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THE EVOLUTION OF THE HARMONIUM: FROM ANCIENT CHINA TO BELOVED INSTRUMENT IN FRANCE

ÁDÁM SÁNDOR FAZAKAS[1]

SUMMARY. The harmonium's journey begins with ancient Chinese instruments like the sheng, which inspired European innovations such as the regal and later the *Orgue expressif*. These early instruments laid the groundwork for Alexandre-François Debain's invention of the harmonium in 1842. Debain's harmonium patent introduced a revolutionary instrument characterized by its blow-feed air system and distinct sound registers. This invention marked a significant advancement in musical instrument design, providing musicians with greater tonal control and expression. Harmonium's history reflects centuries of experimentation and ingenuity, driven by the evolving needs of musicians and technological innovations. From its humble origins to becoming a staple of musical expression, the harmonium embodies the spirit of creativity and innovation in music history.

Keywords: Harmonium, Scheng, Regal, Organ, Instrument

Introduction

The harmonium's journey is a tale of innovation and evolution that traverses both time and geography. Originating from ancient Chinese free reed instruments, it eventually found its place as a cherished musical instrument in France. This article delves into the captivating history of the harmonium, shedding light on its predecessors and the significant milestones that culminated in the creation of the French harmonium.

[1] *PhD student, Gheorghe Dima National Music Academy, Cluj-Napoca, Romania. Assistant Professor Collaborator at the Babeș-Bolyai University, Faculty of Reformed Theology and Music. E-mail: fzksadam@gmail.com*

From the perspective of an organist, my interaction with historical musical instruments is commonplace and an integral part of my life. Through this, I have come to understand the acoustic ideals of past eras and instruments that are often forgotten or rarely encountered.

Over the years, I have expanded my knowledge horizon in the field of historical instruments and have felt increasingly motivated to thoroughly study this instrument.

My first professional experience with the harmonium dates back to 2015, during a demonstrative event dedicated to this musical instrument. The presented harmonium was one of the oldest of its kind. This unique event impressed me so much that I decided to delve into this forgotten universe, interpreting musical pieces written for this instrument.

After a long search, I acquired a specimen, a true gem, built in 1859 in Paris by Alexandre-François Debain, with five rows of reeds. The latter harmonium is the perfected version from the Romantic era. Since then, it has sounded on numerous occasions at concerts and performances.

This article specifically aims to introduce keyboard instruments similar to the harmonium. With the exception of the regal, these instruments originated in the 18th and 19th centuries. While numerous types of instruments were developed during this time, only a few of them have been constructed in significant numbers, hence detailed descriptions will be provided for only a select few instruments.

I hope to provide the reader with an insight into the history of a romantic instrument, which was beloved by many composers such as Camille Saint-Saëns, Georges Bizet, and even Franz Liszt.

Predecessors of the harmonium

The most important characteristic of harmonium is the use of metal reeds as a sound source. Reeds were used long before the appearance of the harmonium.

An important ancestor of the harmonium can be considered the Chinese instrument *sheng* (2852 BC or 2500 BC), an instrument with reed pipes made of bamboo. The first written mention dates back to 1100 BC.

E.g. 1

Sheng[2]

Gellerman's monograph considers a representation of the sheng found in a museum in Philadelphia as the oldest, with the image dating back to 551 AD. This instrument was probably also used at the funeral of Confucius (479 BC). Later, Jesuit missionaries brought and spread the sheng in Europe. This later inspired organ builders to install free-beating reeds in pipe organs, bringing a special timbre.[3]

The *sheng* continues to retain relevance in contemporary contexts notwithstanding considerable evolution over temporal epochs.

The use of free reeds was common throughout Asia but took a long time to reach Europe.

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[2] Chinese Sheng, https://www.metmuseum.org/art/collection/search/505403 (09.04.2024)

[3] Robert F. Gellerman: The American reed organ and the harmonium: a treatise on its history, restoration and tuning, with descriptions of some outstanding collections, including a stop dictionary and a directory of reed organs. Vestal Press, New York, 1996. p. 4–5.

The next important step in Europe between the 15th and 18th centuries was the *regal*. This instrument was a small portable organ with reeds, used both in church and for home music. Behind the keyboard were the bellows, so another person was needed to operate it.

The term “regal” comes from the word “royal,” which means “royal.” Due to the high production costs, only kings and nobles could afford it. According to other sources, its name may have originated from the word “regolare,” which means “to regulate” or “to control.”

E.g. 2

Bible regal in closed and in open states[4]

In 1700, the Italian Filipo Testa built a version of the regal that worked with free reeds, called the “organino.” This could be considered the first organ with free reeds.[5]

In the 18th century, Christian Gottlieb Kratzenstein, a polymath of diverse talents, employed the concept of the free reed in several of his inventions. He is believed to have been among the first to utilize a free resonant reed as a means of producing artificial speech. Additionally, Kratzenstein pioneered the incorporation of free reeds into the construction of what came to be known as a *Vowel organ* in Saint Petersburg.[6]

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[4] Copy of an original bible regal, built by Ture Bergstrøm. https://bergstrom.dk/bible-regal/ (09.04.2024)

[5] Robert F. Gellerman: The American reed organ and the harmonium: a treatise on its history, restoration and tuning, with descriptions of some outstanding collections, including a stop dictionary and a directory of reed organs. Vestal Press, New York, 1996. p. 6.

[6] John J. Ohala: Christian Gottlieb Kratzenstein: pioneer in speech synthesis. International Congress of Phonetic Sciences 2011. p. 157.

Under Kratzenstein's influence, J. N. Maelzel from Vienna built his instrument called the *panharmonicon* in 1805. It should be noted that the monk Georg Joseph Vogler also constructed organs with free reeds. This technology not only conquered Europe but also America: Ebenezer Goodrich, an organ builder from Boston, included these specific reeds in his organs in the early 1800s.[7]

At the beginning of the 19th century, particularly in France and Germany, numerous instruments developed on this principle were introduced. Gabriel Joseph Grenié created his instrument called *Orgue expressif* or *Ophicleide*, which he presented on June 23, 1810, in Paris.

This instrument resembled an organ, but its pipes had reeds, and the air was produced by the performer's feet, making the sound much more dynamic and flexible compared to the rigid sound of the organ.[8] According to Grenié, the sound of the *Orgue expressif* could vary from soft tones to the intensity of a military orchestra.[9]

E.g. 3

Grenié-Muller, Paris ca. 1820 *Orgue expressif* Système Grenié[10]

[7] Robert F. Gellerman: The American reed organ and the harmonium: a treatise on its history, restoration and tuning, with descriptions of some outstanding collections, including a stop dictionary and a directory of reed organs. Vestal Press, New York, 1996. p. 6–7.

[8] Sepsy Károly: Understanding of the harmonium (*Harmóniumismeret*). In: Beharka Pál: Liturgical harmonium (organ) playing, second edition (*Gyülekezeti harmónium- (orgona-) játék. II. kiadás*.) Magyarországi Baptista Egyház, Budapest, 1974. p. 230.

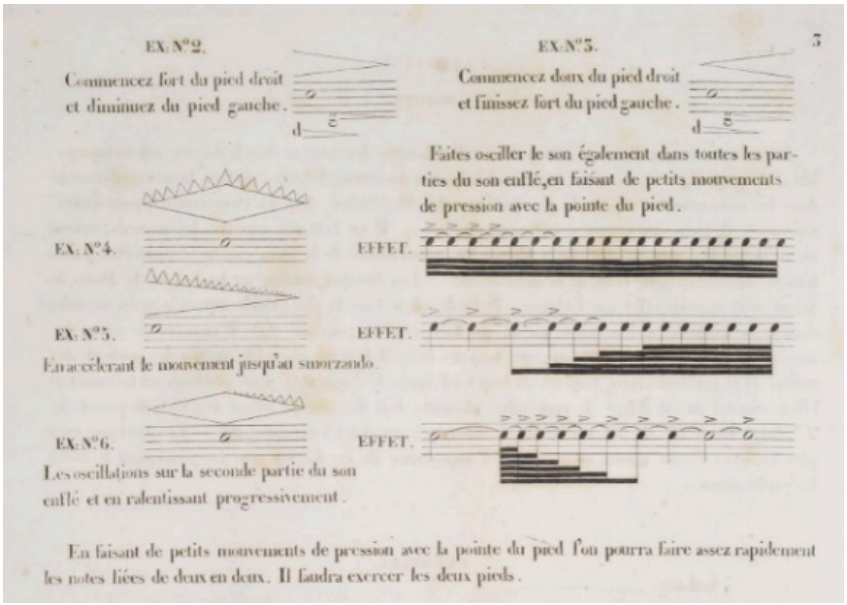
[9] Robert F. Gellerman: The American reed organ and the harmonium: a treatise on its history, restoration and tuning, with descriptions of some outstanding collections, including a stop dictionary and a directory of reed organs. Vestal Press, New York, 1996. p. 6–7.

[10] Simon Buser's private collection. Marburg, Germany http://www.buser.org/ (07.04.2024)

The instrument, due to its special features, quickly gained popularity in the French consciousness and inspired renowned composers of the time, including Alexandre-Pierre-François Boëly, who composed several works for this instrument.

It is important to mention that with the appearance of the *Orgue Expressif*, several pedagogical books were also published, providing theoretical and practical guidance to students.

E.g. 4



Mastery of pedal technique[11]

The *Poïkilorgue*, similar to the *orgue expressif*, was an instrument designed with free reeds by Aristide Cavaillé-Coll in the 1830s, who later became famous as an organ builder. Only a few dozen of these instruments were ever produced.

Despite their rarity, the significance of Cavaillé-Coll's reputation and the fact that the earliest French method for a harmonium-like instrument was written for the *poïkilorgue* indicate that delving into its history is worthwhile.

[11] Louise Geneviève de La Hye (1810-1838): *Méthode théorique et pratique pour l'orgue expressif suivie d'un choix de morceaux de différents caractères* – 1839 posthumous edition, https://vmirror.imslp.org/files/imglnks/usimg/b/bb/IMSLP772482-PMLP1224182-Me-thode_the-orique_et_pratique_pour_-...-La_Hye.pdf

During the 19th century, music publishers released numerous works intended for multiple instruments simultaneously. For instance, there were compositions for ‘‘*Orgue expressif ou Harmonium”* or “*Poïkilorgue ou Orgue expressif*”, among others.

While the *Orgue Expressif* was prevalent in Francophone territories, a new instrument emerged in German-speaking regions: the *Physharmonica*, which gradually evolved to resemble the later harmonium. In terms of size, this keyboard instrument is smaller compared to the *Orgue Expressif*.

The *Physharmonica*, invented in 1821 by Anton Haeckel, shares similarities with the harmonium. Like the harmonium, the bellows of the *Physharmonica* are operated by the feet using an alternating movement. This method also allows for the adjustment of the dynamic force of the tone. The intensity of pedaling determines the pressure of the wind supply, thereby adjusting the tone’s dynamics accordingly.

E.g. 5

***Physharmonica*, Jacob Deutschmann, Vienna, ca. 1839**[12]

[12] Claudio Brizi’s private collection. Montefranco, Italy.

The virtuoso Karl Georg Lickl (1801-1877) was the first renowned soloist to tour extensively across Europe with the *Physharmonica*. In addition to his educational works, he adapted compositions by great composers for this instrument.

His performances garnered admiration from prominent figures such as Giuseppe Verdi, who later led the commission to reform the Instituto Musical Italiano. After experiencing one of Lickl's performances, Verdi advocated for the incorporation of the *Physharmonica* into the curriculum of Italian conservatories.

The Birth of the Harmonium

In its current sense, the inventor of the harmonium is Alexandre-François Debain, who obtained the patent for the "*Harmonium*" in the year 1842. Of course, the musical instrument underwent many modifications before reaching the patented form.

Its novelty consisted in the fact that, unlike an organ, where the tubes become out of tune due to changes in air pressure, the reeds of the harmonium retain their tonality in a more nuanced and dynamic manner.

The original Debain-type harmonium can be characterized as follows:

- Sounds are produced by freely vibrating reeds, which are located inside the instrument, which is filled with compressed air.
- The player alternately operates the treadle pedals to supply compressed air, allowing complete control over the amount of air supplied and thus the intensity of the sound.
- The harmonium keyboard has five octaves, from C to c''''. The keyboard section is divided into two parts: the bass (left hand) and the treble (right hand), with the boundary between them being the notes E and F on a single line.
- The passing variations (registers) of the bass and treble complement each other.

The most important aspect of the Debain-type harmonium is that it operates on a blow-feed air system, and its disposition is as follows:

Table 1

Register markings	Bas part	Discant part	The foot measurements
	Name of the registers		
(1)	Cor Anglais	Flûte	8’
(2)	Bourdon	Clarinette	16’
(3)	Clairon	Fifre	4’
(4)	Basson	Hautbois	8’
(0)	Forte	Forte	
(E)	Expression		
(GJ)	Grand Jeu		

The disposition of Debain’s harmonium 1842

The classic harmonium with four registers, the surrounding Arabic numerals represent the order number of each register. For example, the first pair of 8-foot pipes, *Cor Anglais* - Flûte, is always marked with (1), the 16-foot pipes *Bourdon* - *Clarinette* with (2), and so on. Registers that do not produce sounds (also called assist registers) are usually marked with their initials (also surrounded by circles): (E) for *Expression*, (F) for *Forte* (fixe), but traditionally, the *Forte expressif* is marked as (O).

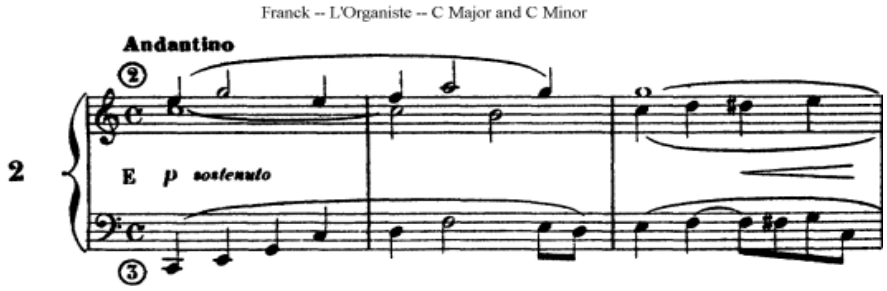
In harmoniums, “foot measurement” is interpreted similarly to how it is in pipe organs. It identifies the length of different registers and indicates the pitch. For example:

- An 8-foot pipe produces a sound at normal pitch.
- A 4-foot pipe produces a sound one octave higher than an 8-foot pipe.
- A 16-foot pipe produces a sound one octave lower than an 8-foot pipe.

The characteristics of the four sound registers can be summarized as follows:

- The basic register (1), *Cor Anglais* - *Flûte* 8-foot, has a round sound like a flute.
- The 16-foot reed register (*Bourdon* - *Clarinette*), marked as (2), has a distinct and dark sound color, suitable for accompaniment in the treble, and is appropriate for quiet solos.
- The 4-foot register (*Clairon* - *Fifre*), marked as (3), has a bright sound.
- The other 8-foot register (*Basson* - *Hautbois*), marked as (4), has a different character, sounding deep and soloistic, reminiscent of an oboe in the treble.

E.g. 6



One manual, two different timbres[13]

The names of each register - like organs - indicate what instrument sound they imitate (for example, flute, clarinet, English horn, oboe, etc.).

Among the assistant registers, the role of the *Expression* register is to close the air reservoir to equalize pressure, allowing the direct valves of the play to reach the reeds. This switch aims to make the sound more expressive by applying differences in blowing pressure.

The *Forte* registers marked with (F) function like those on the organ, opening the shutters (top or side of the reed chest) regardless of the air pressure, keeping them in a fixed position.

Forte Expressive -assistant registers marked with (O), opens the shutters (called swell shades) of the harmonium depending on the strength of the air pressure, operating pneumatically.

On certain harmoniums with four registers, there may also be register if *Sourdine* (bass side) and *Tremblant* (discant side). *Sourdine* (muffling of sound) is associated with the 8-foot *Cor Anglais* register (1); when activated, it produces the fundamental sound but with less air. On the treble side, *Tremblant* (tremolo) is associated with the 8-foot *Flûte* register, giving its sound a vibrato. The *Grand Jeu* assistant register activates all registers (as a Tutti ont the organ) (1), (2), (3), (4) - in the case of classic harmoniums with four registers.

The harmonium conceived by Debain is suitable for playing a good portion of the well-known harmonium literature, although it continued to evolve over the years. New registers emerged, and the instrument found its way into symphonic works. Eventually, the so-called *Art harmonium* was created, capable of producing the most complex tones.

[13] César Franck: L'Organiste: Sept pièces en do majeur et do mineur, no.2. Andantino https://vmirror.imslp.org/files/imglnks/usimg/2/21/IMSLP03804-Franckorganiste.pdf

E.g. 7

Harmonium, Alexandre-François Debain, 1859[14]

Conclusion

In conclusion, the history of the harmonium is a testament to the evolution of musical instruments driven by the needs and innovations of different eras. Originating from the demand for more accessible and space-efficient alternatives to home organs, the harmonium's journey reflects a series of advancements in reed technology and instrument design.

Preceded by ancient instruments like the Chinese sheng and European regal, the harmonium emerged as a culmination of centuries of experimentation and adaptation. Innovators like Christian G. Kratzenstein and Alexandre-François Debain played pivotal roles in shaping its development, introducing concepts like free reeds and blow-feed air systems.

The introduction of the *Orgue expressif* in the early 19th century marked a significant milestone, showcasing the harmonium's versatility and potential for dynamic expression.

[14] The author's private collection. Cluj-Napoca, Romania.

Alexandre-François Debain's patent for the classical four-register harmonium further refined its design, offering musicians greater control over tone and intensity.

In essence, the harmonium's journey from its humble beginnings to becoming a cornerstone of musical expression underscores the rich tapestry of innovation and creativity that defines the history of music.

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