

## A HISTORY OF STRINGED KEYBOARD INSTRUMENTS

This book explores the history of keyboard instruments from their fourteenth-century origins to the development of the modern piano. It reveals the principles of their design and describes structural and mechanical developments through the medieval and renaissance periods and eighteenth- and nineteenth-centuries, as well as the early music revival. Stewart Pollens identifies and describes the types of keyboard instruments played by major composers and virtuosi through the ages and provides the reader with detailed instructions on their regulating, stringing, tuning and voicing drawn from historical sources.

Trained as a harpsichord, organ, and violin maker, Stewart Pollens served as the conservator of musical instruments at The Metropolitan Museum of Art from 1976 to 2006. He has published widely on the history of musical instruments and is the recipient of the American Musical Instrument Society's 1997 Bessaraboff Prize for *The Early Pianoforte* (Cambridge University Press, 1995).

# A HISTORY OF STRINGED KEYBOARD INSTRUMENTS

STEWART POLLENS





Shaftesbury Road, Cambridge CB2 8EA, United Kingdom  
One Liberty Plaza, 20th Floor, New York, NY 10006, USA  
477 Williamstown Road, Port Melbourne, VIC 3207, Australia  
314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India  
103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of education, learning and research at the highest international levels of excellence.

[www.cambridge.org](http://www.cambridge.org)

Information on this title: [www.cambridge.org/9781108434454](http://www.cambridge.org/9781108434454)

DOI: [10.1017/9781108379915](https://doi.org/10.1017/9781108379915)

© Stewart Pollens 2022

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press & Assessment.

First published 2022

First paperback edition 2023

*A catalogue record for this publication is available from the British Library*

*Library of Congress Cataloging-in-Publication data*

NAMES: Pollens, Stewart, author.

TITLE: A History of Stringed Keyboard Instruments / Stewart Pollens.

DESCRIPTION: [1.] | Cambridge, United Kingdom ; New York, NY : Cambridge University Press, 2021. | Includes bibliographical references and index.

IDENTIFIERS: LCCN 2021024797 (print) | LCCN 2021024798 (ebook) | ISBN 9781108421997 (hardback) | ISBN 9781108434454 (paperback) | ISBN 9781108379915 (epub)

SUBJECTS: LCSH: Keyboard instruments—History. | BISAC: MUSIC / General

CLASSIFICATION: LCC ML549 .P64 2021 (print) | LCC ML549 (ebook) | DDC 786.09—dc23

LC record available at <https://lcn.loc.gov/2021024797>

LC ebook record available at <https://lcn.loc.gov/2021024798>

ISBN 978-1-108-42199-7 Hardback

ISBN 978-1-108-43445-4 Paperback

Cambridge University Press & Assessment has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

## CONTENTS

<i>List of Figures</i>	page vii
<i>List of Tables</i>	xiii
<i>Preface and Acknowledgments</i>	xv
<i>Pitch Notation Conventions</i>	xxi
1 ORIGINS OF KEYBOARD INSTRUMENTS	I
2 PRINCIPLES OF DESIGN AND CONSTRUCTION	32
3 THE HENRI ARNAUT MANUSCRIPT	142
4 THE RENAISSANCE	166
5 THE BAROQUE PERIOD	210
6 THE INVENTION OF THE PIANO	313
7 THE CLASSICAL PERIOD	362
8 THE ROMANTIC ERA	446
9 STAGNATION AND REVIVAL	494
<i>Bibliography</i>	529
<i>Index</i>	551

## FIGURES

Photographs by the author, except where noted.

I.1	Woodcut illustration of early keyboard layout showing diatonic naturals and B $\flat$ keys in Sebastian Virdung, <i>Musica getutscht</i> (1511).	page 6
I.2a	Woodcut illustration of <i>Clavicordium</i> and <i>Virginal</i> in Sebastian Virdung, <i>Musica getutscht</i> (1511).	6
I.2b	Woodcut illustration of <i>Clavicimbalum</i> and <i>Claviciterium</i> in Sebastian Virdung, <i>Musica getutscht</i> (1511).	7
I.3a	Reversed woodcut illustration of <i>Clavicordium</i> and <i>Virginal</i> in Sebastian Virdung, <i>Musica getutscht</i> (1511).	7
I.3b	Reversed woodcut illustration of <i>Clavicimbalum</i> and <i>Claviciterium</i> in Sebastian Virdung, <i>Musica getutscht</i> (1511).	8
I.4a	Woodcut illustration of <i>Clavicordium</i> and <i>Clavicymbalum</i> in Martin Agricola, <i>Musica instrumentalis deudsch</i> (1528).	9
I.4b	Woodcut illustration of <i>Virginal</i> and <i>Claviciterium</i> in Martin Agricola, <i>Musica instrumentalis deudsch</i> (1528).	9
I.5a	Reversed woodcut illustration of <i>Clavicordium</i> and <i>Clavicymbalum</i> in Martin Agricola, <i>Musica instrumentalis deudsch</i> (1528).	10
I.5b	Reversed woodcut illustration of <i>Virginal</i> and <i>Claviciterium</i> in Martin Agricola, <i>Musica instrumentalis deudsch</i> (1528).	10
I.6	Engraved illustration of a rectangular <i>Epinette</i> pictured in Marin Mersenne, <i>Harmonie universelle</i> (1636).	14
I.7	Engraved illustration of a <i>Clavecin</i> in Marin Mersenne, <i>Harmonie universelle</i> (1636).	15
I.8	Plan view of <i>muselar</i> virginal by Ioannes Ruckers, Antwerp, 1622. The Metropolitan Museum of Art.	17
I.9	Plan view of <i>spinett</i> virginal by Lodewijck Grouwels, Middelburg, 1600. The Metropolitan Museum of Art.	18
I.10	Bentside spinet, John Crang, London, 1753. Photograph courtesy of the Metropolitan Museum of Art.	19
I.11	Wing-shaped harpsichord, 1777, Girolamo Zenti, Rome, 1666. Photograph courtesy of the Metropolitan Museum of Art.	19
I.12	Bentside spinet, French, ca. 1700. Photograph courtesy of the Metropolitan Museum of Art.	20
I.13	Virginal by Ioannes Ruckers, Antwerp, 1622. The Metropolitan Museum of Art.	21

1.14	Woodcut of <i>Clavicytherium</i> pictured among three clavichords in Michael Praetorius, <i>Sciagraphia</i> (1620).	21
1.15	Fretted clavichord, German, ca. 1800. The Metropolitan Museum of Art.	21
1.16	Wing-shaped “grand” piano, John Broadwood, London, 1792. Photograph courtesy of the Metropolitan Museum of Art.	22
1.17	Square piano, John Broadwood, London, 1797. Photograph courtesy of the Metropolitan Museum of Art.	22
1.18	Cabinet upright piano, Loud & Brothers, Philadelphia, 1830. Photograph courtesy of the Metropolitan Museum of Art.	23
1.19	Giraffe piano, Johann Jacob Könnicke, Vienna, ca. 1810. Photograph courtesy of the Metropolitan Museum of Art.	23
1.20	Lyre piano, Johann Christian Schleip, Berlin, ca. 1820–1832. Photograph courtesy of the Metropolitan Museum of Art.	23
1.21	Pyramid piano, Christian Ernst Friederici, Gera, 1745. Goethe-Museum, Frankfurt am Main.	23
1.22	Engraving of a harpsichord, Denis Diderot and Jean-Baptiste le Rond d’Alembert, <i>Arts et métiers mécaniques</i> , vol. IV, <i>Instruments de musique et lutherie (art du faiseur d’)</i> (Paris, 1785), Plate 10.	24
1.23	Engravings of harpsichord keyboards, Denis Diderot and Jean-Baptiste le Rond d’Alembert, <i>Arts et métiers mécaniques</i> , vol. IV, <i>Instruments de musique et lutherie (art du faiseur d’)</i> (Paris, 1785), Plate 12.	24
1.24	Engravings of harpsichord jacks, Denis Diderot and Jean-Baptiste le Rond d’Alembert, <i>Arts et métiers mécaniques</i> , vol. IV, <i>Instruments de musique et lutherie (art du faiseur d’)</i> (Paris, 1785), Plate 10.	25
1.25	Drawing of Cristofori piano action, ca. 1726.	26
1.26	Engraving of Austro/German piano action in Andreas Streicher, <i>Kurze Bemerkungen über das Spielen, Stimmen, und Erhalten der Fortepiano</i> (1801).	26
1.27	English grand action (Broadwood)	27
1.28	Modern piano action.	27
2.1	Graph of string tensions in a Broadwood grand piano dated 1806.	75
2.2	Clavichord tangents in an anonymous eighteenth-century German clavichord. The Metropolitan Museum of Art.	75
2.3a	Harpsichord jack, front; Italy, late seventeenth century.	76
2.3b	Harpsichord jack, back; Italy, late seventeenth century.	76
2.4	Piano hammer, Gottfried Silbermann, ca. 1746. Neues Schloss, Potsdam.	76
2.5	Piano tangent from Bonafinis spinet. The Metropolitan Museum of Art.	76
2.6	Pentagonal spinet, inscribed Franciscus Bonafinis 1585. The Metropolitan Museum of Art.	77
2.7	Virginal by Lodewijck Grouwels, Middelburg, 1600. Photograph courtesy of the Metropolitan Museum of Art.	77
2.8	Clavicytherium pictured in Marin Mersenne, <i>Harmonie universelle</i> (1636).	77
2.9	Nuremberg <i>Geigenwerck</i> pictured in Michael Praetorius, <i>Sciagraphia</i> (1620).	78
2.10	<i>Viola organista</i> pictured in Leonardo da Vinci’s <i>Codex Atlanticus</i> .	79

## LIST OF FIGURES

ix

2.11	Ruckers virginal, internal construction. The Metropolitan Museum of Art.	92
2.12	Italian polygonal spinet, Venice, 1540. Photograph courtesy of the Metropolitan Museum of Art.	93
2.13	Grand piano by William Frecker, London, 1799; internal construction. Private collection.	97
2.14	Detail of Broadwood square piano showing open-wound overspun strings. Private collection.	107
2.15	<i>Bebung</i> notation in Friedrich Wilhelm Marburg's <i>Anleitung zum Clavierspielen</i> (1765).	109
2.16	Jacob and Abraham Kirckman harpsichord, London, 1788, detail of machine-stop mechanism. Private collection.	112
2.17	Detail of Jacob Kirckman harpsichord, 1744, lute stop. Private collection.	114
2.18	Detail of the <i>harpichordium</i> mechanism in Hans Ruckers's 1581 double virginal. The Metropolitan Museum of Art.	114
2.19	German grand action; key and hammer of a <i>Frère et Sœur</i> ( <i>Geschwister</i> ) Stein piano, Augsburg, ca. 1800. The Metropolitan Museum of Art.	116
2.20	Viennese grand action; key and hammer of a Conrad Graf piano, Vienna, ca. 1838. The Metropolitan Museum of Art.	118
2.21	Érard escapement mechanism patent, London, 1821.	130
2.22	The author's overlay of the drawing of Bartolomeo Cristofori's hammer action in Scipione Maffei's 1711 article in the <i>Giornale de' letterati d'Italia</i> and Sébastien Érard's 1821 London patent drawing.	132
3.1	Clavichord drawing in the Henri Arnaut MS, fol. 129r <sup>o</sup> . Bibliothèque Nationale, ms. Latin 7295.	145
3.2	Representation of the fretting of clavichord strings in the Henri Arnaut MS, fol. 129v <sup>o</sup> . Bibliothèque Nationale, ms. Latin 7295.	146
3.3	Clavichord drawing in the Henri Arnaut MS, fol. 130r <sup>o</sup> . Bibliothèque Nationale, ms. Latin 7295.	147
3.4	<i>Clavisimbalum</i> drawing in the Henri Arnaut MS, fol. 128r <sup>o</sup> . Bibliothèque Nationale, ms. Latin 7295.	150
3.5	Drawings of plucking and striking mechanisms in Henri Arnaut MS, fol. 128r <sup>o</sup> . Bibliothèque Nationale, ms. Latin 7295.	158
3.6	Altarpiece carving of <i>clavisimbalum</i> and clavichord from the Cathedral at Minden, Germany, ca. 1425. Photograph courtesy of Arnold den Teuling.	164
4.1	Woodcut of <i>Virginal, Spinett, and Octav Instrumentlin</i> in Michael Praetorius, <i>Sciagraphia</i> (1620).	169
4.2	Double virginal in <i>muselar</i> form, Hans Ruckers, Antwerp, 1581. Photograph courtesy of the Metropolitan Museum of Art.	177
5.1a	Harpsichord by Louis Charles Bellot, Paris, 1742. Photograph courtesy of the Metropolitan Museum of Art.	212
5.1b	Plan view of harpsichord by Louis Charles Bellot. Photograph courtesy of the Metropolitan Museum of Art.	212

5.2	Harpsichord by Joseph Ioannes Couchet, Antwerp, ca. 1670. Photograph courtesy of the Metropolitan Museum of Art.	214
5.3	Detail of Joseph Ioannes Couchet harpsichord showing added lute register. The Metropolitan Museum of Art.	217
5.4	<i>Pantolon</i> clavichord by Christian Kintzing, Neuwied, 1763. Photograph courtesy of the Metropolitan Museum of Art.	245
5.5	Gottfried Silbermann's <i>Cembal d'Amour</i> as pictured in Jakob Adlung's <i>Musica mechanica organoedi</i> .	249
5.6	Pianoforte by Gottfried Silbermann, Freiberg, Saxony, 1746. Sanssouci, Potsdam.	252
5.7	Pianoforte by Francisco Pérez Mirabal, Seville, 1745, as pictured in Byne and Stapley, <i>Spanish Interiors and Furniture</i> (1922).	284
5.8	Pianoforte by Henrique Van Casteel, Lisbon, 1763. Conservatório Nacional de Música, Lisbon.	284
5.9	Template for a monochord termed an <i>Acordante</i> by Antonio Soler.	285
6.1	Woodcut of Bartolomeo Cristofori's hammer action in Scipione Maffei, "Nuova invenzione d'un Gravecembalo col piano, e forte," <i>Giornale de' letterati d'Italia</i> 5 (1711).	321
6.2	Piano by Bartolomeo Cristofori, Florence, 1720. Photograph courtesy of the Metropolitan Museum of Art.	324
6.3	Key-lever of the 1726 Cristofori piano showing escapement lever and backcheck. Grassi Museum für Musikinstrumente, Leipzig.	326
6.4	Hammer from the 1726 Cristofori piano. Grassi Museum für Musikinstrumente, Leipzig.	327
6.5	Anonymous portrait of Bartolomeo Cristofori dated 1726.	328
6.6	Detail of the hammer action drawing in the portrait of Cristofori.	328
6.7	Internal construction of the 1720 Cristofori piano. The Metropolitan Museum of Art.	335
6.8	Internal construction of the 1722 Cristofori piano. Photograph courtesy of the Museo Nazionale degli Strumenti Musicali, Rome.	336
6.9	Drawing of Jean Marius's first hammer action, from <i>Machines et inventions approuvées par l'Académie Royale des Sciences</i> (Paris, 1735).	341
6.10	Drawing of Jean Marius's second hammer action, from <i>Machines et inventions approuvées par l'Académie Royale des Sciences</i> (Paris, 1735).	342
6.11	Drawing of Jean Marius's third hammer action, from <i>Machines et inventions approuvées par l'Académie Royale des Sciences</i> (Paris, 1735).	343
6.12	Drawing of Jean Marius's fourth hammer and plucking action, from <i>Machines et inventions approuvées par l'Académie Royale des Sciences</i> (Paris, 1735).	344
6.13	Drawing of Christoph Gottlieb Schröter's first hammer-action design in Friedrich Wilhelm Marpur, <i>Kritische Briefe über die Tonkunst</i> (1763).	351
6.14	Drawing of Christoph Gottlieb Schröter's second hammer-action design in Wilhelm Friedrich Marpur, <i>Kritische Briefe über die Tonkunst</i> (1763).	354
7.1	Anonymous German damperless square piano, late eighteenth century. Photograph courtesy of the Metropolitan Museum of Art.	370



## LIST OF FIGURES

xi

- |     |   |     |
|-----|---|-----|
| 7.2 | Ferdinand Hofmann grand piano, Vienna, ca. 1790. Photograph courtesy of the Metropolitan Museum of Art.   | 375 |
| 7.3 | John Broadwood & Sons grand piano, London, 1808. Photograph courtesy of the Metropolitan Museum of Art.   | 375 |
| 7.4 | J. & A. Kirckman harpsichord, London, 1788 with Venetian swell and machine stop. Private collection.  | 381 |
| 7.5 | Johann Schmidt pedal piano, Salzburg, ca. 1790. Photograph courtesy of the Metropolitan Museum of Art.  | 391 |
| 9.1 | Antonio Baciero at the Metropolitan Museum of Art's Joseph Böhm piano, Vienna, ca. 1820, on the occasion of his 1985 concert series featuring four of the museum's early pianos.  | 510 |
| 9.2 | View of the exhibition <i>Keynotes: Two Centuries of Piano Design</i> held at the Metropolitan Museum of Art in 1985–1986. The author was then the conservator of the Department of Musical Instruments and was responsible for carrying out the cosmetic and mechanical restoration work on the thirty-three pianos featured in this event (many of which had been in storage for over 100 years), including tuning and preparation for gallery demonstrations and recitals (including those played by Antonio Baciero, pictured above). Over 350,000 visitors toured this popular exhibition. | 510 |
| 9.3 | Mieczyslaw Horszowski at the Metropolitan Museum of Art's Bartolomeo Cristofori piano, Florence, 1720, on the occasion of his 1978 recording (the first of two) featuring the Cristofori piano. Horszowski recorded sonatas by Lodovico Giustini published in 1732 – the first music composed specifically for the newly invented piano.  | 511 |

## TABLES

2.1	Three-octave spans of select keyboard instruments	<i>page</i> 35
2.2	Some $c^2$ string lengths of keyboard instruments discussed in this book	53

## PREFACE AND ACKNOWLEDGMENTS

This is my fifth publication with Cambridge University Press; previous efforts include *The Early Pianoforte* (1995), *Stradivari* (2010), *The Manual of Musical Instrument Conservation* (2015), and *Bartolomeo Cristofori and the Invention of the Piano* (2017). (It may be considered my sixth if one includes my contribution to the multi-author compilation *The Cambridge Companion to the Guitar* [2011]). This is also the second of my publications to feature left-to-right reversed images of keyboard instruments! The first, an image of Bartolomeo Cristofori's essentially symmetrical oval spinet, was neither an error of mine nor of Cambridge University Press, but rather the supplier of the photograph, the Musikinstrumenten-Museum der Universität Leipzig (Grassi Museum für Musikinstrumente, Leipzig), which apparently scanned its own transparency upside down when producing the digital file that was forwarded to Cambridge University Press for use on the cover of *Bartolomeo Cristofori and the Invention of the Piano*. That reversed image appears not only on the cover but also on p. 88 of that book. *A History of Stringed Keyboard Instruments* includes a photograph of the ca. 1425 carving depicting a *clavisimbalum*, clavichord, and dulcimer featured on the altarpiece of the cathedral of Saints Gorgonius and Peter in Minden, Germany, but this also appears to be reversed, though in this instance the error was that of the altarpiece's fifteenth-century woodcarver, not the generous individual (Mr. Arnold den Teuling) who kindly supplied me with his photograph of the altarpiece detail. This is thought to be the earliest depiction of a harpsichord, though the fact that it is reversed suggests that it was based upon an earlier woodcut or engraving, which itself may have been copied from an even earlier painting, drawing, or illumination (woodcuts and engravings are reversed left to right due to the inversion of the paper over the block or plate during the printing process; some block cutters and engravers were apparently oblivious to this transformation or unconcerned with its significance).

In the past, I have acknowledged the museums, archives, and libraries that permitted me to examine or consult their holdings (though is it not their duty to provide access to their collections?) as well as friends and associates, casual or otherwise, who kindly offered the pleasure of their company, a glass of wine, or possibly a room to stay during my research travels. However, in my

writings, I have rarely sought or received advice, nor have I ever had drafts reviewed by colleagues; the Cambridge University Press editorial staff alone has provided valuable suggestions, for which I am most grateful. If I am to offer acknowledgments, it is to the authors of the many valued publications (over 600 in number) that are footnoted or otherwise referenced herein.

Decades ago, one required the administrative assistance of an affiliated academic institution (which in my retirement I no longer possess) to obtain books on interlibrary loan or to order photocopies or microfilms from libraries and archives, often at considerable expense and with excruciating delay. These days, my sincerest thanks go to UMI and Pro-Quest (suppliers of print-on-demand doctoral dissertations), the International Music Score Library Project (IMSLP), and print-on-demand publishers, which in connection with the postal service deliver within a day or two, on my doorstep in rural Connecticut, and at reasonable cost, facsimiles of many of the sixteenth-, seventeenth-, eighteenth- and nineteenth-century texts cited herein. Online services, such as the Internet Archive and the HathiTrust Digital Library, must also be commended for making millions of books and texts available on the computer screen. Once again, I would like to thank the estates of the late Drs. Emanuel Winternitz and Robert Rosenbaum for the bequest of their libraries to me. These contributions to the 1500 or so books and journals that comprise my personal musical instrument reference library have been a great resource, especially in my retirement from the Metropolitan Museum of Art and retreat from New York City. More recently, my library has been enhanced with books formerly owned by the late professors Robert Lamar Weaver and Christopher Hogwood.

The challenge of writing a history of keyboard instruments within the original contracted limit of 140,000 words and ten photographic illustrations has been formidable (fortunately, Cambridge University Press has allowed me to breach these constraints). Readily available are worthy offerings listed under *The New Grove Musical Instruments Series*, such as its *Early Keyboard Instruments* and *The Piano*, Rutledge's encyclopedic works *The Harpsichord and Clavichord* and *The Piano*, as well as numerous monographs on the harpsichord, clavichord, and piano published by the presses of Cambridge and Oxford Universities, not to mention readily available classics like Frank Hubbard's *Three Centuries of Harpsichord Making*, Donald Boalch's *Makers of the Harpsichord and Clavichord 1440–1840*, Raymond Russell's *The Harpsichord and Clavichord*, Rosamund Harding's *The Piano-forte*, as well as more recent reference works, such as Martha Clinkscale's two-volume *Makers of the Piano*. Obviously, in 250,000 words I could not hope to cover six hundred years of keyboard instrument history in detail or include all of the biographical information and technical data presented in the worthy books cited above, so it was my intention to take a new approach, and one perhaps more in keeping with those

who play or otherwise enjoy keyboard instruments, rather than those who make, restore, and collect them – and that is, to explain the principles of their design and construction and to explore the relationship between keyboard instruments and the composers and virtuosi who used them. In many respects, despite the imposed limitations of word length and number of illustrations, I believe this book goes into far greater detail on several topics than do many of its predecessors cited above; for example, tuning and temperament are almost never discussed in books about the history of keyboard instruments, and even works devoted exclusively to temperament theory rarely provide explicit instructions for setting temperaments as readers will find here. I invite those who play early keyboard instruments to make use of these instructions – the technique of setting a temperament by ear is not difficult and in the end is more “authentic” than resorting to a cell-phone app that has been programmed with excruciating mathematical precision; furthermore, listening to musical intervals fall in line is far more satisfying than watching a rotating disc come to a tremulous halt. Also presented here are transcriptions and translations of numerous historical documents, lexicons, inventories, and treatises – including, for the first time in English, all relevant portions of the early fifteenth-century Latin manuscript of Henri Arnaut of Zwolle.

My training in harpsichord making and thirty years’ experience as the conservator of musical instruments at The Metropolitan Museum of Art (which as I recall has around 200 keyboard instruments in its encyclopedic collection) have been invaluable in explaining the structure and musical qualities of keyboard instruments. In this book, I have focused on the principal types of keyboard instruments that would have been used or preferred by major composers and virtuosi and have largely stood clear of secondary forms, such as square and upright pianos, as well as the musical oddities that clog museum galleries and storerooms: the orphicas, pantalon pianos, folding harpsichords, and the like that seem to provide so much stimulation for keyboard historians these days, nor have I delved into sociological phenomena (such as the institution of piano teaching as a profession for American spinsters), politics (such as the confiscation and destruction of harpsichords during the French Revolution’s Reign of Terror) or romanticized fictional accounts (such as Jane Austen’s square-piano idyll in *Emma*), which are adequately addressed in the literature.<sup>1</sup>

It was my original intention to begin or end this work with a chapter or glossary devoted to keyboard terminology, but my draft of that chapter has been jettisoned due to its excessive length (a thorough index and extensive cross-referencing will hopefully direct the reader to obscure terms and their definitions in the text). My editors have indulged me in retaining the present second chapter, which is devoted to the principles of keyboard design and construction. I then proceed with chapters devoted to the Renaissance,

Baroque, Classical, and Romantic periods, showing how keyboard instruments changed along with music style.

My final chapter, Stagnation and Revival, might at first seem dismissive of the modern grand piano, but I believe a well-tuned, finely regulated, and artfully voiced concert grand (of virtually any manufacturer) is a magnificent instrument that can serve the keyboard repertoires of every school and period. In fact, I began my own piano studies at the age of ten on my grandmother's Wurlitzer "spinet," the most modest of upright pianos, and did not discover the joy of owning to a proper grand piano until my mid-thirties, when I purchased a hundred-year-old Steinway B. For me, the "early keyboard revival" began in my teens: a friend and I pooled our meager financial resources and bought a Zuckermann clavichord kit that we constructed together, and the works of Boalch, Hubbard, Russell cited above were my constant companions. When I graduated from university, I served an apprenticeship with the harpsichord maker John Challis and later went to work with the organ builder Jeremy Cooper. Though my years at the Metropolitan Museum of Art interfered with my ambition to become a keyboard instrument maker, the fine Flemish-style harpsichords made in Frank Hubbard's shop and by Peter Fisk that I acquired over the years have been a great consolation.

During my tenure at The Metropolitan Museum of Art, I had the privilege of working on keyboard instruments dating from 1540 up to the modern era, preparing them for exhibition as well as for recitals and recordings featuring such artists as Andrew Appel, Antonio Baciero, Paul Badura-Skoda, Louis Bagger, Joan Benson, Malcolm Bilson, Mieczyslaw Horszowski, Igor Kipnis, Linda Kobler, Ruth Laredo, Anthony Newman, Lionel Party, Skip Sempé, and Martin Souter. Working as a private restorer, I have repaired, tuned, and readied-for-performance keyboard instruments owned by Leonard Bernstein, John Browning, Albert Fuller, Byron Janis, Steven Lubin, and Julius Rudel, as well as occasional work on historic keyboard instruments owned and played by the faculty of the Juilliard School.

This book is not about "historically informed performance practice" per se, nor does it attempt to delve into the thorny philosophical issues surrounding "authenticity," though the information provided herein regarding compass, disposition, pitch, regulation, stringing, tuning, and appropriate repertoire will hopefully be of service to keyboard players, whether they play the harpsichord, clavichord, fortepiano, or modern piano.<sup>2</sup>

All translations are by the author, except where noted.

## NOTES

1. James Parakilas, *Piano Roles* (New Haven, 2002), p. 134. Antonio Bartolomeo Bruni, *Un Inventaire sous la Terreur* with *Introduction* by J. Gally (Paris, 1890), pp. vii–xxxiv. Kathryn Shanks Libin, “Music, Character, and Social Standing in Jane Austen’s *Emma*,” *Persuasions* 22 (2000), pp. 15–22.
2. Recommended readings on the subject of “informed performance practice” include: Arnold Dolmetsch, *The Interpretation of the Music of the 17th and 18th Centuries Revealed by Contemporary Evidence* (London, 1915); Thurston Dart, *The Interpretation of Music* (London, 1954); Robert Donington, *The Interpretation of Early Music* (London 1963); Theodor Adorno, *Prisms* (Cambridge, MA, 1967); Lawrence Dreyfus, “Early Music Defended against Its Devotees: A Theory of Historical Performance in the Twentieth Century,” *Musical Quarterly* 69 (1983), pp. 297–322; Nicholas Kenyon, editor, *Authenticity and Early Music* (Oxford and New York, 1988); Harry Haskell, *The Early Music Revival* (London, 1988); Richard Taruskin, *Text & Act, Essays on Music and Performance* (New York and Oxford, 1995); Roger Scruton, *The Aesthetics of Music* (Oxford, 1997); Lydia Goehr, *The Imaginary Museum of Musical Works* (Oxford, 2007); Bruce Haynes, *The End of Early Music* (Oxford, 2007).

## PITCH NOTATION CONVENTIONS

English multiple C notation (the system used in this book):

CCC CC C c c<sup>1</sup> c<sup>2</sup> c<sup>3</sup> c<sup>4</sup> c<sup>5</sup>

The Helmholtz prime, subprime system:

C<sub>2</sub> C<sub>1</sub> C c c<sup>1</sup> c<sup>2</sup> c<sup>3</sup> c<sup>4</sup> c<sup>5</sup>

A variation of this system uses commas and apostrophes, for example, C<sub>2</sub> is written C,, C<sub>1</sub> is written C, c<sup>1</sup> (middle C) is written c' and c<sup>2</sup> is written c''.

In early German writings, the notes of the lowest octave were indicated by underlining the note name, the middle octave had plain note names, and the notes of the upper octave had a horizontal line placed above the note name.

Scientific pitch notation (also known as American scientific pitch notation):

Middle C

C<sub>0</sub> C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub> C<sub>5</sub> C<sub>6</sub> C<sub>7</sub> C<sub>8</sub>

In the medieval hexachord system, the range (or gamut) running from G (Γ) to e<sup>2</sup> also indicates octave ranges, for example:

c                    c<sup>1</sup>                    c<sup>2</sup>

C *fā ut*    C *sol fā ut*    C *sol fā*