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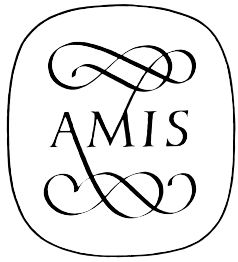

Combination Clarinet Patents in Italy

Francesco Carreras

The clarinet family includes a wide variety of sizes, from the sopranino C clarinet to the contrabass in B-flat. Although numerous sizes have been employed by composers, the most common have been the sopranos in B-flat and A, and occasionally in C.

That each clarinet size is pitched in a specific key reflects the problem that each plays well in only a limited number of keys; the A clarinet, for example, becomes uncomfortable and often hard to manage in keys with many flats. This difficulty was overcome historically by using a set of three clarinets, in C, B-flat, and A; many museums preserve such sets of three in their original single cases. The instrument was selected according to the key of the piece—a solution that was expensive for the player—and the composer had to take into account the compass of each instrument and allow sufficient time for the player to change from one instrument to another. The use of two instruments, in B-flat and A, is still common practice in today's orchestra.

An alternative introduced in the second half of the eighteenth century made use of a *corps de rechange*, an idea common with other families of wind instruments. The finger-hole joints and sometimes the barrel were duplicated in different lengths. Generally a B-flat clarinet had an A *corps de rechange*, and a C clarinet was provided with a B-flat one.

Solutions of this kind have several drawbacks for the player. Switching to a new clarinet requires several seconds or a few bars of rest in the score; disassembling and reassembling one even longer. Further, the newly picked-up or newly-assembled clarinet is cooler and its pitch is initially not the same as that of the warmed clarinet, as well as the fact that each instrument has its own specific features, to which the player must adjust, and do so rapidly.

The *corps de rechange* idea was slowly abandoned during the first decades of the nineteenth century, but even more advanced systems, such as Müller's thirteen-key clarinet, or the Boehm system, did not fully solve the problems encountered in playing music written with many flats or sharps on the clarinet. The need for better solutions began to stimulate the ingenuity of makers, and one such solution was the clarinet with multiple instruments in a single body: the combination clarinet.

Multiple Instruments in One Body

Combination clarinets were discussed by Philip Bate in a new chapter for the 1971 third edition of *The Clarinet*[1] by Geoffrey Rendall and more extensively by Günter Dullat in his book *Klarinetten*.[2] More than twenty different design proposals are known, dating from the early nineteenth century to the 1940s. The instruments can be grouped into four categories, according to the basic idea that inspired their development. Included in this survey is a quick recall of the most innovative proposals presented outside Italy. Many proposals for combination clarinets were documented in patent applications and descriptions, although often no instruments survive to demonstrate the real worth of the innovation.[3]

"Telescope" clarinets. These instruments incorporate a mechanism that alters their dimensions, for instance from B-flat to A and vice versa, but they have only one set of tone holes. This category was named "telescope clarinets" by Bate.

In 1808 Jacques Simiot of Lyon presented a C clarinet that could be extended to B-flat by means of ten telescopic slides distributed over the body of the instrument. The two long keys could be lengthened by unfolding parts connected by hinges. This seems to be the first combination clarinet ever conceived, but no example has been found. In 1827 Simiot presented a clarinet with a rack-and-pinion device to modify the length of the body. One example is a B-flat/A clarinet in ebony in the Edinburgh collection (no. 115).[4]

A tri-tonal clarinet was devised in 1847[5] by Frédéric Triebert of Paris, who used slides to convert a C clarinet to the B-flat and A sizes. The patent shows that the barrel, upper and lower joints, and bell could be extended by means of metal slides similar to those used as tuning slides for the flutes of the time. No example of his version has been found.

1. F. Geoffrey Rendall, *The Clarinet*, 3rd ed. (New York: Ernest Benn, 1971), 154–166.

2. Günter Dullat, *Klarinetten: Grundzüge ihre Entwicklung* (Frankfurt am Main: Bochinsky, 2001).

3. I am very grateful to Albert Rice for having kindly provided information on non-Italian clarinets.

4. Arnold Myers, ed., *Historic Musical Instruments in the Edinburgh University Collection*, Vol. 2, part. F, *Clarinets* (Edinburgh: Edinburgh University, 1994).

5. Frèdèric Triebert. French patent, 24 Dec. 1847, no. 6937 for a "Clarinette multiphonique." See Dullat, *Klarinetten*, 126–128.

Instruments built on similar principles were patented in 1856 by Julius Hell[6] in Vienna and in 1929[7] by Koloman Antos of Berlin. The latter's instrument was made of several sliding sections that could be lengthened by adjusting screws on a long rod.

Clarinets with moveable liners. A second group contains clarinets equipped with two sets of tone holes with a mechanism to activate the appropriate set, at the same time adjusting the total length to the proper size. The mechanism incorporated an inner liner or tube, which could be rotated to reveal the different sets of tone holes.

In 1862,[8] Louis-Auguste Buffet of Paris was awarded a French patent for a metal "omnitonic" clarinet. The instrument had two sets of holes on an inner liner. One or the other set of holes was brought into play by turning the inner liner, which was attached to the bell. Each touchpiece, except the one for the low E key, controlled keys with two covers, and the use of one or the other depended on the position of the inner liner. An example survives in the Dayton C. Miller Flute Collection, Library of Congress, Washington, DC (no. 1059).[9] Romeo Orsi's first model, presented in Milan in 1881, was based on the same principle (see below).

A similar idea was used by James Clinton of London in 1891.[10] Clinton's design shows a wooden body carrying the keywork and an internal liner divided into two parts, one attached to the barrel and running the length of the upper joint and the other to the bell for the lower joint. Twisting the barrel in one direction and the bell in the opposite direction extended the clarinet from the B-flat size to the A size, and special pins assured the correct movement of the parts. Each internal liner was provided with a set of helical windows, whose upper or lower part was put into communication with the tone holes of the body after the appropriate rotation. An example in C/B-flat with enhanced

6. Julius Hell, Vienna, Austrian patent, 23 February 1856, see Dullat, *Klarinetten*, 128. No example has been found.

7. Antos Koloman, Berlin. German patent, 1929, no. 522015. No example has been found.

8. Auguste Buffet, Paris. French patent, 1862, no. 53494 for a metal "omnitonic" clarinet.

9. Laura E. Gilliam and William Lichtenwanger, *The Dayton C. Miller Flute Collection: A Checklist of the Instruments* (Washington, DC: Library of Congress, 1961), 74. A second combination clarinet attributed to Louis-Auguste Buffet was sold by Sotheby's, London, on 22 November 1989.

10. James Clinton, London, British patent, 1891, no. 3638.

simple-system keywork is in the University of Edinburgh Collection (no. 5278).[11] A second model was patented in 1898 (fig. 1)[12] by H. E. Winter and the Clinton Combination Clarinet Co.;[13] an example in C/B-flat with Clinton-system keywork is in the University of Edinburgh Collection (no. 4747).[14]

An innovative clarinet based on the moveable-liner principle was patented by Nicholas Alberti of Chicago in 1914. This patent would apply to flutes, clarinets, and to any instrument with cylindrical bore (fig. 2, where a flute is taken into account).[15] The outer tube of wood or ebonite was provided with rectangular slots with rounded corners, almost elliptical in shape, and correspondingly large cover-plates (see "Fig. 1" and "Fig. 5" in the drawing). The inner liner, that had a set of helical slots (the drawing's "Fig. 2"), rotated to modify the length of the instrument. The position of the inner liner determined which portion of the internal slot acted as a window in the outer tube. This design relies on the fact that the windows move away from each other with the rotation in order to assure the correct acoustical position of the tone holes for the chosen size.

Double-bore clarinets. Instruments with two parallel bores make up a third group. In 1889[16] Theodor Lässig of Hamburg proposed a B-flat/A clarinet with two parallel bores in a single body of wood with a single bell and mouthpiece. A switch at the base of the mouthpiece allowed activation of the desired bore. There was one set of keys with duplicate cover plates. In 1930[17] Friedrich Stein of Saarbrücken patented a clarinet made with two tubes connected by a rotary valve below the mouthpiece. A second model patented in 1933[18] was made with two separate tubes

11. Heike Fricke et al, *Catalogue of the Sir Nicholas Shackleton Collection* (Edinburgh: University of Edinburgh Collection of Historic Musical Instruments, 2007), 185.

12. The reproduction of all images from the Italian Central State Archive in Rome was granted with permission no. 1023/2012.

13. British patent 1898 no. 17975 and Italian patent 1900 no. 55456.

14. Fricke, *Catalogue of the Sir Nicholas Shackleton Collection*, 186.

15. N. Alberti, Chicago, US patent, 1914, no. 1103462 and Italian patent no. 144428. No example of this clarinet has been found, but flutes based on this principle exist.

16. T. Lässig, Hamburg. German patent, 21 November 1889, no. 49793, see Dullat, *Klarinetten*, 134. According to Wilhelm Altenburg in *Die Klarinette* (Heilbron: C. F. Schmidt, 1904, 19), G. A. Pfretzschner of Markneukirchen made Lässig's design as C/B-flat clarinets; Oskar Kroll in *The Clarinet* (New York: Taplinger, 1968, 39) reports clarinets made by Berthold Söhne, Speyer. No examples are presently known.

17. F. Stein, Saarbrücken, German patent, 1930, no. 510975. No examples are known.

18. F. Stein, Saarbrücken, German patent, 1933, no. 580478.

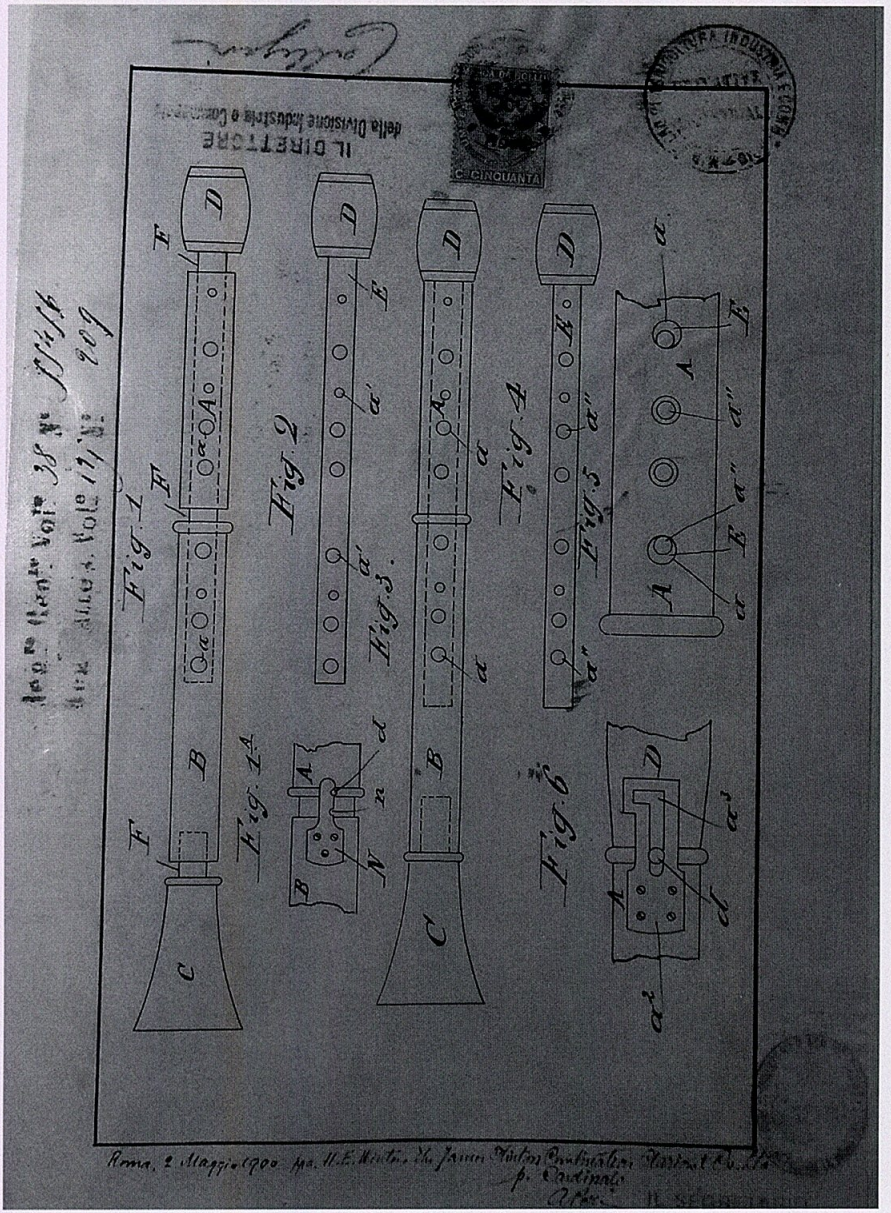

FIGURE 1. H. E. Winter and the Clinton Combination Clarinet Co., Italian patent 1900 no. 55456, Italian Central State Archive, Rome.

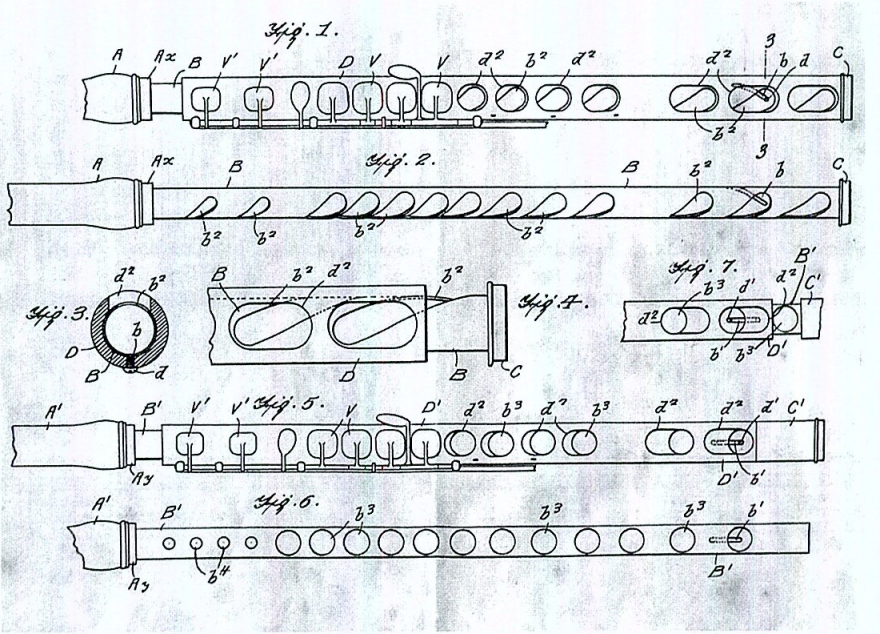

FIGURE 2. N. Alberti, Italian patent 1914 no. 144428, Italian Central State Archive, Rome.

and separate bells; an example by Gebrüder Mönnig, Markneukirchen, is in the Burri Collection, Berne, Switzerland (no. 94).

An unusual design is represented by the Carlo Binda clarinet, patented in 1884 in London (fig. 3 and fig. 4).[19] This instrument has a cocuswood body in two joints with bell and mouthpiece, German-silver keys on pillars, and simple-system keywork. The top joint with integral barrel has six plungers on the right side, and the bottom joint has four. When these are drawn up by pressure on two thumb levers, the resonant volume of the bore is increased by about 12.7 cm^3 (note the two positions in fig. 4). The instrument is then pitched more or less in A. With the plungers fully home it plays in tune in B-flat.[20] The only example is in the University of Edinburgh Collection (no. 2122).[21]

19. C. Binda, London, British patent, 1884, no. 2064.

20. T. K. Dibley, "A Catalogue of the Musical Instruments in the Private Collection of T. K. Dibley" (typed manuscript, 1995), 23.

21. See Fricke, *Catalogue of the Sir Nicholas Shackleton Collection*, 580–581.

FIGURE 3. C. Binda, Fricke, *Catalogue of the Sir Nicholas Shackleton Collection*, 581, with permission.

Chromatic clarinets. A final group includes "chromatic" instruments, that were not based on a specific key but could be played in all keys by means of special key arrangements, such as the clarinets of the Sistema Parra and Sistema Barlassina (to be discussed below).

Italian Patents for Combination Clarinets

The first Italian example of a clarinet that could be played in all keys was Antonio Di Lupo Parra's "Clarinetto Parra," for which he was

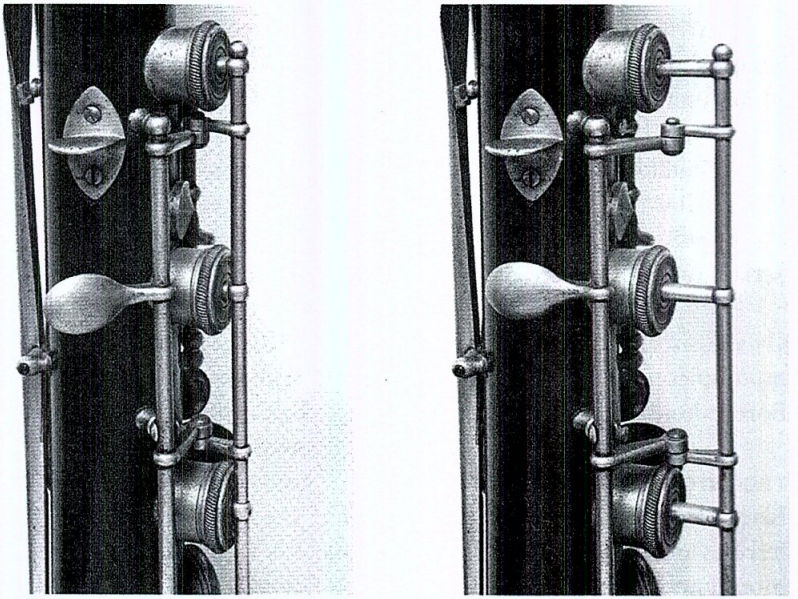

FIGURE 4. C. Binda, Fricke, *Catalogue of the Sir Nicholas Shackleton Collection*, 580, with permission.

granted a patent in 1877[22] (fig. 5). Parra was a wealthy amateur clarinet player who lived not far from Pisa. The prototype might have been realized by Daniele Savorani, a maker of woodwinds whose workshop was close to Parra's house. The idea behind Parra's clarinet was original: it was a fully chromatic instrument—that is, the chromatic scale was played by opening the keys in sequence. According to his description: "The new clarinet has a bore with a bend, keys arranged in a keyboard style, upward bell; the left hand holds the instrument, while the right one has the task of using the keyboard, the same way a piano is played."[23]

The instrument's appearance (fig. 6) recalls the shape of a saxophone, but the bore was cylindrical and a set of keys was positioned on the bell joint. Its compass was c–f‴, sounding pitches, wider than the combined compasses of the three usual sizes, the C, B-flat, and A clarinets. It had

22. Di Lupo Parra, Italian patent, 26 February 1877, no. 9129.

23. "Il nuovo clarinetto è a canna ripiegata, a sistema di chiavi a tastiera, con campana volta in alto, si sostiene con la sola mano sinistra, mentre la destra non ha altro ufficio che di percorrere la tastiera, a somiglianza del piano-forte." Excerpt from the Di Lupo Parra's patent.

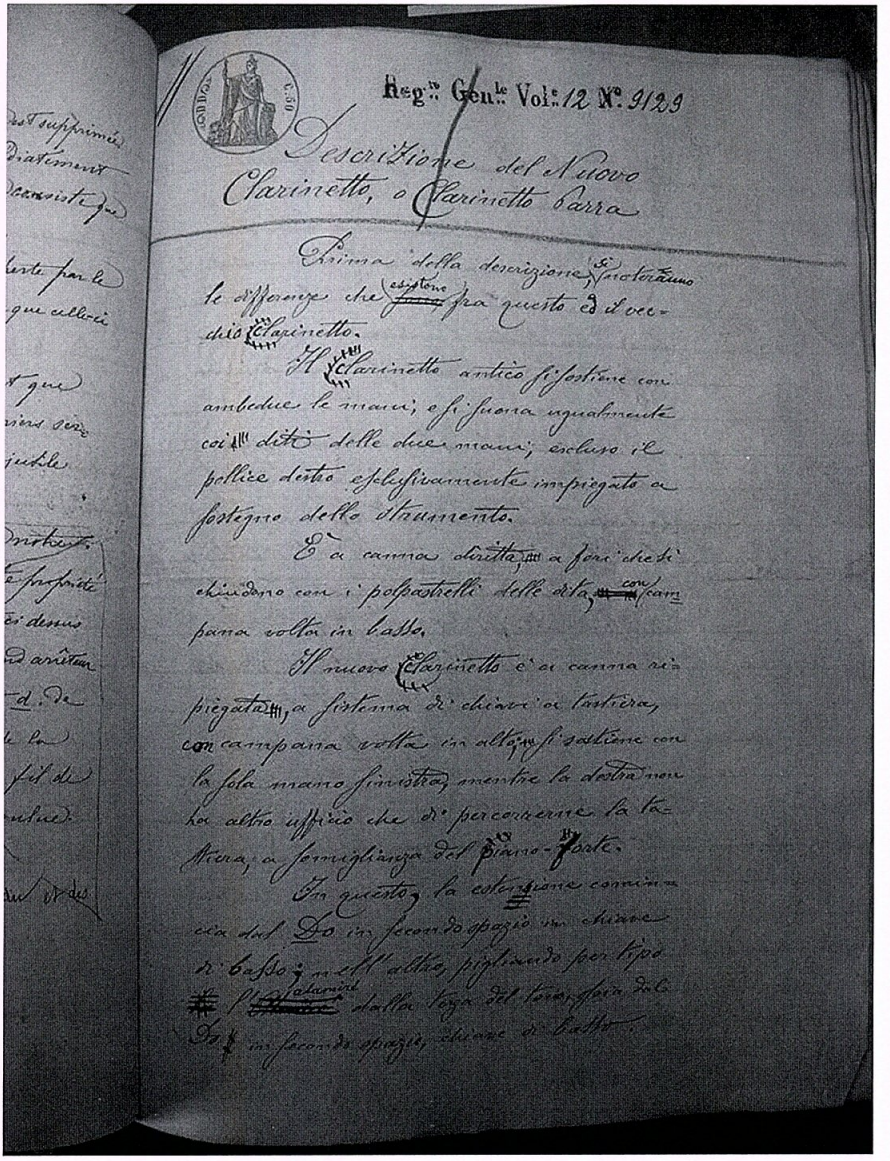

FIGURE 5. A. Di Lupo Parra, Italian patent 1877, no. 9129, Italian Central State Archive, Rome.

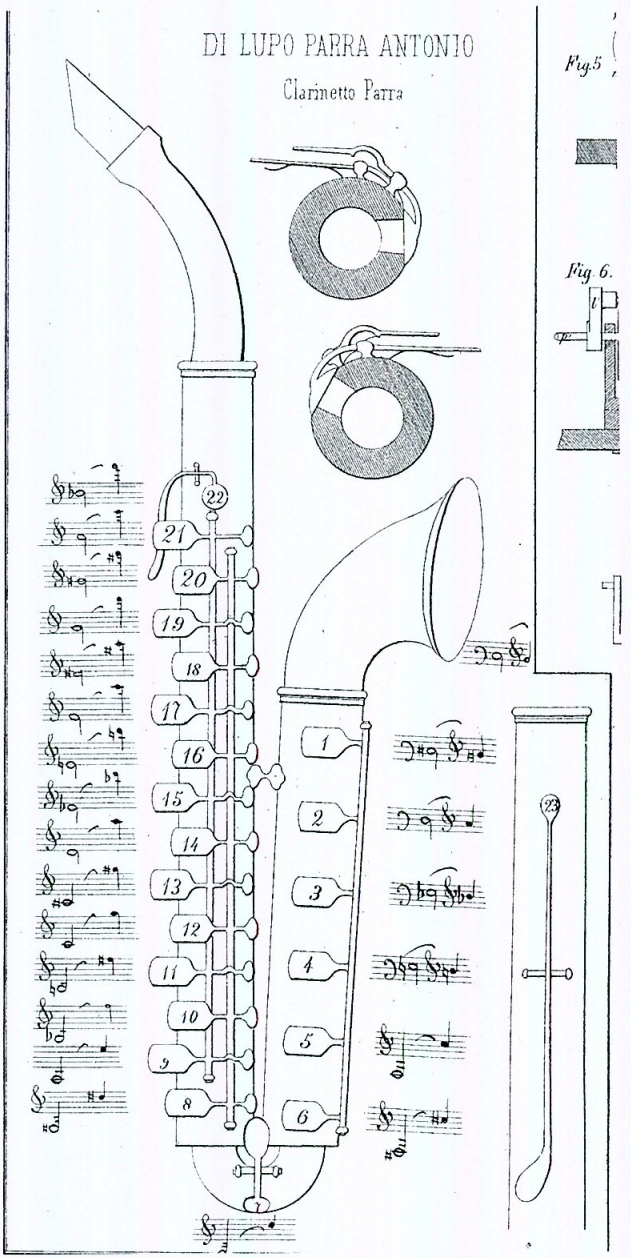

FIGURE 6. A. Di Lupo Parra, Italian patent 1877, no. 9129, Italian Central State Archive, Rome.

three independent sets of keys. In each set, the keys were connected so that the action of one key opened all keys lower in the scale, according to the principle that for a given tone, all holes higher in pitch must be kept closed and all holes lower in pitch must be open. The keys on the bell joint stand open, so that the clarinet will produce a G when no key is depressed. There is one speaker key, on the back of the upper joint, which is operated by the left thumb. According to the patent, the total length of the upper joint was 35 cm, without the metal crook and the mouthpiece.[24] No examples are known.

In 1881 Romeo Orsi of Milan presented a new combination clarinet that he called *Clarinetto a doppia tonalità*.[25] It was based on the principle of the inner liner with two sets of holes, one for each tonality, an idea introduced by Buffet in 1862. In this design, there were two internal metal liners, one fixed to the wooden body, and a movable one attached to the barrel, both covering the full length of the upper and lower joints. Each liner was provided with two sets of holes (see "Fig. 5" in fig. 7). By turning the barrel the player made the inner liner rotate to align a set of holes with one set of holes in the fixed liner, according to the chosen tonality. At the same time, this changed the total length of the instrument. The holes were then aligned with the tone holes on the outside of the wooden body. A pin fixed to the barrel followed an L-shaped slot to assure the proper final position. No example of this model is known.

In the session of January 29, 1881—that is, a few months before the patent was presented—a special commission of the Milan Conservatory judged the musical qualities of this clarinet. A committee at the Congresso dei Musicisti Italiani gave a very favorable evaluation of the instrument, on June 22, 1881. An article by Orsi in the *Gazzetta Musicale di Milano* of May 11, 1884, provided a detailed report on the judgment of January 1881, accompanied by images of a clarinet disassembled (fig. 8) and in the A configuration (fig. 9). Orsi notes that:

> Notwithstanding the two important and praiseworthy verdicts, and the gold medals gained at several exhibitions, I was not fully satisfied with the achievements and I continued to study improvements, as the actual use of the instrument kept suggesting. Therefore, the double-tonality clarinet that I presented to the 1884 General Exhibition of Torino is different from the

24. In the patent original drawing a scale in mm is present at the bottom of the figure.

25. Romeo Orsi, Italian patent, 26 June 1881, no. 12501.

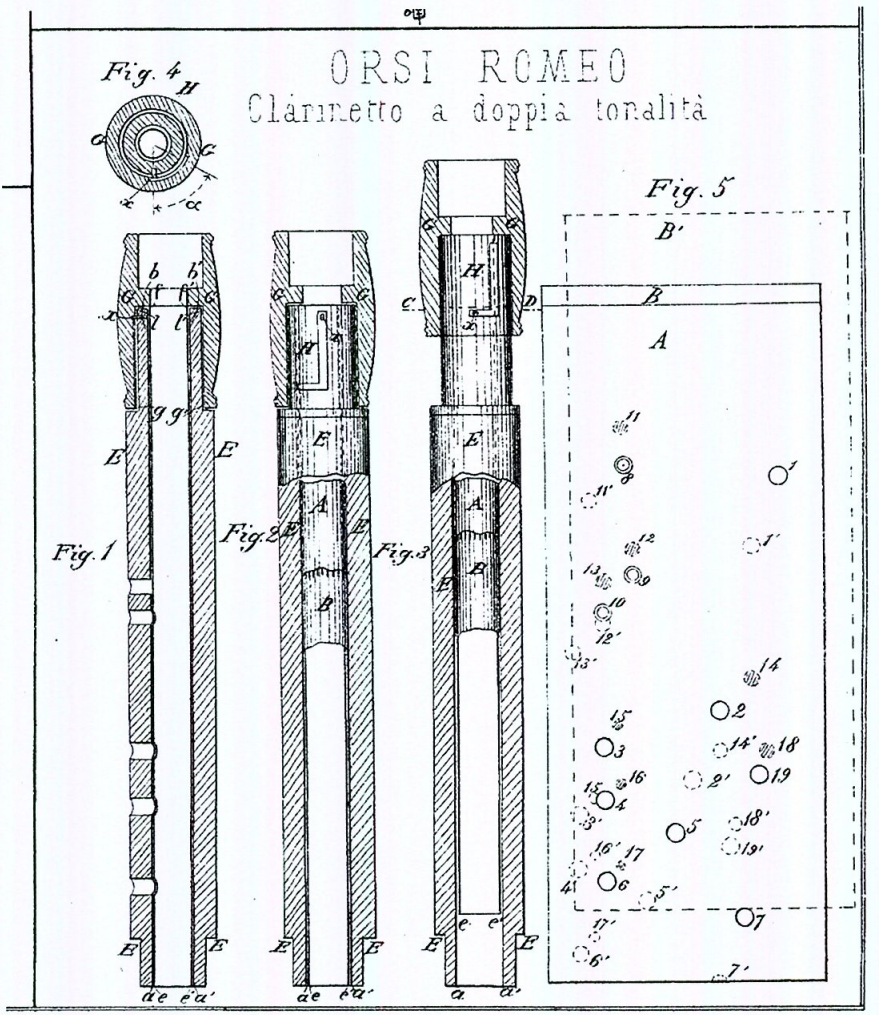

FIGURE 7. R. Orsi, Italian patent 1881, no. 12501, Italian Central State Archive, Rome.

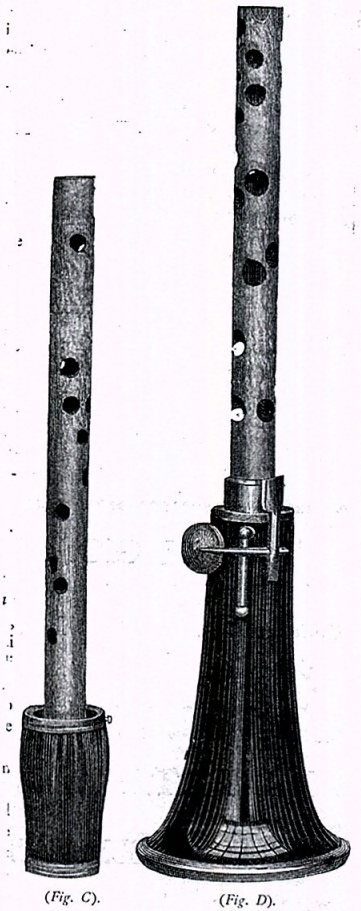

FIGURE 8. R. Orsi, combination clarinet, GMM 1884, Anno XXXIX n. 19, 182.

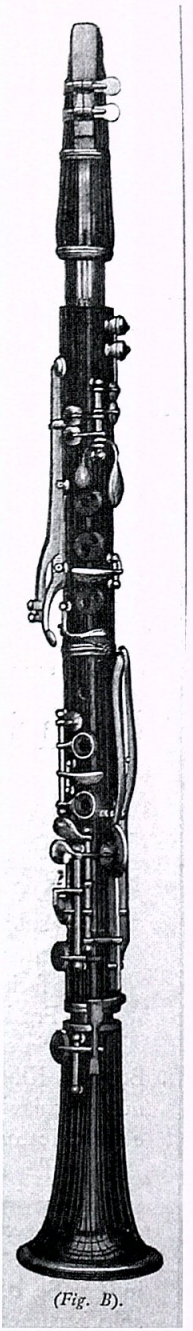

FIGURE 9. R. Orsi, combination clarinet, GMM 1884, Anno XXXIX n. 19, 182.

> one presented to the Lodi exhibition of 1883, and even more different from the first presented to the National and International Industrial exhibitions of Milan in 1881.[26]

The clarinet represented in fig. 8 shows the internal liner divided into two separate parts. This represents the second model that will be discussed below. However, Orsi kept making improvements for several years and a third model appeared before 1898. It is worth noting that Orsi's second model was presented some years before the similar one patented by James Clinton in 1891.

According to the report of the commission of the Milan Conservatory in 1881, a test was performed comparing the sound quality of clarinets in B-flat and A with that of the bi-tonal instrument, first played in B-flat then in A:

> 1) this clarinet, which switches from the tonality of B-flat to A by means of a simple device, is perfectly in tune in the whole chromatic range of both tonalities;
>
> 2) the player cannot feel the minimal difference when changing from B-flat to A, with regard to the distance between tone holes, since the keys, the mouthpiece and the reed do not change;
>
> 3) this clarinet, when used in the different keys of C, B-flat, and A, does not experience a change in pitch due to a cooler instrument, as happens when picking up a new clarinet in the orchestra;
>
> 4) the composer no longer needs to introduce long rests to allow the change of instrument;
>
> 5) this finding can be applied also to the E-flat clarinets in bands;
>
> 6) in this instrument the qualities of both B-flat and A clarinets are present: the brilliant voice of the B-flat clarinet and the mellow voice of the A clarinet.[27]

26. "Malgrado i due autorevoli quanto lusinghieri verdetti, malgrado le medaglie d'oro conferitemi nelle varie esposizioni, non mi sono pur tuttavia accontentato di quanto aveva ottenuto coi primi miei studi, e vi praticai dei miglioramenti ulteriori, suggeritimi dall'uso che io stesso ebbi a fare del nuovo istrumento. Perciò il Clarinetto a doppia tonalità che ho presentato all'Esposizione Generale di Torino del 1884, differirà da quello che già presentai all'Esposizione di Lodi del 1883, e più ancora del primo che esposi nel 1881, all'Esposizione Industriale Nazionale, ed a quella Internazionale Musicale di Milano."

27. "1 – questo unico Clarinetto che passa dalla tonalità di Si b a quella di La, mediante un semplicissimo meccanismo, è perfettamente intonato nella scala cromatica delle due tonalità; 2 – nel sopra citato Clarinetto il suonatore non riscontra alcuna dif-

The intonation in the first design might not have been satisfactory, since the additional length for the A configuration was inserted between the upper joint and the barrel, as on the Buffet clarinet. In this first model, the distance between the finger holes remained the same in both configurations, even if internally there were holes of different sizes and positions and three twin finger holes and duplicate key covers in the upper joint: the rotation of the barrel opened one and closed the other of the small holes and activated one or the other of the two key covers. Possibly in 1883, Orsi presented a new, improved model in which the inner liner was made of two separate sections, one attached to the bell and the other to the barrel. By rotating the bell and the barrel in opposite directions the clarinet would be switched from one configuration to the other easily and rapidly. The additional length for the A size was partly between the barrel and the first joint and partly between the bell and the lower joint. This model kept the two sets of internal holes, distributed on the two joints (fig. 8), as was the case for the first model and the three twin finger holes and duplicate key covers on the upper joint.

Two prototype combination clarinets survive at the Orsi factory in Tradate. Both are marked "Sistema Brev. R. Orsi / P. Maino" and were, therefore, probably built by Orsi's partner, Paolo Maino, by 1881. One is in C, made in German silver with double-walled body (fig. 10); the second is an ebony instrument in E-flat (fig. 11). Both have the body divided in upper and lower joints with internal liner.

A third, perfected model appeared in the supplement of the 1898 Orsi catalogue (fig. 12).[28] In this case, the additional length for the A size was distributed at three points on the instrument's body: between

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ferenza, per quanto minima, allorquando deve cambiare dal Si b al La per ciò che riguarda le distanze fra un foro e l'altro, restando pure inalterate le rispettive chiavi, il bocchino e l'ancia; 3 – il nuovo Clarinetto, essendo sempre adoperato nelle differenti tonalità di Do, Si b e La, non subisce alterazione alcuna nell'intonazione per raffreddamento dell'istrumento, come avviene quando il professore d'orchestra è obbligato di cambiare il Clarinetto passando da una tonalità all'altra; toglie quasi completamente l'inconveniente al maestro compositore di far tacere per molte battute il Clarinetto onde lasciare il tempo all'esecutore di cambiare l'istrumento, non occorrendo pel nuovo Clarinetto che una sola battuta d'aspetto per passare dalla tonalità di Si b a quella di La e viceversa; 5 – tale invenzione può applicarsi anco ai Clarinetti in Mi b delle Bande. . .; 6 – si è constatato essere nell'unico Clarinetto del Prof. Orsi riunite le particolari qualità dei due istrumenti separati: la voce brillante, cioè del Clarinetto in Si b e quella dolcissima del Clarinetto in La."

28. Fricke, *Catalogue of the Sir Nicholas Shackleton Collection*, 579.

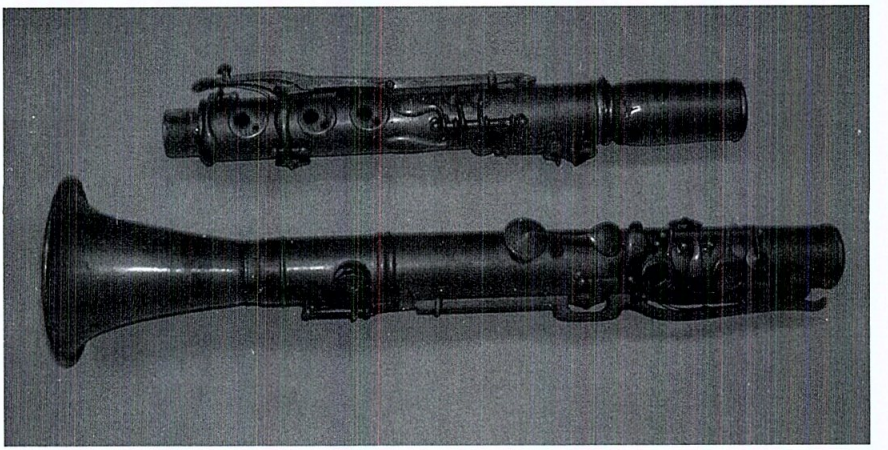

FIGURE 10. R. Orsi, double wall combination clarinet, Orsi factory, Tradate, with permission.

barrel and first joint, between second joint and bell, and now also between the upper and the lower joints. In this model, the inner metal tube with two sets of holes was abandoned. Instead, there was a slide attached to the barrel that allowed the speaker hole to be changed. The speaker key had two covers attached, one for each tonality. This was the most common model of combination clarinet produced by Orsi. Examples of such clarinets at the Orsi factory show several keywork arrangements with simple and Boehm mechanisms.

This third model must have had a certain commercial success, as in 1925 Antonio Tafuri of Genoa patented a device to be applied to such clarinets with the aim of "making the tonality perfect." The "compensation chamber for combination clarinets"[29] consisted of an internal liner (fig. 13). In the B-flat arrangement, the internal holes in the upper joint were smaller than the corresponding external tone holes on the wooden body, while the internal holes in the lower joint exactly matched the external ones. In the A configuration the arrangement was reversed, with the internal holes in the lower joint smaller than the corresponding holes on the body. Tafuri never explicitly mentioned Orsi's instrument but stated that his invention was to be applied to "the well known clarinet."

29. Antonio Tafuri, Italian patent no. 239279, Genoa May 1925, *Camera di compensazione per clarinetto a doppia tonalità.*

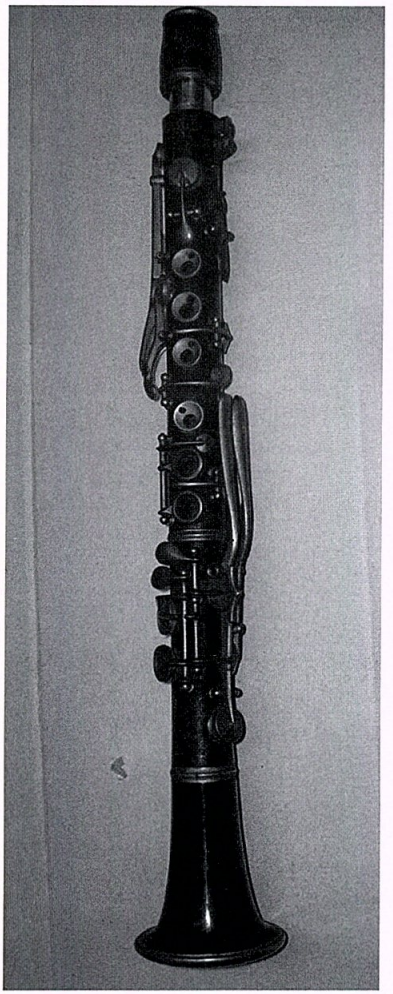

FIGURE 11. R. Orsi, combination clarinet, Orsi factory, Tradate, with permission.

The first prototype of the Orsi clarinet was built by Paolo Maino and presented in January 1881 to the Milan Conservatory. Maino died in the same year. The other instruments were built by Paolo's son, Clemente Paolo Maino. The firm Maino & Orsi was formally founded in 1894, but the trademark seems to have also been used in the previous years. The

FIGURE 12. R. Orsi, combination clarinet, Fricke, *Catalogue of the Sir Nicholas Shackleton Collection*, 579, with permission.

marks on three instruments donated by Romeo Orsi to the Conservatory of Milan, as specimens of the three different models, demonstrate the evolution of Orsi's business name:[30]

Sistema brevet. R. Orsi, P. Maino, Milano

Sistema brevet. R. Orsi, Maino & Orsi, Milano

Sistema brevett. R. Orsi, Maino & Orsi di Prof. Orsi, Milano

Orsi was a skilled entrepreneur and promoted his instruments in magazines and journals by publishing articles and reports, in national and international exhibitions, and by advertisements in musical journals. The *Gazzetta Musicale di Milano* of February 12, 1882 informs readers about the adoption of combination clarinets by the City Band of Milan.

The difficulty of providing the proper distance between the tone holes in the B-flat and A tonalities, which was a major drawback of Orsi's

30. Eugenio De Guarinoni, *Gli strumenti musicali nel museo del conservatorio di Milano* (Milan: U. Hoepli, 1906). These three clarinets are actually not present in the Milan Conservatory.

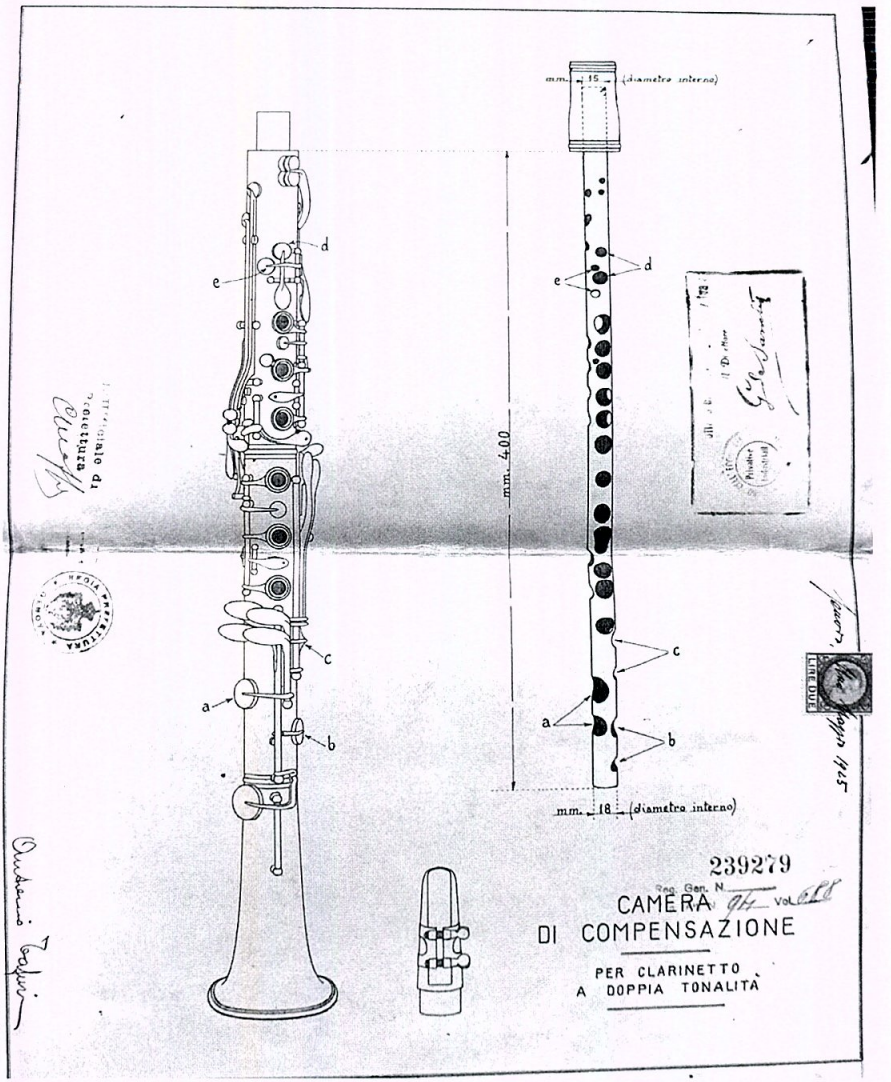

FIGURE 13. A. Tafuri, Italian patent 1925 no. 239279, Italian Central State Archive, Rome.

models, was overcome by some later makers by introducing two separate sets of tone holes.

In 1892[31] Salvatore Sanna, an Italian living in Buenos Aires, applied for an Italian patent for a combination clarinet that introduced a new mechanism based on two lateral plates (fig. 14). A similar solution was also adopted in 1901 by Egidio and Alfredo Rampone with their Leonesi system clarinet. In the patent text Sanna states:

> In this instrument the tonality can be rapidly changed with only one movement, namely lowering or raising a lever. With this lever, two plates slide up and down along the sides of the instrument, opening the tone holes of the keys of one tonality on one side, and closing the holes or inhibiting the keys of the other tonality.[32]

This clarinet was provided with two sets of keys and tone holes, one on the front (see fig. 14, "Fig. 1." and "Fig. 3") and one on the back ("Fig. 2" and "Fig. 4"). The function of some keys changed according to the chosen tonality. For instance, the A key for the B-flat clarinet acted as the speaker key in the A configuration. The mechanism, as described in the patent text, appears rather complex and seemingly delicate. In several cases, the function of a lever was reversed in changing from one tonality to the other, and some keys had two springs to provide an open position for one configuration and a closed position for the other. The body of the instrument was made of ebony, with no internal metal lining. Thus, claimed Sanna, the tone of the instrument would not be altered. No instruments by Sanna are known to survive.

In 1901, Egidio and Alfredo Rampone, the sons of Agostino Rampone, applied for a patent for a "Nuovo Clarino trasposítore per orchestra (Sistema Leonesi) costruito e perfezionato dai Fratelli Rampone di Milano" (New transposing clarinet for Orchestra [Leonesi system] built and perfected by the Rampone brothers in Milan). The patent was granted on June 5, 1901.[33] Giuseppe Leonesi was a clarinetist in Bologna. Rampone and Orsi, the two main woodwind makers in Italy in the first

31. Salvatore Sanna, Clarinetto a doppia tonalità con due registri, Italian patent no. 31920, filed on May 23, 1892, granted on May 28, 1892, for two years.

32. "Esso cambia la tonalità rapidamente e con un solo movimento, l'abbassamento o il sollevamento di una leva, mediante la quale scivolano in giù o in su due placche a coulisse che chiameremo pompe, su due lati dello strumento; queste pompe mentre aprono da una parte i buchi e le chiavi di una tonalità chiudono i buchi o paralizzano le chiavi dall'altra parte, appartenenti all'altra tonalità."

33. Italian patent, no. 58242.

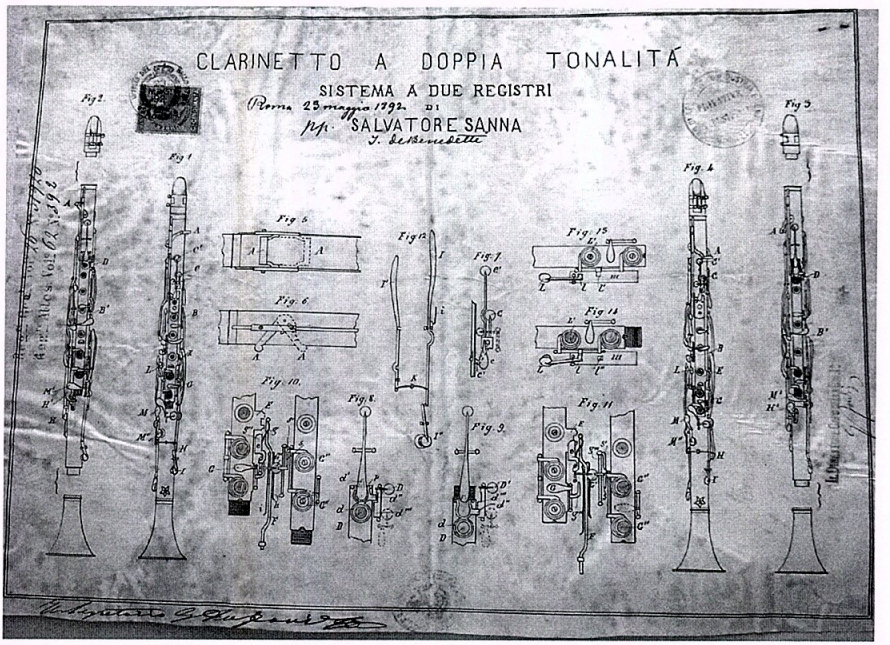

FIGURE 14. S. Sanna, Italian patent 1892, no. 31920, Italian Central State Archive, Rome.

decades of the twentieth century, sometimes experimented with systems suggested by players: for instance, the Quaranta system clarinet (Rampone) or the Scozzi-Incagnoli oboe (Orsi).

The Sistema Leonesi clarinet is comprised of a mouthpiece, barrel, a body in one piece, and a bell. An example survives in the Bate collection, Oxford, no. 474 (fig. 15).[34]

The patent reads:

> The central body, that is the most important part of the instrument, has (differently from other systems) a double key work, which means double keys and double tone holes that are positioned in such a way as to make a difference of a semi-tone between the two lay-outs. Two rectangular plates that can slide into two slots in the sides of the instrument, allow the activation of one or the other set of keys. Tiny tails of two different shapes are attached to the plates, which lower or raise the shanks of the keys, opening or closing

34. Also, see the description by Anthony Baines in *The Bate Collection of Historical Wind Instruments, Catalogue of the Instruments* (Oxford: The Bate Collection, 1976), 38–39.

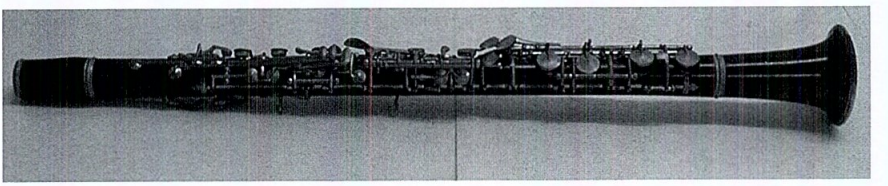

FIGURE 15. E. Rampone, Italian patent 1901, no. 58242, Bate Collection, Oxford, no. 474.

> tone holes and setting up the selected B-flat or A configuration. . . . It is therefore easily understandable that this clarinet equipped with two key layouts, one working independently from the other and vice versa, can be used to replace two separate clarinets. It has the advantage of ease of transport and a homogeneity of tone and intonation, because only one instrument needs to be warmed up when playing.[35]

The mechanism (fig. 16) is well described by Philip Bate:[36]

> Here a tube of full A length was provided with duplicate sets of holes, one for each tonality (except for the speaker and the two topmost trill-holes which remained single). Twin keys mounted on tubular sleeves governed corresponding holes in the two series, and these pairs were in turn controlled by single touchpieces through the action of overlying lugs similar to those employed by Boehm in his 1832 flute. Beneath the key-tails were three strips of metal, sliding longways in grooves cut in the surface of the body. Each strip carried a number of tiny wedges so placed that, depending on the position of the strip, they held closed the keys belonging to one or the other tonality. All the strips were linked together and moved by a touchpiece located near the thumb-hole.

The last proposal[37] for a combination clarinet in Italy came from Giuseppe Barlassina of Milan, a well-known maker of Boehm flutes. The

35. "Il pezzo centrale che è la parte importante dell'istrumento è (a differenza d'altrui sistemi) a doppia meccanica, doppie essendo le chiavi ed il numero dei fori, distanziati in modo da produrre tra un sistema e l'altro un semitono. . . . Si comprende allora facilmente come un clarino, munito di queste due intere meccaniche, una volta che l'una possa funzionare indipendentemente dall'altra e viceversa, tenga luogo di due distinti clarini, coi grandi vantaggi, oltreché della maggior comodità di trasporto, della omogeneità della voce, e della intonazione, unico essendo il riscaldamento che l'istrumento subisce quando è suonato"

36. Philip Bate, Combination clarinets, as cited in F. Geoffrey Rendall, op. cit., 162.

37. A new Italian patent for a combination clarinet was recently found: Francesco Miotto a Venezia, "Sistema di spostamento della meccanica del clarinetto per poter suonare con un solo strumento in Si bemolle e in La senza trasporto," Italian patent no. 393815, granted on April 11, 1942.

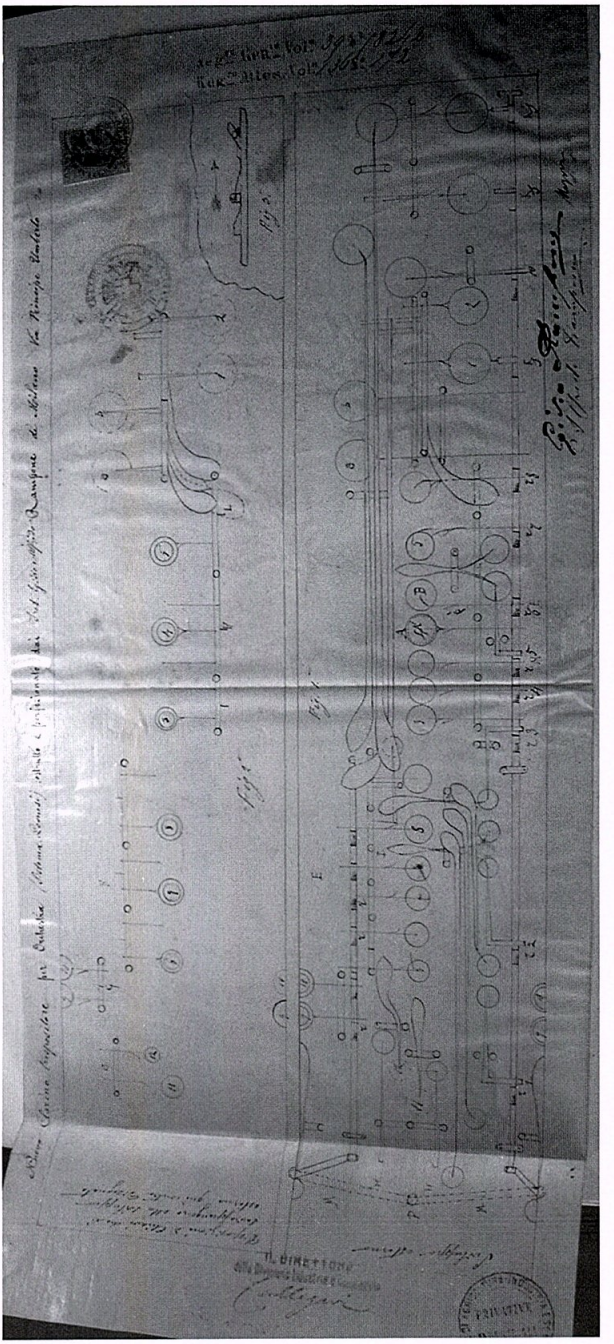

FIGURE 16. E. Rampone, Italian patent 1901, no. 58242, Italian Central State Archive, Rome.

patent was granted in May 1933, with the title "Clarinetto a tasto diatonico" (clarinet with diatonic key).[38] The original idea for a fully chromatic instrument with a transposing mechanism was proposed by Priamo Dall'Argine (d. 1934), who published a booklet[39] entitled *Nuovo clarinetto a tasto diatonico* in 1888. He presented a clarinet based on this principle at the musical exhibition of Bologna in 1888. It is not known who built this prototype instrument. Dall'Argine continued to work on enhancing his clarinet for several decades.

In this pamphlet Dall'Argine dedicates a chapter to the acoustical principles needed for the correct placing of tone holes in woodwind instruments. The application of his theory would require that all tone holes below the last closed one were open and all the holes above were closed, an idea also used as the basis of the Di Lupo Parra clarinet. A similar theory was introduced around the same time by Carlo Tommaso Giorgi, and applied to his vertical flute, also a chromatic instrument, which was commercially produced by Maino & Orsi in Milan and by Wallis in London. A clarinet based on this principle was realized and patented by Giuseppe Barlassina in 1932.

Barlassina's clarinet has keys for all the notes of the diatonic scale in C, and secondary keys for all semitones.[40] All the keys are open-standing keys, with the exception of the three topmost ones, and all but the last three before the bell have the same key-cover diameter. It is a non-transposing instrument that can play in all keys, having c as its lowest note. As shown in the patent drawings, a special key (n. 21 in fig. 17), operated by the right little finger,[41] when pressed closes all the semitone holes. In this condition, by raising each finger in sequence, a C diatonic scale will be played: hence the name "diatonic key" given to this special-purpose key. The mechanism for producing semitones is based on nine small, fork-shaped devices (see fig. 18 and n.16, 17, 18 in fig. 17) that can open or close the secondary key covers. Each fork is transversely soldered to the axle of a tone hole key and rotates when the key is closed.

38. Giuseppe Barlassina, Milano, Clarinetto a tasto diatonico, 27 June 1932, Italian patent, no. 307787

39. Priamo Dall'Argine, *Nuovo clarinetto a tasto diatonico*, Parma: Stab. Tip. L. Battei, 1888.

40. Barlassina calls these keys "chiavi secondarie."

41. In a two-page advertisement, "Qualche chiarimento sul nuovo Clarinetto sistema razionale a Tasto-Diatonico," Giuseppe Barlassina identifies the diatonic key as the key operated by the right index finger.

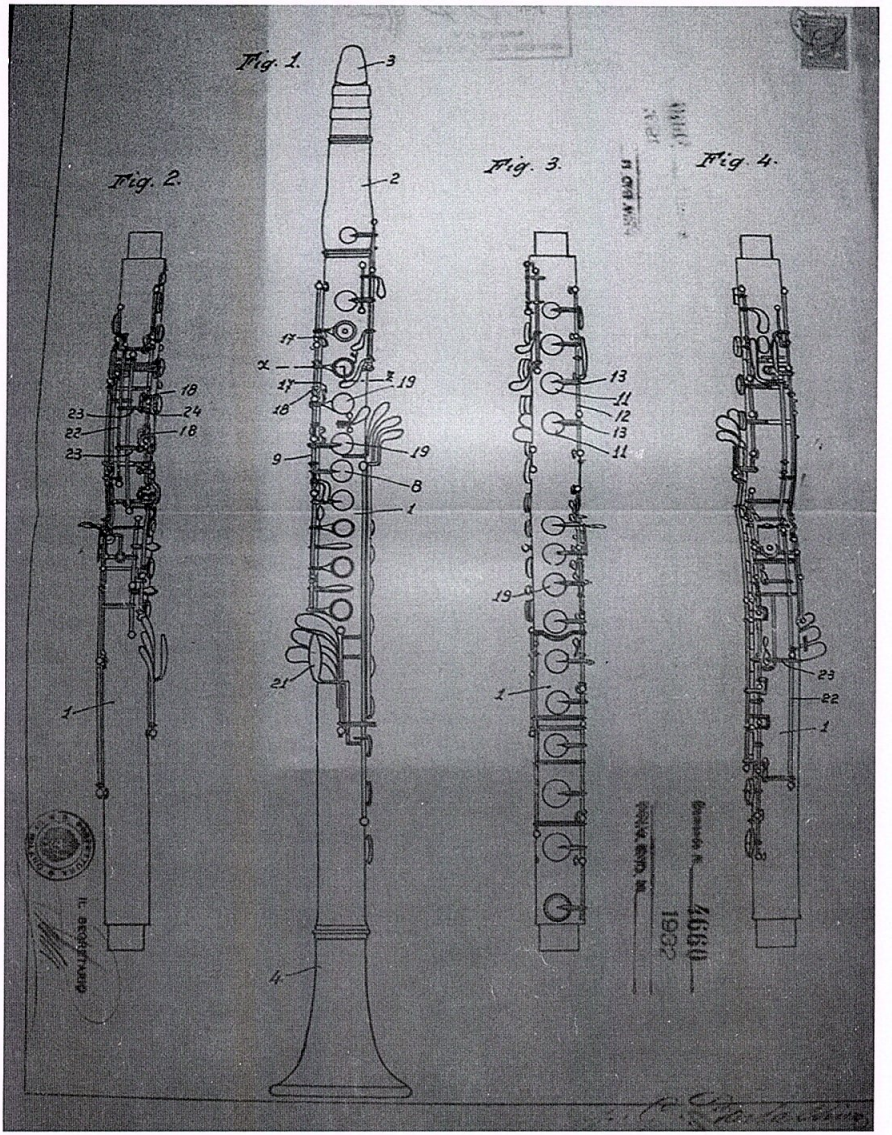

FIGURE 17. G. Barlassina, 1932, Italian patent, no. 307787, Italian Central State Archive, Rome.

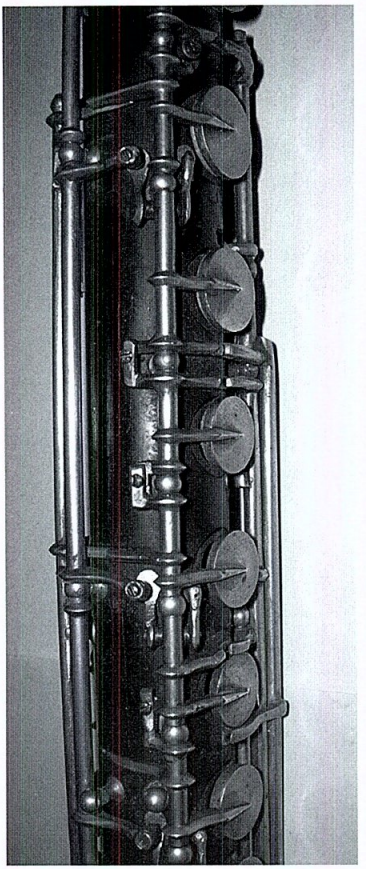

FIGURE 18. G. Barlassina, diatonic key clarinet, Museo Teatrale della Scala, Milan, with permission.

The diatonic key moves a shank (n. 23 in fig.19) for each fork, fixed to the long rod (n. 22 in fig. 19) that extends along the body of the instrument. When the diatonic key is pressed, the shank will push down one arm of the fork (n. 17 in Fig. 19), while the second arm will press down a lug soldered to the secondary key (n. 20 in Fig. 19), that will be closed. This action is effective only in case the tone key is closed. When the tone key is open, the fork is in its rest position and the diatonic key shank will not be able to reach the fork arm. The mechanism is designed to inhibit the action of the diatonic key for all secondary keys associated with the

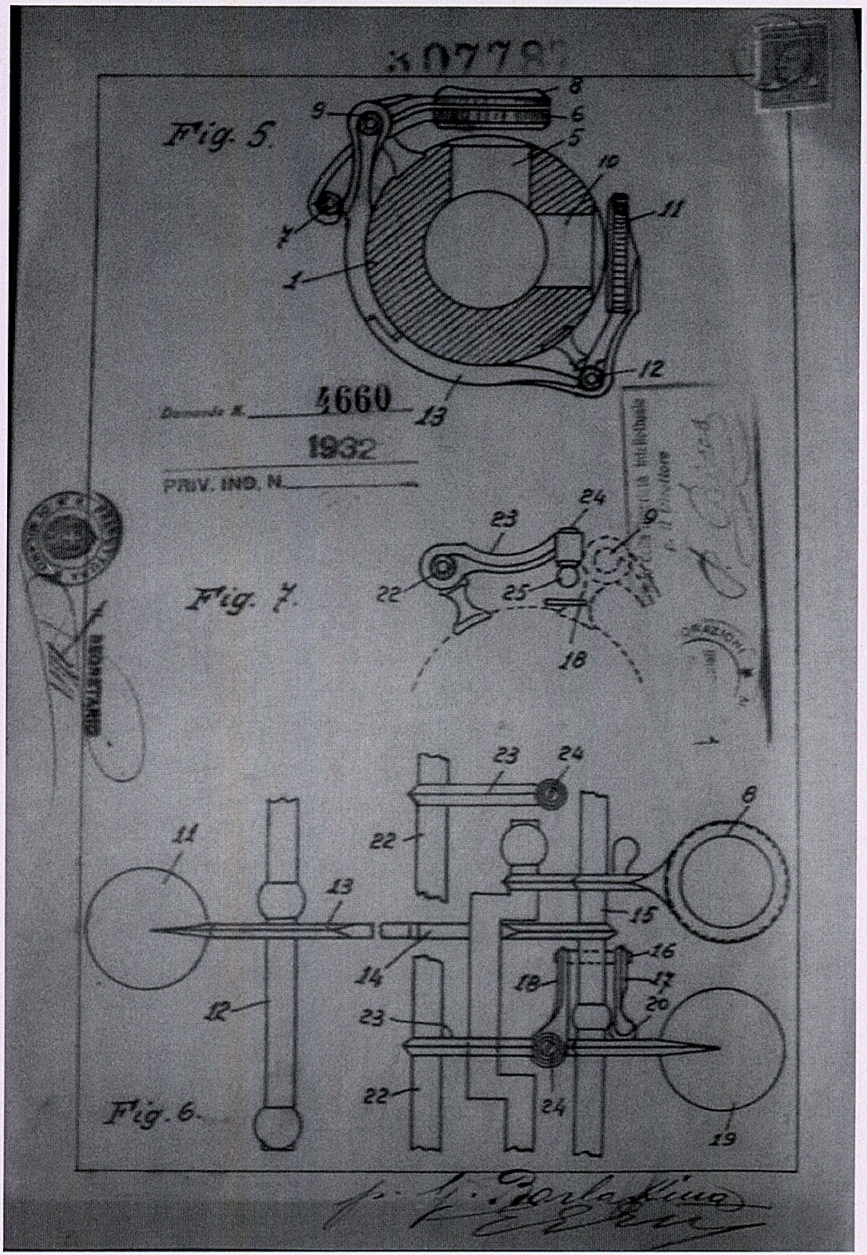

FIGURE 19. G. Barlassina, 1932, Italian patent, no. 307787, Italian Central State Archive, Rome.

closed tone hole keys higher than the last closed one, a mechanism previously adopted by Di Lupo Parra in his 1877 clarinet. Of course, the fingering is very different from that of the usual clarinet, and the key work rather complicated. Di Lupo Parra's clarinet had a separate key for each tone and semitone. Barlassina's instrument makes use of only one key, the diatonic key, to raise the pitch of any tone by a semitone.

Even though Barlassina stated that his clarinet had a simple key arrangement that allowed easy maintenance, the instrument in the Museo Teatrale di Scala in Milan (no. FA/18)[42] has a very complex mechanical design: for example, on the top part of the clarinet there are nine parallel rods (fig. 20). Moreover, the action of the diatonic key moves nine keys at the same time, an arrangement whose adjustment and maintenance seem problematic. The non-playable state of this instrument did not allow testing of its sound or mechanism in detail.

Conclusion

The problem of combining two or more differently-pitched clarinets in one instrument was a challenge taken up by many makers over more than a century. However, despite the numerous proposals and ingenious solutions, no attempt seems to have found the favor of professional players. Further, such instruments were rarely adopted, except in a few bands: for example, the Orsi bi-tonal clarinets were used by the City Band of Milan.[43] There may be several reasons for the lack of success of these instruments. In the first place, the intonation seems to have been far from perfect; secondly, the tone color typical of the B-flat and A clarinets was difficult to achieve in combination clarinets; thirdly, the mechanism and key work were more complex than in ordinary clarinets. It must also be noted that many proposals remained in the prototype stage and only in very few cases did models reach the market. However, these inventions testify to the richness of ideas, solutions, and talent of many makers in Europe and in the United States.

42. See Alfredo Bernardini, "Gli strumenti ad ancia" in *La collezione di strumenti musicali del Museo Teatrale alla Scala*, ed. G. Bizzi, Milano: Silvano, 1991, 133.

43. Romeo Orsi, in the 1881 patent text mentions that the pieces of music played by bands in only one key, for instance in E-flat, can be boring after a while, and that the employment of clarinets that can play both in E-flat and D could allow the use of other keys.

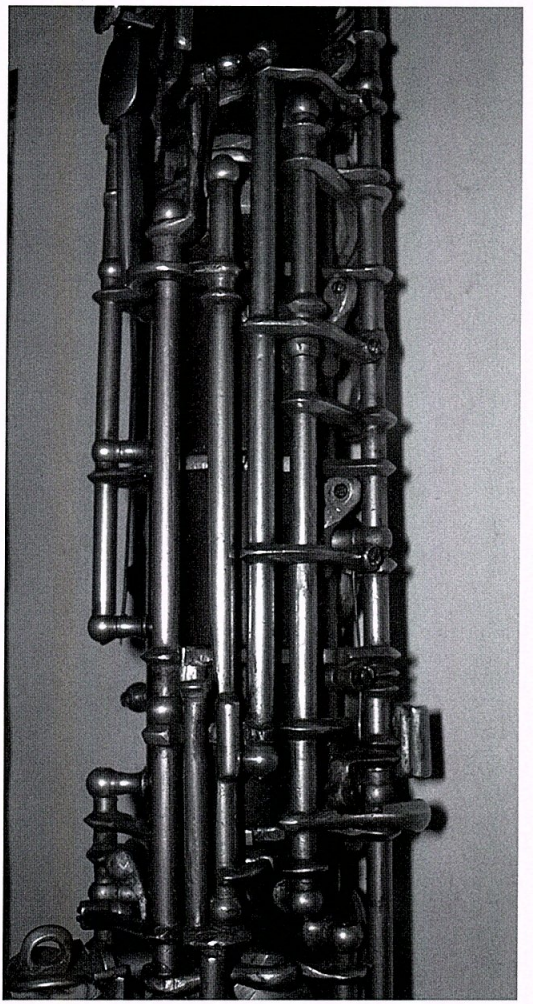

FIGURE 20. G. Barlassina, diatonic key clarinet, Museo Teatrale della Scala, Milan, with permission.