Innovations in the construction of the pianoforte from Mozart to Debussy and the resulting influences on piano style

Elizabeth Ann Loeffler

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THE INNOVATIONS IN THE CONSTRUCTION OF THE
PIANOFORTE FROM MOZART TO DEBUSSY AND
THE RESULTING INFLUENCES ON PIANO STYLE

By

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B. A. University of Montana, 1965

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Master of Arts

UNIVERSITY OF MONTANA

1966

Approved by:

[Signatures]

Chairman, Board of Examiners

Dean, Graduate School

JUN 6 1966
Date
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF PLATES</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF ILLUSTRATIONS</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF EXAMPLES</td>
<td>v</td>
</tr>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>I. THE PROBLEM</td>
<td>1</td>
</tr>
<tr>
<td>The Problem</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the problem</td>
<td>1</td>
</tr>
<tr>
<td>Basic assumptions and justification of the study</td>
<td>2</td>
</tr>
<tr>
<td>Delimitations of the problem</td>
<td>2</td>
</tr>
<tr>
<td>Methodology</td>
<td>2</td>
</tr>
<tr>
<td>Procedure</td>
<td>2</td>
</tr>
<tr>
<td>II. THE PRE-MOZARTIAN PIANOFORTE</td>
<td>4</td>
</tr>
<tr>
<td>III. THE PIANOFORTE OF MOZART'S GENERATION</td>
<td>15</td>
</tr>
<tr>
<td>IV. THE PIANOFORTE OF BEETHOVEN'S GENERATION</td>
<td>32</td>
</tr>
<tr>
<td>V. THE PIANOFORTE OF THE ROMANTIC GENERATIONS</td>
<td>45</td>
</tr>
<tr>
<td>VI. THE PIANOFORTE OF DEBUSSY'S GENERATION: A SUMMATION</td>
<td>66</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>73</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>78</td>
</tr>
</tbody>
</table>

-ii-
# LIST OF PLATES

<table>
<thead>
<tr>
<th>Plate</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>English Pianoforte and Italian Pianoforte</td>
<td>14</td>
</tr>
<tr>
<td>II.</td>
<td>Early Pianofortes</td>
<td>66</td>
</tr>
</tbody>
</table>
LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Cristofori's Action</td>
<td>5</td>
</tr>
<tr>
<td>II.</td>
<td>Cristofori's Action, 1726</td>
<td>7</td>
</tr>
<tr>
<td>III.</td>
<td>English Single Action</td>
<td>11</td>
</tr>
<tr>
<td>IV.</td>
<td>Stein's German Action</td>
<td>18</td>
</tr>
<tr>
<td>V.</td>
<td>Broadwood Grand Action, 1795</td>
<td>20</td>
</tr>
<tr>
<td>VI.</td>
<td>Double Escapement Action</td>
<td>47</td>
</tr>
</tbody>
</table>
**LIST OF EXAMPLES**

<table>
<thead>
<tr>
<th>Example</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mozart, Sonata, K. 331</td>
<td>25</td>
</tr>
<tr>
<td>2. Mozart, Fantasia and Fugue, K. 397</td>
<td>26</td>
</tr>
<tr>
<td>3. Mozart, Sonata, K. 309</td>
<td>27</td>
</tr>
<tr>
<td>4. Mozart, B-flat Concerto, K. 595</td>
<td>27</td>
</tr>
<tr>
<td>5. Mozart, Sonata, K. 332</td>
<td>28</td>
</tr>
<tr>
<td>6. Clementi, Sonata in B-flat, Opus 2</td>
<td>30</td>
</tr>
<tr>
<td>7. Beethoven, Sonata, Opus 10, Number 3</td>
<td>39</td>
</tr>
<tr>
<td>8. Beethoven, Sonata, Opus 53</td>
<td>40</td>
</tr>
<tr>
<td>9. Beethoven, Sonata, Opus 81a</td>
<td>40</td>
</tr>
<tr>
<td>10. Beethoven, Sonata, Opus 109</td>
<td>41</td>
</tr>
<tr>
<td>11. Beethoven, Sonata, Opus 106</td>
<td>42</td>
</tr>
<tr>
<td>12. Liszt, Totentanz</td>
<td>47</td>
</tr>
<tr>
<td>14. Field, Nocturne Number 9 in E minor</td>
<td>51</td>
</tr>
<tr>
<td>15. Schubert, Impromptu in G-flat major, Opus 90, Number 3</td>
<td>60</td>
</tr>
<tr>
<td>16. Chopin, Scherzo in B-flat minor, Opus 31</td>
<td>61</td>
</tr>
<tr>
<td>17. Brahms, Concerto Number 2 in B-flat major, Opus 83</td>
<td>61</td>
</tr>
<tr>
<td>Example</td>
<td>Page</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>18. Schumann, Concerto in A minor, Opus 54</td>
<td>62</td>
</tr>
<tr>
<td>19. Beethoven, Concerto in E-flat major</td>
<td>64</td>
</tr>
<tr>
<td>20. Debussy, &quot;The Little Shepherd&quot; from Children's Corner</td>
<td>67</td>
</tr>
<tr>
<td>21. Debussy, Prelude, La Cathedrale englouti</td>
<td>68</td>
</tr>
<tr>
<td>22. Ravel, Gaspard de la Nuit</td>
<td>68</td>
</tr>
</tbody>
</table>
CHAPTER I

THE PROBLEM

Throughout the history of music, composers and performers have been limited by the peculiar capabilities of their instruments. Perhaps no other instrument has been changed and in changing affected the style of composition as much as has the pianoforte during the history of its development.

Many students of the piano do not understand the complex mechanism of their instrument, nor do they know how it has evolved from the invention of Cristofori to the well-established modern instrument known today. Also, in their study of the repertoire for the instrument, many students are unaware of the relationship between the music and the instrument; both the instrument of the period in which the music was written and the instrument of today.

THE PROBLEM

Statement of the problem. The historical development of the pianoforte in a mechanical sense has centered around five essentials: (1) the action, including the keys, and hammers; (2) pedals; (3) the strings; (4) the sounding board; and (5) the frame. The purpose of
this paper is to determine in what ways, if any, the continued development of these factors has influenced the style of composition for the instrument.

Basic assumptions and justification of the study. It is assumed that any serious student of the piano should have a basic knowledge of the construction of the instrument and of the principles upon which it operates. One method of gaining this knowledge is through a historical study of the instrument's evolution and development. Although this knowledge is beneficial in itself, it is also most useful in the study of expressiveness and interpretation of the literature from the various periods of music. A knowledge of the instrument at a specific date in time, including its good qualities and its limitations, will enable the student and the performer to view the music in its proper historical perspective.

Delimitations of the problem. This paper is not meant to be a detailed history of the development of the pianoforte. It will point out only the major innovations or those which seemingly had influence on the style of composition for the instrument. In most cases the influence, if any, will not be seen immediately, but only after the innovation has been accepted for some time.

METHODOLOGY

Procedure. After a brief introduction of the invention of the pianoforte and its development up to the time of Mozart, the discussion
of the innovations in the construction of the pianoforte will be divided into four parts, each of which is centered around a major composer of pianoforte literature. These are Mozart, Beethoven, Chopin, and Debussy. In each of these four chapters, we will examine the pianoforte music of the period represented by each composer to see if the innovations of the period had any influence on the style of composition for the instrument.
CHAPTER II

THE PRE-MOZARTIAN PIANOFORTE

1709--First successful pianos built by Bartolommeo Cristofori in Florence

1716--Marius submitted models of pianofortes to the Academy in Paris

1717--Christoph Gottlieb Schröter invented two actions with hammers

1721--Schröter submitted two models of pianoforte actions to the Court at Dresden

1730--Probable date that Silbermann began to make instruments similar to Cristofori's

1732--First music written specifically for the pianoforte

1736--Gottfried Silbermann showed two pianofortes to Johann Sebastian Bach

1739--Domenico del Mela da Gagliano invented and made an upright grand pianoforte

1745--Christian Ernst Friederici of Gera (Silbermann's pupil) is credited with having constructed the first upright grand pianoforte

1760--Johann Christoph Zumpe began producing pianos in England

1750--Emergence of a new style of composition ideally suited to the peculiar characteristics of the pianoforte

It was probably in 1709, during his visit to Prince Ferdinando de' Medici at Florence, that Scipione Maffei first saw the gravecembalo.
col piano e forte which had been invented and constructed by Bartolommeo Cristofori. (It is thought that Maffei saw three instruments of this type by Cristofori.) However, Maffei's description of the instrument was not published in the Giornale de' Letterati d' Italia until 1711.¹ This harpsichord-shaped instrument which was capable of a gradual diminution of tone with a sudden return to its full power is believed to be the first successful pianoforte constructed. A reproduction² of Maffei's sketch of the Cristofori action appears below (Figure I):

![Figure I](image)

Figure I

¹Edward F. Rimbault includes the complete text in its original language and an English translation in The Pianoforte: Its Origin, Progress, and Construction (London: Robert Cocks and Co., 1860), pp. 95-102. In this article, Maffei calls the inventor Cristofali, but, as A. J. Hipkins points out in "Pianoforte," Grove's Dictionary of Music and Musicians, ed. J. A. Fuller Maitland, III (1916), 716, the inscriptions upon the extant pianofortes by the inventor are decisive evidence in favor of the correct spelling being Cristofori.

model is only four octaves, C to C, the old normal compass equivalent to the human voice. The diagram below (Figure II) of the 1726 instrument shows the important addition of a check and that the escapement attacks the intermediate lever lower down:

![Diagram of 1726 Pianoforte by Cristofori]

Figure II

Cristofori had also provided for repetition, so far as was possible without a double escapement. Like his first instruments, both of these were bichord. In place of the customary sound-holes, he cut little openings at the front edge of the belly.

---

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![Diagram of a 1726 instrument by Cristofori](image)

Figure II

Cristofori had also provided for repetition, so far as was possible without a double escapement. Like his first instruments, both of these were bichord. In place of the customary sound-holes, he cut little openings at the front edge of the belly.

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Although Cristofori is now generally accepted as the inventor of the pianoforte, several others have claimed its invention for themselves. Among these were Marius, a French manufacturer, and Christopher Gottlieb Schröter, a German organist. In 1716 Marius submitted models of pianofortes to the Academy in Paris. The following year, Schröter invented two actions with hammers, but it was not until 1721 that he submitted models of these to the Court at Dresden. These instruments were, however, inferior to those built by Cristofori. Godfrey Silbermann of Strasbourg (also of Freiberg) was one of the earliest makers of pianofortes, and he has sometimes been credited with the invention of the instrument throughout Germany. He probably began making pianofortes about 1730-33, and proof has been found that shows that his instruments were copies of Cristofori's (rather than of Schröter's pianofortes). However, Silbermann's instruments were slightly different in the retention of the sound-holes, in the more extended keyboard, and in the external case being, as in modern pianos, part of the structure. 4 It was probably during Bach's visit to Dresden in 1736 that Silbermann showed two of his pianofortes to the famous music director from Leipzig. At this time, Bach criticized these pianofortes for being too weak in the treble and having a heavy touch. However, in 1747, as often related, Bach

played upon a Silbermann pianoforte belonging to Frederick the Great and praised the instrument. 5

Concerning the upright pianoforte, Hipkins reports that Signor Cesare Ponsicchi told him of an upright grand pianoforte invented and made by Domenico del Mela da Gagliano in 1739, with a special action, not copied from Cristofori, though with some similarity in the butt, and not at all like Friederici's, which originated the "sticker" principle. 6 However, Christian Ernst Friederici of Gera (supposedly a pupil of Silbermann's) is generally credited with having constructed the first upright pianoforte. 7 This same clavier builder has also been credited with having constructed the first square pianoforte; however, this is doubtful. 8

Pianoforte making began to flourish in England about 1760 with the arrival of, as Rimbault says, 'many ingenious German

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5See Arthur Loesser, Men, Women and Pianos (New York: Simon and Schuster, 1954), pp. 40-41 for an account of this incident from Spener's Gazette, a Berlin newspaper, the Thursday, May 11, 1747 issue and also for Loesser's remarks concerning Bach's "praise" of the pianoforte.


7See Carl Parrish, "Criticisms of the Piano When It Was New," The Musical Quarterly, XXX (1944), 429 and also Loesser, Men, Women and Pianos, p. 42.

8See Harding, Grove, VI (1959), 727 and Loesser, Men, Women and Pianos, p. 44.
mechanics." These were workmen who had left their homeland which had been devastated and impoverished by the ravages of the Seven Years' War (1755-62). Perhaps among these was Johann Christoph Zumpe who is thought to have begun making pianofortes in England about this same time. The earliest known square pianoforte by Zumpe is dated 1762. Hipkins states that Zumpe had the merit of introducing the English square piano and he (Hipkins) describes the instrument thusly:

It was of pleasing form and placed upon a stand. The action, almost rudimentary but efficient, contained what was called the "old Man's head," a metal pin with a leather knob on the top to raise the hammer, and the "mopstick" damper raised by a simple jack, which accounts for the name. The dampers (Sourdini), collectively divided into two halves, bass and treble, were taken off by handstops placed within the case of the instrument; another stop brought a long strip of leather, called a "sourdine" (Sourdino), into contact with the strings to produce a pizzicato . . . . The compass was five octaves from F to f⁴.⁹

The action which Zumpe used was never patented, but it became the typical English single action in the diagram below¹⁰ (Figure III). These instruments became very popular in England. Burney describes their tone as "very sweet" and says that with "a little use" they were "equal to any degree of rapidity."¹¹

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⁹ Hipkins, History of the Pianoforte, p. 105.

¹⁰ Harding, Grove, VI (1959), 730-31.

¹¹ As quoted by Harding in Grove, VI (1959), 731.
The transition from the harpsichord and clavichord to the pianoforte naturally did not occur simultaneously in the various European countries, for national preferences and tastes played a part in the adoption of the piano. The English accepted the new instrument whole-heartedly from its first appearance in their country and were soon making pianofortes which were acknowledged as the finest in Europe. However, the French were rather skeptical of the new instrument, and its advance in Germany was retarded by the Germans' fondness for the clavichord. Also, many early makers considered the square piano merely as an improved clavichord and the grand piano as an economical substitute for the harpsichord. For a while, in Germany, there prevailed a conception that each of the three

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-12-

stringed keyboard instruments had a specific function, distinct from that of the other two. Under this system, the piano was to be used only for accompanying a singer and in small chamber groups. This concept is known to have persisted at least as late as 1817. In spite of the concept, however, the shift to the use of the pianoforte, without the option of harpsichord, began to be general about 1785.14

The earliest music known, at present, to have been written specifically for the pianoforte was a set of sonatas by Guistini, published in Florence in 1732.15 This was merely an isolated example; however, for the earliest records of public performances on the pianoforte and the composition of music that calls for the instrument do not appear until the 1760's. Around 1750 a new style of music was evolving. This new style demanded nuance, above all, and also, vivid, forceful accents and striking contrasts of volume. Since the harpsichord, because of its lack of sustaining power, was more suited to music characterized by short, running notes than block chords and melody notes of a longer rhythmic value, and also because of its minimum of dynamic possibilities, it was no longer

13See Parrish, The Musical Quarterly, XXX (1944), 437-439 for a discussion of this concept.


15Ibid., p. 83.
the preferred instrument of composers who were now writing in the new style. Thus the new style and the new instrument emerged together, making the other keyboard instruments practically obsolete.
1. ENGLISH PIANOFORTE, Zumpe and Buntebart, 1770.
2. ITALIAN PIANOFORTE by the inventor, B. Cristofori, 1726
   (No. 1: Galpin Collection; No. 2: Hever Museum, London.)
CHAPTER III

THE PIANOFORTE OF MOZART'S GENERATION

1770--Johann Andreas Stein reintroduced the hopper (escapement) giving a separate escaper to each key, instead of a long rail which had been used previously

1772--About this time Backers invented the English Direct Action

1777--John Broadwood built the first English grand piano

1777--Sebastien Erard began the French manufacture of the small piano

1780--John Broadwood reconstructed Zumpe's type of instrument and improved it

1783--John Broadwood patented two pedals; damper and celeste

1787--Pascal Taskin credited with producing the first grand piano in France

1788--About this time John Broadwood made a new scale grand piano, dividing the curved bridge

1790--John Broadwood made the first piano with five and a half octaves

1794--Andreas Streicher perfected the Viennese grand action

1794--Broadwood extended the bass half an octave to C making a six octave keyboard

1796--First grand piano produced by Sebastien Erard
The span of Mozart's life (1756-1791) coincided almost exactly with the time during which the piano gradually superseded the older instruments, the harpsichord and clavichord. While he was in Salzburg, where pianofortes were scarce, his main instruments were the clavichord and the harpsichord. However, after 1774, while traveling where pianofortes were more plentiful, he played on and wrote for the new instrument. Indeed, Mozart is often considered to be the first major composer for the pianoforte. Mozart first bought a pianoforte made by Anton Walter, for it was said that Walter tried to invent tonal and mechanical improvements with each instrument that he constructed. The compass of Mozart's Walter was from F to E, not quite a full five octaves. Mozart also liked the instruments made by Späth. However, after he had tried Stein's pianofortes, he much preferred them to any other. The following is Mozart's description, written in a letter to his father October 17-18, 1777, of Stein's pianoforte:

This time I shall begin at once with Stein's pianofortes. Before I had seen any of his make, Späth's claviers had always been my favourites. But now I much prefer Stein's, for they damp ever so much better than the Regensburg instruments. When I strike hard, I can keep my finger on the note or raise it, but the sound

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ceases the moment I have produced it. It never jars, it is never stronger or weaker or entirely absent; in a word, it is always even. It is true that he does not sell a pianoforte of this kind for less than three hundred gulden, but the trouble and the labour which Stein puts into the making of it cannot be paid for. His instruments have this special advantage over others that they are made with escape action. Only one maker in a hundred bothers about this. But without an escapement it is impossible to avoid jangling and vibration after the note is struck. When you touch the keys, the hammers fall back again the moment after they have struck the strings, whether you hold down the keys or release them. He himself told me that when he has finished making one of these claviers, he sits down to it and tries all kinds of passages, runs and jumps, and he polishes and works away at it until it can do anything. For he labours solely in the interest of music and not for his own profit; otherwise he would soon finish his work. He often says: 'If I were not myself such a passionate lover of music and had not myself some slight skill on the clavier, I should certainly long ago have lost patience with my work. But I do like an instrument which never lets the player down and which is durable.' And his claviers certainly do last. He guarantees that the sounding-board will neither break nor split. When he has finished making one for a clavier, he places it in the open air, exposing it to rain, snow, the heat of the sun and all the devils in order that it may crack. Then he inserts wedges and glues them in to make the instrument very strong and firm. He is delighted when it cracks, for he can then be sure that nothing more can happen to it. Indeed he often cuts into it himself and then glues it together again and strengthens it in this way. He has finished making three pianofortes of this kind. . . . The device too which you work with your knee is better on his than on other instruments. I have only to touch it and it works; and when you shift your knee the slightest bit, you do not hear the least reverberation.  

²The idea that the notes of the Mozart piano die away too quickly and are almost as short-lived as those of a harpsichord is a doubtful assertion as is pointed out by Eva and Paul Badura-Skoda in Interpreting Mozart on the Keyboard, trans. by Leo Black (New York: St. Martin's Press, 1962), p. 15. In reference to this passage they say: "Surely Mozart was referring, not to the tone of the piano, but to the efficiency of the dampers and release mechanism, whether one played legato or staccato."

Rimbault describes the action of the Stein's pianofortes thusly:

The mechanism of the key was not, in the first instance, more perfect than the construction of the sounding-board; for it consisted merely of a pilote attached vertically to the key, which impelled against the string a short and light hammer, suspended by a leather hinge, and guided by a thin shank which passed through its centre. Stein discovered a better process, when he devised the simple escapement, which still retains its name of German mechanism and is still [1860] employed in the greater part of the pianofortes fabricated at Vienna. In this piece of mechanism, which has the two-fold advantage of great lightness and little expense, the hammer falls the moment the pilote of the key has described its elliptical curve, and allows the strings to vibrate at liberty, though the finger still remains on the key. Considering the fineness of the strings used in the first pianofortes, this piece of mechanism was not only sufficient, but the very best that could be devised. 4

This "German action" evolved when Stein converted the jerking ledge into an escapement. In 1770 Stein had reintroduced the hopper (escapement) giving a separate escaper to each key, instead of a long rail which had been used previously. A diagram 5 of Stein's "German action" appears below (Figure IV):

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5Harding, Grove, VI (1959), 728.
In reference to the sound of the pianoforte during this time, Rimbault describes the tone of Stein's instruments as silvery and brilliant. 6

Eva Badura-Skoda has described the sound of Mozart's Walter pianoforte, which is now in the Mozart Museum in Salzburg, and compares it with the sound produced by both contemporary and later instruments:

It is difficult to describe sound, but one could say that the clarity of the treble and the full warm rich tone of the bass is a specially characteristic feature of Mozart's piano. Compared with modern pianos Mozart's piano has more specific tone colors and every register is amazing with its peculiar timbre, far from the melting sound which is regarded as a quality of romantic pianos. On Mozart's piano it is easy for the ear to distinguish the notes of a five-tone chord, even in the low bass register, whilst on late romantic and our pianos we hear only a dull sound-mass. Compared to some contemporary instruments, e.g., the English Broadwoods of the 18th century, and to the Schantz pianos, Walter's piano sounds less harpsichord-like. It does not have the little phut sound with which every tone starts suddenly on other early pianofortes and harpsichords, but shows, in spite of the clarity of sound, a nearly romantic softness.7

Turning now to the progress of the pianoforte in England, we find that the English Direct Action was invented about 1772 by a Dutchman, Americus Backers. According to Henry Fowler Broadwood, his grandfather, John Broadwood, and his apprentice, Robert Stodart, helped Backers bring this action to perfection. The first English grand piano was consequently built by John Broadwood in 1777. The new action which was utilized in this piano was quite successful since

---


it prevented blocking and made possible a powerful stroke upon the strings, if perhaps at the cost of a certain loss of speed. A diagram of a 1795 model of this action appears below (Figure V):

![Diagram of a 1795 model of piano action](image)

Figure V

Broadwood also reconstructed the Zumpe-type square, and, in 1780, he succeeded in improving it by rearranging the internal workings and thus providing more space for resonant surface. Also, in 1783, he added a patent for two pedals: a sustaining pedal, often miscalled a "loud" pedal, and a "soft" pedal by which the tone was muffled by applying a piece of cloth to part of the strings. Among Broadwood's more important improvements was the divided bridges on the grand pianoforte and the adoption of a definite striking place. About 1788, with the help of Cavallo and Dr. Gray of the British Museum, he divided the sounding-board bridge in order to make a separate bridge

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8Loesser, Men, Women and Pianos, pp. 224-225.

9Harding, Grove, VI (1959), 731.
for the bass strings, which were too long and also produced only a relatively weak sound due to an ineffective striking place. This divided bridge allowed him a greater tension, thus enabling him to use shorter but stouter strings, which in turn allowed him to establish an acoustically better striking place. The best place, he found, was at about one-ninth of the vibrating length of the string. In 1790 Broadwood extended the instrument's five octave range to five and a half by adding a half octave in the treble. Later, in 1794, he also extended the bass half an octave to C, producing a six-octave keyboard. Thus, by the end of the century, Broadwood was producing a piano-forte which was unmatched anywhere in its day for strength, sonority, and range.  

10Loesser, Men, Women and Pianos, p. 227.

Until the 1770's France had been dependent upon Germany and England for its pianofortes. In 1777 Sebastien Erard began the French manufacture of the small piano. Like most of his competitors, his early instruments were copies or variants of Zumpe's square pianoforte, with single pilot action and no escapement. The usual compass was five octaves. The first grand piano produced in France is credited to Pascal Taskin in 1787. Erard did not construct a grand piano until after his return from London in 1796. This instrument was a wing-shaped grand, equipped with the English type grand action with escapement.
Returning to Germany, we find that in 1794, Andreas Streicher, son-in-law of Johann Andreas Stein, improved upon Stein's escapement, and this newly improved "Prellmechanik" ("bouncing action") became the standard "Viennese-action." The typical Viennese pianoforte of the 1790's was made entirely of wood, except for the strings, the tuning pins, and the pedals which were metal. The action had a shallow key-fall. The hammers were small and covered with leather. The usual compass was five octaves, but some Viennese makers had followed the English lead in extending the keyboard. The upper registers had two or three strings, tuned in unison, for each note. In the bass were long, thin strings of brass which had a good tone quality but were weaker in proportion to the treble. The horizontal wing-shaped pianoforte was used for concert performances, but the smaller squares were very popular in homes.

Reflections of the transition from the older instruments to the new pianoforte can be seen in the music and in the comments and criticisms of the period. A distinction between the music for the clavichord and that for the pianoforte was made by Carl Cramer in his review of the newly-published fourth set of C. P. E. Bach's Kenner und Liebhaber sonatas.

The E major Rondo, as well as the preceding second Sonata, is definitely intended for the clavichord, and only that instrument can bring to it the expressive nuances which it demands. The piece is made suitable for this first of instruments by the flow and the closeness of its melodic intervals, the light and shadow
with which it is suffused, the use of a certain musical chiaroscuro, and the almost complete abstention from those arpeggios and passages consisting of mere broken chords which, as I am well aware, occur too often in these new collections of the Herr Kapellmeister to suit some connoisseurs. The remarks of these latter are, considered abstractly, perhaps not without reason; but actually they lose much of their force when one recalls that these Rondos, Sonatas, etc., are, according to the title-page, intended for the piano and that adjacent melodic notes make a bad effect on this defective instrument, since no player has springs in his fingers. Composers must, therefore, change the character of their melodies so that the intervals are wider, in order to lessen the untimely sounding together of notes already heard.  

In this review, Cramer seems to be objecting to the kind of damping problem in the action which Mozart found solved so well in the pianofortes by Stein. However, as Parrish points out, Cramer was a bitter opponent of the piano, and so his comments are probably quite prejudiced and perhaps meant ironically.

Much of the music written during this period could be satisfactorily performed on either the harpsichord or pianoforte. For example, Mozart's Fantasia in D minor, although probably written for the pianoforte, includes no effect that could not be realized on the earlier instrument. Also many compositions were titled pour le Clavecin ou le Piano Forte. However, as Parrish points out in the case of Haydn\(^\text{12}\) (this probably occurred with other composers also),


many of these indications were supplied by the publishers, and did not necessarily indicate the intentions of the composer. Thus there must not have been too great a divergence between the style of composition for the older and the new instrument.

In spite of this, some compositional devices can be seen that were definitely influenced by the special characteristics and limitations of the instruments involved. For example, the harpsichord was not capable of producing a gradual increase or decrease in volume. Therefore, even though entitled *per cembalo*, the Haydn Sonatas numbers 29 in F major and 34 in e minor include the indications *cresendo* and *perdendosi*. Thus they must have been intended for the pianoforte. Also in his famous Variations in F minor we find an arpeggio figure in the major part of the theme which implies gradation of tone as an essential feature.

The harpsichord has also been criticized for its lack of sustaining power. Thus it was more suited to contrapuntal writing and short, running notes. The pianoforte on the other hand was more ideally suited to the singing melodies of the new homophonic style; though not unsuited to polyphonic style. Mozart's beautiful aria-like melodies which are especially characteristic of his second movement themes would be impossible on the harpsichord. On the other hand, the pianoforte was severely criticized for its inability to produce a very large volume of sound. This was especially a problem when the pianoforte was coupled with other instruments. The following quotation
Dynamic and articulation markings are often present in abundance in accompanied keyboard sonatas. And the composers give not a few hints of the keyboard's "weak tone" which certainly suggest the piano rather than harpsichord. Thus, in Rosetti's accompanied sonatas, Op. 6 (H-or-P&Vn), published about 1781, the violin is marked one dynamic degree softer than the keyboard much of the time.\(^{13}\)

Mozart also made allowances for the weakness of the pianoforte tone, and this explains why he marked the orchestral accompaniment piano even in passages whose character is clearly that of a forte.\(^{14}\)

Although the pianoforte of Mozart's time did not have a pedal as we think of the pedal today, it was usually equipped with a knee-lever which had the same function as the present-day sustaining pedal. Thus it is improbable that Mozart was sparing in his use of the tonal possibilities of this knee-lever. There are many passages which can be played more expressively and effectively with the aid of the pedal. One such passage may be found in the Sonata in A major (K. 331), first movement, variation IV, measure 3 (Example 1):


There are also passages in his works which rely on a pedal effect. Examples are the very beginning of the D minor Fantasia (K. 397) and measure 46 of the Fantasia from the C major Fantasia and Fugue (K. 397), (Example 2): 15

![Example 2](image)

Even from his relatively early sonatas, Mozart made full use of the resources of the pianoforte including its entire compass. An especially fine example of his use of the entire compass of the instrument is found in the first movement of the Sonata in C major (K. 309). In the first bar the left hand descends to a G below the bass staff which is only one note above the maximum extension of the instrument. Later in measure 50, the line ascends to the F above the treble staff, which is the highest note on the keyboard. Sometimes he was forced to modify the lines in order to keep them within the range of the keyboard. The Sonata in C major (K. 309) again provides an example. In the development section, where the theme of the opening

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measures is restated in the dominant key, the octaves in the left hand
would fall beyond the range of the instrument, so the idea was modified
thusly (Example 3):

Example 3

Another example of modification in order to stay within the compass
of the instrument may be found in the third movement of the B-flat
Concerto (K. 595). In measures 112-113 the subject is (Example 4-A):

Example 4-A

However, at the recapitulation (measures 251-252), the original
diatonicism is altered into chromaticism to avoid going above the top
F (Example 4-B):

Example 4-B
Instances may also be found which seem to exceed the five octave range of Mozart's pianoforte. In the first movement of the D minor Concerto (K. 466), measures 88-90, Mozart wrote pedal notes which he meant to be played on the forte piano pedale. The pedale was an instrument in itself. It had long bass strings and covered nearly two octaves.¹⁶

The light, shallow action of the Viennese pianofortes was especially suited to rapid scale passages and arpeggios, which are found in abundance in Mozart's pianoforte works. This kind of passage work is seen in the driving finale of the Sonata in F major (K. 332) which opens (Example 5):

\[ \text{Example 5} \]

¹⁶ For pictures of this type of instrument see Badura-Skoda, *The American Music Teacher*, (July-August, 1963), p. 12 and Badura-Skoda, *Interpreting Mozart*, the plates between pages 6-7 and 22-23.
This same sort of thing is found throughout the Sonata in D major (K. 284). "This sonata," wrote Mozart from Munich in 1777, "sounds exquisite on Stein's pianoforte."\(^{17}\)

Clementi occupies a rather unusual position in the history and development of the pianoforte and its literature. He was born twenty years after Haydn, four before Mozart, and outlived Beethoven by five years.\(^ {18}\) Thus his life spans the time from which the piano was just emerging until it had supplanted the harpsichord and the clavichord and become firmly entrenched in musical life. He is discussed here because the period of his greatest activity as a performer and composer was between 1773 and 1796.\(^ {19}\)

His first sonatas of 1773 are perhaps the earliest pieces to make use of the distinctive powers of the instrument.\(^ {20}\) Later (some-time in the 1790's), he became associated with a piano manufacturing firm which ultimately became known as Clementi & Co.\(^ {21}\) Through this firm, he probably had considerable influence on the development and improvement of the pianoforte. His Opus 2 is remarkable for its

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\(^{19}\)ibid., p. 738.


idiomatic uses of the keyboard and its anticipation of the more brilliant writing of Beethoven and other late-Classicists. It abounds with advanced scale and arpeggio passages, broken octaves, and tricky chordal figures. The following measures from the first movement of the Sonata in B-flat, Opus 2, Number 6 are illustrative (Example 6):

Example 6

This brilliant writing was more suited to the English-action pianofortes with their heavier, deeper action and more sonorous tone.
However, Clementi's style changed in his later periods. One of his students, Ludwig Berger, reports (in 1806) Clementi's comments about this:

I asked Clementi whether in 1781 [the year of his encounter with Mozart] he had begun to treat the instrument in his present style. He answered no, and added that in those early days he had cultivated a brilliant execution, especially in double notes, hardly known then, and in extemporized cadenzas, and that he had subsequently achieved a more melodic and noble style of performance after listening attentively to famous singers, and also by means of the perfected mechanism of the English pianos, the construction of which formerly stood in the way of a cantabile and legato style of playing.\(^2\)

Thus, during Mozart's generation, we have seen that two types of pianoforte actions have evolved: the Viennese and the English. The former had a light, shallow action which is especially suited to rapid passage work of a type often found in Mozart's pianoforte music. The latter had a heavier, deeper action and was more suited to the brilliant writing of Clementi. The Viennese pianoforte owned by Mozart had a knee-lever for lifting the dampers. After 1783, the Broadwood pianofortes had two pedals. Both were relatively limited in range. During this period, the pianoforte, though still a new instrument, and as yet quite undeveloped, had established itself firmly in the musical life of the time.

CHAPTER IV

THE PIANOFORTE OF BEETHOVEN'S GENERATION

1799--Metal bracing for a grand pianoforte by Joseph Smith

1800--Isaac Hawkins patented an upright pianoforte for his son Dr. John Isaac Hawkins, of Bordertown, New Jersey

1802--Thomas Loud patented a diagonal upright pianoforte

1807--William Southwell patented the cabinet pianoforte

1808--James Broadwood first applied iron bars to a grand pianoforte

1808--Sebastien Erard patented the upward bearing and the "celeste" pedal

1809--Sebastien Erard had an early form of the double escapement action

1811--Robert Wornum made the first cottage pianoforte

1811--Robert Wornum constructed a diagonally strung instrument

1813--Robert Wornum constructed a vertically strung instrument

1820--Allen and Thom's compensating frame with metal tubes and plates

During Beethoven's generation composers and pianists desired a greater range of expression. The problem was basically that of strengthening the pianoforte so that it would respond to more forceful muscular impacts by emitting a greater volume of sound, without
crumpling or breaking. More tone required heavier hammer heads hitting harder on the strings; the strings, in turn, had to be thicker, heavier, and tighter. There was also a trend toward higher, more brilliant tuning and for extending the compass of the keyboard. The stress and strain exerted by these factors was more than the all-wooden frame of the pianoforte could withstand, without buckling or breaking. Thus, metal braces and plates were introduced for the purpose of resistance. This introduction of metal in the construction of the pianoforte was one of the most important and far-reaching developments in the history of the instrument.

The earliest patent for metal braces was Joseph Smith's of 1799. In his pianoforte, Smith used metal braces and extenders to the case which were to be placed close under the sounding board, but not touching it. These braces, however, were not for the purpose of resisting the strain of more and heavier strings, but rather to allow the addition of a "drum, tabor, or tambourine with sticks or beaters" to the underside of the instrument.¹

On March 20, 1800 in Poulson's American Daily Advertiser, John Hawkins advertised his "portable grand" pianoforte. This was the first true upright pianoforte. Prior to his invention, upright instruments had merely been horizontal instruments turned up on the broad

¹Harding, Grove, VI (1959), 733.
end and put upon a stand. In this instrument, however, the strings
descended below the keyboard and the bottom of the instrument was
upon the floor. Hawkins stated that this instrument "took up a quarter
of the space occupied by a grand, stayed in tune five or six times as
long, and was 'an elegant piece of furniture.'" Its ability to stay in
tune was due to several factors: the sounding board was suspended in
a metal frame, which in turn was braced by iron bars; the upper bridge
was of metal; and the tuning pins were true screws working in threaded
sockets in a metal wrest-pin block. Also the bass strings were heli-
cally coiled into springs, thus substituting thickness and weight for
space-consuming length in making low pitches. Although this instru-
ment included several important innovations, it was too far ahead of
its time to be successful. However, many of these were "re-invented"
and developed for use in later pianofortes. Thus, the "stage was set"
for the use of metal in the pianoforte.

In 1808 James Broadwood first applied iron bars to a grand
pianoforte. These were tension bars which were applied to the treble.
Hipkins states, however, that Broadwood was unsuccessful in fixing
them. In the same year, Sebastien Erard patented an impact-resistant,
and therefore tone-encouraging, device. This device, the agraffe, was
a short upright metal blade or stud. There was one to a note, and

^Loesser, Men, Women and Pianos, p. 461.
^Ibid.
each one was perforated with as many holes as the note had unison strings. The agraffes were screwed into the rear edge of the wrest plank, behind the tuning pins, each string passing through its opposite perforation. The agraffes formed an upward bearing for the wires and prevented the hammer blows from bending or buckling them. Erard also patented the "celeste" pedal that year.

In reference to the pedals usually found on the pianofortes at the turn of the century, we find the following description by Hipkins of instruments by Erard and Broadwood:

An Erard piano 1810 (made for Napoleon) has an action on the Stein principle. It has also the row of pedals customary in Austrian and German pianos of the time. Going from left to right the pedals are piano (shifting the action), bassoon (a parchment slip touching the strings for about three octaves), damper, piano "celeste" (muting by thin cloth), and drum and triangle (for Janissary music, the drum-stick striking the underside of the belly of the instrument). A third piano pedal was not uncommon, muting the strings as a sourdine more completely with leather—a suggestion from the late harpsichord. The contemporary English grand pianos were constant in the use, as now, of two pedals, but the piano pedal by a stop in the block gave the player the choice of two strings or one string, according to the effect sought—the latter being the "una corda" of Beethoven; and the damper pedal, by a divided foot, gave the option of raising the dampers in bass and treble divisions, or as now, all together. This arrangement of the pedals remained in force until about the year 1830. Complication of the pedals does not apparently coincide in the long run with the pianist's requirements.  

Iron had been introduced into the construction of the pianoforte before 1820, but without much lasting success. The real change

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from a wooden resisting structure to one in which iron began to play an important part came with the patent by William Allen and James Thom for a compensating frame with metal tubes and plates. Allen, a tuner in the employ of the Stodart firm, conceived the idea of a metal system of framing. This framing was not, however, intended basically for resistance, but rather, to overcome the disturbance in tuning caused by the strings being made of two different metals, brass and iron. These metals were influenced differently by changes of temperature. In 1820, Allen, with the help of Stodart's foreman, Thom, perfected and patented the invention which was a combination of parallel metal tubes, with metal plates, iron over the iron strings, and brass over the brass strings in the bass division of the instrument. The metal plates were grooved to slide upon balls fixed to the bent side of the instrument and held the hitch-pins to which the farther ends of the strings were attached. It was supposed that when the strings became less tense due to heat and thus flatter in pitch, the lengthening of the tubes, due to the same cause, would, by extending the bearings of the strings, effect an adequate compensation. Stout wooden bars, crossing the tubes at right angles, insure the stability of the tubing. This invention made possible the use of thicker and heavier strings, and its great merit was universally admired; not for the compensation aspect, but, rather, for the resistance against the strain of the strings.®

®Hipkins, Pianoforte, p. 16.
Improvements and experiments were also made with the other two forms of the pianoforte. However, the most was done with the upright rather than the square pianoforte. As previously mentioned, the first true upright was constructed by John Isaac Hawkins in 1800. In 1802 Thomas Loud patented a pianoforte by which greater portability could be attained by "fixing the first bass strings from the left-hand upper corner to near the right-hand lower corner, and the rest of the strings in a parallel direction." In 1807 William Southwell patented his Cabinet Pianoforte, with a hinged sticker action, which became extremely popular. In 1811 Wornum first constructed his Cottage piano which was a diagonally strung instrument. In 1813 he also constructed a vertically strung instrument.

Although the innovations brought to the pianoforte during Beethoven's generation were important and far-reaching, they did not directly influence the pianofortes or the music of the time. The pianofortes used during Beethoven's generation were basically the same as those developed and used during the previous one. The most popular instrument during this period was that with the Viennese action which had been perfected by Stein's son-in-law, Johann Andreas Streicher. Beethoven is known to have owned pianofortes made by Erard, Broadwood, and Graf (loaned for his lifetime) and played upon pianofortes

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7 Above, pp. 33-34.

8 Harding, Grove, VI (1959), 737.
by Stein, Walter, Jakesch, Streicher, and Vogel. It is a common conception that Beethoven was greatly influenced by the instrument given him by the Broadwood firm. Even though he much preferred it over any of his other instruments, he did not receive it until 1818. Therefore, this instrument had influence only on his late sonatas, Opus 106 forward.  

The light Viennese action and buckskin hammers favoring ease of execution and hardness of tone was especially well suited to the graceful, elegant style of playing—full of swift, pearly runs and embellishments, and not too greatly encumbered with successions of heavy chords. This style, which was so successfully perpetuated by Hummel, was extremely popular with the Viennese public. Beethoven, however, seemed quite impatient with the mechanical resources of these instruments, for he worked them to the extremes of their capacity in range, dynamics, and expressiveness. He was known at times to have hit them so hard that strings and hammers broke. It has even been said that he projected dynamic and expressive demands that

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11Loesser, Men, Women and Pianos, p. 147.
taxed the best instruments available a century and a quarter after his death. 12

The effect of the limitations of the pianoforte and its gradual increases in range, resonance, and power can definitely be seen in Beethoven's compositions for the instrument. The limit of the five octave compass, which held through Opus 31, Number 3, forced Beethoven to modify his ideas when a literal restatement in the highest or lowest octaves would have exceeded this compass; as in the first movement of Opus 10, Number 3 (Example 7):

Example 7

Other modifications due to the limits of the compass of the keyboard may be found in the first movement of the G major Concerto, Opus 58, measure 31, and in the first movement of the E-flat Concerto ("Emperor"), Opus 73, measure 332. The gradual increase in the compass of the keyboard can be seen in the use of "additional keys" as in Opus 53 ("Waldstein"), composed in 1805 (Example 8):

![Example 8](image)

Also in Opus 81a, composed in 1809 (Example 9):

![Example 9](image)
And the last note of the first movement in Opus 109, composed in 1820 (Example 10):

Example 10

The gradual increase of the resonance and power required by Beethoven can be traced from Opus 53 (1804) through Opera 57 (1804-1806), 81a (1809), 101 (1815-1816) to Opus 105 (1818-1819). Opus 106, *Grosse Sonate für das Hammer-Klavier*, was the first sonata that Beethoven composed after he received his Broadwood pianoforte. This six octave instrument as yet had no metal in its frame. It had heavier strings, a heavier action, and was more sonorous, more dynamic, and more expressive than the contemporary Viennese instruments. However, as Donington points out, the tone still remained smaller, but also more colorful than that of the present-day pianoforte.\(^\text{13}\) In this first sonata composed on his

\(^{13}\text{Robert Donington, } \textit{The Interpretation of Early Music} \text{ (London: Faber and Faber, 1963), p. 512.}
new Broadwood, Beethoven boldly opens with *fortissimo* chords (Example 11):

![Example 11](image)

It then proceeds on a course designed to utilize all of the instrument's powers. We find dynamic markings in varying degrees from *ppp* to *fff*, juxtaposition of *forte* and *piano*; and directions such as *espressivo*, *appassionato e con sentimento*, and *con grand' espressione*. The work abounds with pianistic acrobatics: two octave skips, octaves, broken octaves, scale and arpeggio passages, long passages in contrary motion, and figures which extend from low in the bass to high in the treble. The pedal markings in the third movement, *Adagio sostenuto*: *Appassionato e con molto sentimento*, point up a feature which is no longer found on modern instruments. Here we find the alternation of the directions *una corda* and *tutte le corde*, which indicates the use of a shifting soft pedal with a double shift; that is, from three strings to two strings, and again from two strings to one string. Thus Beethoven literally meant "one string." The Sonata, Opus 27,
Number 2 ("Moonlight") is often given as an example of the use of another pedal feature which is no longer available on modern pianofortes. Prior to 1830, the bass and treble dampers were often controlled separately; thus, the performer was able to provide a sustained accompaniment while playing a detached melody. Although Beethoven pushed the instrument to its maximum capacity in the matter of range, power, and resonance, he did not take full advantage of its sustaining power. In the first movement of the Sonata in A-flat major, Opus 110, use of the sustaining pedal is essential; however, in general, his music would not suffer greatly without the use of the sustaining pedal. His failure to cultivate this aspect of the instrument's power has been attributed by many to his deafness.

It is interesting to note that in the chronology of Beethoven's works there is no dividing line between the lighter and the heavier instruments, but the change is symbolized between the Piano Concerto in G major, Opus 58 which could conceivably be effective on a Mozartian pianoforte and the Piano Concerto in E-flat major, Opus 73 ("Emperor"), which imperiously demands the full power and display of the heavier, more sonorous instrument. Although such a


division does not occur within the corpus of Beethoven's works, there is a very distinct difference between his style and Hummel's, which was so well suited to the light Viennese action. We must also remember that, although iron was introduced into the construction of the pianoforte during Beethoven's lifetime, it had not begun to appear generally in the instruments manufactured.
CHAPTER V

THE PIANOFORTE OF THE ROMANTIC GENERATIONS

1821--Clementi and Collard invent a "bridge of reverberation"

1821--Erard patented a double escapement action (repetition action) dependent upon the speed of the fingers

1821--S. Herve invented the fixed string-plate (brought out at Broadwood's)

1822--James Broadwood adapted iron bars to the string-plate

1823--Sebastien and Pierre Erard introduced a complete system of nine resistance bars from treble to bass

1824--Liszt played in Paris on an Erard grand pianoforte of seven octaves, C to C

1825--Pierre Erard patented bolts to iron bars

1825--Alphaeus Babcock patented in America a cast-iron frame square pianoforte

1826--Pape granted a patent for improvement of the pianoforte including covering hammers with felt

1827--James Broadwood patented iron bars and string-plate combined in a grand pianoforte

1827--James Stewart patented stringing without "eyes" to the strings (in Messrs. Collard's pianofortes)

1834--Webster of Birmingham brought out steel wire

1835--Böhm had over-strung pianofortes made in London; Pape introduces over-stringing in French pianofortes

-45-
1838--Pierre Erard introduced the "Harmonic bar"

1840--Jonas Chickering made the first cast-iron frame for a grand pianoforte

1843--A. Bord of Paris invented the "Capo tasto" bar

1847--H. F. Broadwood invented his "Iron" grand pianoforte

1853--Chickering & Son combined cast frame and over-stringing in a square pianoforte

1854--H. Wölfel, of Paris, invented an iron wrest-plank with mechanical screw-pins

1859--Steinway & Sons patented in America a cast frame over-strung grand pianoforte and double over-strung square pianoforte

During Beethoven's generation experiments with the double escapement action and the use of iron in the construction of the pianoforte were to have far-reaching effects. In 1809 Dussek had played upon an early form of Sebastien Erard's double escapement action. At first this new action aroused skepticism as to the practicability and durability of such a complex mass of small moving parts. However, by 1821 Erard had perfected and patented this repetition action which was dependent upon the speed of the fingers. This innovation consisted of a number of smaller levers and springs. These let the hammer rebound from the string, not to the original point of rest, but to an intermediate point which was closer to the string. The hammer remained in this position as long as the finger was still holding down the key. The hammer could return to its original position only after the key had been released. Figure VI differs in some details, but is essentially the form of the action originally patented: ¹

¹Harding, Grove, VII (1959), 736.
At first this action was furnished only on the Erard grand pianofortes, but by the 1830's it was being built into all their instruments. Within twenty years it had been adopted, sometimes with modifications or further improvements, by all pianoforte makers.

The kind of rapidly repeating notes now possible on the pianoforte with the new double escapement action can be seen in the Fifth Variation of Liszt's Totentanz (Example 12):

![Example 12]
However, this new action had more advantages than just the facilitation of repeated notes:

Its more general virtue lay in its lightness, rapidity, and responsiveness, which were all achieved without loss of firmness or strength, thus uniting the good points of both the English and the Vienna mechanisms. It was this Erard action that made possible the smaller, quicker shadings on the piano, the breathless ultrapianissimos, the delicious swoon of a high note suddenly whispered, and the plastic relief of prominent and subordinate voices in closely woven tone-textures.²

Thus, the double escapement, which was at first doubted and then so eagerly accepted, is still a standard in pianoforte equipment.

Meanwhile continued progress was being made in the use of iron in the construction of the pianoforte. In 1821 Herve invented the fixed string-plate which was brought out at Broadwood. The following year James Broadwood adapted iron bars to the string-plate.³ Moscheles' remark concerning the instruments used that same year at Cramer's annual London concert is of interest in respect to this innovation:

The strong metal plates used by Broadwood in building his instruments, give a heaviness to the touch, but a fullness and vocal resonance to the tone, which are well adapted to Cramer's legato, and those fingers softly gliding from key to key. I, however, use

²Loesser, Men, Women and Pianos, p. 338.

³This seems to have been a period during which everyone had similar ideas at the same time, and it is rather difficult to determine which firm was first with certain developments. See Harding, Grove, VI (1959), 734 for a discussion of the conflicting claims of the Broadwood and Erard firms.
Clementi's more supple mechanism for my repeating notes, skips and full chords. 4

This remark helps us determine the date of the effective use of the metal plate in the pianoforte. It also indicates the kind of tone quality which the metal plates aided in producing. Finally, it indicates that the employment of these metal plates was not at that time a general practice.

In 1823 Sebastien and Pierre Erard introduced a complete system of nine resistance bars from treble to bass; with a simple mode of fastening them through the sound-board to the wooden beams beneath. The following year Liszt played in Paris on an Erard grand pianoforte of seven octaves, from C to C. More than ten years later, when he was composing the Etudes d'Execution transcendante, he stayed mainly within a six and a half octave range. However, in the "Prélude," he acknowledged the extended compass of the Erard instrument by writing for measures 7 and 8 a version for piano a 7 octaves (Example 13):

Example 13

4Loesser, Men, Women and Pianos, p. 303.
Liszt's method of including a version for the seven octave keyboard, as sort of an after-thought, seems to indicate that seven octave keyboards were not yet universally found.

In the same year that Pierre Erard patented bolts to iron bars, 1825, an American, Alphaeus Babcock, patented a cast-iron frame for a square piano. This unification of the separate parts of the resistance frame was important in adding to the strength and resonance of the instrument. It was taken up in America by Conrad Meyer, Jonas Chickering, and others, but universal acceptance did not come for a long time. One reason for the slow acceptance is reflected in this remark by Rimbault:

We agree with Mr. Pole that the growing tendency to the use of too much metal in the construction of pianofortes, is injurious to the quality of the tone. It also adds greatly to the weight of the instrument, and consequently diminishes its portability and general usefulness. 5

Nevertheless, he concedes that the use of metal has its advantages, and that in fact, it cannot be dispensed with due to the increased weight of the strings. Hipkins speaks even more positively about the use of metal in the pianoforte:

The greater elasticity of iron as compared with wood does not allow the lesser vibrating sections or upper partial tones of a string to die away as soon as they would with the less elastic wood. The consequence is that in instruments where iron or steel preponderates in the framing there is a longer sostenente or singing tone, and increasingly so as there is a higher tension or strain on the wire. Where wood preponderates these vibrating

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sections die out sooner. The extremes of these conditions are a metallic whizzing or tinkling, and a dull "wood" tone. The middle way, as so often happens, is to be preferred.®

During this period there were also many experiments aimed toward producing a more resonant and therefore a more sonorous instrument. In 1821 Clementi and Collard invented an additional bridge, not for regulating musical intervals, but for augmenting the duration of the vibration, which they called "the bridge of reverberation." The advantage of this new bridge, placed at a regulated distance on the sound-board, was that the motion given to the principal part of the string by the impulse of the hammer was kept up by the bridge of reverberation, instead of being suddenly checked by an attachment to an unyielding substance.®

This prolonged vibration is said to have produced a "purity, power, and continuity of sound somewhat resembling the richness of an octave below."® This innovation was especially beneficial to the slow, melancholy melodies of the Field and Chopin nocturnes. Field's Nocturne, Number 9 in E minor (Example 14) is illustrative:

Example 14

®Hipkins, History of the Pianoforte, p. 7.
®Rimbault, The Pianoforte, p. 182.
®Ibid.
Also, as Hipkins pointed out,⁹ the vibrating sections of a string vibrate longer in an instrument that has metal in its frame than in one that is entirely wooden.

Experiments with other aspects of construction also affect the tone produced. In all the instruments previously discussed, the hammers were covered with tanned deer-leather. At the time it was considered the most durable material for the purpose, but it became brittle and hard with age and tended to produce a dry, sharp, poor quality of tone. In 1826 Pape was granted a patent for improvements of the pianoforte which included covering hammers with felt. An additional patent contained his prescription for the preparation of felt for hammer covering. Felt was a pliable, durable material and was light enough to be applied in several layers without adding too much weight to the hammer. It was found that impact by a larger, softer-striking surface at the hammer's end allowed the string to develop its vibration more slowly along its entire length, thus encouraging the formation of stronger lower harmonics on which a richer quality of sound depends.¹⁰

In 1827 James Broadwood combined the metal string-plate with iron bars and patented his invention. Through this invention,

⁹See above, p. 50.

¹⁰Loesser, Men, Women and Pianos, p. 339.
complete control over the unused lengths of wire behind the belly-bridge was gained. Thus, the wood and iron pianoforte was now brought to its first stage of efficiency. There were four bars in this patent, compared to nine in Erard's, but no bar parallel with the straight side and lowest bass string. In the same year James Stewart patented a method of stringing without "eyes." This new method involved using only one hitch-pin (of double the usual size), instead of two, and passing the string from one tuning-pin to the other around the single hitch-pin, with one continuous piece of wire. This method had several advantages: it prevented the distortion of the fibers of the wire by twisting, which often made them false; it removed the problem of the wire giving way at the "eye" or "noose;" it avoided the frequent snapping of the string at the twist; and it made tuning easier and faster. This method was first used by the Collard firm, but after the patent expired it was almost universally adopted. A further improvement in stringing was made possible in 1834 when Webster of Birmingham brought out a steel wire to replace the iron wire that had been used previously. Steel wire had been tried before this time in Germany, but with little success. Webster's wire had a much greater tensile strength than iron wire. Thus, the strings could be pulled tighter, producing a clearer and more brilliant tone. Still another improvement was made in the method of stringing in 1834.

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11 Hipkins, The History of the Pianoforte, pp. 16-17.
In London, Böhm, the famous German flutist, perceived the advantages of over-stringing and had pianofortes made by this method. In France, Pape introduced over-strung pianofortes during the same year. With this method of stringing, the higher strings are arranged in the form of a fan, spreading over the largest part of the soundboard. The bass strings are then strung, crossing them at a higher level. Cross-stringing, as it is sometimes called, was not generally adopted, however, until Steinway & Sons used it in their grand piano-forte of 1859.

Returning to the use of metal bars and cast-iron frames in the construction of the pianoforte, we find that in 1838 Pierre Erard introduced what he called the "Harmonic Bar." This was a pressure bar upon the wrest-plank in the treble part of the scale. It was intended to increase the rigidity of the wrest-plank which would in turn increase the purity and clearness of the tone produced. In 1840 Jonas Chickering patented, in America, the first cast-iron frame for a grand piano. In 1834 A. Bord of Paris invented the "Capo tasto" bar (sometimes called "Capo d'astro" bar). This was also a pressure bar which acted as the nearer bearing of the vibrating length of a string. It was used both as a replacement for and a supplement to the wrest-plank bridge.

In 1847 H. F. Broadwood invented his "Iron" grand piano-forte. Among the improvements introduced with this instrument were
a newly revised harmonic scale of strings; a peculiar method of fixing
the sounding-board; the transverse metal bar, by which several
tension bars were dispensed with; the construction of the tension bars,
so as to combine the maximum of strength, with the minimum of
weight; the fixing of these tension bars in the string-plate by means of
wedges, thus ensuring equal tension; and the diagonal tension bars
which abut against the strongest angle of the wrest-plank and bass
scale. These diagonal tension bars effectively meet what is termed
the "side-swag" of the string-plate, and they enable the maker to use
only a single direct tension bar. 12

In 1853 the firm of Chickering & Son combined the cast frame
and over-stringing in a square piano. The following year H. Wölfer,
of Paris, invented an iron wrest-plank with mechanical screw-pins.
In 1859 the firm of Steinway & Sons patented in America a cast frame
over-strung grand piano and a double over-strung square piano. The
new grand piano, anticipated by a similarly made square piano exhib­
ited in 1855, was played in public for the first time at the New York
Academy of Music, on February 8, 1859. Hipkins says that without
a doubt "it represents the flood-mark of American pianoforte making;
what has been done since being to modify and further improve it
according to the ideas and experience of the respective makers of

different countries who have adopted it.\textsuperscript{13}\hspace{1em} This pianoforte with its increased width of the soundboard, its complete iron framing, and its steel wire under increased tension produces a more \textit{sostenente} or singing tone, and it also stays in tune longer.

Donington says that "the grand piano of Chopin's generation is the last to retain any of the old lightness and colourfulness of tone, and in this kind is an almost perfect instrument, lacking only the extremest rapidity of repetition."\textsuperscript{14} The music of the period was expanded in harmonic range and substituted warmth of color and richness for clarity of tone. With new patents for improvements in the pianoforte being granted almost every year, both the music and the instrument grew to maturity very rapidly. This is different from the earlier periods, when it took quite some time for innovations to be accepted and utilized.

It is interesting to note how a composer-pianist's tastes and preferences grow, change, and mature. This can usually be seen in his music, but it can also be seen in the kind of instruments he chooses. For example, Moscheles' wife, Charlotte, gives an excellent view of the development of the Erard pianoforte and how Moscheles' growth as a composer and pianist is related to this development. She writes that in 1821 he preferred Pape's instruments, because the Viennese

\begin{flushright}
\textsuperscript{13}Hipkins, \textit{The History of the Pianoforte}, p. 21. \\
\textsuperscript{14}Robert Donington, \textit{The Interpretation of Early Music} (London: Faber and Faber, 1963), p. 512.
\end{flushright}
pianos, with their lightness of touch, had "rather spoilt" him for the slow and heavy action of the Erards of that time. Further on we read a report by Moscheles himself:

Young Erard took me to-day to his piano factory, to try the new invention of his uncle Sebastien. This quicker action of the hammer seems to me so important that I prophesy a new era in the manufacture of pianofortes. I still complain of some heaviness in the touch, and therefore prefer to play upon Pape's and Petzold's instruments; I admired the Erards, but am not thoroughly satisfied, and urged him to make new improvements.

In 1823, Moscheles writes, telling about a concert and his purpose and the audience's reaction:

I tried in my Fantasia to show the value of the broad, full, although somewhat muffled tone of the Broadwood piano [lent him by Beethoven]; but in vain. My Vienna public remained loyal to their countryman--the clear, ringing tones of the Graf were more pleasing to their ears.

In 1824 he writes:

Important in the history of pianoforte-playing is the fact Erard's pianos became very popular, having attained this year a great excellence. The touch in particular is vastly improved, I begin to revel in these instruments.

In the following year, he writes:

Pierre Erard showed and explained to me on a dumb keyboard his uncle Sebastien's now completed invention, for which the firm had just taken out a patent. I saw the earliest experiment of this invention in Paris. It consists in the key, when only sunk half way, again rising and repeating the note. I was the first to play upon one of the newly completed instruments, and found it of priceless

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value for the repetition of notes. In the matter of fullness and softness of tone, there is something yet to be desired, and I had a long conversation on the subject with Erard.

He writes in 1828:

Erard presented me to-day with a grand concert piano, of the value of 160 guineas. I certainly owe him my best thanks for such a present. Externally the instrument is all that can be wished for, but the tone of the higher notes is somewhat dry, and I find the touch still too heavy. My Clementi, therefore, still remains my favorite, although Erard's instruments have begun steadily to make their way.

Concerning Moscheles' growth as a pianist and composer up to 1830-1831, his wife writes:

We have seen how Moscheles, starting as a bravura player, gradually too, broader views of his art both as a composer and player. His powers steadily matured, and this year we find in his compositions and execution, a depth of feeling and expression in advance of former years; witness the adagio of his Concerto in C major, written about this time, and the new Trio upon hearing which Hummel said that no modern pianoforte player but Moscheles could write such an adagio. It should, however, be stated here that this progress, although mainly originating with Moscheles himself, was greatly favored by the improvements made in Erard's pianos; their organ-like tone and full resonant sounds gave Moscheles such pleasure that no doubt he had every incentive to bring into relief these great excellences, and display them in this adagio. "A very violin-cello," he used to say, praising the tone, which he could prolong without using the pedals; to excessive use of these he had a rooted aversion; "A good player," he used to say, "must only rarely use the assistance of either pedal, otherwise he misuses it."

Finally, she writes that at his annual concert of 1831, for the first time on such an occasion, Moscheles used an Erard in preference to a Clementi piano.

In reference to Chopin and his preferences in pianos, there are a few, but contradictory, remarks. First of all, Niecks says that:
From the fact that Chopin played during his visit to Great Britain in 1848 at public concerts as well as at private parties on instruments of Broadwood's, we may conclude that he...appreciated the pianos of this firm.  

Liszt reports that:

While Chopin was strong and healthy, as during the first years of his residence in Paris, he used to play on an Erard piano; but after his friend Camille Pleyel had made him a present of one of his splendid instruments, remarkable for their metallic ring and very light touch, he would play on no other maker's.

If he was engaged for a soirée at the house of one of his Polish or French friends, he would often send his own instrument, if there did not happen to be a Pleyel in the house.

Chopin was very partial to (affectionnait) Pleyel's pianos, particularly on account of their silvery and somewhat veiled sonority, and of the easy touch which permitted him to draw from them sounds which one might have believed to belong to those harmonicas of which romantic Germany has kept the monopoly, and which her ancient masters constructed so ingeniously, marrying crystal to water.  

However, in reference to the relationship between his preference of pianos and his health, Chopin himself says:

When I am indisposed, I play on one of Erard's pianos and there I easily find a ready-made tone. But when I feel in the right mood and strong enough to find my own tone for myself, I must have one of Pleyel's pianos. 

In spite of the contradictions, we can see through these remarks and with the help of reviews appearing in La France musicale that Chopin

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17 Ibid.

18 Ibid.
preferred a pianoforte with a rapid, light action and a tone that was not too dry or clear-cut. He must have also wanted an instrument that responded sensitively and was versatile. This is the sort of instrument that his music implies. In the waltzes we find the melodies moving lightly but elegantly over the keys. A piano with a heavy action would make them seem awkward. His peculiar melancholy melodies require an instrument that can "sing;" that is, a resonant instrument in which the vibrations of the strings are prolonged rather than one with a short, dry, tone like Mozart's piano. In the pianistic style of the Romantic period, themes were often slow with a rapid accompaniment in the form of arpeggios and scale passages, not for the sake of playing a scale or arpeggio but for the sound of the harmonic background. Schubert's Impromptu in G-flat major, Opus 90, Number 3 (Example 15) and the second theme in Chopin's Scherzo in B-flat minor, Opus 31 (Example 16) are illustrative:

Example 15
Example 16

This type of melody with a rapidly moving harmonic background is almost inconceivable on a Mozartian pianoforte. Also, due to a more resonant instrument, we find music that sparkles, flashes, thunders, and gallops over the entire compass of the keyboard as does Liszt's Mephisto Waltz and Transcendental Etudes, Schumann's Concerto in A minor, Opus 54 (Example 17), and Brahms' Concerto Number 2 in B-flat major, Opus 83 (Example 18):
Hand in hand with the increased resonance, we find an increase in the use of the pedals, especially the sustaining pedal. Previously, the pedals were seldom used, but now they become a necessity. Hipkins makes the following comment on the use of the pedals during this period:

The works of Schumann and Chopin, both of whom realised, as none of their predecessors had done, the artistic value of that evanescent tone of the piano which was at first considered the chief defect of the instrument. Both turned the sustaining pedal to richer account, and got new effects from its use, and both loved a dreamy, poetical, indefinite form of melody, and a style of ornamentation to which the word "ethereal" is suitably applied. . . . The sustaining pedal, which in the hands of Schumann and Chopin is used very often as if it were a veil enfolding their melodies in a luminous haze, is frequently used by Liszt as a means of setting the hands free for other things; and a special kind of brilliance was attained by him in rapid ornamental passages in the higher octaves of the piano. 19

The increased strength of the frame and the increased tension of the strings were necessary to withstand the brilliant bravura style.

of playing commonly associated with Liszt. The Mozartian pianoforte probably would have crumpled under the strain of repeated fortissimo octaves as in the Liszt, Mephisto Waltz and the Chopin, Nocturne, Opus 48, Number 1 or the full marcato chords in the first movement of the Brahms B-flat major Piano Concerto. A versatile instrument with rapid action and immediate response is necessary to effectively execute passages like the pianissimo repeated octaves in Chopin's well-known Polonaise in A-flat major, Opus 53. Finally, the sonority which the pianoforte of Chopin's generation was able to produce made possible the beautiful middle themes of Chopin's Nocturnes, Opus 37, Numbers 1 and 2 which on a Mozartian pianoforte would sound dull and tasteless.

Finally, the pianoforte had become an instrument that could "hold its own" when it was combined with other instruments. When the pianoforte was first invented, it was thought to be suitable only for accompanying singers and small chamber ensembles. During Mozart's generation, composers had to mark any accompanying instruments or orchestra at least one dynamic level lower so that the piano could be heard. In Beethoven's time many of the concertos written were for piano with orchestra, rather than piano and orchestra. Even in Beethoven's E-flat major, "Emperor" Concerto, which was for piano and orchestra, the texture of the orchestral part often becomes quite thin whenever the piano is playing. For example, compare the orchestration in the measures in which the piano plays with those in which it does not in Example 19.
In Chopin's generation, however, with its increased size, strength, and resonance, the piano was more capable of being heard through the orchestral texture most of the time. In Schumann's Quintet for Piano and Strings in E-flat major, Opus 44, the piano balances the four strings. In this work, the piano plays almost constantly, with only six measures rest in the entire work, and it holds its own very nicely through thick and thin.

Thus, the trends in the construction of the pianoforte, which were begun during Beethoven's generation, were continued and brought to maturity during Chopin's generation. The music of the period also began to exploit the new resources of the instrument, but it was left to the following period to bring this process to its full fruition.
CHAPTER VI

THE PIANOFORTE OF DEBUSSY'S GENERATION

A SUMMATION

Since Steinway & Sons patented their cast frame over-strung grand pianoforte in 1859, there have been no major developments in the construction of the pianoforte. In 1874 Steinway perfected a mechanism for keeping the damper lifted, at the will of the player, off any single string or strings, without affecting the other dampers. They called this device the sostenuto pedal. It has become standard on most American pianofortes, but it is usually not found on European instruments. Therefore, its utility has been rather limited and it has not been exploited by composers such as Debussy and Ravel. Although there are no actual markings in their music to indicate the use of the sostenuto pedal, it could be effectively applied in many instances throughout their piano compositions.

In 1888 Henry John Broadwood took out a patent for a barless pianoforte. In this instrument the metal plate of mild or cast steel is turned up around the sides to form a continuous flange, so as to meet the strain without requiring bars. This mode of construction goes
back in simplicity of construction to the original wooden pianofortes ante 1820, but it adequately bears the modern increase of tension.

Thus, it is an ideal construction, and the musical instrument produced is of singular beauty and equality of tone.¹

Finally, in the 1890's, the seven octave compass of the keyboard is slightly extended to seven and one-third octaves, or to the eighty-eight keys that we know today. These notes, the highest B-flat, B, and C, are rarely used and are the poorest in quality of all the piano's tones. Anything that was done after this time was either a refinement of previous innovations or a radical experiment with unusual keyboards.

The music of this period was mainly concerned with the further exploitation of the instrument's capabilities in the areas of dynamic shading and contrast, range, and resonance. There is much pianissimo playing and delicate shadings as in the Debussy Preludes, Deux Arabesques, and the Children's Corner Suite. Example 20 from "The Little Shepherd" of the Children's Corner is illustrative:

![Example 20](image)

¹Hipkins, The History of the Pianoforte, pp. 22-23.
The sustaining pedal especially was used to produce an atmospheric or veiled effect in which the colors of different note clusters are allowed to run together. Although there are no actual markings in Debussy's music to indicate the use of the sostenuto pedal, many times notes or chords are held too long to sound effectively without the use of this pedal, as in Prelude X, La Cathédrale engloutie (Example 21):

![Example 21](image1)

Ravel made much use of the upper register and of the entire compass of the piano, as in the suite Gaspard de la Nuit. Also, his tempos were very rapid, and he made use of very rapidly repeating notes as in Gaspard de la Nuit (Example 22):

![Example 22](image2)
Thus, we have music for an instrument which is capable of producing many shades and ranges of touch and expression.

SUMMARY

In this paper we have examined the major innovations in the construction of the pianoforte, and we have also surveyed the ways in which these innovations have influenced the style of composition for the instrument during each of the different periods.

In the history of the grand pianoforte there were three main types of actions: (1) the light Viennese action, which was so well suited to the rapid scale and arpeggio passages found so often in Mozart's piano works; (2) the heavier English direct action, which was more suited to the brilliant playing and composition of Clementi and Beethoven; and (3) the double escapement action, developed by Erard, which made possible the faster repetition of notes and combined the best features of the other two actions.

The compass of the keyboard was expanded from the four and four and a half octaves of the first Cristofori instruments, through five octaves of the Mozartian pianoforte, and six octaves of the Beethoven pianoforte, to seven octaves of the pianofortes of Chopin and Liszt. These increases in range necessitated the strengthening of the frame which was accomplished through the use of metal bars and plates and finally the cast-iron frame. The following quote from
Loesser shows the importance of these innovations in the history of the pianoforte and its repertoire:

The metal frame permitting a stronger blow and therefore greater volume, the rapid double-escapement action making for more delicate stroke-responsiveness combined with speed, the thickly felt-covered hammers giving a "rounder" tone than those formerly used—all these developments converged into one trend: the making of an instrument suitable for use by a person who could project piano music commandingly, fascinatingly, in a large room, a concert virtuoso in other words; a piano that could be played louder and faster with more sensitive shading, more violent contrast, and a richer, more "singing" quality than had been possible previously. It was about 1830 that this newer ideal of piano making and piano playing was taking definite shape; it was fully realized a few years later. By then the last echoes of the eighteenth century were being stilled, the conception of what was desirable in a tone quality had completed its long period of change, and the fading ghost of the harpsichord was finally laid. A sharp, bright sound—a clear, well-defined, unambiguous statement of individual tone—such as the earlier eighteenth century had liked, was no longer wanted. The yearning was for a vague, mellow tone-cloud, full of ineffable promise and foreboding, carrying intimations of infinity.3

Throughout the course of its history, many inventors have been concerned with improving the pianoforte. At first the main concern was with attaining a satisfactory action. After this problem was fairly well solved, attention was turned to increasing the range. This, however, involved problems of strengthening the frame. As these problems were solved with the introduction of metal in the construction, the attention was turned toward making a more resonant and sonorous instrument.

Concerning the influence of these innovations on the style of composition for the pianoforte, it is difficult to say anything very definite, since it is sometimes difficult to say which came first, the innovation or the music. Also, there were other, perhaps more important, influences on each composer's style of composition. However, a direct influence can be seen in terms of the limitations of the instrument and the gradual extension or widening of its capabilities. The problem is further complicated by the fact that sometimes the innovations did not take effect until many years after their first appearance, or sometimes it was necessary for them to be re-invented before they were accepted and had an opportunity to influence the style of composition.
EARLY PIANOFORTES

1. Anton Walter, c. 1780, formerly Mozart's. 2. J. Broadwood & Sons, 1817, formerly Beethoven's. 3. J. Broadwood & Sons, 1848, used by Chopin.

(No. 1: Mozarteum, Salzburg; No. 2: National Museum, Budapest; No. 3: Broadwood & Sons, Ltd., London.)
CHRONOLOGY

1709--First successful pianofortes built by Bartolommeo Cristofori in Florence

1716--Marius submitted models of pianofortes to the Academy in Paris

1717--Schröter invented two actions with hammers

1721--Schröter submitted two models of pianoforte action to the Court at Dresden

1726--Gottfried Silbermann, of Freiberg, showed two pianofortes to Johann Sebastian Bach

1733--Silbermann probably began making instruments similar to Cristofori's at this time

1739--An upright grand pianoforte invented and made by Domenico de Mela da Gagliano, with a special action, not copied from Cristofori, though with some similarity in the butt, and not at all like Friederici's, which originated the "sticker" principle

1745--Friederici is credited with having constructed the first upright grand pianoforte

1760--Johann Christoph Zumpe began producing pianofortes in England

1770--Johann Andreas Stein reintroduced the hopper (escapement) giving a separate escaper to each key, instead of a long rail which had been used previously

1771--Backers exhibited his invention "original Forte Piano" at the Thatched House in London

1772--Backers about this time invented the English Direct Action

1774--First American built pianoforte; in Philadelphia by John Brent
1777--Sebastien Erard began the French manufacture of the small pianoforte

1777--John Broadwood built the first English grand pianoforte

1780--John Broadwood reconstructed Zumpe's type of instrument and improved it

1783--John Broadwood patent for two pedals: loud and soft ("celeste")

1786--Geib patented the square "grasshopper" action

1787--First grand piano produced in France credited to Pascal Taskin

1787--John Landreth patented the "upright" grand pianoforte

1787--Walton patented a soft pedal with shifting hammers

1788--John Broadwood about this time made a new scale grand pianoforte, dividing the curved bridge

1789--Stein, of Augsburg, invented a soft pedal with shifting action

1790--John Broadwood made the first pianoforte with five and a half octaves

1794--William Southwell invented the "Irish" damper

1794--Andreas Streicher perfected the Viennese grand action

1794--Broadwood extended the bass half and octave to C, making a six octave compass

1796--First grand pianoforte produced by Sebastien Erard

1798--William Southwell patented a square pianoforte turned up

1799--Joseph Smith used metal bracings in a grand pianoforte

1800--Isaac Hawkins patented an upright pianoforte for his son, Dr. John Isaac Hawkins, of Bordertown, New Jersey

1802--Thomas Loud patented a diagonal upright pianoforte

1807--William Southwell patented the cabinet pianoforte
1808--James Broadwood first applied iron bars to a grand pianoforte

1808--Sebastien Erard patented the upward bearing, through the use of agraффes, and the "celeste" pedal

1809--Sebastien Erard had an early form of the double escapement action

1811--Robert Wornum made the first cottage pianoforte

1811--Robert Wornum constructed a diagonally strung instrument

1813--Robert Wornum constructed a vertically strung instrument

1820--Allen and Thom's compensating frame with metal tubes and plates

1821--Messrs. Clementi and Collard invented the "bridge of reverberation"

1821--Double escapement action (repetition action) dependent upon the speed of the fingers

1821--S. Herve invented the fixed string-plate (brought out at Broadwood's)

1822--James Broadwood adapted iron bars to the string-plate

1823--Sebastien and Pierre Erard were the first in the field with a complete system of nine resistance bars from treble to bass; with a simple mode of fastening them through the sound-board to the wooden beams beneath

1824--Liszt played in Paris on an Erard grand pianoforte of seven octaves, C to C

1825--P. Erard patented bolts to iron bars

1825--Alphaeus Babcock patented in America a cast-iron frame square pianoforte

1826--Robert Wornum patented the crank action, improved in 1828

1826--Pape was granted a patent for improvements of the pianoforte which included covering the hammers with felt
1827--James Broadwood patented iron bars and string-plate combined in a grand pianoforte

1827--James Stewart patented stringing without "eyes" to the strings (brought out at Collard's)

1831--W. Allen patented in London a complete cast-iron frame pianoforte

1833--Conrad Meyer patented in America a cast-iron frame square pianoforte

1834--Webster of Birmingham brought out steel wire to replace iron wire

1835--Böhm had over-strung pianofortes made in London; Pape introduced over-stringing in French pianofortes

1838--P. Erard introduced the "Harmonic bar"

1840--Jonas Chickering patented in America a cast-iron frame with damper socket (square pianoforte)

1840--Jonas Chickering made the first cast-iron frame for a grand pianoforte

1843--A. Bord of Paris invented the "Capo tasto" bar.

1847--H. F. Broadwood invented his "Iron" grand pianoforte

1851--Jonas Chickering exhibited in London grand pianofortes with frames in one casting

1851--Lichtenthal, of St. Petersburg, exhibited in London over-strung grand pianofortes

1853--Chickering & Son combined cast frame and over-stringing in a square pianoforte

1854--H. Wölfel, of Paris, invented an iron wrest-plank with mechanical screw-pins

1959--Steinway & Sons patented in America a cast frame over-strung grand piano and double over-strung square piano

1874--Steinway perfected the sostenuto pedal

1888--Henry John Broadwood patented a barless pianoforte
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