harp-shaped Pianos. These two pianos by Maucher are so far the only known extant signed instruments of this harp-shaped type. Two unsigned harp-shaped pianos in American collections show distinctively differing features after careful examination. It is obvious that these pianos are by two different makers and that neither of them is by the same builder as the one who made the above-mentioned group of standard-model instruments. One is at The Metropolitan Museum of Art, New York (MMA 89.4.2910), while the other is in the Marlow A. Sigal Collection in Newton Centre, Massachusetts, near Boston (no. 1972.2). The former is closer to the standard model in having a concave front part in the area of the toolbox (fig. 11). The Boston instrument has a protruding keyboard (fig. 12), which is also found in a harp-shaped piano in the Colt Collection in Bethersden, near Ashford, Kent, England (M 512 G).[17]

17. C. F. Colt with Anthony Miall, *The Early Piano* (London: Stainer & Bell, 1981), 29.

Figure 11. Unsigned harp-shaped piano. The Metropolitan Museum of Art, 89.4.2910. Photo: MMA.

Figure 12. Unsigned harp-shaped piano. Marlowe A. Sigal collection, Newton Centre, Massachusetts, 1972.2. Photo: Marlowe A. Sigal.

As shown above, the two Maucher pianos have a similar and very distinctive case construction. Comparing them with the two harp-shaped pianos in New York and in Boston reveals that the latter are constructed very differently. Both pianos have a two-layer conifer bottom board with a concave quarter-round molding cut into its lower edges. However, in the New York instrument the grain of both layers runs parallel to the front wall; in the Boston piano only the upper layer is parallel to the front wall, while the lower layer is arranged diagonally from the left rear corner to the right front corner. The construction of the bentside is very peculiar in both pianos. In the New York instrument the wrestplank partially substitutes for the bentside; only above the wrestplank is there a real bentside, which was sawn out of the same piece of wood as the little straight part of the spine (fig. 13). This is a simple but rather weak construction in which wrestplank distortion, which occurs frequently because of string tension, is quite obvious, whereas it is more hidden when a separate bentside is used, as for example in the Maucher piano at the Shrine. Likewise, the bentside of the Boston piano is not made of one piece but rather of two pieces set above each other. However, the point of division between them is not level with the wrestplank surface, and it can be assumed that the lower part is a separate wall, not just the wrestplank itself. The upper part of the bentside is laminated.[18]

The walls of the Boston piano are presumably either of walnut stained to look like mahogany, or of real mahogany; the spine is oak. The front wall and the bentside are connected by hidden dovetails, all the other walls are connected by butt joints or mitered joints, and the walls are glued on top of the bottom board. In the New York instrument the front wall, the left side wall, and the spine are of conifer, while all the other walls are of fruitwood. Dovetails are used for connection, and the walls stand in a rabbet of the upper layer of the bottom board. The New York instrument is manufactured very sloppily, as can be seen, for example, in the fact that the bottom board and the walls do not match exactly. In contrast, the instrument in Boston is by a neat maker.

18. A third variant of bentside construction can be seen in a harp-shaped piano at the Deutsches Museum in Munich (1910-27419). There the short, straight front part of the bentside is of 11 mm thick walnut, thinned to 3 mm in the bent area. The three-part laminated bentside is built up from a conifer core sawn to shape and a veneer at its inside. See Hubert Henkel, *Besaitete Tasteninstrumente* (Frankfurt am Main: Erwin Bochinsky, 1994), 212.

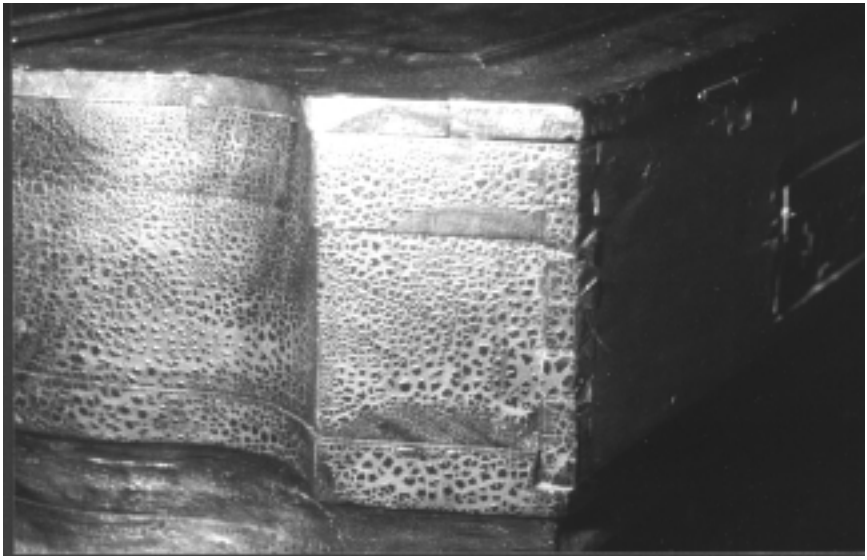

Figure 13. Construction of the bentside and small part of the spine of the harp-shaped piano. The Metropolitan Museum of Art, 89.4.2910. Photo: Sabine Klaus.

The harp-shaped pianos in New York and Boston have the standard model's hitchpin plank with rounded front surface, and a soundboard which covers the entire interior of the instrument (figs. 14 and 15). In the instrument in New York the wrestplank is not covered by the soundboard, but is stained black; in contrast, the Boston piano has a cap of walnut or mahogany on top of the wrestplank. The rib that crosses under the bridge is cut out in the New York instrument, but not in the Boston piano. The mousehole of the New York piano's belly rail is surprisingly well made in an otherwise sloppy instrument (fig. 16), while in the Boston instrument the mousehole has the shape of an ellipse cut in half. Only the bridge of the New York instrument shows the characteristic flat-topped shape and double pinning, although it lacks the change of side bearing in the treble. The Boston piano has a slenderer bridge with no double pinning, but a single row of pins.

Both pianos have a compass of C to f^3 and are single strung, but their scalings are very different. The MMA's piano has a c^2 speaking length of 284 mm, which is also found in instruments of the standard model. In contrast, the Boston piano has a much longer c^2 speaking length of 329

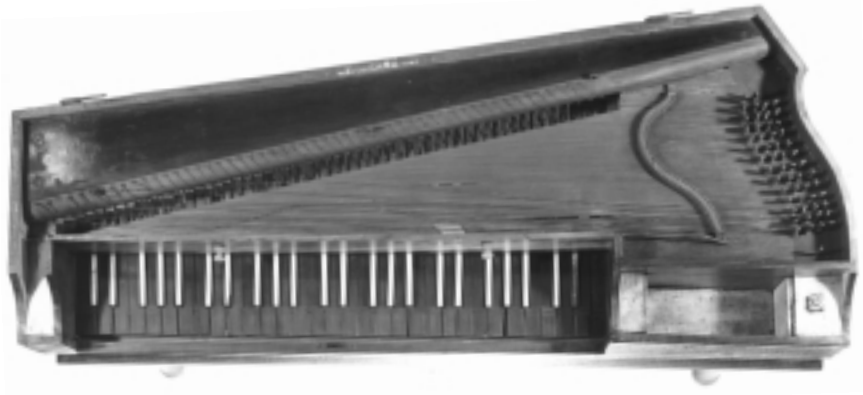

Figure 14. Plan view of the harp-shaped piano. The Metropolitan Museum of Art, 89.4.2910. Photo: MMA.

Figure 15. Plan view of the harp-shaped piano. Marlowe A. Sigal collection, Newton Centre, Massachusetts, 1972.2. Photo: Marlowe A. Sigal.

mm, which would require the use of a rather thin iron wire in the treble. Foreshortening is observable throughout the compass from treble to bass (see table 3).

The instrument in New York has no key frame, but instead has a plate which serves to support all necessary parts of the action and the key guiding (fig. 17). This construction is very unusual, though somewhat reminiscent of the standard model's key frame with its extremely broad

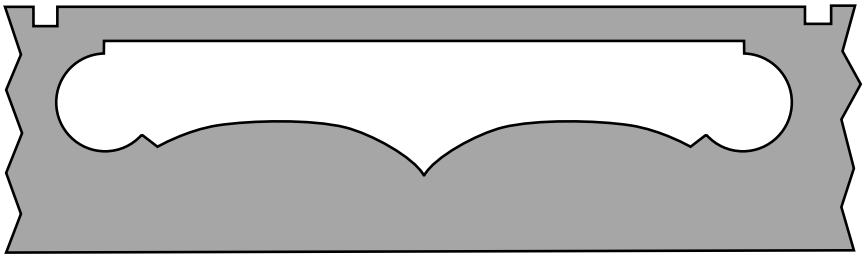

Figure 16. Shape of the belly rail's mousehole of the harp-shaped piano. The Metropolitan Museum of Art, 89.4.2910. Drawing: Sabine Klaus, redrawn for publication by John Watson.

Table 3. String length and striking points of two anonymous pianos (in millimeters)

	MMA 89.4.2910	Boston 1972.2
C	878 (45)	999 (32)
c	690 (30)	772 (24)
c^1	468 (12)	554 (19)
c^2	**284 (15)**	**329 (11)**
c^3	135 (8)	144 (4)
f^3	85 (8)	102 (3)

strip of wood at the front. The Boston instrument has a normal key frame. The key guidings of the two instruments are also different. In the New York piano, vertical slats of dark-stained conifer are glued into small notches at the back of the key plate, and the keys are guided between these slats. The slats are held together on top by individual small blocks of conifer, glued between them, which serve as a kind of over-rail and are covered by the hammer rail (fig. 18). This key-guiding system is similar in principle to the box-guiding of the standard model, but lacks its careful leather padding. Although it also uses a kind of box-guiding with vertical wooden slats, the Boston instrument has a most unusual key guiding system. The slats do not guide the back of the keys at their sides, but saw cuts in the key levers' ends fit around the guiding slats (fig. 19a).

When the key plate of the instrument in New York needs to be removed, it is taken out through an opening in the spine, as in the standard model (fig. 18). In the Boston piano the key frame is taken out at the front, despite the fact that this instrument also has a soundboard

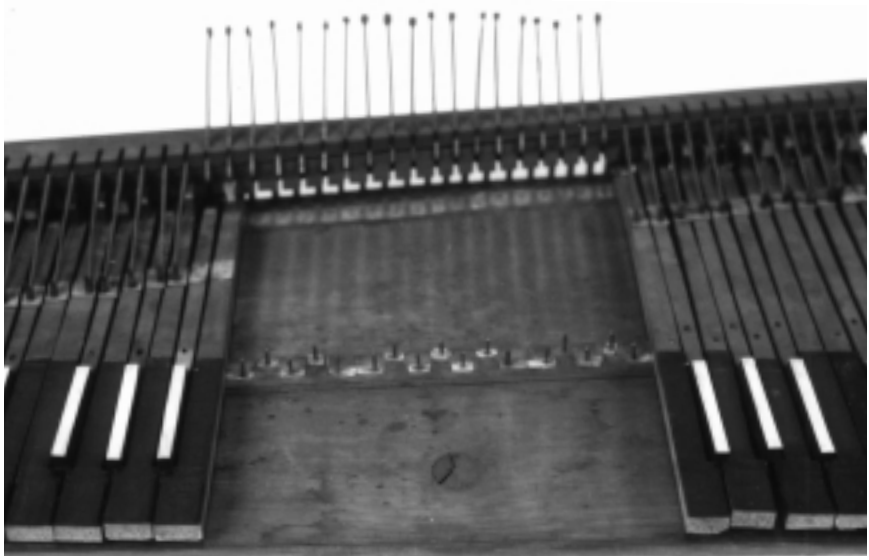

Figure 17. Key plate of the harp-shaped piano. The Metropolitan Museum of Art, 89.4.2910. Photo: Sabine Klaus.

Figure 18. Key guiding system of the harp-shaped piano. The Metropolitan Museum of Art, 89.4.2910. Photo: Sabine Klaus.

Figure 19a. Key guiding system of the harp-shaped piano. Marlowe A. Sigal collection, Newton Centre, Massachusetts, 1972.2. Photo: Marlowe A. Sigal.

Figure 19b. Action of the harp-shaped piano. Marlowe A. Sigal Collection, Newton Centre, Massachusetts, 1972.2. Photo: Marlowe A. Sigal.

extending over the keys as well. It seems, therefore, that there is no compelling connection between the presence of a soundboard extension and whether the action is pulled out at the front or at the back; evidently this was a decision made by the individual maker.

The key levers of the Boston piano are sawn out of one plank as usual, as can be seen in the continuation of the grain of adjacent key levers. But the key levers of the piano in New York seem to have been fabricated individually, since there is no continuation of the wood grain from one key lever to the next (fig. 20).

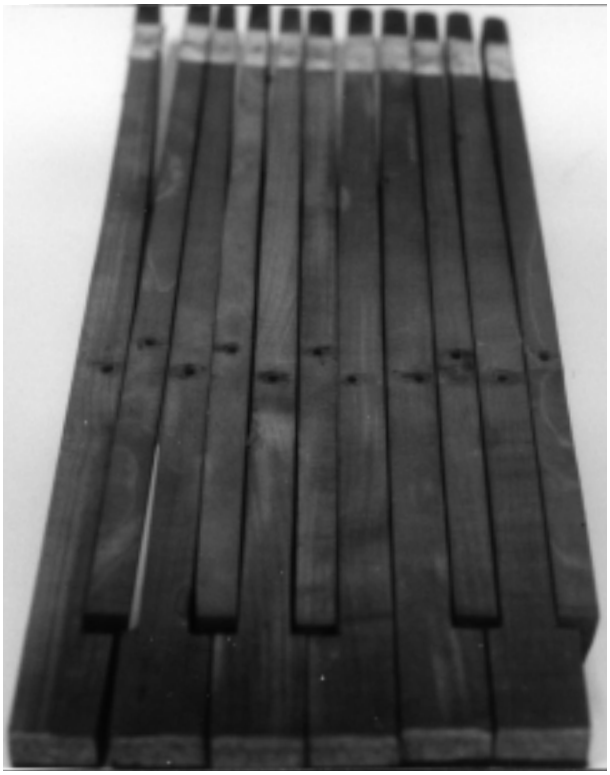

Figure 20. Underside of the keys of the harp-shaped piano. The Metropolitan Museum of Art, 89.4.2910. Photo: Sabine Klaus

Both instruments have a *Stoßmechanik* similar to the kind found in the standard model (figs. 17 and 19b). All hammers are pivoted by a single strip or cord, fitted in notches of the hammer rail. They both have a rigid wooden jack glued on top of the key lever; however, the form of this jack is characteristically different in both instruments.

Neither piano has dampers, but both have two hand stops, operating a harp stop and a piano stop respectively. In the New York instrument these hand stops are attached to the name board, while in the Boston piano the hand stops are located in the tool boxes at either side of the keyboard. The harp stop in the latter instrument consists of a nicely decorated, cloth-padded walnut or mahogany ledge, following the shape of the bridge; the piano stop has been lost. In the New York instrument the piano stop consists of a fruitwood ledge with white leather strips, cut

into individual pieces for each hammer; the ledge is attached to the underside of the hitchpin plank and is moved between hammers and strings by the left-hand stop lever. In both cases the harp stop prevented long reverberation, and the piano stop made the bright sound of the bare hammer heads mellower and also quieter. Because it once had a piano stop, the current leather coverings of the Boston piano's hammers might not be original, but were probably added when the piano stop was removed. The originally bare hammer heads, the lack of dampers, and the many stops point to these instruments' pantalon ancestry, or at least to the influence of the tonal qualities of the hammered dulcimer, as is typical for this model as a whole.

These pianos in New York and Boston clearly prove to be by two different makers. They seem to have no more in common than a general model on which they are based and from which they deviate in some details. In this respect they are comparable with the square piano type developed by John Zumpe (1726–1790), which was widespread in England from the 1760s and later all over Europe and America, and was used as a model by many makers.

Square Pianos of the Same Model. A related group of pianos with *Stoßmechanik* and hammers pointing toward the player share a number of features with the harp-shaped standard model, but have rectangular cases. The seemingly oldest instrument of this type (GNM, MINe 156) bears a suspect label on the soundboard reading "*Joh. Socher / Obern Sonthofen / Allgau / 1742*," but Michael Cole has convincingly shown that this piano is not credible and should be dismissed as the oldest extant square, or at least treated with great suspicion.[19] A much more convincing but unsigned instrument of this type is found in The Metropolitan Museum of Art, New York (MMA 89.4.3254, fig. 21). This piano shares with the standard model a compass of C to f^3, single stringing, a soundboard extension, a c^2 speaking length of 284 mm, a flat-topped bridge, a change of bridge pinning for the treble-most pins, an opening in the spine for removing the keyframe, the *Stoßmechanik*, and the typical natural key fronts of diamond-and-dot embossed paper.[20]

19. Michael Cole, "Johann Socher's Square Piano of 1742," *Fellowship of Makers and Researchers of Historical Instruments Quarterly* 83 (1996): 75–84.

20. This type of paper is not recorded in the catalogs of papers at the Deutsches Buch- und Schriftenmuseum, Leipzig (information kindly provided by Sigrid Feiler of the museum's Papierhistorische Sammlung).

Figure 21. Unsigned square piano. The Metropolitan Museum of Art, 89.4.3254. Photo: MMA.

The instrument's case resembles a clavichord not only in its rectangular shape but also in some of its construction details. The walls are connected by dovetails and are glued on top of a two-layer bottom board, and the lid is hinged to the spine instead of to the hitchpin plank. However, the 35-mm-thick hitchpin plank is different from normal clavichord construction. Its front surface is not round, as in the standard model of harp-shaped piano, but flattened (fig. 22) as in Maucher's instruments and in the square piano MIR 1159 at the Germanisches

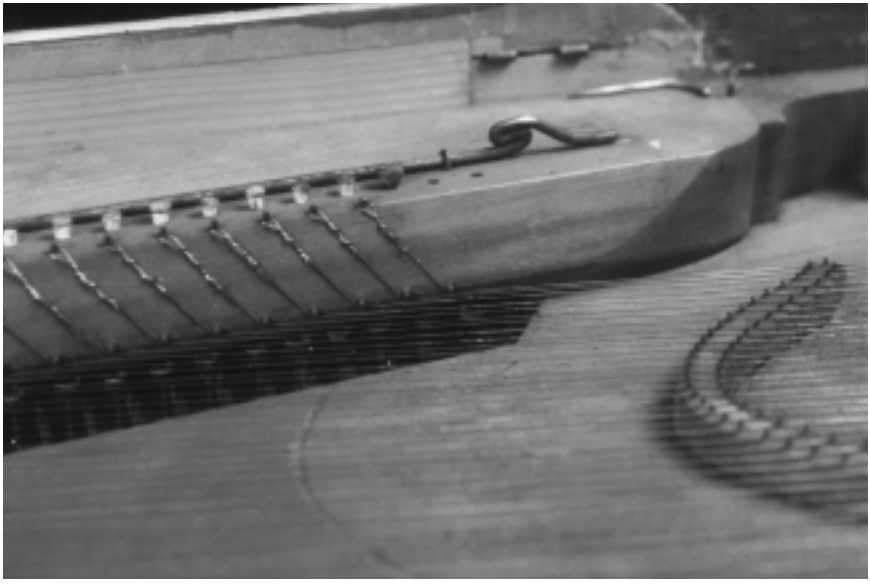

Figure 22. Hitchpin plank of the unsigned square piano. The Metropolitan Museum of Art, 89.4.3254. Photo: Sabine Klaus.

Nationalmuseum,[21] although the exact shape of the hitchpin plank surface is slightly different in all of these instruments. A peculiarity of the square piano in New York is the ornamental treble end of the hitchpin plank. The soundboard consists of two assembled parts, one with fine grain and the other with wider grain extending over the keys (fig. 23). This is slightly reminiscent of the instrument GNM, MIR 1159, which has elliptical cut-outs in the soundboard area above the keys.

The key levers of MMA 89.4.3254 are guided by front pins, which seems to point to a late date. An unusual feature of the keyboard is the use of a very flat sled underneath the normal key frame. The typical *Stoßmechanik* has hammers pivoted by a single cord in the hammer rail. Rigid wooden jacks glued on top of the key levers are used. The hammer heads are covered by one layer of tawed leather, which seems to be original because the instrument has no piano stop and the same leather

21. Günther, "Wer baute . . . ?" 89.

is also found on the damper levers. The single damper levers show an elaborate construction and are hinged by brass pins between two ledges (see fig. 1).

There are two hand stops, both located on the nameboard. One operates a harp stop (fig. 23), the other a damper lifting device. Since the damper lifter is operated by hand, and therefore cannot be shifted while playing, this stop still shows the influence of the hammered dulcimer. One can assume that the harp stop is meant to be used only in connection with the damper lifter.

This square piano has a label on the harp stop ledge with almost illegible numbers at the lower left corner. Laurence Libin interpreted these numbers as *1778* or *1808*,[22] but the reading *818* is also possible, meaning *1818*. This would be an extremely late date for a square piano of this type, but it is conceivable in a very remote place, especially if one considers some later features of this instrument such as the front guiding pins.

There are several pianos of this type with rectangular cases at the Germanisches Nationalmuseum (MIR 1159, MINe 164, and MINe 165). MIR 1159 bears the credible date *1802* on a label on top of the harp stop,[23] while MINe 164 reveals among several repair signatures at the back of the nameboard the inscription "*Johann . . . 1820 / Schnezenhausen*." This might also be a repair signature, but Schnezenhausen is a little place on Lake Constance close to Friedrichshafen, and therefore in the area of Gottfried Maucher's activity. So it is possible that as late as 1820 such instruments were still being built (and not only repaired) in little villages, based on models known for decades in the vicinity.

Even later might be a square piano in the Yale University Collection of Musical Instruments, New Haven (4961.00). This instrument bears the signature "*Wendel Hassenner [?] . . . Jahr 1831 [?]*" in black ink on the back of a ledge to the left of the tuning pins, and is nicely veneered in walnut, revealing Biedermeier style. It shares a few characteristics with the group of instruments under discussion, including a soundboard covering the entire instrument and a *Stoßmechanik* with hammer heads pointing toward the player. The mounting of the hammers shows an interesting mixture of styles. The hammer shanks are pivoted in pearwood *Kapseln* by brass pins surrounded with black felt bushings, as in the

22. Laurence Libin, "The 'Lying Harp' and Some Early Square Pianos," *Early Keyboard Studies* 8, no. 3 (July 1994): 1–8, at p. 6.

23. Günther, "Wer baute . . . ?" 88.

Figure 23. Two-part soundboard of the unsigned square piano. The Metropolitan Museum of Art, 89.4.3254. Photo: Sabine Klaus.

Prellmechanik with escapement by Johann Andreas Stein (1728–1792). However, the *Kapseln* are not glued onto the key levers, as they would be in a *Prellmechanik*, but on top of the keys' overrail. The hitchpin rail of this instrument is not in front of the spine, but behind the nameboard (which is also the front wall in this instance).

The great diversity of the square pianos under discussion can finally be seen in the instrument MIR 1134 at the Germanisches Nationalmuseum, which shows the rounded hitchpin plank typically found in connection with the standard model, but is instead equipped with a *Prellmechanik*. The variety found in square (as opposed to harp-shaped) instruments of this type shows once again that the attribution of all of these instruments to a single maker is not justifiable. Instead, we need to think in terms of a model used by many different makers with numerous modifications.

An interesting feature to compare in all of these pianos discussed so far, whether harp-shaped or square, is the three-octave span, the so-called *Stichmaß*. Hubert Henkel has pointed out that a three-octave span

of approximately 485 mm is typical for the standard model.[24] Among the eighteen instruments for which measurements were available to me, exactly half show this *Stichmaß* of about 485 mm, while the rest range from 452 mm (Maucher, Constance) to 494 mm (MINe 164), indicating that quite a number of makers must have been involved in building these instruments. Even a piano like MMA 89.4.3254, having the typical *Stichmaß* of 485 mm but differing in other details from the standard model, is most likely not by the same maker as MINe 162, MIR 1136, and MIR 1137, the three pianos mentioned above as typical examples of that standard model.

Origins of the standard model. This whole group of instruments, and especially the question of their authorship, has been the subject of much debate recently. As long ago as 1910 a remark in Georg Kinsky's catalog of the Heyer collection proposed attributing them to the Ulm maker Johann Matthäus Schmahl (1734–1793),[25] and his suggestion has been followed more or less blindly since then. However, several publications during the past decade have raised doubts about this rather vague attribution, especially since none of the existing pianos is signed by Schmahl.[26] In addition, new archival material concerning Schmahl has come to light, which has been interpreted controversially.[27]

In a recently-published article, Michael Günther continues to favor the workshop of Johann Matthäus Schmahl as the most likely place of origin for this type of piano.[28] He argues that the term *Hammerflügel*, used in the contemporary Ulm newspapers for Schmahl's instruments and usually translated as grand pianoforte, must in this case be understood as meaning harp-shaped piano. The reason for this is, according to Günther, the use of the term *Flügel-Klavier* in a document referring to a harp-shaped piano in the possession of an organist and teacher in a vil-

24. Henkel, *Besaitete Tasteninstrumente,* 209.

25. Georg Kinsky, *Besaitete Tasteninstrumente, Orgeln und orgelartige Instrumente, Friktionsinstrumente* (Leipzig: Breitkopf & Härtel, 1910): 126.

26. Libin, "The 'Lying Harp' "; Michael Cole, "*Tafelklaviere* in the Germanisches Nationalmuseum: Some Preliminary Observations," *The Galpin Society Journal* 50 (1997): 180–207; and Cole, *The Pianoforte in the Classical Era* (Oxford: Clarendon Press, 1998), 163–69.

27. Sabine Katharina Klaus, "Der Instrumentenmacher Johann Matthäus Schmahl (1734–1793) im Spiegel der Ulmischen Intelligenzblätter," *Musica Instrumentalis* 1 (1998): 72–93; Günther, "Wer baute . . . ?" 83–102.

28. Ibid., 95–99.

lage close to Ulm in the middle of the nineteenth century.[29] If we follow Günther's interpretation, Schmahl would not have made any grand pianos, but only clavichords, square pianos, harp-shaped pianos, and harpsichords. But we will see soon that the only plausibly signed and dated keyboard instrument by Schmahl still in existence today was in fact originally a grand pianoforte, which was later converted into a harpsichord. Günther failed to discuss the advertisement of a special kind of pianoforte in the Ulm newspapers, called a *Forte Piano nach Ottobeurener Art* [of the "Ottobeuren" type].[30] This could indeed have been a special kind of fortepiano, probably in the harp-shaped form, which was well known to customers in Ulm, where newspapers mention that the organ maker Zettler—either Joseph (1700/10–1760) or his son Franz Beda (c. 1742–1810)—built such instruments. As Ottobeuren is not far from Bad Waldsee, the birthplace of Gottfried Maucher, this could be a further path leading to the origin of this widespread model, which then could have been used by Johann Matthäus Schmahl as well.

However, as long as no harp-shaped or square piano is found with similar features and clearly signed by Schmahl, there is no justification for attributing any of them to this maker. The group of standard-model instruments mentioned at the beginning are all very well made. This does not accord well with Schmahl's reputation as a rather unreliable maker, as evidenced by his ongoing battles with several church parishes in his home region and by the fact that after his death the organ in the Ulm Cathedral, which was officially under his care, was in very bad

29. Ibid., 92. This term is quoted from a document of the year 1866; Günther thinks that the term *Flügel-Klavier* was handed down from a time around 1825. But he overlooks that the basis of this term is the word *Klavier,* an instrument related to the clavichord, and the term *Flügel* is used in the function of an attribute. Therefore it is incorrect to think of this term as equivalent to the term *Hammerflügel,* in which the basis is the word *Flügel,* and *Hammer* is used as an attribute. Moreover, it is very clear that Schmahl used the term *Flügel* in the traditional meaning of "harpsichord" when he talks of *bekielte Flügel* (Klaus, "Der Instrumentenmacher Johann Matthäus Schmahl," 89). Finally, an advertisement in the *Ulm Intelligenzblatt* of 9 March 1780 offers a brand new *Flügel* by *Schmal & Spat* from Regensburg; there is no reason to doubt that this was a tangent piano, or in any case an instrument in the shape of a harpsichord or a grand piano, since 160 lots were drawn for this instrument, each for the price of 1 fl. Therefore the term *Flügel* must have been used in Ulm, as everywhere else, to mean an instrument in the shape of a harpsichord, and with the addition *Hammer* specifically to mean "grand piano."

30. Klaus, "Der Instrumentenmacher Johann Matthäus Schmahl," 82.

shape.[31] Therefore it would be more plausible to assume that some of the less well made instruments of this type could be his work.

The likelihood that the model of harp-shaped pianos flourished especially in Upper Swabia, and probably also in the adjacent northern part of Switzerland, is supported not only by the fact that Maucher lived in this area—as did Schmahl (if he really built such instruments), Zettler, and the unknown maker or restorer of the instrument from Schnezenhausen—but also by a harp-shaped piano of this type in private possession in Switzerland, which has a ground glass coating inside the soundboard compartment, probably to stiffen it and also to protect the wood. This kind of coating occasionally occurs in trumpets marine in the area of the Black Forest and the northern, German-speaking parts of Switzerland.

Grand Pianos with Similar Characteristics. One surviving stringed keyboard instrument actually had a label by Johann Matthäus Schmahl until the middle of the twentieth century. This is a small grand piano now kept as no. 46 at the Musikhistorische Sammlung Jehle at Schloß Lautlingen (Albstadt-Lautlingen, Baden-Württemberg; see fig. 24). According to the museum's files, Martin Friedrich Jehle found this instrument in the attic of a little village church in Mühringen near Horb (Baden-Württemberg) in about 1950. The label's appearance is preserved in the form of a photocopy at the Stadtarchiv Ulm (fig. 25). The original seems to be lost now, but must have existed at least until 1966, when Jehle sent the photocopy to the archives, accompanied by a letter stating credibly that it was made from the original: "Enclosed you [will] find the instrument label of Johann Matthäus Schmahl. Since the label is old and dirty it is apparently not possible to make a better copy."[32]

The action of this grand piano was destroyed in a fire at Jehle's workshop in 1956,[33] where it was kept separately from the instrument, a circumstance that led to the preservation of the instrument itself, along with its keyboard. The lost action consisted, according to J. Hartmut

31. Ibid., 72.

32. *"In der Anlage finden Sie den Instrumentenzettel von Johann Matthäus Schmahl. Weil der Zettel alt und schmutzig ist, läßt er sich scheints nicht besser Photokophieren [sic]."* (Letter by Jehle dated 25 April, 1966: Stadtarchiv Ulm, Personalbögen G2, Johann Matthäus Schmahl).

33. My thanks to J. Hartmut Burgmann, Ingersheim, Baden-Württemberg, for this information.

Figure 24. Grand piano by Johann Matthäus Schmahl, Ulm, 1775, rebuilt into a harpsichord in 1964. Musikhistorische Sammlung Jehle, Schloß Lautlingen, no. 46. Photo: Sabine Klaus.

Figure 25. Photocopy of the original label from the grand piano by Johann Matthäus Schmahl, Ulm, 1775. Stadtarchiv Ulm, Personalbögen G2: Johann Matthäus Schmahl.

Burgmann, of a ledge with an incomplete set of hammers; Jehle describes it as follows: "It was a very primitive *Stoß-Mechanik*, in which the 'jack' was presumably a piece of felt sitting on the key lever. When the key was depressed the felt struck the hammer shank and threw the hammer against the strings, the hammer being pivoted in a rail by a strip of parchment."[34] Inserts of some sort of cloth or felt still found in the key levers of the Lautlingen instrument prove Jehle's description to be reliable. In order to ensure the working condition of such an action, the hammer shank must have been extremely close to the key, otherwise felt would not have worked as a jack.

However, Jehle assumed that the Lautlingen instrument was originally a harpsichord, and that Schmahl had just added the action.[35] Jehle was led to this conclusion by his opinion that the instrument's case was too small and its construction too light for it to have been originally designed as a grand piano. Also, an opening in the cheekpiece led him to assume that it had originally had protruding register levers. This was the reason why Jehle decided to rebuild the instrument into a harpsichord in 1963/64, after the action had been burned. Jehle further suggested that the keys had come from a harpsichord which had a smaller compass and that they were reused by Schmahl who enlarged the compass to five octaves. At this point Jehle loses credibility. The instrument now has a compass of only four and one-half octaves, C to f^3. While it is true that there are key levers of two different kinds randomly distributed throughout the compass, among which the brighter ones look partly newer, the cranks of the key levers would not allow anything else except the present

34. *"Es handelt sich um eine ganz primitive Stoß-Mechanik, bei der der 'Stößer' vermutlich ein Stück Filz war, das auf dem Tastenende saß. Durch das Niederdrücken der Tasten stieß dieses Filzstückchen den Hammerstiel, der seinerseits durch einen in einer Leiste festgehaltenen Pergamentstreifen beweglich war, an die Saite."* (Martin Friedrich Jehle, *Württembergische Klavierbauer des 18. Jahrhunderts* [Frankfurt am Main: Das Musikinstrument, 1982], 14.)

35. Ibid.

arrangement. Therefore one can exclude a later enlargement of the keyboard; the newer key levers are more likely to be just replacements of lost or broken old ones. The key levers' cranks take the gap spacer between d^1 and $d\sharp^1$ into account. A recess in the wrestplank and signs of nails in the belly rail look convincingly original, indicating that such a gap spacer was part of the original arrangement (although the present gap spacer of conifer and beech might be a replacement). The original presence of a gap spacer gives still further support to the idea that the instrument was designed as a grand piano from the beginning and not as a harpsichord. In this case Schmahl's label can be plausibly interpreted as a maker's label and not a restorer's signature. It is likely that this grand piano in Lautlingen, now converted into a harpsichord, is the only remaining example of Johann Matthäus Schmahl's work as a maker of stringed keyboard instruments. Jehle himself thought that a similar instrument might have been advertised by Schmahl in the Ulm newspaper in 1773. The most striking similarity of the instrument in Lautlingen to this advertisement consists of the interior lid decoration *"im Nilsonschen Gusto"* ["in the style of Nilson"].[36] Copper prints after the Augsburg painter Johann Esaias Nilson (1721–1788) were frequently used by carpenters and panel painters in the second half of the eighteenth century in South Germany,[37] and the lid painting of the grand piano in Lautlingen has been identified as being in the style of the Nilson school.[38]

It is useful when further examining this humble instrument in Lautlingen to compare it with another small grand piano at the Smithsonian Institution in Washington, D.C. (SI 315,750, fig. 26). This instrument likewise has a simple *Stoßmechanik* with hammer heads pointing toward the player and, as we will see, has other features in common with the standard model of harp-shaped pianos.

The grand pianos in Lautlingen and in Washington both have sloping cheeks, which are a characteristic of South German harpsichords as well. They also share a very slender, quite distinctive case outline. The Lautlingen instrument has a little curve at the end, whereas the grand

36. Ibid., 13; *Ulmische Wöchentliche Anzeigen*, 24 June and 1 July 1773.

37. S. Ducret, *Keramik und Grafik des 18. Jahrhunderts: Vorlagen für Maler und Modelleure* (Braunschweig: Verlag Klinkhardt & Biermann, 1973), 20.

38. Letter of 4 February 1963 from Dr. Norbert Lieb, Städtische Kunstsammlung Augsburg, to M. F. Jehle, kept at the Musikhistorische Sammlung Jehle, Schloß Lautlingen.

Figure 26. Unsigned South German grand piano. Smithsonian Institution, National Museum of American History, Washington, D.C., 315,750. Photo: Smithsonian Institution.

in Washington shows a very short, straight tail piece (fig. 27). In the Washington piano the walls are of cherry wood, dovetailed and glued on top of the bottom board. This is unlike the instrument in Lautlingen, whose walls are of conifer, painted green, and are connected by nailed butt joints, and whose bentside is laminated of two layers (fig. 28); however, its walls are glued on top of the bottom board as well. The instrument in Washington shows an inner frame reminiscent of Johann

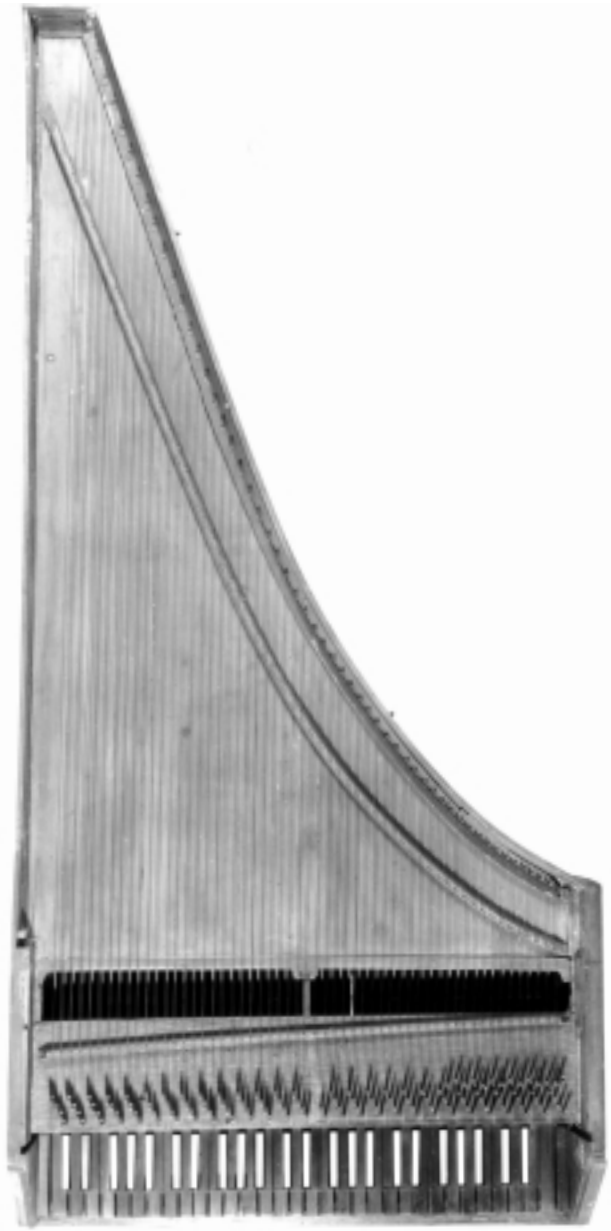

Figure 27. Plan view of the unsigned South German grand piano. Smithsonian Institution, National Museum of American History, Washington, D.C., 315,750. Photo: Smithsonian Institution.

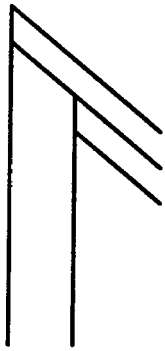

Figure 28. Spine-bentside construction of the grand piano by Johann Matthäus Schmahl. Musikhistorische Sammlung Jehle, Schloß Lautlingen, no. 46.

Andreas Stein's well-known A-frame construction.[39] Two braces extend from the bentside curve to the belly rail; the first is glued to the bottom board, while the second stretches above the first from the bentside to the belly rail. Although the internal construction of the Lautlingen instrument was not recorded when the soundboard was taken out and replaced, there seem to be individual upright blocks at the bentside, a construction known from South German and Viennese harpsichords.[40]

The soundboard of the Washington instrument is original. Two rectangular ribs cross the bridge with long cutouts. The bridge follows the shape of the bentside, reaching from the spine to the cheekpiece (fig. 27). The bridge of the Lautlingen instrument is straight at the bass end as well; the treble end is not original. The gap spacer in the Washington piano is found at exactly the same place as in the instrument in Lautlingen, namely between d^1 and $d\sharp^1$, and is of conifer with fruitwood veneer.

The c^2 speaking length of the Washington piano is 270 mm, but no meaningful comparison is possible since the scaling of the instrument in Lautlingen was changed when its soundboard was replaced. The compass is the typical C to f^3 range in both instruments. The last octave in the treble of the Washington piano is triple strung, whereas the Lautlingen instrument, in its current state as a harpsichord, has two 8-foot strings per note throughout.

39. Information about the internal construction is taken from the drawing of this grand piano made by Thomas Wolf and kindly given to the author.

40. Sabine K. Klaus, "Einige Neuigkeiten zum Cembalobau im süddeutschen Sprachraum," *Das deutsche Cembalo: Symposium im Rahmen der 24. Tage Alter Musik in Herne, 1999,* ed. Christian Ahrens and Gregor Klinke (Munich: Katzbichler, 2000), 25–43.

The most striking feature connecting the grand piano in Washington with the standard model of harp-shaped pianos is the above-mentioned diamond-and-dot embossed paper used on the key fronts (fig. 29). The key frame has the characteristic front plate reaching from the front to the balance rail, and the key-guiding system consists of the typical box-guiding or *Kanzellenführung* with lateral guiding slats, padded with white leather. The grand in Lautlingen, by comparison, has carved key fronts, and its keys are guided by brass pins in slots of a rack at the back of the key frame. Moreover, its three-octave span is considerably larger than the standard model's, namely 491–92 mm, while the Washington piano shows a slightly narrower *Stichmaß* of 488–90 mm.

The typical *Stoßmechanik* with hammer heads pointing toward the player appears in the Washington instrument with a single brass rod serving as pivot for all hammers instead of the cord or string used in the standard model. The jacks consist of wedge-shaped limewood blocks inserted part-way into the key levers (fig. 30). Compared with the standard model, the Washington instrument's action is quite crude. If we accept Jehle's description of the lost action of the Lautlingen instrument, it had parchment strips like Maucher's pianos, instead of a cord as pivot for all the hammers; since it was possible to store the action separately from the instrument—the reason why only the action was burned—its construction was presumably similar to the one in Maucher's piano at the Shrine.

In both grand pianos there are signs of lost dampers, and no stops remain. The Lautlingen grand might have had a buff stop, judging from cut pins at the back of the nut, but reconstruction of the stops of the Washington piano is not possible.

The Washington grand reveals that features of the "standard model," such as the typical action and the embossed paper key fronts, were not limited to harp-shaped and square pianos, but can also be found in grand pianos. The assumption that many different makers were involved in the production of this model is reinforced by the presence of certain details which deviate from the norm, for example the use of a brass rod instead of a cord for pivoting the hammers.

Because the Lautlingen grand shows the highest possibility of actually having been made by Johann Matthäus Schmahl, we can surmise that the standard model's rather different action was not made by him, but by someone else. Moreover, the rather sloppily made instrument in Lautlingen fits better into the known picture of Schmahl as a careless

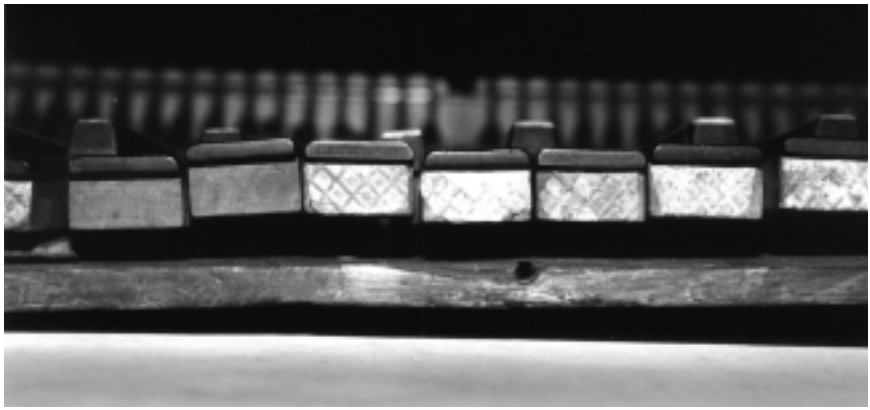

Figure 29. Key fronts with typical diamond-and-dot embossed paper of the unsigned South German grand piano. Smithsonian Institution, National Museum of American History, Washington, D.C., 315,750. Photo: Sabine Klaus.

and negligent builder than do the well-made instruments of the standard model. But of course the incompleteness of the Lautlingen grand, including the fact that the label is now missing, makes it difficult to provide a really convincing proof for the work of this maker.

Pianos with Hammer Heads Pointing Toward the Player, with Escapement

There is a refined version of *Stoßmechanik* with hammer heads pointing toward the player, in which the jack is not rigid, as in the group described above, but pivoted as a moving part. The earliest written reference to this kind of action is found in Peter Nathanael Sprengel's *Handwerke und Künste in Tabellen*, vol. 11 (fig. 31), a compendium published in Berlin in 1773. Unfortunately, Sprengel does not mention the source of his information, but it is likely that he interviewed a musical instrument maker in Berlin.

As is evident from table 4, most surviving square pianos of this type were made in or near one of two cities: Stuttgart, the eighteenth-century capital of the duchy of Württemberg (including its suburb, Untertürkheim) or Vienna. Most of them are preserved in European collections, but one is kept at The Metropolitan Museum of Art, in New York, namely a square piano made in 1795 by the Viennese maker Johann Jakob Seydel (MMA 1978.372).

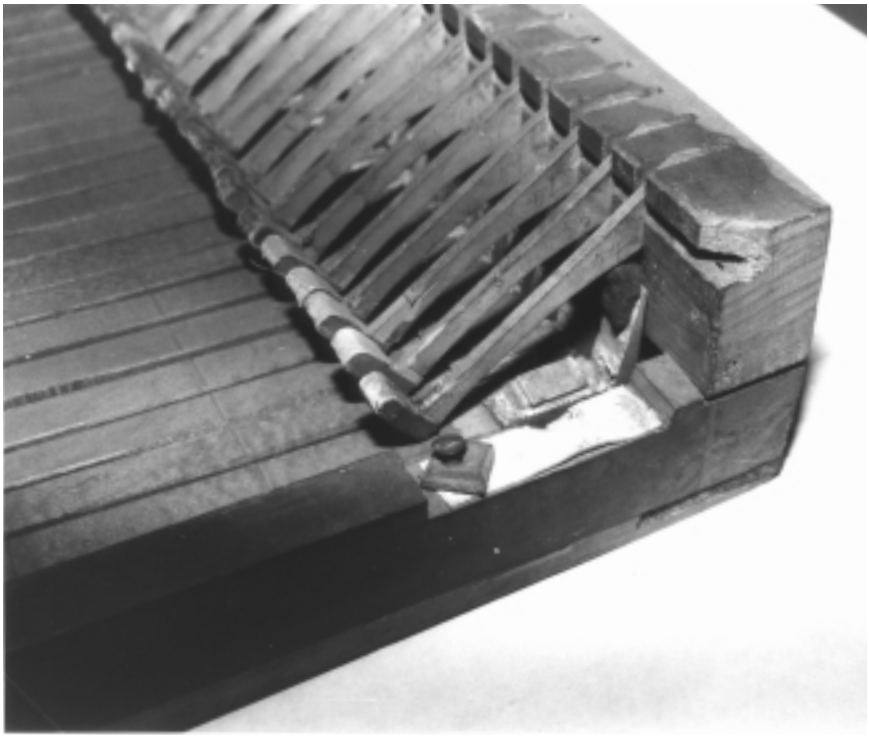

Figure 30. Action of the unsigned South German grand piano. Smithsonian Institution, National Museum of American History, Washington, D.C., 315,750. Photo: Sabine Klaus.

What is possibly the oldest extant instrument with an action of this type is kept at the Deutsches Museum in Munich (DM, no. 1919-46963). It bears the inscription "*1776 / gefertigt von / Philipp Jakob Warth / Schullehrer u. Instrumentenmacher / Untertürkheim / 1918 repariert v. Carl Pfeiffer Königliche Hof pianofortefabr. / Stuttgart.*"[41] According to a report in the *Schwäbische Chronik* of 14 March 1788, Philipp Jakob Warth (3 March 1754–20 September 1821)[42] was trained as a schoolmaster and taught himself to manufacture stringed keyboard instruments, turning to this profession after he failed to receive the schoolmaster's post in his home

41. "1776 / manufactured by / Philipp Jakob Warth / school teacher and instrument builder / Untertürkheim / 1918 repaired by Carl Pfeiffer, royal court pianoforte maker / Stuttgart" (quoted according to Henkel, *Besaitete Tasteninstrumente*, 214).

42. Letter of 22 February 2000 from Dr. Christa Mack, Stadtarchiv Stuttgart.

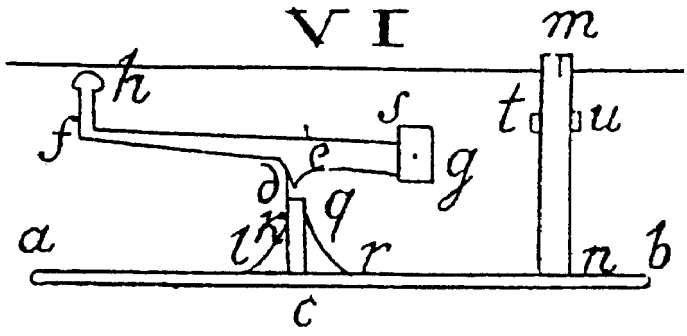

Figure 31. Piano action, depicted in Peter Nathanael Sprengel, *Handwerke und Künste in Tabellen*, Vol. 11 (Berlin, 1773), Tab. VI.

town. It is likely that Warth started his career as an instrument builder around 1772. The most famous of his customers was Prince Friedrich of Württemberg (1754–1816), the later King of Württemberg.

Interest in keyboard instruments with hammers is documented very early at the court of Stuttgart. Among the many keyboard instruments whose purchase is recorded during the reign of Prince Carl Eugen (1728–1793) are hints of several with hammers. A bill dated 31 July 1745 refers to the acquisition of a new kind of instrument, called the *Pantalon*, from the Ludwigsburg keyboard instrument maker Siegfried,[43] and evidence for the continually growing interest in such instruments is provided by a bill from the court instrument maker Johann Friedrich Haug (c. 1730–1793), dated 13 May 1763, to his duke for "the small harpsichord, ordered from me. This consists of 2 keyboards one above the other, one with tangents and silver plectra, the other one with small hammers in a specially invented manner. . . ."[44]

43. "*. . . bey dem hiesigen Claviermacher Siegfried ein Neues Instrument der Pantalon genannt . . .*" [. . . from the local keyboard instrument maker Siegfried a new instrument, called *Pantalon* . . .]: Hauptstaatsarchiv Stuttgart, A 282, Büschel 1730. It is likely that this was not a dulcimer, but a keyboard instrument with hammers, since its maker was a *Claviermacher* and the sum of *200 Gulden* was paid; this was two-thirds of the cost of a harpsichord. The keyboard-instrument maker Siegfried might be related to the family of organ builders with the same name who were active at the turn of the seventeenth to the eighteenth century in the areas of Braunschweig and Frankfurt am Main (see Fischer and Wohnhaas, *Lexikon*, 388).

44. "*den bey mir . . . bestellten kleinen Flügel. . . . Solcher bestehet in 2 Claviers auf einander, das eine mit Tangenten und silbernen Kiehl, das andere aber mit Hämmerlen auf eine besondere inventirte facon . . .*" (Hauptstaatsarchiv Stuttgart, A 282, Büschel 1730).

Table 4. Square pianos with escapement *Stoßmechanik* and hammer heads pointing toward the player (arranged by date)

Maker	Origin	Date	Present Location*
Warth?	Untertürkheim?	1776?	Munich, DM, 1919-46963
Warth?	Untertürkheim?	1770s	Innsbruck, Ferdinandeum
Christoph	Vienna	c. 1785	Vienna, SAM, no. 625
Kober	Vienna	1788	Vienna, SAM, no. 496
Warth?	Untertürkheim?	1790?	Linz, Landesmuseum
Warth?	Untertürkheim?	1791?	Vienna, GdMf, no. 8
Seydel	Vienna	1795	New York, MMA, 1978.372
Haug?	Stuttgart?	1797	Nuremberg, GNM, MINe 175
Kober?	Vienna?	late 18th C.	Vienna, TMW, no. 350
Schantz	Vienna	late 18th C.	Vienna, GdMf, no. 6
unsigned	South Germany	late 18th C.	Nuremberg, GNM, MIR 1142
Warth?	Untertürkheim?	1800?	Berlin, SIM, no. 340
Haug	Stuttgart	c. 1810	Germany, private collection

**Abbreviations:*
DM = Deutsches Museum; SAM = Sammlung alter Musikinstrumente; GdMf = Gesellschaft der Musikfreunde; MMA = The Metropolitan Museum of Art; GNM = Germanisches Nationalmuseum; TMW = Technisches Museum Wien; SIM = Staatliches Institut für Musikforschung Preußischer Kulturbesitz

Two square pianos with an action very similar to the one used by Warth are found at the Germanisches Nationalmuseum, MIR 1142 and MINe 175. The maker of MINe 175 is listed as *J. C. Haug, Stuttgart 1797* in the museum's files,[45] but there is no longer any obvious signature on the instrument. Considering the similarity of its action with Warth's instruments it seems likely, however, that this square piano was built in Stuttgart. A square by Johann Friedrich Haug's son Theodor Christoph (1771–1847), who followed his father in the post of court instrument maker in March 1793,[46] has an escapement *Stoßmechanik* of the same type as well. This instrument might have been built as late as 1810 or even later, judging from the compass of FF to f^4 and its quite massive appearance, but it might still reflect a family tradition.[47]

45. Renate Huber, *Verzeichnis sämtlicher Musikinstrumente im Germanischen Nationalmuseum Nürnberg* (Wilhelmshaven: Florian Noetzel, 1989), 177.

46. *Schwäbische Chronik*, 29 March 1793, 75. No instrument by Johann Friedrich Haug seems to be preserved.

47. My thanks to Alfred Gross, Reutlingen, for permission to examine this instrument.

The particular kind of escapement *Stoßmechanik* with hammer heads pointing toward the player, recorded in Stuttgart since the 1770s and known there probably even earlier, has also been described in recent publications as a separate tradition of Viennese instrument building, which might precede the escapement *Prellmechanik* (Viennese action) usually associated with this city.[48] The earliest preserved Viennese square piano of this type is by Ignatz Kober and was built in 1788 (Vienna, Kunsthistorisches Museum, SAM no. 496).[49] A similar instrument at the Technisches Museum in Vienna (TMW no. 350) might be by Kober as well.

Other Viennese makers using this action for square pianos at the end of the eighteenth century were Franz Xaver Christoph (c. 1728–1793) and Johann Schantz (c. 1762–1828).[50] Also, it has been suggested recently that two early grand pianos by Anton Walter (1752–1826) now at the Haydn house in Eisenstadt and at Mozart's birthplace in Salzburg might have had a kind of *Stoßmechanik*.[51] Anton Walter could very well have been the link between Stuttgart and Vienna, since he came from Neuhausen auf den Fildern, a place less than seven miles south of Stuttgart's suburb Untertürkheim. Therefore, it is possible that this type of action was known to Walter before he left his home town, and that he introduced it in Vienna.

After Kober's square of 1788 the above-mentioned instrument by Johann Jakob Seydel (c. 1758–1806) made in 1795 (MMA, 1978.372) is the next signed and dated piano with this action type.[52] Seydel was born

48. Alfons Huber, "Der österreichische Klavierbau im 18. Jahrhundert," *Die Klangwelt Mozarts*, ed. Gerhard Stradner (Vienna: Kunsthistorisches Museum, 1991), 62–69; Cole, *The Pianoforte*, 233; Richard Maunder, *Keyboard Instruments in Eighteenth-Century Vienna* (Oxford: Clarendon Press, 1998), 56–63, 78–82.

49. Victor Luithlen, *Katalog der Sammlung Alter Musikinstrumente, I. Teil: Saitenklaviere* (Vienna: Kunsthistorisches Museum, 1966), 71–72, 88–89.

50. Cole, *The Pianoforte*, 230–32. The latter also used this action in an orphica (a kind of portable piano invented by Karl Leopold Röllig in Vienna c. 1795), now preserved in the National Museum in Prague (no. 1283).

51. Michael Latcham, "Mozart and the Pianos of Gabriel Anton Walter," *Early Music* 25 (1997): 382–400, at pp. 386, 390.

52. My unpublished report on this instrument, kept in the files of The Metropolitan Museum of Art, is cited with the wrong surname (Sabine *Meyer*) in Maunder, *Keyboard Instruments*, 81.

in Kirchheim, Germany,[53] and is first recorded in Vienna in 1790. His square is signed in the form of a copperplate engraving on a paper label at the left rear corner of the soundboard, which reads *"Johann Jakob Seydel / Bürgerlicher Orgel und In= / strumentmacher, Wohnhaft / auf der Wien in der Koth gas= / sen bey den 2 Meer Fräulen / N° 58."* [Johann Jakob Seydel civil organ and instrument maker, resident at the Wien river in the Kothgasse in the house of the two mermaids, no. 58]. The date *1795* and the number *68* are written by hand in black ink at the bottom of the printed label; an oval brass plaque with the inscription *Johann Jacob Seydel / Wien 1792* on the nameboard is not original. The instrument has a rectangular case with angled front corners (fig. 32). The walls of conifer are veneered with mahogany. The naturals are plated with ivory and have four red lines in front of the sharps as decoration. Brass beadings, forming rectangular panels, decorate the walls, and the four tapered legs end in brass sleeves. All these features are typical for expensive models of Viennese pianos at the time.[54] The instrument's construction follows the common clavichord design, with walls glued on top of a single-layer bottom board of spruce, and there is a toolbox to the left of the keyboard. The hitchpin rail's flat top surface is only 16 mm higher than soundboard level. The soundboard overlaps the top key lever only slightly (fig. 33). The hitchpin rail and the soundboard seem to be partly replacements, but the present construction cannot deviate much from the original. There is a rose at the right rear corner of the soundboard, behind the tuning pins. Its exterior part is also a replacement, but the inner segment of seven layers of parchment, resembling a gothic church window, seems to be original. A similar rose can also be found in the Kober 1788 square.[55] The pattern of these roses is reminiscent of the kind found in Saxon clavichords of the eighteenth century and

53. Kirchheim is a very common name in Germany, which makes Seydel's provenance very difficult to determine. He is not recorded in any of the three Kirchheims in Württemberg (Kirchheim/Neckar, Kirchheim/Ries, and Kirchheim/Teck), according to research in the church registers of these places, kept at the Landeskirchliches Archiv in Stuttgart.

54. Michael Latcham, "Large Musical Instruments as Source Material for the Historian of Furniture," *Gedenkschrift für Kurt Wittmayer*, ed. Silke Berdux (in preparation).

55. Johannes Hubek, "Erwähnungen von Musikinstrumenten in den Briefen der Familie Mozarts," *Die Klangwelt Mozarts*, ed. Gerhard Stradner (Vienna: Kunsthistorisches Museum, 1991), 99–108, at p. 101.

Figure 32. Square piano by Johann Jakob Seydel. The Metropolitan Museum of Art, 1978.372. Photo: MMA.

Figure 33. Plan view of the square piano by Johann Jakob Seydel. The Metropolitan Museum of Art, 1978.372. Photo: MMA.

the grand pianos of Gottfried Silbermann;[56] an influence cannot be excluded.

The compass of Seydel's instrument extends from FF to f^3. Its stringing is very unusual: from FF to C single-strung, from C♯ to $g♯^1$ double-strung, and from a^1 to f^3 triple-strung. However, the triple-stringing in the treble seems not to be original, judging from signs of changes at the hitchpin rail, soundboard, and bridge; therefore, the scaling is also suspect.

The key balance system of Seydel's instrument is again similar to Kober's square. The correct key balance is achieved not by the position of the balance point, but by brass return-springs at the back of the balance rail that fit into eyes on the underside of the key levers. Without these springs the key levers fall down as if they were being pressed. Key guiding is provided by central front pins; in addition, action details of Seydel's square are very reminiscent of the instruments by Kober. The escapement lever or movable jack consists of an elegantly shaped little maple slat hinged to the key lever by a parchment strip (fig. 34). This jack is pressed against a padded iron stick by means of a brass spring. Exactly the same system is also found in the square pianos by Philipp Jakob Warth[57] and Theodor Christoph Haug, although both of these makers used a less elegant jack and an additional guiding pin in front of the jack.

Another striking similarity between Seydel's and Kober's actions is found in the construction of the hammer head rest pads. In the instrument by Seydel they consist of threaded iron pins with white leather pads (and renewed red cloth) and are fixed to the key levers. As in Kober's instruments they cannot be interpreted as a check, because the distance between the two arcs described by the rest pad and the hammer head increases during the motion instead of decreasing.

The way the hammers are pivoted differs considerably in all the square pianos under discussion. Warth used a very simple wooden *Kapsel* with brass pin pivot fixed to the overrail. In the instrument by Haug a wooden *Kapsel* is used as well, but the pivot holes are filled with a black felt bushing similar to those in the wooden *Kapseln* used by Johann Andreas Stein, who is said to have been Haug's teacher.[58] The

56. Stewart Pollens, *The Early Piano* (Cambridge: Cambridge University Press, 1995), 182.

57. Henkel, *Besaitete Tasteninstrumente,* 216.

58. Jehle, *Württembergische Klavierbauer,* 10.

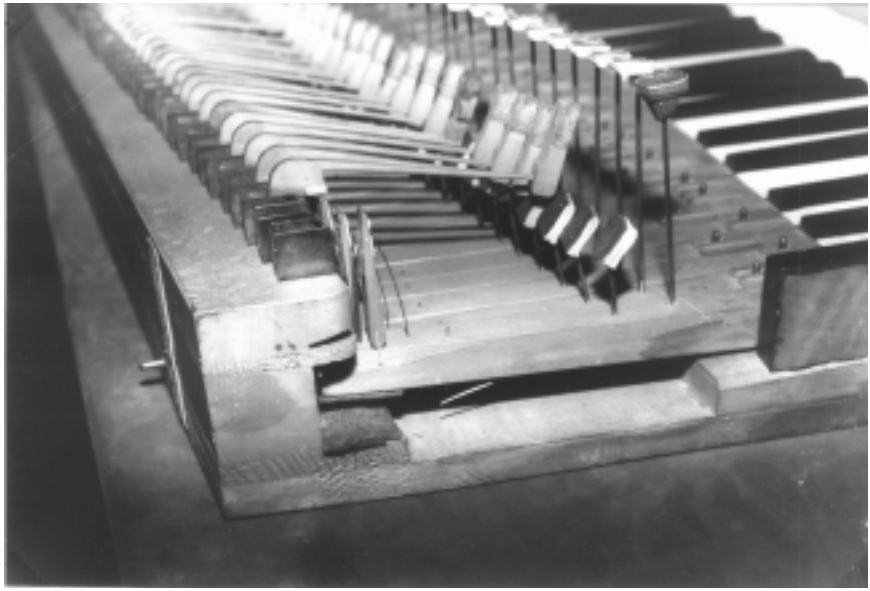

Figure 34. Action of the square piano by Johann Jakob Seydel. The Metropolitan Museum of Art, 1978.372. Photo: Sabine Klaus.

instruments by Kober have a very unusual mounting system for the hammers. The pivot is a metal pin which is held in place by leather strips fixed by wooden wedges in a comb-like rack (fig. 35). The advantage of this system is that each hammer can be taken out for repair purposes simply by removing two wedges. In addition, pressing the wedge more or less deeply into the comb-like rack controls the speed of the hammer motion by adding friction to, or taking it away from, the axle pin. In contrast to this system, Seydel used a brass *Kapsel* without stalk mounted on top of the overrail for the pivoting of his hammers (fig. 34). The Viennese official Stephan Edler von Keeß proclaimed Seydel to be the inventor of the brass *Kapsel:* "The adjustment of the action was greatly facilitated by the invention of brass *Capseln*, in which the hammer shank pivots on a pin. This pin touches the *Capsel* only with the two pointed ends, which causes very little friction. The invention of these *Capseln*, which are now in use throughout Germany, is usually attributed to the late Viennese keyboard-instrument-maker Seidel."[59]

59. *"Die Verbesserung der Mechanik wurde sehr durch die Erfindung der Capseln von Messing erleichtert, worin der Hammerstiel an einem Stifte sich bewegt, der nur an den beyden*

Figure 35. Hammer mounting with leather strips and wedges of an unsigned square piano attributed to Ignatz Kober. Technisches Museum Wien, no. 350. Photo: Sabine Klaus.

The square piano by Seydel has individual over-damper levers and two knee levers, one for piano (achieved by inserting individual cloth strips between hammers and strings) and the other for a damper-lifting device. The L-shaped iron levers let into the bottom board to transmit

spitzigen Enden die Capsel berührt, und äußerst wenig Reibung hat. Die Erfindung dieser Capseln, die nun durch ganz Teutschland in Gebrauch gekommen sind, wird allgemein dem verstorbenen Wiener Clavier=Instrumentenmacher Seidel zugeschrieben." (Stephan Edler von Keeß, *Beschreibung der Fabricate welche in den Fabriken, Manufacturen und Gewerben des österreichischen Kaiserstaates erzeugt werden*, vol. 2 [Wien: Strauß, 1823]: 206). This statement cannot be entirely dismissed for grand pianos (contrary to Maunder, *Keyboard Instruments*, 82). Keeß mentions the work of Anton Walter immediately before his report about Seydel, so he must have known Walter's instruments too. It is not proved that Walter used brass *Kapseln* for any of his early instruments (Latcham, "Anton Walter," 386, 390). The only signed *and* dated grand piano by Anton Walter using brass *Kapseln* is from 1796 (ibid., 393). Other signed and dated Viennese grand pianos up to 1793 show wooden *Kapseln*, for example those by Johann Gottfried Mallek, 1787 (Maunder, *Keyboard Instruments*, 209) and Sebastian Lengerer, 1793 (Cole, *The Pianoforte*, 239). Therefore the possibility cannot be excluded that Seydel was indeed the first to use brass *Kapseln* in Vienna after his arrival in 1790. He certainly was the first one to use them for the escapement *Stoßmechanik*, described here, and in square pianos.

the motion of the knee levers to the stops are reminiscent of the construction of the same devices in the square piano attributed to Kober at the Technisches Museum in Vienna.

Seydel's square, with its refined escapement action, individual dampers, and knee levers, represents a completely different sound ideal and function from the simple instruments with no dampers and a non-escapement action, barely controllable by the player, described in the first part of this section. Both types of *Stoßmechanik* with hammer heads pointing toward the player—those without and with escapement—were apparently known at the latest by the 1770s in the Southwest of Germany. Towards the end of the eighteenth century the latter type made its way to the musical capital of Vienna and was used by professional musicians, while the former continued to flourish into the early nineteenth century in more remote areas of South Germany, predominantly in the homes of amateurs.

Pianos with Hammer Heads Pointing away from the Player

The second main type of *Stoßmechanik* is an arrangement in which the hammers are pivoted on a rail that is positioned close enough to the middle of the key frame to allow space for the hammer heads to point to the back of the instrument. We have seen that this arrangement is a simplification of the Cristofori action in which the intermediate lever is omitted. The most widespread model of this action type is found in the English square pianos by and after John Zumpe and in their Continental and American derivations.[60] Another tradition using this type of action existed in Saxony, namely the *Clavecin Royal* of Johann Gottlob Wagner (1741–1789) and related instruments.[61] The following discussion, however, will be devoted to instruments that resemble neither of these traditions, but instead represent several different and independent solutions incorporating this same action principle. As before, instruments presently located in America will be compared with similar instruments in European collections (see table 5) in order to reveal their possible provenance or depict them as part of a larger tradition. There are two German square pianos at the Smithsonian Institution in Washington, D.C., that fall into this category.

60. Cole, *The Pianoforte*, chapters 3 and 4.
61. Ibid., 172–77.

Table 5. Square pianos with *Stoßmechanik* and hammer heads pointing away from the player (in order mentioned)

Maker	Origin	Date	Present Location*
unsigned	Germany	late 18th C.	Washington, D.C., SI, 303,538
Steinbacher	Bamberg	1793	Nuremberg, GNM, MINe 173
Krämer	Bamberg	1788	Nuremberg, GNM, MIR 1147
Krämer	Bamberg	1774	Würzburg, Mainfränkisches Museum
Hoffmann	Cleve	late 18th C.	Washington, D.C., SI, 299,865
Hoffmann?	Cleve?	late 18th C.	Brussels, MIM
unsigned	Germany	late 18th C.	Brussels, MIM
Hoffmann	Cleve	1790	Riverside, Edward Dean Museum
unsigned	Germany	late 18th C.	Nuremberg, GNM, MINe 166
unsigned	Germany	late 18th C.	Nuremberg, GNM, MINe 167
unsigned	Germany	late 18th C.	Frankfurt/Oder, Mus. Viadrina, Mk 1
unsigned	Germany	late 18th C.	Leipzig (formerly Heyer no. 118)
Weber	Dublin	1772	New York, private collection

**Abbreviations:*
SI = Smithsonian Institution; GNM = Germanisches Nationalmuseum; MIM = Musée des Instruments de Musique / Muziekinstrumentenmuseum

Square Pianos from Bamberg. The first of these two square pianos is unsigned (SI 303,538) (fig. 36), and belongs to the category of instruments offering a mixture of seemingly rather early features together with very uncommon characteristics. Such pianos often give an initial impression of a very early date, but equally likely they could be by a rather inexperienced later maker working in a remote place. This one has a simple, later stand; presumably it was originally designed as a small instrument which would have been placed on a table for playing rather than having a permanent position in a room. Its case measures only 1163 × 408 × 148 mm (not including moldings and lid); this is comparable with the dimensions of an eighteenth-century fretted clavichord. The case construction is also derived from the clavichord. Conifer walls with molded edges are connected with through dovetails and are glued on top of a single-layer bottom board of conifer and nailed on with hand-forged iron nails. The brown paint on the case is most likely a later addition, but floral wallpaper in red and blue found on the inside of the walls above soundboard level seems to be original. This and the case moldings point to an origin in the eighteenth century. Another early feature of this square piano, typical also for German clavichords, is the chamfered and cranked key levers. However, the chamfering is done in a

Figure 36. Unsigned square piano, plan view. Smithsonian Institution, National Museum of American History, Washington, D.C., 303.538. Photo: Smithsonian Institution.

rather sloppy, irregular manner, suggesting the instrument could be by a non-professional maker. As a result of the cranked key levers the belly rail is also angled. It has a simple rectangular mousehole. The conifer soundboard ends at the belly rail and has one tall and slender rib, tapering at the ends and reaching from the front wall to the spine, with a wide cutout where it crosses the bridge. As in many clavichords, the soundboard liners reach down to the bottom board and are nailed to the spine. The slightly S-curved bridge ends in scrolls, and only one row of bridge pins is used. The nut at the front edge of the flat hitchpin rail is formed by an applied molding. Despite its being very close to a clavichord in construction, the possibility that the instrument ever was a clavichord can be excluded, since no signs of removed tangents can be found on the key levers.

The second tool box at the right rear corner, behind the angled row of tuning pins, is an unusual feature also found in the highly suspect square piano by "Johann Socher" at the Germanisches Nationalmuseum (MINe 156), mentioned above. In the Smithsonian's instrument this construction seems to be original, however, since all surrounding wooden parts match nicely.

SI 303,538 has the C-to-f^3 compass also found frequently in fretted clavichords of the last quarter of the eighteenth century, and is double strung. The c^2 speaking length of 311 mm for the longer string and 306 mm for the shorter points to the use of iron stringing in the treble, and the scaling foreshortens throughout the compass from treble to bass. The keyboard shows both unusual and old-fashioned features. The broad tails of the natural keys for E, F, B, and C represent a return to the

simplest way of laying out a keyboard, namely by centering the sharps between two adjacent naturals, a method already found in the treatise of Arnaut de Zwolle of c. 1440.[62] Particularly unusual is the dual method of key guiding, in which the naturals have front pins but the sharps are guided by central pins at the back (fig. 37). The action is equally unusual: all the hammers are pivoted by means of a single gut string and are attached to a comb-like rack or hammer rail, which in turn is mounted onto two iron rods coming up from the longitudinal braces of the key frame (fig. 38). The hammer shank consists of a maple part with chamfered edges, ending in a threaded iron rod, which is hooked at the very end. The hammer head is formed by a sort of leather ball. The jack is a rigid iron pin with leather-padded top. There is no hammer head rest pad, so the hammer heads hang in the air. The entire arrangement gives the impression of an experiment or a dilettante's work. It is no wonder that there are no dampers. The construction of the buff stop is equally strange, consisting of a cloth-padded ledge which is guided within slanting slots by seven iron hooks on top of the hitchpin rail (fig. 36). This ledge is new, but obviously follows the original design. When a hand stop at the left keyboard side wall is moved, the ledge slides down and touches the strings from above with its cloth. This is a less elegant and less stable construction compared with the usual arrangement of the buff stop attached to the front edge of the hitchpin rail underneath the strings.

All these unusual features strongly point to the conclusion that this piano was built by a maker with little training who attempted to manufacture an instrument with hammers either on an experimental basis or by copying a similar instrument without the benefit of skilled experience. An origin at the end of the eighteenth century is likely.

There is some evidence as to where this maker might have worked or where his model came from, because two signed square pianos at the Germanisches Nationalmuseum, MINe 173 and MIR 1147, have similar features. Both instruments were built in Bamberg. One is by Martin Steinbacher[63] and was finished in 1793. Although slightly more advanced

62. G. le Cerf and E.-R. Labande, *Instruments de musique du XV^e^ siècle: Les Traités d'Henri-Arnaut de Zwolle et de divers anonymes (MS B.N. Latin 7295)* (Paris: Auguste Picard, 1932), Pl. IX.

63. According to information provided by the Stadtarchiv Bamberg, there is no Martin Steinbacher recorded in Bamberg in 1793, which means that he must have lived there only briefly. However, the last name Steinbacher can be found in Bamberg in 1754 (Kartei Bruno Röttinger, D 1008, Nr. 124), though it is not yet known if there are any connections to the instrument maker Martin Steinbacher.

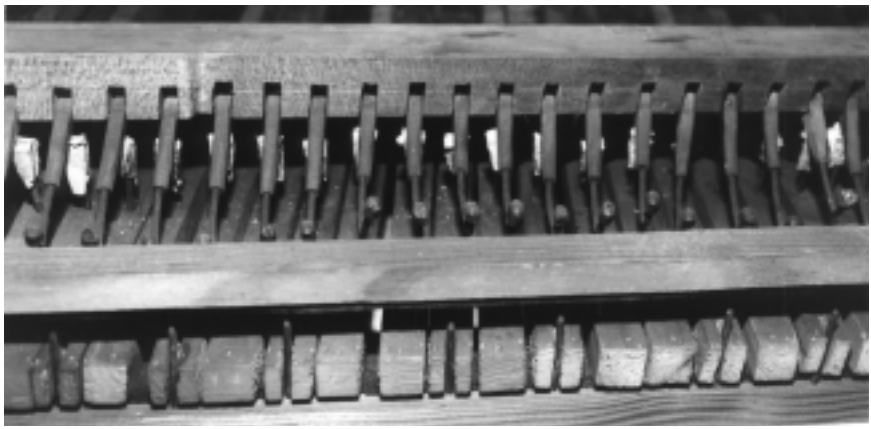

Figure 37. Guiding of the sharps by central pins at the back of the unsigned square piano. Smithsonian Institution, National Museum of American History, Washington, D.C., 303,538. Photo: Sabine Klaus.

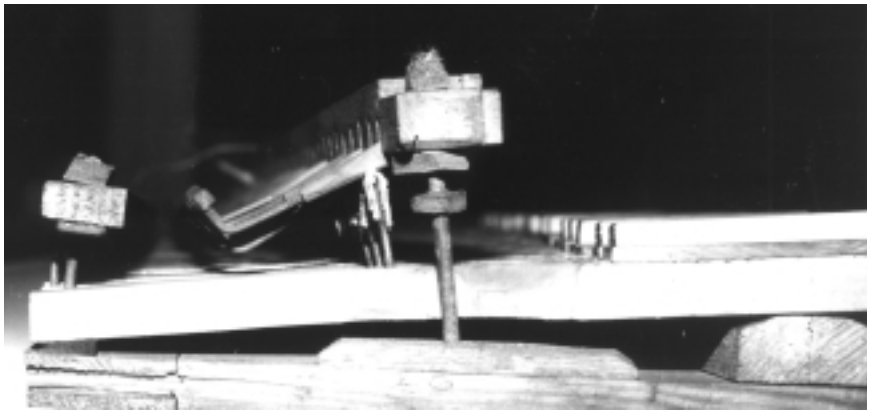

Figure 38. Action of the unsigned square piano. Smithsonian Institution, National Museum of American History, Washington, D.C., 303,538. Photo: Sabine Klaus.

in its construction (fig. 39), its action is very reminiscent of the unsigned square SI 303,538, even in the kind of chamfering used on the wooden part of the hammer shanks. The instrument is equipped with hammerhead rest pads and underdampers, the latter being similar to the hammers in their appearance. The dampers are constructed as under-

Figure 39. Action of the square piano by Martin Steinbacher, Bamberg, 1793. Germanisches Nationalmuseum, Nuremberg, MINe 173. Photo: Germanisches Nationalmuseum.

dampers in the form of a two-armed leverage, the back part of which touches the string from underneath. Lifting the front part causes the lowering of the back part. An especially interesting feature of this instrument is the divided bridge for brass and iron stringing. There is also a tool box at the right rear corner behind the tuning pins (fig. 40).

The second Bamberg square is by the court organ builder Georg Ludwig Krämer (1731–1790), as shown by the following inscription at the tool box to the left of the keyboard: "*Nro 203 / Invenit et fecit / Georg Ludwig Krämer / Hochfürstlich, Bambergischer Hof= Orgel und Instrumenten Baumeister 1788*" [No. 203 / Invented and made [by] / Georg Ludwig Krämer / court organ and instrument building master in Bamberg 1788].[64] The signature of this piano seems to support the hypothesis

64. Another square piano by this maker, from 1774, is preserved at the Mainfränkisches Museum in Würzburg (Germany), according to Fischer and Wohnhaas, *Lexikon*, 214–15. I have not yet examined this instrument.

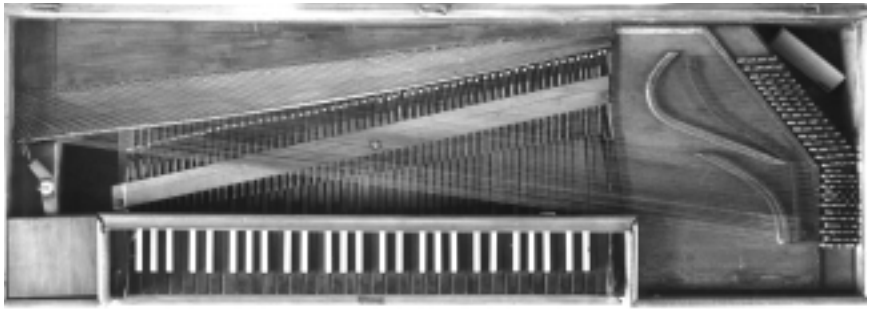

Figure 40. Plan view of the square piano by Martin Steinbacher, Bamberg, 1793. Germanisches Nationalmuseum, Nuremberg, MINe 173. Photo: Germanisches Nationalmuseum.

that Krämer considered himself to be an "inventor"—one of the many—of hammered keyboard instruments and that he had an extremely high production output. Krämer's square is an interesting mixture of German and English features. On the one hand, the arcaded key fronts are reminiscent of clavichords by the Ansbach maker Christian Gottlob Hubert, while on the other hand the bone naturals with the wide three-octave span of 495 mm and the imitation-mahogany case show English influence. The action and the underdamper system are similar to Steinbacher's square. Nothing is yet known about a master-pupil relationship between Krämer and Steinbacher, but it is possible that they worked together.

It is amazing to find this distinct and relatively unrefined type of *Stoßmechanik* with hammer heads pointing away from the player at the end of the eighteenth century in Bamberg, about 30 miles away from John Zumpe's birthplace of Fürth, and at a time when he had long since developed a somewhat more refined and very successful model of the same action principle.

Square Pianos with Two Sets of Hammers in Middle and North Germany. Tonal variety was one of the main concerns of makers, particularly of square pianos, at the end of the eighteenth century, when squares were usually equipped with more different kinds of stops than grand pianos were. This is the reason why Philipp Jacob Milchmeyer (1749–1813) recommended the square, not the grand, in his piano tutor *Die wahre Art das Pianoforte zu spielen*.[65] An example of an instrument

65. (Dresden: C. C. Meinhold, 1797), 57.

constructed with many tone-modification stops is the above-mentioned *Clavecin Royal* by Johann Gottlob Wagner in Dresden.

One of the rarer methods for increasing the tonal variety of a square piano was to equip it with two rows of hammers, one with bare heads, the other covered with leather. This approach is documented in Middle and North Germany and was described by J. H. E. Nachersberg in 1804: "In fortepianos with two sets of hammers, of which one belongs to the forte, the other one to the piano, the hammer head and the hammer shank are usually made out of one piece, or the head is securely glued to the shank."[66] Nachersberg describes the *Stoßmechanik* for square pianos and the escapement *Stoßmechanik* for grands.[67] Using the *Stoßmechanik* for two sets of hammers requires the following construction for the jack:

> Fortepianos with two sets of hammers, of which one produces the piano and the other one the forte, do not have a second and particular pin [jack] on the key for the piano hammers. No, the little stick, described above [that is the jack, consisting either of a metal pin with leather top, screwed into the key, or a wooden stick glued on top of the key], lifts either the forte or the piano hammers, depending on whether the forte or the piano stop is pulled, and thus moves either the one set of hammers or the other to the place where the pin can lift them.[68]

Nachersberg considered the second, leather-covered set of hammers as one method of achieving a piano stop. It is quite astonishing that he described this costly construction although he knew that the same effect could be gained with the normal kind of piano stop in which a leather- or cloth-covered strip was inserted between hammers and strings:

66. *"Bey den Fortepianos mit einer doppelten Reihe Hämmer, wovon die eine zum Forte, die andere zum Piano gehört, ist der Kopf und Stiel des Hammers gewöhnlich aus e i n e m* [sic] *Stücke gearbeitet, oder der Kopf ist auf dem Stiel fest geleimt."* (J. H. E. Nachersberg, *Stimmbuch oder vielmehr Anweisung, wie jeder Liebhaber sein Clavierinstrument, sey es übrigens ein Saiten- oder Pfeifenwerk, selbst reparieren und also auch stimmen könne* [2nd edition, Leipzig: A. Gehr, 1804], 19. The first edition was published in 1801 in Breslau.)

67. Nachersberg, *Stimmbuch,* 20 and 24. The parts of this work concerning stringed keyboard instruments were published separately by L. Gall with the title *Clavier-Stimmbuch* in Vienna in 1805. This explains why the escapement *Stoßmechanik* is described in Vienna at a time when the escapement *Prellmechanik* was predominant for grand pianos there.

68. *"Fortepianos mit einer doppelten Reihe Hämmer, wovon die eine das Piano, die andere das Forte hervorbringt, haben auf ihren Claves nicht etwa noch einen zweyten und besondern Stift für die Pianohämmer. Nein, das oben genauer beschriebene Stäbchen hebt bald die Fortehämmer, bald die Pianohämmer, je nachdem man Forte oder Piano zieht, und also diese oder jene Reihe Hämmer in den Wirkungskreis des Stiftes hinein schiebt"* (Nachersberg, *Stimmbuch,* 20–21).

> The piano stop. The piano is achieved by very special hammers in some fortepianos, but not in others. The former have in addition to the forte hammers the same number of similarly constructed piano hammers with a cap of leather, cloth or felt; by pulling the piano stop the piano-hammers come forward and touch the strings instead of the forte-hammers. In those fortepianos which do not have a special set of hammers for the piano, there is usually a rail which is covered with protruding tabs of leather or cloth. This is pushed forward, and the hammer does not directly touch the strings but rather strikes these cloth or leather tabs, causing the soft, flute-like sound characteristic of the piano.[69]

Finally, Nachersberg knew of a third possibility for producing the piano: "There are also fortepianos in which the hammer heads are half covered with cloth or another soft material. If one pulls the forte stop, the naked half of the hammer heads hits the strings, but pulling the piano stop causes the covered half to touch the strings."[70] As in the pianos with two sets of hammers, a hand stop for keyboard shift is needed to enable the strings to be struck either by the bare half of the hammer heads or by the covered half.[71]

An instrument with two sets of hammers, one for piano (leather covered) and one for forte (bare), is at the Smithsonian Institution (SI 299,865, fig. 41). It is signed on the nameboard in an inlaid ornamental field of bright wood: *"IO: FRIED: HOFFMANN / IN CLEVE. / F.W."*[72] Further examples include two in the Musical Instrument Museum in

69. *"Vom Pianozuge. Das Piano wird bey einigen Fortepianos durch ganz eigenthümliche Hämmer bewirkt, bey andern nicht. Jene haben außer den Fortehämmern noch eben so viele, ähnlich gestaltete Pianohämmer mit Kappen von Leder, Tuch oder Filz, zieht man nun Piano, so rücken die Pianohämmer vor und berühren statt der Fortehämmer die Saiten. Bey den Fortepianos, welche für das Piano keine besondere Hämmer haben, schiebt sich gewöhnlich eine Leiste, die mit hervorragenden Flecken von Leder oder Tuch besetzt ist, hervor, und der Hammer berührt dann nicht mehr unmittelbar die Saiten, sondern er schlägt nun an diese Tuch= oder Lederflecke, wodurch denn der sanfte, flötende Klang entsteht, welchen man am Piano bemerkt"* (ibid., 21–22).

70. *"Es gibt aber auch Fortepianos, wo die Köpfe der Hämmer zur Hälfte mit Tuch oder einer andern weichen Materie belegt sind. Zieht man hier Forte, so schlagen die Hammerköpfe mit ihrer nackten Hälfte an die Saiten; zieht man aber Piano, so bringen sie ihre bedeckte Hälfte daran"* (ibid., 22).

71. A similar construction is also occasionally found in clavichords, with one half of the tangent covered with leather, the other half being blank. Such clavichords are likewise equipped with a hand stop for keyboard shifting.

72. The two initials at the end might be a later addition of an owner. Also, the signature itself shows signs of being partly rewritten, but its authenticity is not questionable.

Figure 41. Square piano by Johann Friedrich Hoffmann, Cleve. Smithsonian Institution, National Museum of American History, Washington, D.C., 299,865. Photo: SI.

Brussels, one of which has been attributed to Hoffmann,[73] two more at the Germanisches Nationalmuseum in Nuremberg (MINe 166 and MINe 167),[74] and one at the Museum Viadrina in Frankfurt an der Oder.[75] Georg Kinsky also describes such a square in the former Heyer collection in Cologne.[76] The Saxon organ and harpsichord builder Ferdinand Weber (1715–1784) built a square with two sets of hammers in Dublin as early as 1772, based on the Zumpe model.[77]

73. Cole, *The Pianoforte,* 176. Martha Novak Clinkscale mentions another square piano by Hoffmann at the Edward Dean Museum, Riverside County Art and Culture Center, California (*Makers of the Piano, 1700–1820* [Oxford: Oxford University Press, 1993], 146). This instrument seems to have only one row of hammers; I have not yet examined it myself.

74. Huber, *Verzeichnis,* 171. The second set of hammers is missing now in the instrument MINe 167.

75. Herbert Heyde, *Historische Musikinstrumente der Staatlichen Reka-Sammlung am Bezirksmuseum Viadrina Frankfurt (Oder)* (Leipzig: Deutscher Verlag für Musik, 1989), 90–92.

76. Kinsky, *Besaitete Tasteninstrumente,* 133–34.

77. Laurence Libin, "Ein bemerkenswertes Tafelklavier von Ferdinand Weber," *Musica Instrumentalis* 3 (2001), 143–46. I am grateful to Laurence Libin for giving me a copy of this article prior to its publication.

The piano maker Johann Friedrich Hoffmann was born in Netz in Vogtland, Germany, in 1744.[78] He is first recorded in Cleve at the time of his marriage on 6 October 1776,[79] and he died there on 17 February 1807 at the age of 62 years.[80] His death certificate gives his profession as *Luthier*.[81] A report dated 7 May 1792 about *Nützliche Fremde und Künstler* [useful foreigners and artists] reviews his work: "A certain Hoffmann makes fortepianos now, which are sold in Amsterdam for almost the same price as English ones."[82] In light of this information it is not surprising that he adopted some obviously English features such as the nameboard and the divided front flap of the lid. It is possible that this nameboard was painted by the local *"Signatur und Pastel Mahler"* [signature and pastel painter] Jacob Paulus, who is referred to in a list of artists in Cleve in 1786.[83] The ebony naturals and the oak case with through dovetails, however, contribute to the more German appearance of Hoffmann's square piano at the Smithsonian (fig. 42). It is very carefully crafted; scribe lines reveal the manufacturing process. The flat beech hitchpin rail is doweled to its support block of oak. A notch at the front edge of the hitchpin rail serves as a nut. The soundboard covers the entire space to the right of the keyboard, and the tuning pins are driven directly through the soundboard as in clavichords. The key levers are cranked, which results in a belly rail angled twice. The belly rail is made up of three layers of conifer and two layers of oak; there is no mousehole, so it is impossible to ascertain the number and form of the ribs. The shape and cross section of the bridge is reminiscent of middle German clavichords, for example those by Gottfried Joseph Horn (1739–1797) and his younger brother Johann Gottlob (1748–1796), active in Dresden. Characteristic is the use of grooves to guide the strings to the right of the bridge pins from FF to e, a technique that enabled

78. Standesamt Kleve, Sterbeurkunde 1807 (reference kindly provided by Dr. Bert Thissen, Stadtarchiv Kleve). In this document the age of the deceased is given as 62 years. In the Bürgerliste from 1806 (Stadtarchiv Kleve, A VIII 12/12', no. 260) the birth date 1746 is given, but it has been corrected to 1744.

79. Stadtarchiv Kleve, Hs. Fotok. 2: Kirchenbuch luth. Gemeinde Kleve, Trauungen 1767–1830.

80. Stadtarchiv Kleve, Hs. Fotok. 2: Kirchenbuch luth. Gemeinde Kleve, Beerdigungen 1766–1835; Sterberegister 1798–1810, no. 24.

81. Standesamt Kleve, Sterbeurkunde 1807.

82. *"Ein gewißer Hoffmann arbeitet jetzt Fortepiano, die in Amsterdam mit den Englischen, fast um gleichen Preis bezahlet werden"* (quoted in Herbert Heyde, *Musikinstrumentenbau in Preußen* [Tutzing: Hans Schneider, 1994], 60).

83. Stadtarchiv Kleve, A XXX 23.

Figure 42. Plan view of the square piano by Johann Friedrich Hoffmann, Cleve. Smithsonian Institution, National Museum of American History, Washington, D.C., 299,865. Photo: SI.

the maker to dispense with back pins. The instrument is double strung throughout its compass of FF to g^3. The c^2 speaking length of 306 mm for the longer and 301 mm for the shorter string allows for iron stringing in the treble, which shows almost pythagorean scaling between c^2 and c^3. Possibly original gauge marks in ink are found on the key levers.[84]

The action of Hoffmann's square piano is a simple *Stoßmechanik* with hammer heads pointing away from the player (fig. 43). Hammer shanks and hammer heads are made out of one narrow piece, just as described by Nachersberg. This is also the case in the instrument GNM MINe 166 and the square piano in Frankfurt an der Oder, both unsigned. Hoffmann's hammers are pivoted by one common cord in a comb-like rack (fig. 44) which is part of the hammer rail. A leather-covered beech block serves as a jack, fixed to the key lever by a brass pin. One set of hammers is covered with brown leather with the grain side on top (three layers from FF to b^1, then two from c^2 to g^3), while the other set of hammers is bare. The hammer rail is moved by means of a hand stop at the left keyboard side wall. This causes either the bare or the leather-covered hammers to be activated by the jacks and therefore to touch the strings, resulting in either a bright or a mellow sound.

This piano originally had individual over-lever dampers, as can be conjectured from holes in the hitchpin rail, which guided damper lifters

84. The gauge marks range from 0 to 4 and are found on the following key levers: 0 on BB, 1 on d, 2 on a, 3 on e^1, and 4 on d^2.

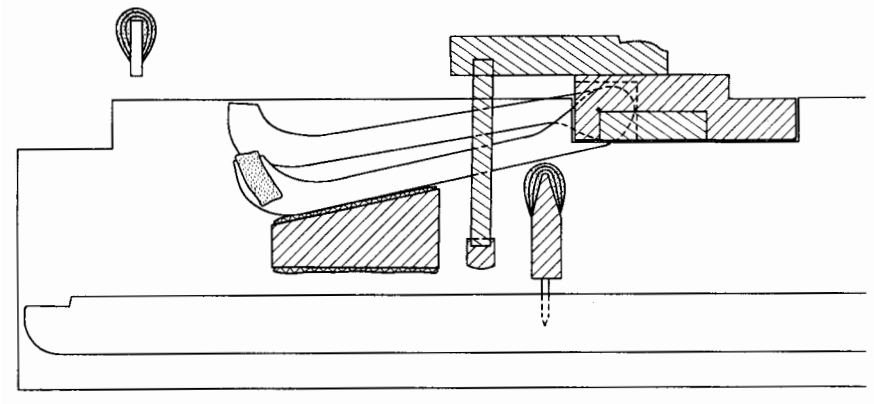

Figure 43. Action of the square piano by Johann Friedrich Hoffmann, Cleve. Smithsonian Institution, National Museum of American History, Washington, D.C., 299,865. Drawing: Sabine Klaus, redrawn for publication by John Watson.

in the form of some sort of stick, pushed upwards by the keys. The two pedals seem both to have served for damper lifting, divided for bass and treble.

Hoffmann's well-made square piano, with its tonal possibilities of soft and bright sounds and a damper-lifting device offering three different possibilities (the whole instrument, the bass, or the treble undamped), might have been used for the musical eduction of one of the many patricians' daughters in the military town of Cleve.

Conclusion

As one might expect from the political structure of German-speaking countries in the eighteenth and early nineteenth centuries—which were divided into many duchies, each with its own government, money, dialect, and customs—early square piano building was multifaceted in these regions. It is therefore not surprising that specific construction features cluster in certain areas, while they seem to be unknown in other states of the German-speaking community. As we have seen, they could also be transferred from one city to another by migrating instrument makers. This is true both for instruments with *Prellmechanik* and for those with *Stoßmechanik*. In both types, simple and complicated systems coexisted at the same time, side by side. To a certain extent this might

Figure 44. Comb-like rack for pivoting the hammers in the square piano by Johann Friedrich Hoffmann, Cleve. Hammers seen from the back. Smithsonian Institution, National Museum of American History, Washington, D.C., 299,865. Photo: Sabine Klaus.

reflect the difference between rural and urban makers, working for clienteles with different demands.

By changing or improving existing action types, makers seem to have considered themselves as "inventors" of the piano. Many of these technical alterations were motivated by attempts to produce a large amount of tonal variety, ranging from a very bright sound with much reverberation to a mellow or dry sound. The first was achieved by the use of bare hammer heads and the absence of dampers, while the latter resulted from the use of individual dampers and the addition of soft materials to interfere with the vibration of the strings or to cover the bare hammer heads.

The same models of instruments were used by many different makers. Their individual workmanship can be distinguished through quality differences and the presence (or absence) of individual construction features. This phenomenon of building based on models can be seen particularly clearly in the harp-shaped pianos and related instruments with *Stoßmechanik* with hammer heads pointing toward the player. The variety they exhibit in the details of their appearance, construction, and mechanism unequivocally shows that they cannot all be by one maker (whether

Johann Matthäus Schmahl or anyone else), but must have been built by many different makers, probably until as late as the 1820s in southwestern Germany, particularly in Upper Swabia.

Besides this first model there was a second type of square piano known in South Germany and Austria. This used a more advanced escapement *Stoßmechanik* with hammer heads pointing toward the player, and a case construction closer to the clavichord. This model might have been used in the area of Stuttgart as early as the 1760s, possibly at the court of Württemberg, and it is also found in Vienna in the 1780s, maybe as an import from Swabia.

While instruments with a *Stoßmechanik* with hammer heads pointing toward the player seem to cluster in South Germany, variations of the *Stoßmechanik* with hammer heads pointing away from the player seem to have flourished equally in northern, central, and southern Germany.