

Chapter 1

History

“Any new thing that appears in the made world is based on some object already in existence.”

—George Basalla, author of *The Evolution of Technology*

The Early Piano

Cristofori and Followers

Although the first stringed keyboard instruments in which the strings are struck¹ were described as early as 1440,² the invention of the first pianoforte is credited to Bartolomeo Cristofori, a designer and curator of musical instruments at the court of Prince Ferdinand de' Medici, in Florence. Around 1700, Cristofori fitted a harpsichord with a mechanism that utilized small hammers instead of the usual plectra.³ With this mechanism a player could produce tones of varying volume. A prominent writer, Scipione Maffei, published a description and diagram of Cristofori's new instrument, which he called the *gravicembalo col piano e forte* (harpsichord with soft and loud), in 1711.⁴ This invention, further refined by Cristofori in his later instruments (such as the earliest surviving one, built in 1720⁵—see Figures 1, 2, and 4), initiated an extraordinary new chapter in the history of music.

¹ As opposed to plucked (harpsichord), struck with tangents that remain in contact with the strings (clavichord), or excited by friction belts (*Geigenwerk* instruments).

² In a manuscript by Henri Arnaut de Zwolle. See Stewart Pollens, *The Early Pianoforte*, pp. 7–26.

³ http://www.metmuseum.org/toah/hd/cris/hd_cris.htm

⁴ In *Giornale de' letterati d'Italia*. See Stewart Pollens, *The Early Pianoforte*, pp. 57–62.

⁵ Cristofori's 1720 piano is in the Metropolitan Museum of Art in New York, his 1722 piano in the Museo Stumenti Musicali in Rome, and his 1726 piano in the Musikinstrumenten Museum in Leipzig.



Photo by the Metropolitan Museum of Art, the Crosby Brown Collection of Musical Instruments, 1889

Figure 1 Cristofori's *gravicembalo col piano e forte*, made in 1720.

Pianos continued to be made in Cristofori's tradition in Florence,⁶ but they enjoyed much greater popularity in **Portugal** and **Spain**, where, by the mid-1700s, they were made by several makers. It may have been the Italian com-

⁶ A 1746 pianoforte/harpsichord by Cristofori's student Giovanni Ferrini is described in Stewart Pollens, *The Early Pianoforte*, pp. 96–107.

poser and keyboardist Domenico Scarlatti who introduced Cristofori's piano in that region.⁷

Scipione Maffei's letter was published in German translation in 1725.⁸ Whether he learned about the new instrument from this source or earlier, **Gottfried Silbermann**, a Dresden organ and clavichord maker, started building it in the 1730s. J.S. Bach is said to have criticized his efforts in 1736, but approved of a presumably improved design in 1747, and by 1749 had become Silbermann's agent.

The concept of a harpsichord "with piano and forte" had inspired music written expressly for the instrument by 1732.⁹ Harpsichords were converted to the hammer action possibly as early as 1726 (Figure 3).¹⁰ But although the new *pianoforte* was popular among aristocrats¹¹ and cognoscenti, it had to become much simpler, much cheaper, and much more portable before it would gain wider acceptance.

Pantalon and Square Piano

In the early 1700s Europe was swept by the expressive and apparently very dynamic playing of a hammer-dulcimer virtuoso, **Pantaleon Hebenstreit**. The dulcimer,¹² a folk instrument, was very popular in Middle Europe, but few people had the skills to play it well. Hebenstreit's style of performing generated demand for a similar instrument, but equipped with a keyboard that would make playing it easier. The hammer action, although crude, made the new keyboard instrument, often referred to as a *Pantaleon* or *Pantalon*, appeal to a wider audience.

⁷ Michael Cole, *The Pianoforte in the Classical Era*, p. 15. See also David Sutherland, "Domenico Scarlatti and the Florentine piano," p. 250. The traditional view has been that Scarlatti wrote his keyboard works for the harpsichord. However, considering that he was a teacher of Queen Maria Barbara of Spain, and the inventory at her death shows that five of her 12 keyboard instruments were pianos (although two of those were converted to harpsichord), it is very likely that Scarlatti was at least exposed to—and influenced by—the new instrument. See also footnote 9.

⁸ Published in Mattheson's *Critica musica*.

⁹ Lodovico Giustini of Pistoia used dynamic markings, including *più piano* and *più forte*, in his 12 *Sonate Da Cimballo di piano, e forte*, published in Florence in 1732 (<http://ims1p.org/wiki/>). It is interesting to note that Giustini dedicated his sonatas to Maria Barbara's uncle, Don Anthonio da Braganza, who was also a student of Scarlatti. A performance by Andrea Coen on a Cristofori piano replica is available on a 3-CD set (Brilliant 94021).

¹⁰ A 1696 harpsichord in the Kunsthistorisches Museum in Vienna (SAM catalog no. 845), depicted in Figure 3, was converted to the *Stossmechanik* (push) action, but it is not clear when. There are two inscriptions on the underside of the soundboard, indicating that some work was done in 1703 and 1726. Though the 1726 date is plausible, the conversion is more likely to have taken place later in the 18th century. See Alphons Huber, ed., *Das Österreichische Cembalo*, pp. 124–126, 269–286.

¹¹ Frederick the Great of Prussia, for example, purchased several pianos from Silbermann.

¹² In German-speaking countries, the hammer dulcimer is known as the *Hackbrett*, or "butcher block."



Photo by the Metropolitan Museum of Art, the Crosby Brown Collection of Musical Instruments, 1889

Figure 2 Cristofori's 1720 piano action is surprisingly similar to the modern action. Note that the hammers were replaced at a later date and do not reflect the original design, in which paper cylinders were covered with short strips of soft leather on top.



Figure 3 Harpsichord built in 1696 and converted to hammer action, possibly in 1726. The insert shows the hammers (front), and the harpsichord jacks (back), which were converted to dampers (Kunsthistorisches Museum, Vienna).

Christoph Gottlieb Schröter (see page 6) claimed that pantalons were made as early as 1721.¹³ The earliest known German-made instrument with strings and hammers, also inspired by Hebenstreit, was advertised for sale in 1731.¹⁴ Though this early pantalon was shaped like a harpsichord, pantalons soon appeared in the shape of the **clavichord**, a keyboard instrument that was very popular in Germany and Austria. Essentially a zither¹⁵ on a stand, with keys that struck the strings with small metal blades (tangents),¹⁶ the clavichord was capable of graduated dynamics (*piano e forte*), but its sound was faint.

Schröter stated that pantalons had a downstriking action,¹⁷ but the term was also used for instruments with upstriking actions¹⁸ and for vertical pianos.¹⁹

The pantalon came from a tradition of playing on the open strings of a dulcimer, in which the strings were damped only occasionally. A sophisticated damper system was not a priority, if it was installed at all. By contrast, Cristofori's pianos, which were rooted in the harpsichord tradition, didn't even allow the lifting of all the dampers. Bear in mind that early pantalons were not loud and had a very short sustain, which made playing them without dampers quite satisfying.²⁰

A similar instrument with an upstriking hammer action, called the *Tafelklavier* or **square piano**, became popular in the second half of the 18th century.²¹ Its tone, produced by leather-covered hammers, was somewhat softer and fuller than that of pantalons, which emulated the bright sound of the dulcimer with wooden hammers. The square piano was simple, inexpensive, and portable, and was able to satisfy the rising demand during the coming decades. The pantalon died out by the end of the 18th cen-

¹³ Schröter claimed in 1764 that instrument makers in "more than twenty towns and villages" had been making pantalons since 1721. See Friedrich Marburg, *Kritische Briefe*, Vol. III, part I, p. 85, quoted in Arthur Loesser, *Men, Women and Pianos*, p. 107.

¹⁴ The advertisement by Wahlfried Ficker of Zeitz, in a Leipzig newspaper, was for a metal-strung *Flügel* ("wing-shaped") instrument of his own invention with down-striking hammers, which would imitate the effects of "the famous Pandalon [*sic*]." He called it "Cymbal-Clavir." See Michael Cole, "The Pantalon," p. 69; Michael Cole, *The Pianoforte in the Classical Era*, p. 28; or Michael Cole, "The Twelve Apostles," p. 22.

¹⁵ The zither and dulcimer are from the same family. Dulcimers have speaking lengths of strings on both sides of a centrally placed bridge, whereas the zither is laid out like a guitar, with an oversized body and more strings.

¹⁶ The tangent excites the string to vibrating and remains in contact with it, becoming its speaking-length termination.

¹⁷ Arthur Loesser, *Men, Women and Pianos*, p. 107.

¹⁸ Stewart Pollens, *Early Pianoforte*, p. 169.

¹⁹ Michael Cole, "The Pantalon," p. 69.

²⁰ See Michael Cole, "The Pantalon." I wish to thank Alfons Huber for broadening my understanding of this topic, and for letting me play on his replica of a pantalon.

²¹ A harp-shaped version was made in southwestern Germany. See Sabine Klaus, "German Square and Heart-shaped Pianos."

tury, while the square piano continued on for another hundred years.

Possibly the earliest surviving square piano, made by Johann Socher in 1742,²² has an action of rudimentary simplicity. Socher hinged the hammers on a rail in the back, pointing them toward the player, and had them pushed up by a rigid block at the end of the key.²³ Mechanically, this is similar to hanging the hammer on the end of Cristofori's intermediate lever and forgoing his real hammer, backcheck, and movable jack (see Figure 4). Pianos like Socher's square, with a "jack" **push action** (*Stossmechanik*) and hammers pointing toward the player, were made in southern Germany throughout the 18th century. The more sophisticated instruments of this type had a movable (escaping) jack that allowed the hammer to rebound from the strings, but they were a far cry from Cristofori's advanced design.

In another primitive action arrangement, the jack would push the hammer shank or butt directly (Figure 5). This design is more reminiscent of Cristofori's action because the hammers point away from the player, but it lacks the intermediate lever and backcheck, and has a rigid, non-escaping jack. Dominant in northern Germany and England, this action type was improved and became the basis for the modern grand action.

Yet another style of action was popular in southern Germany and Austria, not only in square pianos but in grand pianos as well: the *Prellmechanik* or **bumping action**, in which the hammer was attached to the key and the other end of its shank would bump against a fixed rail (*Prellleiste*).²⁴ This type of action, later known as the "German action," was perfected by Johann Andreas Stein of Augsburg, who replaced a fixed bumper rail with individual escapements for every hammer (Figure 12). In 1777, Mozart wrote enthusiastically to his father about Stein's pianos with this new action.²⁵ Stein's design was subsequently enhanced, by his daughter Nannette and son-in-law Johann Andreas Streicher, into the form that became known as the "Viennese action" (Figure 13). Bösendorfer and other Austrian piano makers used Viennese actions throughout the 19th century.

Likely influenced by the playing of Hebenstreit Pantaleon²⁶ and by the growing desire for expressiveness and dynamics,²⁷ the French inventor **Jean Marius** applied in 1716 for a royal privilege—a patent of sorts—with the Académie Royale des Sciences to make his new invention, the *clavecin à maillets*. His privilege was challenged in court by the guild of master instrument makers in Paris, of which he was not a member, and he never made the instrument.²⁸ In 1759, another French builder, Weltman (or

²² The authorship and date are disputed; see Stewart Pollens, *The Early Pianoforte*, p. 202. The piano is in the Germanisches Nationalmuseum, Nuremberg.

²³ Rosamond Harding, *The Piano-Forte*, p. 39.

²⁴ Walter Pfeiffer, *The Piano Hammer*, Figs 1–3, pp. 22–23.

²⁵ Robert Spaethling, ed., *Mozart's Letters*, 17 October 1777, p. 77.

²⁶ Edwin Good, *Giraffes*, p. 45.

oso, Franz Liszt, enthusiastically endorsed Érard pianos with the new action after his 1824 London concert.⁷¹ Although the concert was organized by Pierre Érard, it is reasonable to believe that Liszt's endorsement was at least partially sincere; he continued performing on Érards for years to come. Johannes Brahms had Viennese-action pianos in his home⁷² and commented favorably on them in his correspondence, but for his concert performances he preferred Érard⁷³ and, later, Bechstein⁷⁴ and Steinway pianos,⁷⁵ all of which had double-escapement actions.⁷⁶

From today's perspective it may be surprising that it took decades for the new action to be universally adopted. Pleyel, Érard's rival, whose pianos were preferred by Frédéric Chopin,⁷⁷ retained a single English action until the 1870s.⁷⁸ After using a single-escapement and at least two variations of repetition-assisted English actions, Steinway began offering their double-escapement action around 1865, but did not discontinue their older action styles for at least 10 more years.⁷⁹ Most European piano makers switched to the double-escapement action by 1900, while Austrian makers continued using the Viennese action for another decade or two.⁸⁰

The first half of the 19th century was a ferment of activity:

- Sébastien Érard invented the **agraffe** in 1808⁸¹ (Figure 150 on page 58)
- Pierre Érard patented his **harmonic bar** in 1838⁸²
- Antoine Bord of Paris patented the **capo tasto** bar in 1843⁸³
- Henri Pape introduced **cross-stringing** in 1828⁸⁴

⁷¹ Arthur Loesser, *Men, Women and Pianos*, p. 349; see also <http://www.pianosromantiques.com/erardhistory.html>.

⁷² George Bozarth and Stephen Brady, "Johannes Brahms," p. 42.

⁷³ Walter Frisch, *Brahms and His World*, p. 75.

⁷⁴ *Ibid.*, pp. 73, 74, 86.

⁷⁵ George Bozarth and Stephen Brady, "Johannes Brahms," pp. 49–51.

⁷⁶ It's likely that Brahms also preferred these pianos for their volume of sound.

⁷⁷ See Jean-Jacques Eigeldinger, "Chopin and Pleyel"; Arthur Loesser, *Men, Women and Pianos*, p. 363.

⁷⁸ http://real.uwaterloo.ca/~sbirkett/pleyel_info.htm.

⁷⁹ Presumably Albert Steinway would not have patented a sostenuto mechanism for both the double- and single-escapement actions in 1875 (see sidebar, "Myth/Truth," p. 76) if his company weren't committed to making pianos with the single-escapement action for at least another several years. 1865 is proposed as the start of the double-escapement action in Steinway & Sons' poster "The Touch: The Development of Action Mechanisms" [publication information unknown].

⁸⁰ See Walter Pfeiffer, *The Piano Hammer*, pp. 30–31. The diagram in Fig. 11 shows that August Kögler, a designer from Graz, Austria, was still trying to improve the Viennese action in 1931.

⁸¹ Edwin Good, *Giraffes*, p. 167.

⁸² A removable capo tasto bar. See Rosamond Harding, *The Piano-Forte*, pp. 187–188.

⁸³ *Ibid.*, p. 188.

Myth: New inventions were adopted quickly because they were technologically superior.

Truth: As Edwin Good points out in *Giraffes, Black Dragons, and Other Pianos*, many successful designs took a long time to be widely adopted. Whereas designs like the compensation frame, which could be patented or used with small modifications without infringing on an existing patent, were adopted quickly, complex designs like Érard's double-escapement action took decades to become widespread. Cost was a big factor in such decisions—manufacturers didn't want to pay royalties or reduce their profits with a complex and expensive design.

- Henri Pape started using **felt for hammers** in 1826; he patented a technique for preparing felt for hammer heads in 1844⁸⁵
- The **soundboard** grew in square pianos, first extending over a few keys, and eventually over all of them (see "Evolution of the Square Piano," page 10)
- **Machine covering of hammers** with felt was introduced around 1835; Alfred Dolge patented an improved machine in 1887⁸⁶

Almost Modern 1850–1900

By 1850, America was a vibrant and growing market hungry for music and pianos. Skilled craftsmen were paid well and, unlike their European counterparts, weren't bound by long apprenticeships and strangling guild rules. Machinery was sophisticated and plentiful, and pianos were made on an industrial scale.

Steinways—the Engine of Innovation

Although this environment would seem to guarantee success for any newcomer, it took the diligence, business acumen, and marketing genius of the Steinways to challenge the established heavyweight, Chickering of Boston. Engelhardt Steinweg, a piano maker from Germany, formed **Steinway & Sons** with his four sons in 1853 in New York. By 1860 the Steinways had gained a reputation for innovation and quality, employed 350 men, and produced 35 pianos per week.⁸⁷ To showcase the powerful yet singing tone of their pianos, they opened Steinway Hall in 1866. Seating 2,500, the venue served as a major concert hall until Carnegie Hall opened in 1891. After Steinway won *la première médaille* at the 1867 Exposition in Paris, their popularity grew in Europe, and they opened a factory in Hamburg in 1880.

⁸⁴ Arthur Loesser, *Men, Women and Pianos*, p. 401.

⁸⁵ Rosamond Harding, *The Piano-Forte*, p. 182; Edwin Good, *Giraffes*, p. 177.

⁸⁶ Alfred Dolge, *Pianos and their Makers*, pp. 99–103.

⁸⁷ Ronald Ratcliffe, *Steinway*, p. 40.

Steinway & Sons innovated relentlessly, receiving 49 patents from 1860 to 1880. During this period they introduced almost all the main features that define the “modern” piano, such as the capstan screw, the full-size plate with a transverse plate bar, the nose bolt, the continuous laminated rim and metal shoe, and the laminated long bridge.⁸⁸ Steinway exhibited their new concert grand at the Centennial International Exhibition in Philadelphia in 1876.⁸⁹ This piano, known as the “Centennial grand,” was the precursor of the modern Steinway concert grand model D. Improved in 1884 with the continuous laminated rim, the new concert grand completed the journey to the completely modern grand piano.

Other Inventions

Steinway & Sons was not the only manufacturer to innovate during this period:

- Manufacturers and action makers on both continents experimented with various **action designs** aimed at improving reliability and repetition. French makers were particularly industrious, making remarkable advancements that culminated in the “Schwander” wippen design, which was used in many European and early Asian grands until the late 20th century.
- As mentioned earlier, in 1887 Alfred Dolge patented a **hammer-covering machine**, which made possible the pressing of large, modern felt hammers
- Mason & Hamlin produced **screw stringer** pianos (see below)
- Richard Gertz of Mason & Hamlin patented his **Tension Resonator** in 1900 (see page 25).

American piano makers, including Chickering, Knabe, and Steinway & Sons, fully modernized the piano by the 1880s, and, aside from relatively minor improvements, that’s the form in which they have been made ever since.

While overall American and German piano production increased sharply during the late 1800s,⁹⁰ the French and British shares of the market began to decline. This trend continued during the 20th century.

Screw Stringer Pianos

Since they started building pianos in the early 1880s, the Boston-based keyboard-instrument maker Mason & Hamlin had utilized a system with screw tuning pins suspended by a massive plate flange (Figure 27). This system, referred to as a “screw stringer,” dispensed with the need

⁸⁸ Capstan screw: U.S. patent no. 170,645 (1875). Full-size plate with a transverse plate bar: U.S. patent no. 170,647 (1875). Nose bolt: U.S. patent no. 178,565 (1876). Continuous laminated rim and metal shoe (“tone collector”): U.S. patent no. 204,106 (1878) (both inventions were first introduced in the model A). Laminated long bridge: U.S. patent no. 233,710 (1880).

⁸⁹ See Richard Lieberman, *Steinway & Sons*, pp. 63–72. An illustration of the Steinway booth is on p. 69.

⁹⁰ Edwin Good, *Giraffes*, p. 217.



Figure 25 This 1878 Steinway 8'6" [259 cm] Style III concert grand is among the last “antique” Steinways with composite rim, open-face pinblock, and three-quarter plate. This model was made in parallel with the 8'9" [267 cm] “Centennial” concert grand, which had a full-size plate and was first made in 1875. Both were superseded by the composite-rim model D in 1878, and by the rescaled model D in 1884, which had a continuous, laminated rim and a full-size double cupola plate.



Figure 26 Modern 52" [132 cm] upright by Yamaha (model U3).