

The Changing British Flute of the Nineteenth Century

Illustrated through Four Examples at the National Music Museum

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Of flute makers in nineteenth-century England, few stand as highly regarded as the firm of Rudall & Rose and its later variations. From the simple-system instruments with few keys of the early 1800s to modern metal-bodied instruments at the turn of the twentieth century, Rudall, Rose, and their affiliate Richard Carte showed ingenious adaptability and innovation in responding to fundamental changes of flute design and its various uses not only in England, but throughout the world of Western music. Their partnerships and subsequent instruments were the cornerstone of British flute engineering for nearly a century, from the founding of Rudall & Rose in 1822 to the early 1900s. By examining four distinct examples of their work found in the collections of the National Music Museum (NMM), it is easy to see what was changing in British flute design through the nineteenth century, what brought about these changes, and when they occurred. These extant instruments, analyzed in conjunction with the available historical context on the history and development of the flute, present a unique portrait of the organological niche occupied by Rudall, Rose & Carte's output in post-industrial revolution Europe, and the sweeping revisions of flute design implemented during their existence.

Before any contextual placement can begin, a brief technical description of the four instruments will lay the framework on which further analysis can be done. The instruments, discussed here in chronological order, are representative of the standard styles built during the nineteenth century by Rudall & Rose, and later Rudall, Rose & Carte. The flutes are spaced equally through the nineteenth century, displaying four different key systems, and numerous other technical developments that were, however briefly, the *de facto* standards of their times in the British market.

The earliest example, NMM 4345, is a wooden flute built by Rudall & Rose. The address "No. 1 Tavistock Street" is stamped in the maker's signature, providing an approximate date

range of manufacture from 1838 to 1847.¹ It has three main components: a headjoint, a body from a single piece of wood, and a footjoint, all with cork tenons. The headjoint appears to be the same tuning mechanism as Rudall & Rose's 1832 Patent Headjoint, but does not feature the patent design stamped on the crown.² The bore profile of the body and footjoint is conical, with a cylindrical headjoint. The key system is nearly identical to that introduced in 1832 by Theobald Boehm: there are sixteen toneholes in total (body and footjoint), five of which are covered manually by the fingers, the other eleven are operated by keys and levers.³ All keys and levers are mounted on axels and posts, and with the exception of the axel for the three right-hand fingerholes, use leaf springs. The trim, lip plate, and keywork are made of silver, while the body, headjoint, and footjoint are likely made of cocus (*Brya ebenus*). Cocuswood had replaced boxwood as the preferred material for woodwind manufacture in the 1830s due to its improved resilience to humidity-related changes in size.⁴ All things considered, this example is a fine representation of the conical-style, Boehm-system flute that was first seen in England circa 1843, providing a more narrow range of origin from 1843 to 1847.⁵

Moving forward another step in the lineage of British flutes, NMM 14889 was built in 1851 or 1852 at the address "38 Southampton St, London," by Rudall, Rose & Co.⁶ It has three

¹ William Waterhouse, "Rudall & Rose," *The New Langwill Index: A Dictionary of Musical Wind-Instrument Makers and Inventors* (London: Tony Bingham, 1993): 339.

² Robert Bigio, *Rudall, Rose & Carte: The Art of the Flute in Britain* (London: Tony Bingham, 2011): 70-71.

³ Nancy Toff, *The Development of the Modern Flute* (Chicago: University of Illinois Press, 1986): 56-57

⁴ Jeremy Montagu, *The Flute* (UK: Jeremy Montagu, 1990): 17-19.

⁵ Philip Bate, *The Flute* (New York: W. W. Norton & CO, 1969): 142.

⁶ William Waterhouse, "Rudall, Rose & Co.," *The New Langwill Index: A Dictionary of Musical Wind-Instrument Makers and Inventors* (London: Tony Bingham, 1993): 339.

main components: a headjoint, a single-piece body, and a footjoint, all with cork tenons. The headjoint has a simple, crown-adjusted cork with a mechanical-screw tuning mechanism. The bore profile of the body and footjoint is conical, with a cylindrical headjoint. The key system is that of Richard Carte's 1851 patent, which differed significantly from the popular Boehm system.⁷ There are seventeen toneholes in total, four of which are open rings to be covered by the fingers. The remaining twelve are operated by keys and levers. All keys and levers are mounted on posts and axels, and with the exception of the three off-axis pads on the body, use needle springs. There is a roller present on the c' key. The lip plate is small and is made from a carved ivory insert. The trim and keywork are silver. The wood is likely cocus, as this is the only option listed in Rudall catalogs from this time period.⁸ This instrument is fairly typical of the "Cone-Boehm" conical instruments built by Rudall, Rose & Co. and other makers at this time, although wood examples were less common than those of metal, and cylindrical instruments were far more prevalent in general throughout the market.⁹

The next instrument in this tour of the NMM collections shifts some twenty years into the future and away from the wooden construction that dominated flutes into the beginning of the nineteenth century. NMM 14888 was built sometime between 1872 and 1878 at the address "20 Charing Cross, London," by Rudall, Carte & Co. (Rose was no longer part of the partnership).¹⁰ It has three main components: a headjoint, a body, and a footjoint, with friction-fit metal tenons made of the same piece as the main components. The headjoint has a simple, crown-adjusted

⁷ Charles Day, *A Descriptive Catalogue of the Musical Instruments Recently Exhibited at the Royal Military Exhibition, London, 1890* (London: Eyre & Spottiswood, 1891): 46.

⁸ Robert Bigio, *Rudall, Rose & Carte*, 279-281.

⁹ Georgina Rockstro, *The Flute* (London: Rudall, Carte & Co., 1928): 381-383.

¹⁰ William Waterhouse, "Rudall Carte & Co.," *The New Langwill Index: A Dictionary of Musical Wind-Instrument Makers and Inventors* (London: Tony Bingham, 1993): 339.

cork with a screw adjustment. Instead of a lip plate, there is an embouchure barrel which encircles the entire headjoint around the embouchure hole. The bore profile of the body and footjoint is cylindrical, with an inversely-tapering (parabolic) headjoint that narrows at the tenon.¹¹ The key system is that which was patented and produced in 1867 by Carte (commonly known as the Carte/Boehm system): there are sixteen toneholes in total, all of which use closed-hole keys.¹² All keys and levers are soldered to rib-mounted posts and axels, and with the exception of the c'' and B keys, use needle springs.¹³ There is a roller on the c' lever. The entire flute, all trim and keywork, is made of silver. With the highest available trim at the time and the highly-touted Carte/Boehm system, this flute is representative of the model that formed the backbone of Rudall Carte & Co.'s production through the latter half of the nineteenth century.

Rounding out this British quartet is NMM 14887. Bearing the address "23 Berners Street" in the signature, this flute was made between 1895 and 1897 by Rudall Carte & Co.¹⁴ It has three main components: a headjoint, a body, and a footjoint, with friction-fit metal tenons made of the same piece as the main components. The headjoint has a simple, crown-adjusted cork with a screw adjustment. Instead of a lip plate, there is an embouchure barrel which encircles the entire headjoint around the embouchure hole. The bore profile of the body and footjoint is cylindrical, with a parabolic headjoint. The key system is the standard Boehm system as patented in 1847. There are sixteen toneholes in total, with only the A, F#, F, and E keys using

¹¹ Robert Bigio, *Rudall, Rose & Carte*, 286.

¹² Nancy Toff, *The Development of the Modern Flute*, 113-115.

¹³ The ribs are long, thin strips of stamped metal which are soldered to the main components to provide a foundation for the posts and axels.

Murray Campbell, Clive Greated and Arnold Myers, *Musical Instruments: History, Technology, and Performance of Instruments of Western Music* (New York: Oxford University Press, 2009): 135.

¹⁴ William Waterhouse, "Rudall Carte & Co," *The New Langwill Index*, 339.

open holes.¹⁵ All keys and levers are soldered to rib-mounted posts and axels, and with the exception of the left hand thumb keys, use needle springs. There is a roller on the c' lever. A left-hand crutch, or saddle, is soldered to the body shortly below the headjoint ferrule. The entire flute, all trim and keywork, is made of silver. Pushing the trailing edge of the nineteenth century, this Boehm-style flute is a keen depiction of what later became the modern flute in the 1900s.

The nineteenth century was packed full of changes in the flute world. Instrument designs and key systems came and went seemingly at the drop of a hat, with makers constantly attempting to further refine their own and other's works to craft a lasting improvement. This process of invention, according to Nancy Toff, was derived from three compounding constituents – “recognition of need, development of theory and method, and practical implementation.”¹⁶ The fast-paced shifts in musical preference and compositional techniques through the romantic era brought about new demands on performers and fluctuating expectations from employers and audience members. In the flute, there were two main obstacles in creating an instrument which allowed the performer the ability to meet these demands. Instruments with few keys required numerous cross-fingerings throughout their registers to accomplish a tempered chromatic range. Linked to this lack of keys was the issue of finger hole placement: instruments with tone holes spaced for manual covering were a compromise between the ideal acoustic placement of the holes and the ability of the player to reach the holes, limited by the size of his hand and fingers. This resulted in out of tune notes, odd-sounding resonances, or other undesirable effects from the

¹⁵ “The Boehm Flute,” Raimundo Pinedae, last modified June, 2010, accessed December 11, 2015, https://raimundopinedaestudio.files.wordpress.com/2010/06/la_flauta_boehm.pdf.

¹⁶ Nancy Toff, *The Development of the Modern Flute*, 5.

combinations of open finger holes, closed-standing keys, cross fingerings, etc.¹⁷ There were numerous proposed changes to the flute mechanism and fingering systems at the beginning of the 1800s, mostly in response to expanding repertoire, but the first system to make long-lasting headway was the Boehm ring-keyed flute, adopted by Rudall & Rose and seen in NMM 4345.

The 1832 patent Boehm system had its roots in London – it was prototyped in the workshop of Gerock & Wolf in 1831 – but found its widest and earliest acceptance back on the continent. Awards followed Boehm to the French Academy of Sciences, and other prominent continental makers such as Buffet and Lot were producing instruments in the ring-key Boehm style. The system was well established in conservatories in France and Belgium by 1840.¹⁸ England, unlike its continental counterparts, was not dominated by the influence of esteemed conservatories, nor did they have any large-scale governing bodies that could influence what styles of instruments were produced.¹⁹ England also had a pervading cohort of elite flutists that insisted that the old system flute was adequate in facility and superior in tone, and that any issues wrought by the fingering difficulties were simply necessary in learning proper technique of the instrument.²⁰ It wasn't until the early 1840s that the Boehm system flute gained acceptance on the isles, spurred primarily by its endorsement from John Clinton at the Royal Academy of Music, and a new manufacturing interest by Rudall & Rose, who were working in conjunction with one of Boehm's former partners.²¹ NMM 4345, made possibly as early as 1843, clearly shows the integration of Boehm's conical design with the high-end manufacturing techniques of

¹⁷ Richard Carte, *Sketch on the Successive Improvements made in The Flute* (London: Rudall, Rose & Co., 1851): 9-12.

¹⁸ Ardan Powell, *The Flute* (London: Yale University Press, 2002): 156-158.

¹⁹ Robert Bigio, *Rudall, Rose & Carte*, 81.

²⁰ Ardan Powell, *The Flute*, 158-159.

²¹ *Ibid.*

Rudall & Rose. The use of cocuswood distinguishes this instrument above the cheaper boxwood alternatives as an instrument of considerable class, and the 1832 patent headjoint tuning mechanism was considerably timelier to manufacture than the simple screw-cork variations. At the time, this flute was the *crème de la crème* in the English market, but demands were still shifting with every passing year and a new generation of flutes emerged under Rudall & Rose not a decade later.

In 1851, Richard Carte (working in partnership with Rudall & Rose) attempted to fill a demand vacuum in the flute industry by departing from Boehm's system of fingering. This system relied heavily on one principle to distinguish its successes from that of Boehm: greatly reducing the number of movements required from the fingers to produce notes in the same quality of tone and tuning as available on previous models.²² It introduced a greater number of open-standing keys, eliminated numerous cross-fingerings, and entirely removed the left thumb from operation of the mechanism.²³ In total, Carte's system eliminated almost half of the cross-fingerings, 2/3 of the left hand little finger movements, and 3/4 of the total thumb movements.²⁴ Produced by Rudall, Rose & Co., this system was sold as the "1851 Patent Model". NMM 14889 is an early example of this model, which merged the conical bore and parabolic headjoint of the Boehm design, with the improved fingering system. The 1832 patent headjoint had been abandoned, as it was seen as adding unnecessary weight and complexity.²⁵ By this time, there were numerous rival systems being offered by English and continental makers, each with their own purported merits over the others. Boehm had recently patented and marketed a new

²² Georgina Rockstro, *The Flute*, 379.

²³ Robert Bigio, *Rudall, Rose & Carte*, 116-118.

²⁴ Richard Carte, *Sketch on the Successive Improvements made in The Flute*, 30.

²⁵ Robert Bigio, *Rudall, Rose & Carte*, 70-71.

development in 1847 that capitalized upon a cylindrical bore and rendered a subtle tone more preferable to the German and continental styles.²⁶ It is impossible to determine which if any was “best”, but it is clear that in England, the Carte 1851 system was preferred above other contemporary systems for its ease of operation, and the powerful, brilliant tone derived from its Boehm-rooted conical bore and large toneholes. This preference, like most things in the flute world, did not last long, and the “cone-Boehm” soon disappeared from the mainstream, with metal and cylinders taking precedence by 1865.

The European flute market was forever changed in 1860 when the Paris Conservatory, under the recommendation of prominent performers and composers such as Hector Berlioz, officially mandated the cylindrical metal flute as the highest standard.²⁷ Rudall, Rose & Carte, along with all other manufacturers who were not keen on being eliminated from the market, had been producing metal cylindrical flutes since the late 1840s, but what was previously perhaps a novelty or specialty option was now seen in the industry as the necessary common denominator. Like most other innovations in the Rudall, Rose & Carte catalog, the introduction of a prominent metal cylinder design was an innovation brought about in response to the developments of other makers. Although quality never suffered in the London workshop – the instruments of Rudall, Rose & Carte still ranked the pinnacle of flute craftsmanship – they were never ahead of the continental engineers. NMM 14888 is a model “1867 Patent” flute, and the 1867 patent was Carte’s answer to the new demand spurred by the cylindrical Boehm flute which was patented a whole twenty years earlier in 1847. This model, which combined elements of Carte’s 1851 patent system and the 1847 Boehm system was seen as the best of both worlds, and provided even

²⁶ Georgina Rockstro, *The Flute*, 382-383.

²⁷ Ardan Powell, *The Flute*, 161-162.

further alternate fingerings to decrease unnecessary motion throughout the register.²⁸ Although the Boehm system had overtaken Carte's 1851 system in popularity outside of Britain, the 1867 system was hugely popular in the country and established a dynasty that lasted nearly a century. Carte 1867 patent flutes were common in England through the end of the nineteenth century, with many individuals still preferring them until the years around World War II.²⁹

Despite having won over the English flautists with the 1867 patent flute, Rudall, Rose & Carte still continued to attempt new models that would satisfy the demands of continental customers and provide alternatives to those English patrons who for whatever reason did not prefer the Carte-Boehm system. By the end of the nineteenth century, their catalogues consisted of over 100 varieties of flute using numerous key systems.³⁰ The sheer force of competition between manufacturers, players, and composers, had unfortunately reach critical mass. By the time NMM 14887 was built, the flute market was transferring its momentum from innovation to decline. The plethora of options available eventually collapsed on itself leaving only a few long-standing systems as the standards that would carry the flute into the turn of the twentieth century. In Britain, the Carte-Boehm system was the last stronghold of purely English design in the flute market, but the Boehm system – the very same one that manufacturers had been elaborating and re-conceiving for decades – was becoming more and more established throughout Europe and abroad as the only system of flute worth playing.³¹ NMM 14887, being a typical cylindrical flute with an 1847 Boehm system, was the type of flute that Rudall, Rose & Carte was best known for worldwide. In an era of burgeoning international industrial relations, worldwide preferences

²⁸ Nancy Toff, *The Development of the Modern Flute*, 113-115.

²⁹ Ardan Powell, *The Flute*, 163.

³⁰ Nancy Toff, *The Development of the Modern Flute*, 124-125.

³¹ *Ibid.*, 128-130.

began to overtake regional interests. The number of available customers for Boehm flutes was outpacing the once esteemed Carte-Boehm models, once seen as “the only important and lasting modification of Boehm’s flute.”³² This convergence of interests affected all manufacturers, but it was the culmination of a multitude of effects that saw Rudall, Rose & Carte dwindle away in the twentieth century.

It is undeniable that the unique systems designed by Carte through the nineteenth century had many advantages. However, their advantages were not prominent enough to win over the flute world. In 1883, Richard Carte, the last surviving member of the Rudall, Rose & Carte trio, relinquished control of Rudall, Cart & Co., at the age of 75.³³ Carte had been personally responsible for the majority of the firm’s success through the decades, and his departure set in motion the coming end of the greatest flute manufacturer in nineteenth century England. Under his follower’s control, the distinctively English elements of their flute line were phased out: production was brought into line with the Boehm standard and streamlined for maximum widespread appeal. As the flute mechanism became standardized, the appeal of new innovations was lost and the greatest market once held by Rudall, Rose & Carte— that which the Boehm could not fill—was no longer available. By the beginning of the twentieth century, Carte & Co.’s catalog had reached stagnation, and remained unchanging until World War II.³⁴ They attempted for a brief time to revitalize their operations by focusing on converting high-pitch flutes to the newer low-pitch standard, but it was often easier for customers to purchase a new low-pitch flute from another manufacturer. It is also noted that their flutes were so well made that those who had

³² Ardan Powell, *The Flute*, 163.

³³ Robert Bigio, *Rudall, Rose & Carte*, 147.

³⁴ *Ibid.*, 149.

purchased them during the height of the flute arms race did not yet need replacements, and secondhand instruments were selling more often than new ones.³⁵ Shortly after the war, due to a lack of sustainability in their operations, the firm was finally sold off and assimilated into Boosey & Hawkes.³⁶

Many things could be said about the final decades of the business that grew out of Rudall & Rose, but perhaps it is time better spent reflecting on their impeccable reputation of the previous century. For five decades they stood as the peak of flute innovation and manufacturing in the British isles, and their creations spawned admirers and contenders throughout the music world. In these four instruments from the NMM collections, the lineage of the British flute is plainly evident: from the 1832 conical Boehm and the 1851 Carte patent system, to the cylindrical 1867 Carte-Boehm standard and the modernly recognizable metal, cylindrical Boehm-style flute. They did not all survive the test of the free market, but they represent important milestones nonetheless. This brief tour of four surviving instruments is a welcome glimpse into the highlights of British flute modernization.

³⁵ Robert Bigio, *Rudall, Rose & Carte*, 150-151.

³⁶ *Ibid.*, 152.

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