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Proportions and Architectural Motives in the Design of the Eighteenth-Century Oboe[1]

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"BEAUTY," wrote the architect Andrea Palladio in 1570, "will result from the form and correspondence of the whole, with respect to the several parts, of the parts with regard to each other, and of these again to the whole; that the structure may appear an entire and complete body."[2]

In search of beauty, eighteenth-century oboe makers incorporated venerable proportional systems and many familiar architectural motives and decorative shapes into the designs of their instruments. At the beginning of the century oboe shapes leaned heavily toward the imposing decorative style typical of the late Baroque (fig. 1). Later in the century they frequently exhibited elements of the lightness of the Rococo (fig. 2), and toward the end of the century, a number of the formal elements of classicism (fig. 3). The appearance of the oboe in each of these eras reflects more than just an interest in functionality. Kevin Coates suggests that instrumental shapes are the result of an alliance of three aspects of design: acoustic, ergonomic, and aesthetic.[3] On the oboe, acoustic concerns determine the length and volume of the air column and the placement of the fingerholes, while ergonomics are concerned with the comfortable placement of the holes and the weight of the instrument. Aesthetic considerations become part of the equation when these functional components are retained as traditional features and are harmonized into an artistic whole through the use of proportions and familiar architectural features.

Over the last fifty years, beginning with the 1949 publication of Rudolph Wittkower's *Architectural Principles in the Age of Humanism*,[4] and

1. An earlier version of this article was presented as a paper at the Twenty-Fifth Annual Meeting of the American Musical Instrument Society, held at America's Shrine to Music Museum in Vermillion, South Dakota, May 15–19, 1996.

2. Andrea Palladio, *I quattri libri dell' architettura* (Venice, 1570), quoted from Isaac Ware's translation (London, 1738) entitled *Four Books of Architecture* (facs. reprint New York: Dover, 1965), I, 1.

3. Kevin Coates, *Geometry, Proportion and the Art of Lutherie* (Oxford: Clarendon Press, 1985), 164–65.

4. Rudolph Wittkower, *Architectural Principles in the Age of Humanism* (New York: Random House, 1949, rev. ed. 1962).

FIGURE 1. Oboe decorated in a heavy Baroque style. Dupuis, Paris, c. 1690 (Berlin, Musikinstrumenten-Museum 2933).

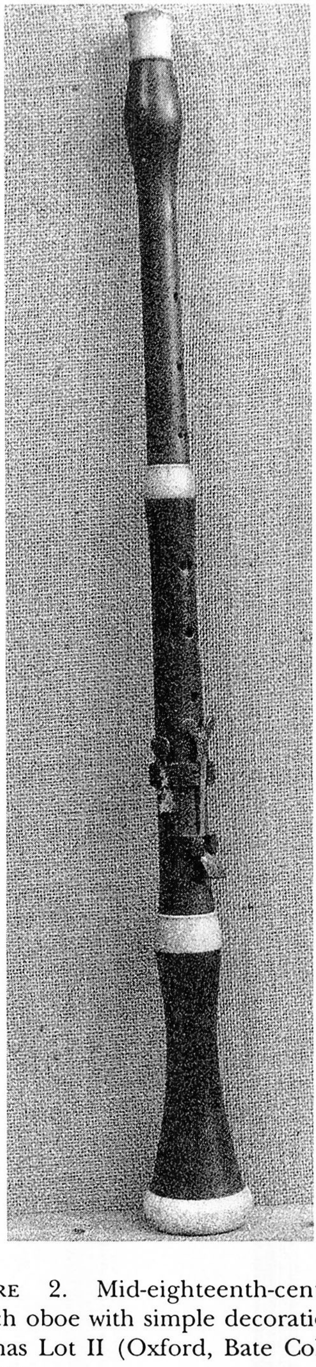


FIGURE 2. Mid-eighteenth-century French oboe with simple decorations. Thomas Lot II (Oxford, Bate Collection 24).

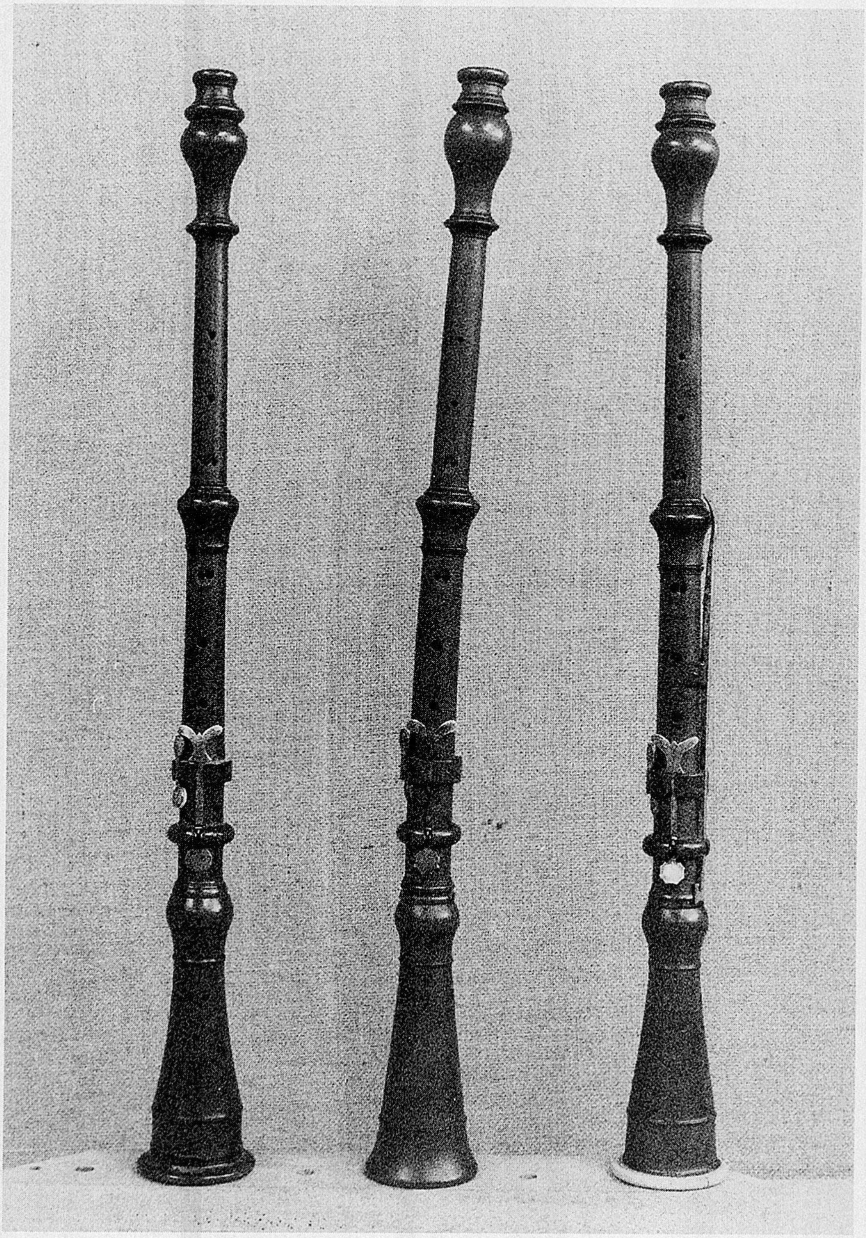


FIGURE 3. Oboes exhibiting Classical elements. William Milhouse, c. 1800–c. 1820 (Oxford, Jeremy Montagu I88, Bate Collection 203, Bate Collection 27).

more recently through Kevin Coates's *Geometry, Proportion and the Art of Lutherie,* we have been made acutely aware of the pervasiveness of classical learning and the extent to which it influenced architecture and the design of instruments in the sixteenth through the eighteenth centuries. But while there is ample evidence of the use of geometric and proportional systems in architecture, no written records concerning the use of these systems in the design of instruments are known to exist. Indeed, the proportional nature of instrument design is not even apparent to the undiscerning or casual observer, giving rise to questions regarding its validity and usefulness.

In the absence of written records providing definitive answers, Coates offers various speculations based on practical, aesthetic, and metaphysical considerations to explain the features observable on surviving instruments. It appears that this lack of written records simply stems from the crafts tradition perpetuated by the guilds, which allowed such information to be transmitted only in the utmost secrecy from master to pupil.[5] In a more practical sense this meant that a knowledge of proportions was transmitted at the workbench as part of an overall understanding of the principles of design rather than as a set of reproducible instructions. Further, the understanding and use of the proportional system lent a consistency to the design process, even if its results were not always apparent. To the maker-designer, whose work also had to reflect the shifting elements of eighteenth-century style, these components gave assurance and confidence that the parts of his work would lead to a correspondence with the whole—and thence to the creation of beauty.

Proportions

In order to understand their role in the design and construction of oboes, it is necessary to establish a basic understanding of what the different proportions were and how they were applied. Renaissance architects, following traditions established by the Greeks, propounded the use of proportions in terms of three means: arithmetic, harmonic, and geo-

5. Coates, 169, points out that Renaissance instrument makers were regularly members of merchants' or artists' guilds, rather than specific luthiers' guilds, of which he claims none existed in the sixteenth century. Luthiers' guilds were common during the eighteenth century, however, in France and Germany, where they exerted rigid control on all aspects of the trade, including apprenticeships, licensing, production, and sales. They were abolished in France beginning about 1789 and in Germany about 1810.

metric. They accepted the first two means on the basis of the consonant musical intervals contained in their ratios, but rejected the third because it created a dissonance. Their interest was not in translating music into architecture, but in using the consonant intervals as audible proof of the beauty of ratios constructed on the small whole numbers, 1:2:3:4. The following brief explanation will help to clarify their thought in this regard.

The *arithmetic* mean is a simple average between two numbers, determined as being equidistant from the extremes. For example, the arithmetic mean between 6 and 12 is 9, giving the ratios 6:9:12. Its pairs of numbers produce the consonant intervals of a perfect fifth and a perfect fourth, which together equal an octave.[6]

A *harmonic mean* results when the third integer exceeds the second by the same fraction as the second exceeds the first; in other words, the harmonic mean exceeds and is exceeded by equal parts of its extremes. For example, 8 is the harmonic mean of 6 and 12, because it exceeds 6 by one-third of 6 and 12 exceeds 8 by one-third of 12. The ratios of the harmonic mean therefore produce the same intervals as those of the arithmetic mean, but using a different division of the octave, in which the fifth is now above rather than below the fourth.[7]

The *geometric mean* lies between the extremes so that it is to the first term as the third is to the second. Thus, 6 is the geometric mean of 4 and 9, because 9 is half again larger than 6, just as 6 is half again larger than 4.[8] Either of these ratios produces the consonant interval of a perfect fifth (3:2); when added together, however, they equal a ninth (9:4), a dissonant interval.

The irrational *golden mean,* often represented by the symbol ∅, has a ratio of approximately 1:0.618, which can be determined by the formula: $\varnothing = \frac{1}{2}(\sqrt{5} - 1)$. Another way of determining the golden mean is to establish a progression of numbers in which each number is the sum of the preceding two. This results in a summation series such as 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, and so on, which is known as a Fibonacci series, after

6. These intervals are obtained by reducing 6:9:12 to simpler ratios representative of musical intervals. Thus, 12:6 equals 2:1, or an octave; 9:6 becomes 3:2, which is a perfect fifth; and 12:9 embodies 4:3, a perfect fourth.

7. In musical terms 12:6 is again an octave, 12:8 (3:2) is a perfect fifth, and 8:6 (4:3) is a perfect fourth.

8. This mean can be determined between two extremes as the square root of their product, as in the present example, where $4 \times 9 = 36$, of which the square root is 6.

Leonardo of Pisa, also called Fibonacci, who described it in 1202 in connection with a number game based on the propagation of rabbits.[9] The quotient of the division of two successive numbers of a Fibonacci series beyond the seventh pair is always a golden mean. Such series are the basis of many natural patterns and can be seen in the petals of a daisy or the spirals of a pine cone.

The golden mean or section, in which the ratio of the whole to the larger part is the same as the ratio of the larger part to the smaller, was first described in Luca Pacioli's *Divina proportione* of 1509 as an extension of the Vitruvian idea of the perfection of the human body.[10] In Pacioli's view it was "essential, singular, ineffable, miraculous, indescribable, inestimable, supreme, most excellent, most incomprehensible, most noble," and was declared, somewhat metaphysically, to be "the source from which all of the measures and denominations of the human body derive, and where is to be found all and every ratio and proportion by which God reveals the innermost secrets of nature." "After having considered the flawless arrangement of the human body," he wrote, "the ancients proportioned all their work in accordance with it. For in this vessel they found two main figures without which it is impossible to achieve anything, namely the perfect circle and the square."[11]

Affirmation of this is found in the Vitruvian figure of Leonardo da Vinci reproduced as fig. 4. To this figure, one of the symmetrical bodies that Leonardo drew for Pacioli's book, I have added (in the top and right margins) an analysis of its proportional measurements. It is noteworthy that the horizontal proportions are irrational, that is, based on successive golden means, while the vertical ones are all rational proportions based on the numbers 1 to 4. For example, on the horizontal plane

9. Leonardo of Pisa (Fibonacci), *Incipit liber abaci compositus a leonardo filio bonacij Pisano* (1202). Edited from the Codex Magliabechiano, C. I, 2616 by Baldasarre Boncompagni as volume 1 of *Scritti di Leonardo Pisano* (Rome, 1857).

10. Marcus Vitruvius Pollio was a Roman architect of the first century B.C. whose celebrated treatise, *De architectura* (written after c. 27 B.C.; ed. and trans. by Frank Granger as *Vitruvius on Architecture* [New York, G. P. Putnam's Sons, 1931]), served as the main authority on ancient classical architecture in the Renaissance, Baroque, and Neoclassical periods. In his third book, "On Temples," Vitruvius writes about the proportions of the human figure and their relationship to the proportions of temples; cf. Wittkower, 14.

11. Luca Pacioli, *De divina proportione*, ed. Constantin Winterberg in *Quellenschriften für Kunstgeschichte und Kunsttechnik des Mittelalters und der Neuzeit* (Vienna, 1889; reprint Hildesheim: Georg Olms, 1974), 129. Texts quoted in this article have been translated by the present author unless otherwise indicated.

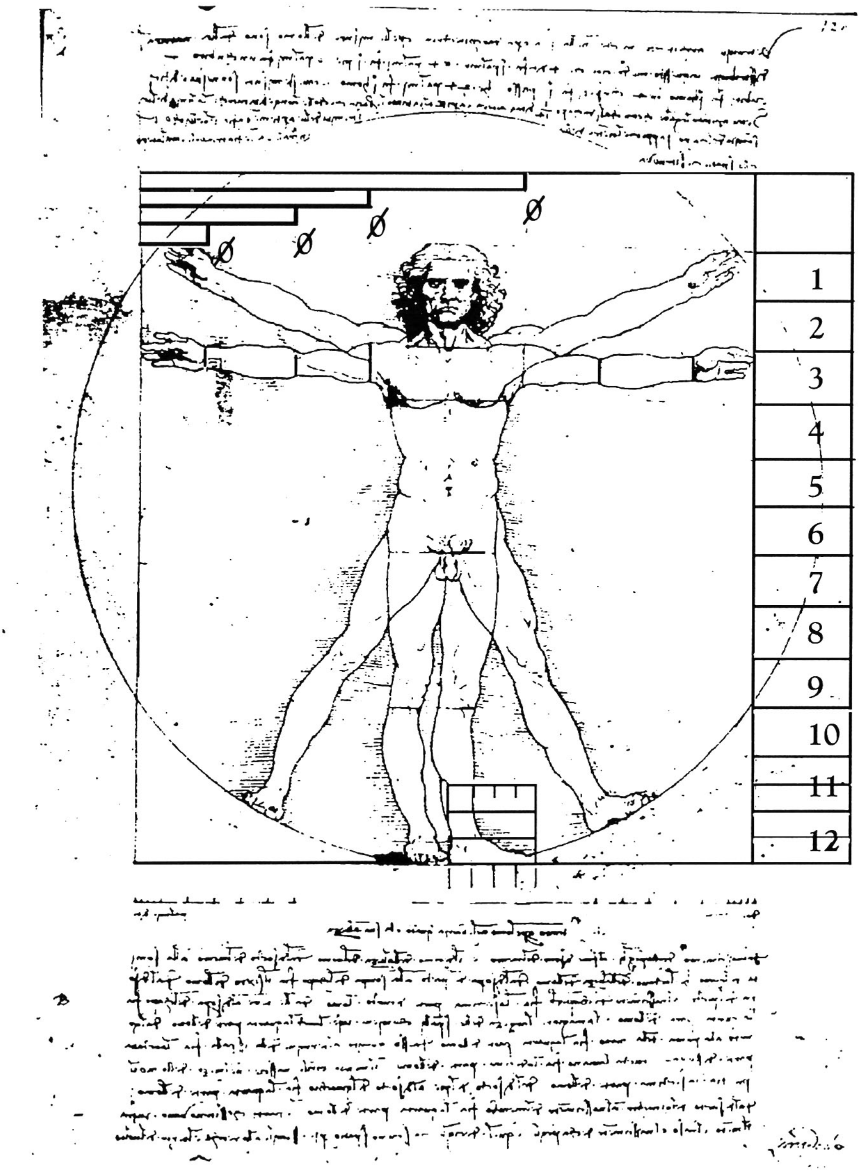


FIGURE 4. The Vitruvian figure of Leonardo da Vinci. Courtesy Academia da Vinci, Milan.

a series of golden sections are found between the hand and the forearm; between these together and the upper arm; between the hand, forearm, and upper arm and the torso; and between all of the preceding components and the entire arm span. In a vertical direction there is a profusion of duplex (2:1), sesquialtera (3:2), and sesquiquarta (4:3) proportions between the head and torso (3:2), torso and thigh (4:3), thigh and upper calf (2:1), and lower calf and foot (4:3).[12]

Oboes and Proportions

Before describing some of the many occurrences of these proportions on eighteenth-century oboes, I must emphasize that their pervasiveness in our physical world makes it difficult to make strong assertions regarding how consciously they were applied to these instruments. Much of what our measurements derive as proportional may have been, in the eye of the maker, simply good design, a matter of adjusting the proportions so that they looked right. "This beautiful manner," according to the sixteenth-century writer Daniele Barbaro, "is called *Eurythmia* (or harmony), the mother of grace and delight in music as well as in architecture."[13]

The proportions most frequently found in the design of oboes are 2:1, 3:2, and 4:3, together with the harmonic mean and the golden mean. All are based on rational or whole integers and are of Pythagorean origin except the golden mean, which is irrational[14] and of later origin. Because of their relationship to the musical intervals of the octave (2:1), fourth (4:3), and fifth (3:2), these rational proportions, together with the irrational golden mean, were considered to be expressions of universal harmony, a concept often depicted in the form of a monochord, as illustrated in Robert Fludd's *Utriusque cosmi historia* of 1617 (fig. 5).[15]

The acoustical and decorative design of oboes may be analyzed in a number of ways. Besides the proportional systems which are the thrust of this discussion, there are also some empirical arithmetic plans that can

12. A 5:4 proportion exists, however, between the length of the hand and foot.

13. Danielle Barbaro, *I dieci libri dell' Architettura di M. Vitruvio* (Venice, 1556), 24, ad Vitruvium I, ii, 3.

14. Irrational numbers are not expressible as integers or as the quotients of two integers, for example the square root of 2, which equals 1.4142.

15. Robert Fludd, *Utriusque cosmi, majoris scilicet et minoris, metaphysica, physica, atque technica historia* (Oppenhemii, 1617), 163.

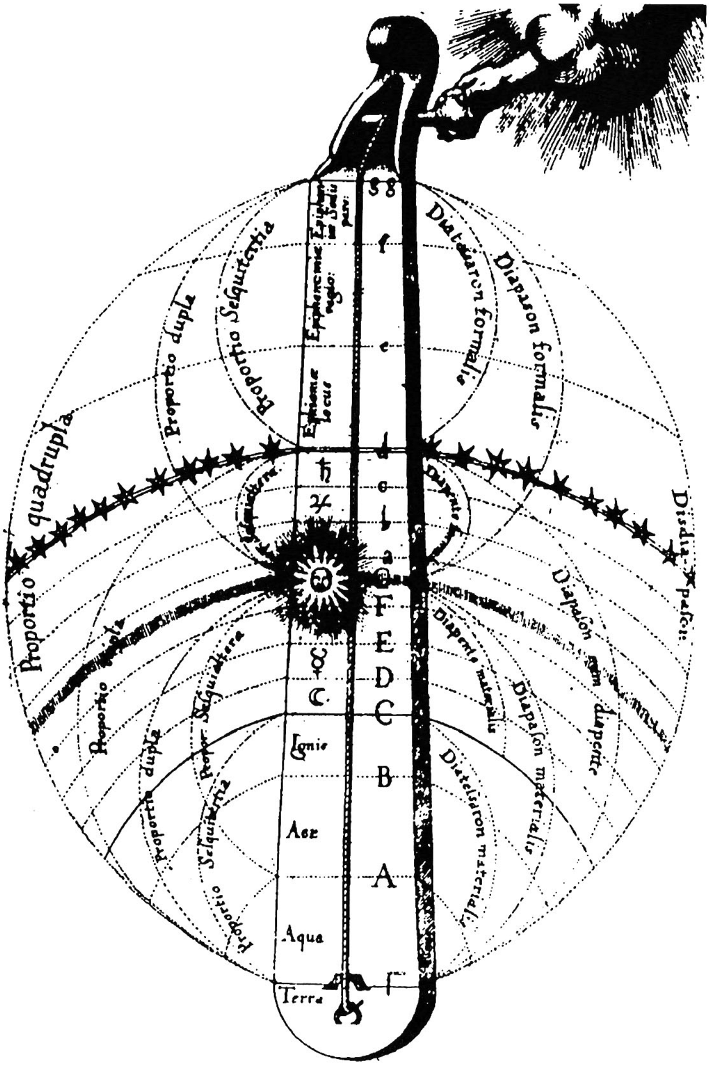


FIGURE 5. Universal harmony exemplified by a monochord. Robert Fludd, *Utriusque cosmi . . . historia* (1617), 163.

be used to lay out the instrument. When historic oboes are analyzed according to any of these schemes, many variations result, even among instruments by the same maker. Changes in decorative features, acoustical modifications, and manufacturing mistakes are only a few of the adjustments that contribute to the differences, and as a result it is often not possible to discern the original concept. With this in mind, let us investigate to what extent proportions and arithmetical plans appear to be an active part of the design process.

Empirical Analytical Systems

Herbert Heyde, in his book *Musikinstrumentenbau,* devoted numerous pages to the proportions of string and keyboard instruments,[16] but in the end he faced the same dilemma encountered by Coates or anyone else: deciding whether the proportions were knowingly applied, or were simply the consequence of empirical procedures. For contemporary string and keyboard instruments practical instructions and designs abound, but in the case of oboes, not only are there no proportional designs, there are also no practical instructions for laying out the tone holes and decorative elements. To enable his discussion of oboes Heyde presents a practical scheme of his own devising that was derived from the instruments themselves.[17]

Heyde's method determines the placement of the division between the top and center joints by measuring from the top a distance equal to two-fifths of the total length of the instrument. Centered over this point is a segment equal to one-third of the total length. The extremes of this segment, which is divided into six parts, show the placement of the first and sixth holes, and its other points of division locate the second through fifth holes.[18] Holes seven to nine are laid out according to

16. Herbert Heyde, *Musikinstrumentenbau 15.–19. Jahrhundert: Kunst, Handwerk, Entwurf* (Leipzig: VEB Deutscher Verlag für Musik, 1986), 88–172.

17. Heyde, 179.

18. Heyde, 179, cites a number of ways of setting the holes. He mentions a Richters oboe with schalmei antecedents (Vienna, Sammlung alter Musikinstrumenten 653), which has the top hole at one-quarter of the total length—though the three-keyed Fornari oboe (Venice, Fondazione Querini Stampàli 400-2) works better at this interval than does the Richters. His plan of one-third total length for the span of the holes is quite accurate, but the placement of the mid-point of this segment at a distance two-fifths of the length from the top usually situates it in the middle of the tenon rather than at the mid-joint as he suggests.

prime numbers (that is, a number divisible only by itself or one, such as 1, 2, 3, 5, 7, 11, 13 . . .), or a Fibonacci series.

Figure 6 uses a drawing of an oboe by Engelbert Terton to demonstrate this system of division into five parts, and the placement of a one-third-length segment for establishing the location of the first six finger-holes. Holes 7 and 8, those covered by the two keys, can be considered to be positioned according to either a prime or Fibonacci series, since their relationship involves only the numbers 2, 3, and 5, which are common to both series. The distance between holes 6 and 7 is one-and-a-half times that of the distance between holes 5 and 6 (that is, if the latter distance is considered as being 2 units, then the former will equal 3). Similarly, the distance between holes 6 and 8 stands in a 5:2 ratio to the distance between holes 5 and 6. The placement of hole 9 at a distance of 4.75 units from hole 6, however, does not correspond to anything in either the prime or Fibonacci series.

A simpler scheme formulated by the present author, while also lacking a recorded historical precedent, can be used to directly place not only seven of the nine holes, but many of the other exterior features as well. By dividing the total length of the oboe into eighteen parts, as illustrated at the right side of fig. 6, all of the holes except 7 and 8 can be sited, as can the finial-baluster juncture, the bottom of the top column beads, the upper extent of both key rings, and the top of the center column base.[19] Holes 7 and 8, however, must be placed according to the system previously described.

Analyses Using Proportions

To begin with, it must be conceded that not all of the available proportional schemes were used by architects or instrument makers. Some did not produce consonant musical intervals, and hence were rejected by the architects. Other proportions, including some of those used by string instrument makers, for example, were not applicable to oboe design, because the oboe did not have the same kind of broad surface areas that were part of the resonant bodies of string instruments. Figure 7 illustrates some of the simpler lateral relationships existing on the belly

19. Appendix A presents a diagram detailing the nomenclature used in connection with the parts of the oboe. Note also that six of the eighteen parts equal the one-third segment used by Heyde to establish the placement of holes 1–6.

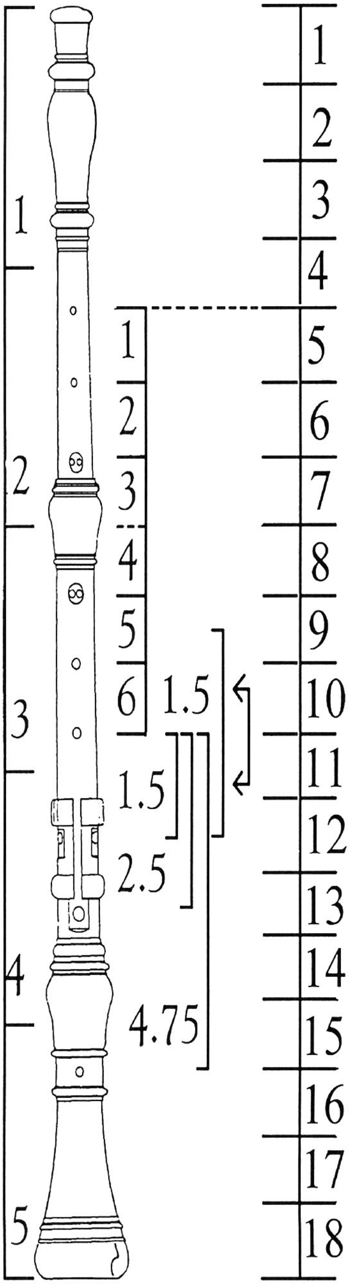


FIGURE 6. Empirical demonstration of the placement of oboe tone holes. Engelbert Terton, c. 1700 (Washington, D.C., Smithsonian Institution 208,185).

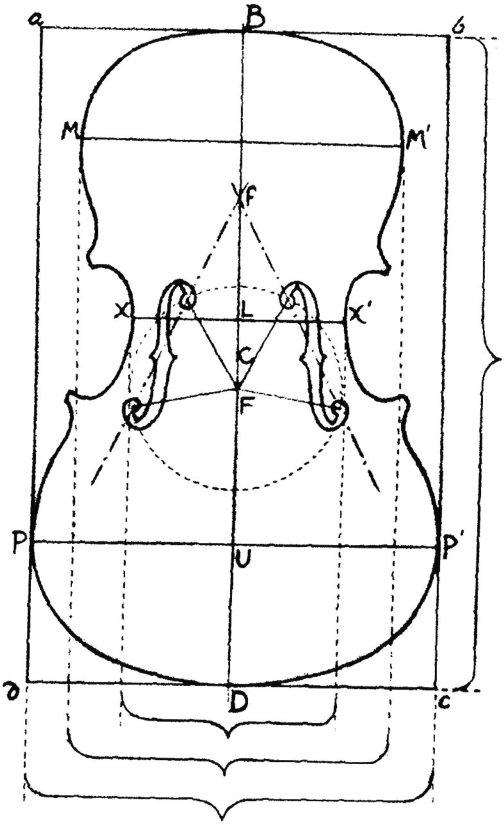


FIGURE 7. Proportional analysis of the belly of a viola by Giovanni Paolo Maggini (c. 1610). Kevin Coates, *Geometry, Proportion and the Art of Lutherie* (Oxford: Clarendon Press, 1985), fig. 66.

of a viola (c. 1610) by Giovanni Paolo Maggini, as analyzed by Coates.[20] The germane parts of this detailed analysis are that *mm':xx'*, *pp:mm'*, and *ad:ab* use the ratios 3:2, 5:4, and 5:3 respectively. Only the first of these (3:2) was found on early oboes or used in architecture. The other two ratios pointed out by Coates (5:4 and 5:3) produce intervals of a just major third and a just minor tenth, which were not part of the Greek tradition upon which Renaissance architecture was based.

There are no instances of irrational proportions applied to the diametric (or lateral) dimensions of the oboe. The only rational proportion

20. Coates, 82, fig. 66.

that has been found with any frequency in conjunction with diametric measurements is the harmonic mean that occurs between the baluster joints on some 44% of earlier eighteenth-century Dutch oboes by such makers as Willem Beukers, Hendrik and Frederik Richters, and Terton. This mean, occurring at the bell baluster, is established by using the diameters of the bell rim and the finial baluster as the extremes (fig. 8).

As one might assume from the proportional nature of pitches, vertical measurements tell a different story. Figure 9 illustrates the various points where golden sections occur on a late Classical oboe by William Milhouse. Compared with earlier instruments, oboes from the end of the eighteenth century have a greater number of observed golden sections. Consider the difference in the frequency of irrational proportions on the late oboe by Thomas Cahusac and the early instrument of Hendrik Richters depicted in fig. 10. Since these relationships are consistent on the individual instruments of these makers, we have some indication that much of the work was the result of conscious design. For example, on the early oboes shown in fig. 11a, a golden mean established between the apogee (the apex, or highest point of the curve) of the baluster and the top of the finial lies at the center of the **torus** (a semicircular or elliptical projection, often in combination with other shapes)[21] of the lower finial beads. Further, a duplex (2:1) proportion established between these same two points consistently intersects either the top or the **astragal** (also a semicircular projection, usually smaller in relation to a torus) of the lower finial beads. The same proportions established from the same points on the later oboes in fig. 11b are, however, more random, intersecting the finial either in the center of the torus and the astragal as above, or just below and above the torus.

Rational proportions are found on all oboes of the eighteenth century, but often seem to occur only incidentally, that is, as a consequence of some other measurement. On modular instruments (those whose features are placed according to a specific unit of measure), like the Beukers oboe seen in fig. 12a, with many coincidences between the points of division and the design features, such proportions abound. Yet there are other instances where all of the proportions are integral to the design. Of particular note are the keys on the oboes of Hendrik and Frederik Richters, which exhibit numerous simple proportions (fig. 12b).

21. See Appendix B, which contains a list, with definitions and profiles, of molding shapes encountered on eighteenth-century oboes. In addition, for the convenience of the reader, the initial mention of each molding shape is printed in boldface type in the main text.

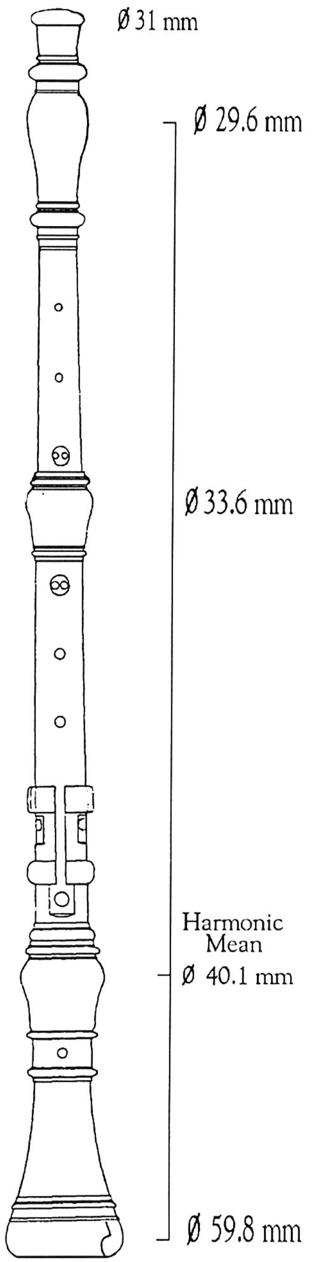


FIGURE 8. Harmonic mean applied to an oboe (ø = diameter). Engelbert Terton, c. 1700 (Washington, D.C., Smithsonian Institution 208,185).

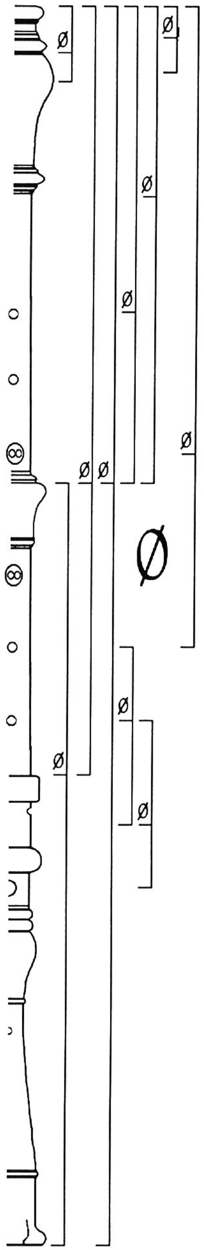


FIGURE 9. Occurrences of the golden mean on a late Classical oboe. William Milhouse, 1789–1810 (Edinburgh, Collection of Historical Musical Instruments 2003).

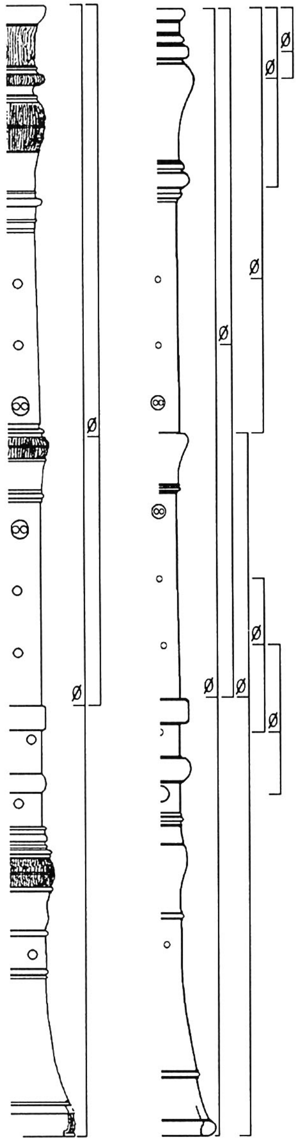


FIGURE 10. Irrational proportions occurring on early and late eighteenth-century oboes by Hendrik Richters, c. 1710–1727 (Boston, Marlowe Sigal, ex-Piguet [left]), and Thomas Cahusac Jr., c. 1780–1810 (Oberlin, James Caldwell [right]).

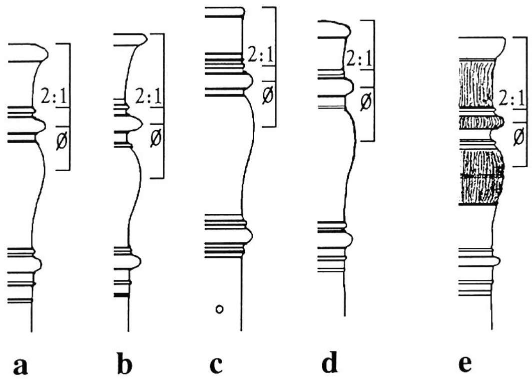


FIGURE 11a. Incidence of the golden mean on early eighteenth-century oboe balusters.
a. Willem Beukers (The Hague, Gemeentemuseum Ea 10-x-52).
b. Richard Haka (Stockholm, Musikhistorisk Museet MM155).
c. Nicolas Hotteterre (Brussels, Musée Instrumental du Conservatoire 2320).
d. Engelbert Terton (Washington, D.C., Smithsonian Institution 208,185).
e. Hendrik Richters (Boston, Marlowe Sigal [ex Piguet]).

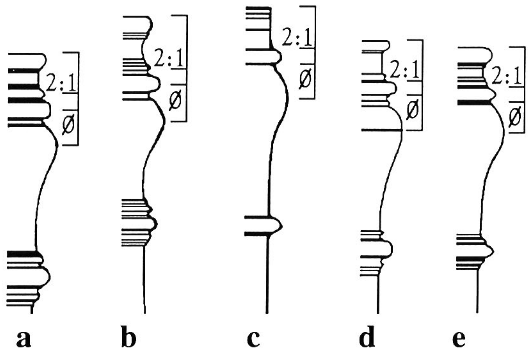


FIGURE 11b. Incidence of the golden mean on late eighteenth-century oboe balusters.
a. Thomas Cahusac (Oberlin, James Caldwell).
b. Thomas Collier (David Jones, "A Three-keyed oboe by Thomas Collier," *The Galpin Society Journal* 31 [1978], 39).
c. Christoph Delusse (Oxford, Bate Collection 20).
d. Andrea Fornari (Bern, Historisches Museum 36776).
e. William Milhouse (Edinburgh, Collection of Historical Musical Instruments 2003).

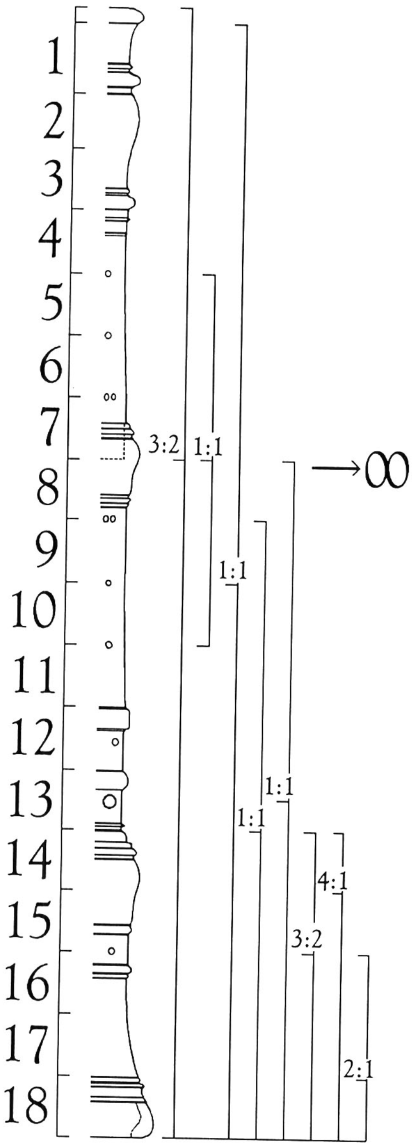


FIGURE 12a. Appearances of rational proportions on an oboe by Willem Beukers (The Hague, Gemeentemuseum Ea 10-x-52).

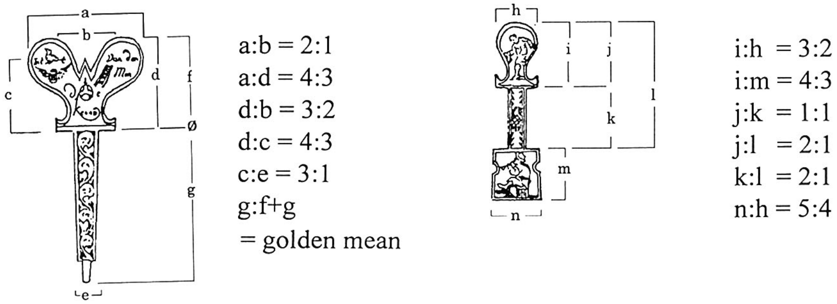


FIGURE 12b. Appearances of rational proportions on oboe keys by Hendrik Richters (Washington, D.C., Library of Congress, Miller Collection 158 [left]; Vermillion, Shrine to Music Museum 4547 [right]).

Architectural Motives

Andrea Palladio, whose 1570 prescription for beauty was cited at the beginning of this article, was the last of a long line of Renaissance architects[22] through whose works the Vitruvian hierarchy of architectural values was transmitted to the seventeenth and eighteenth centuries. The most influential writers of this later era were Scamozzi, Perrault, Gibbs, and Chambers,[23] whose individual works, or similar works of others, were known during the period to students and scholars interested in perpetuating the beauty of classical design.

From simple moldings to complex proportions, oboes abound with references to furniture and architecture. There are at least twenty-three molding shapes that occur as part of oboe ornamentation (see Appendix B). These shapes range from simple **beads,** or small rounded moldings (figs. 13a, b), to complex clusters that are sometimes made up of as many as six individual shapes (fig. 13c). Although some motives are

22. Other important late Renaissance architects who, with Palladio, helped to shape the future concept of classical design were Sebastiano Serlio, *The Five Books of Architecture* (Venice, 1566; English trans. London, 1611; facs. reprint New York: Dover, 1982) and Giacomo da Vignola, *Regole delle cinque ordini d'architettura* (Rome, 1562).

23. Vincenzo Scamozzi, *L'idea dell'archittetura universale* (Venice, 1615); Claude Perrault, *Ordonnace des cinq espèces de colones* (Paris, 1683); James Gibbs, *Rules for Drawing the Several Parts of Architecture* (London, 1732); and Sir William Chambers, *A Treatise on Civil Architecture* (London, 1759).

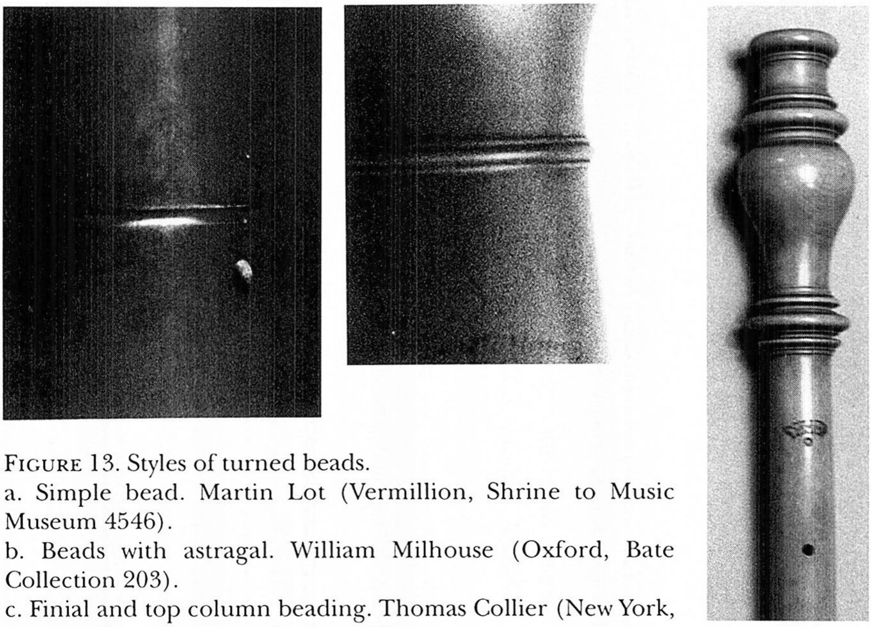


FIGURE 13. Styles of turned beads.
a. Simple bead. Martin Lot (Vermillion, Shrine to Music Museum 4546).
b. Beads with astragal. William Milhouse (Oxford, Bate Collection 203).
c. Finial and top column beading. Thomas Collier (New York, Metropolitan Museum of Art 1981.216).

shared among the many makers, almost every maker used some sort of individualized combination that makes his work identifiably different from that of his peers.[24]

The top of the finial, for example, provides some interesting and varied combinations of what is often regarded as a common theme. Figure 14a shows a Milhouse finial that consists of a **nose** (a large bead applied at an edge) and two **fillets** (narrow flat members often used to separate adjacent moldings). The second example (fig. 14b), from an oboe by Thomas Stanesby Sr., uses the nose in combination with an **ovolo** (a circular or elliptical quarter round), while the third, from an instrument by his son (fig. 14c), combines a fillet with a **scotia** (a concave elliptical quarter) below the nose. Another common grouping is a simple **bolection** made up of an astragal bounded by two beads, a combination which

24. A suggested analytical technique for identifying individualized molding patterns may be found in the third paragraph of Appendix B. This simple approach allows complex moldings to be assigned discrete alphabetic codes, which can then be classified into groups and used to compare consistency of design and manufacture. Given a large enough database, it may also be useful for identifying anonymous instruments by comparing their molding patterns with those of known oboes.

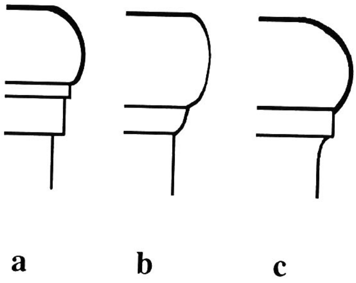


FIGURE 14. Variants in finial design.
a. Nose and two fillets. William Milhouse (Oxford, Bate Collection 203).
b. Nose with ovolo. Thomas Stanesby Sr. (London, Horniman Museum 14-5-47/277).
c. Nose with fillet and scotia. Thomas Stanesby Jr. (London, Horniman Museum 1969.683).

appears universally as the upper waist beads on oboes of the Classical period, for example on the bell of the instrument by Johann Friedrich Englehard depicted in fig. 15a. On earlier oboes this feature is always balanced with a lower set of beads that frequently have more elements, as does the bell of Johann Heinrich Eichentopf's oboe shown in fig. 15b, which also has an added fillet at the bottom of the group.

It is true, of course, that these moldings are as much the property of the furniture maker and the wood turner as they are of the oboe maker. Indeed, many woodwind makers began their work as turners before taking up musical instruments.[25] However, just as the use of proportions discussed above exceeds that commonly encountered in the manufacture of furniture, the use of molding elements often exceeds the scope of eighteenth-century furniture decoration.

In fact, resonances of architectural features turn up in oboes as well as in furniture. Of the following examples, some are prominent on oboes throughout the century, while others demonstrate a shift to Classical

25. The patriarchs of both the Richters and Milhouse families began their work as wood turners. Frederik Richters learned the trade in his home village of Laar in Germany's Münsterland before his emigration to the Netherlands in 1677, and Richard Milhouse worked as a turner in Newark-on-Trent, England, in the mid-eighteenth century. Biographical details on the Richters family may be found in Cecil Adkins, "Oboes Beyond Compare: The Instruments of Hendrik and Fredrik Richters," this JOURNAL 16 (1990), 42–117, esp. 107–15. For information on the Milhouse family, see the author's "William Milhouse and the English Classical Oboe," ibid. 22 (1996): 42–88.

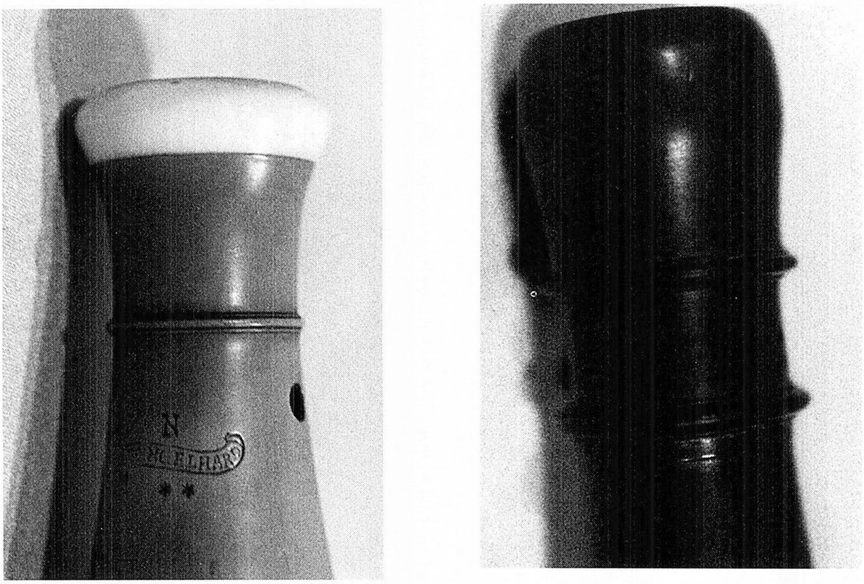


FIGURE 15. Bolection moldings.
a. Astragal with beads. Johann Friedrich Engelhard (Leipzig, Musikinstrumentenmuseum der Universität 13230).
b. Astragal with beads and fillet. Johann Heinrich Eichentopf (Halle, Händel-Haus MS-420).

ideals from those of the earlier Baroque style. Besides those that occur commonly throughout the period, such as the Attic base and the separation of molding shapes with fillets, one can find many examples that appear only late in the century, including symmetry in molding clusters, the hawksbeak (an asymmetrical convex/concave shape), and classically-designed balusters.

One of the more conscious architectural adaptations is the Attic base, a figure constructed of two tori with an intervening **cove** (a semicircular groove) (fig. 16a). This feature, which is used on oboes as the base of the middle joint, occurs in many modifications, with some of the most obvious ones appearing later in the eighteenth century (fig. 16b). An interesting adaptation on a Jan Steenbergen oboe from the first half of the century has only an ovolo (or quarter round) at the base of the middle joint, but it combines with the torus on the bell baluster to make a convincing Attic base (fig. 16c, 1 & 2). On the subject of bases, it should be pointed out that not infrequently the crown of the middle baluster

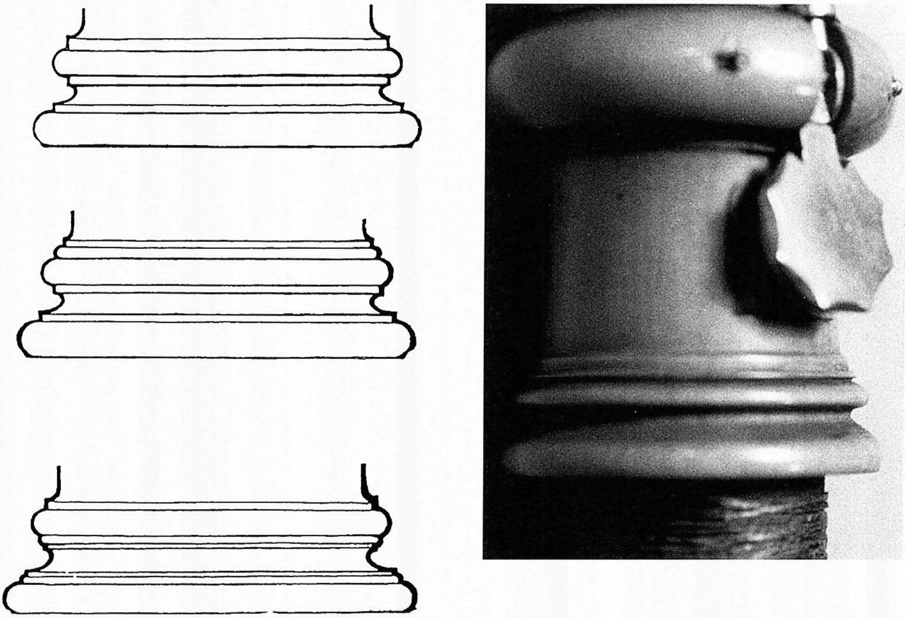


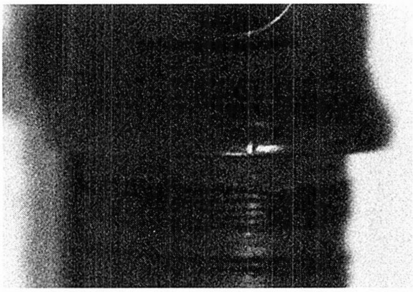
FIGURE 16. Attic base.
a. Classical forms of the Attic base.
b. An Attic base at the bottom of the middle oboe joint. Thomas Collier (New York, Metropolitan Museum of Art 1981.216).

becomes the base of the top joint when the two parts are joined (fig. 16d, 1 & 2).

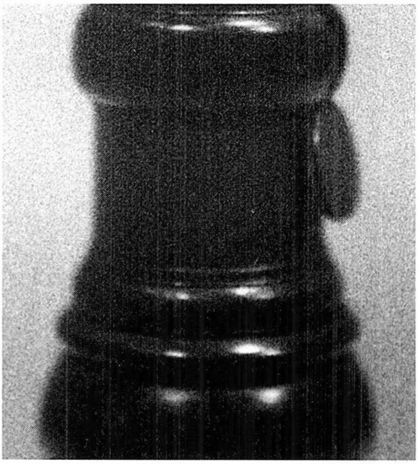
As was seen on the lower waist beads of the Eichentopf oboe in fig. 15b, fillets were used consistently throughout the century to set off moldings. Early in the period these were often paired in an asymmetrical form (fig. 17a), but more compact, symmetrical molding clusters were evident later on, especially in the last quarter of the century. The top-column bead area just below the baluster was a favorite place for this kind of treatment (fig. 17b).

A Greek molding virtually absent in the Renaissance was the hawksbeak. This shape, related to the **ogee** or cyma but with a convex upper and concave lower surface (fig. 18a), was reintroduced by classicists[26]

26. Robert Chitham, *The Classical Orders of Architecture* (New York: Rizzoli, 1985), 152.



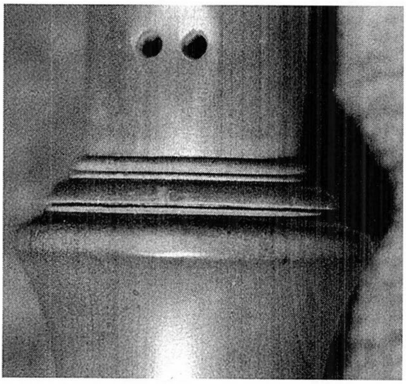
1



2

FIGURE 16, *continued.*
c1. A two-part Attic base at the middle joint.
c2. The Attic base seated on the bell baluster. Jan Steenbergen (Amsterdam, Han de Vries).

1



2

FIGURE 16, *continued.*
d1. Crown of the middle joint as an Attic base of the top joint.
d2. Top joint joined to the middle joint, forming a column with an Attic base. Button & Purday (Vermillion, Shrine to Music Museum 1317).

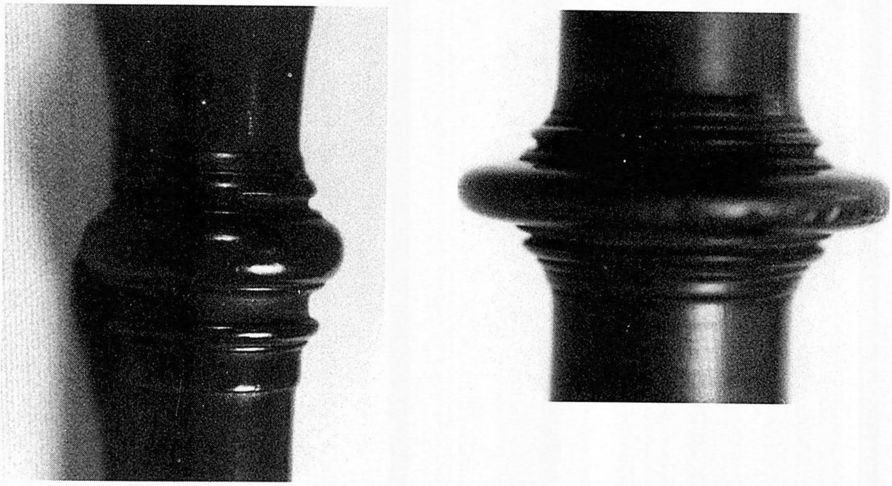


FIGURE 17. Use of fillets to set off decorations.
a. Non-symmetrical top column beading with fillets. Johann Wolfgang Kenigsberger (Boston, Museum of Fine Arts 17.1908).
b. Top-column beads with symmetrical fillets. Button & Purday (Vermillion, Shrine to Music Museum 1317).

toward the end of the eighteenth century, when it was frequently seen on English oboes (fig. 18b). After the turn of the century it becomes even more extreme, as on the Andrea Fornari oboe illustrated in fig. 18c.

Oboe baluster design, often likened to an inverted Greek vase or to the balusters used in Classical balustrade panels (see fig. 19), tends to stricter classical design at the end of the century. Earlier oboes emphasize the balance between the finial and the baluster. Compare, for example, the early and late oboes in figs. 11a and 11b, noting that the finials of those in 11a tend to encompass about forty percent of the overall finial-baluster length, while those in 11b encompass only twenty-five percent of the combined length. Classical requirements for baluster design (fig. 20) are fulfilled on the oboes by the late eighteenth-century makers William Milhouse and Thomas Collier shown in figs. 21 and 13c. (In fig. 20 the balustrade is shown inverted in order to make the representation of the oboe easier to comprehend.)

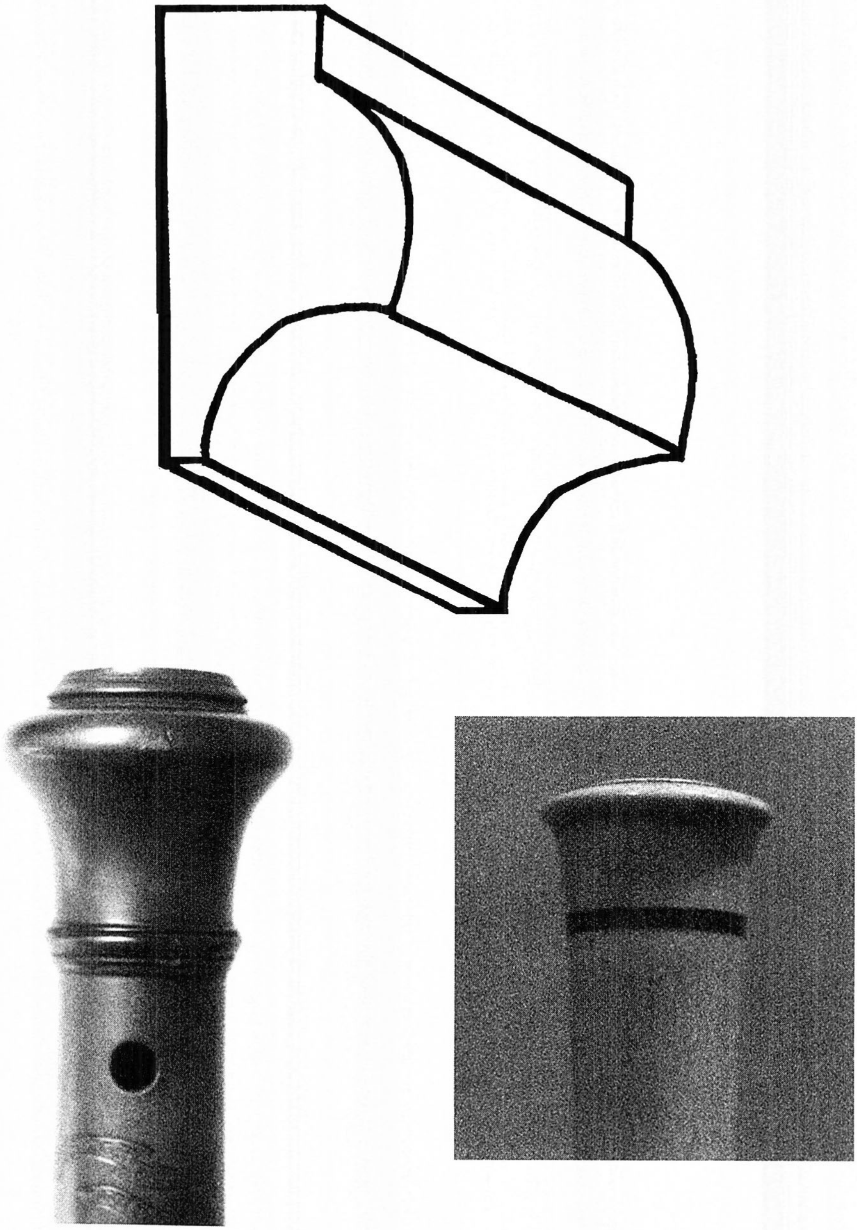


FIGURE 18. Hawksbeak.
a. Hawksbeak as an architectural molding.
b. Hawksbeak as a center-joint baluster. Button & Purday (Vermillion, Shrine to Music Museum 1317).
c. Hawksbeak as a finial. Andrea Fornari (Leipzig, Musikinstrumentenmuseum der Universität 1327).

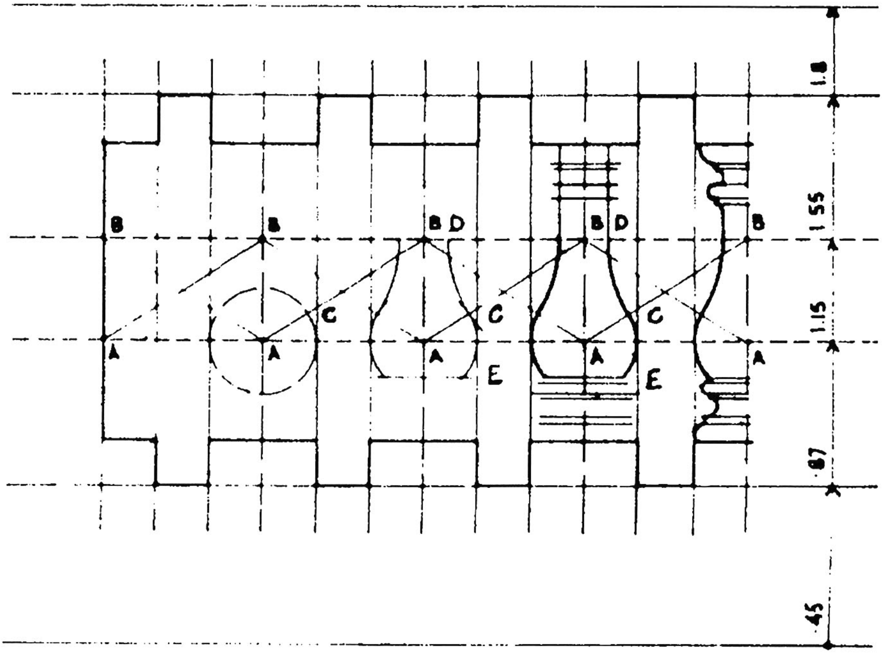


FIGURE 19. Baluster design. Robert Chitham, *The Classical Orders of Architecture* (New York: Rizzoli, 1985), fig. 2.

Architectural Orders

The commonness of architectural moldings in oboe design leads one to ask, first, why was the oboe the only instrument to regularly use such a superfluity of non-functional decorative features,[27] and, second, how far were oboe makers willing to extend their ideas in pursuit of the classical forms of which these moldings are part, and that are so evident later in the century in the balusters of Milhouse and Collier? If the concept of

27. Such ornaments also occur on recorders, bassoons, and clarinets, though nowhere so extensively as on the oboe. Those on the clarinet have a more functional origin, as may be seen in the key rings that parallel the oboe's top column beads on the clarinets of Jacob Denner and P. Paur (Rocko Baur), or the lower baluster used by Denner that more often resembles the fontanelle common in an earlier period. Non-functional ornamentation can be seen on clarinets (particularly some by G.-A. Rottenburgh) that are in the style of French oboes (Jean-Jacques Rippert, Charles Bizey, the Lot family, and Jean [?] Deschamps) of the third quarter of the eighteenth century. Among other instruments the harp is the best example of adaptation of classical elements, but its column design is actually of twentieth-century origin.

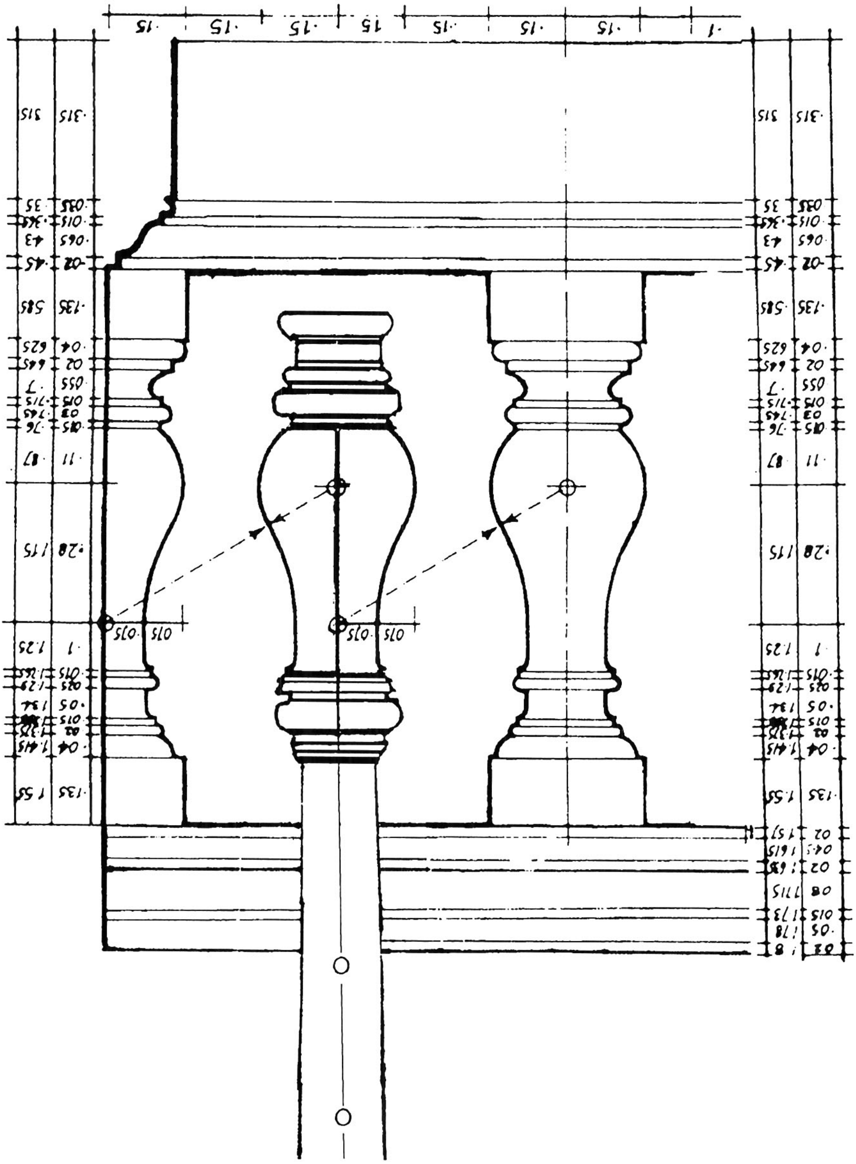


FIGURE 20. A classically-drawn oboe baluster by William Milhouse (Edinburgh, Collection of Historical Musical Instruments 2003), compared with a baluster adapted from Chitham, *The Classical Orders of Architecture,* Plate 40.

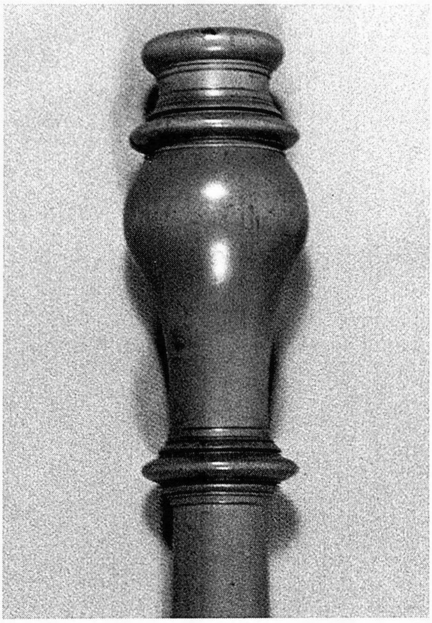


FIGURE 21. A classically-designed oboe baluster by William Milhouse (Boston, Museum of Fine Arts 17-1909).

oboe design were grounded on a larger architectural form, then it might be said that the decorations fulfilled an aesthetic function as part of the whole, and, of course, that larger form would have to have been the column. To pose a parallel between the column and the eighteenth-century oboe may take a flight of fancy, but juxtaposition of the two produces some striking similarities.

The technique of laying out a column in the Greek fashion was covered in all post-Renaissance architectural manuals, and though each author may have varied the details according to his own fashion, the basic scheme remained unchanged. All calculations involved in designing a column are based on the diameter of the base of the shaft. If this remains constant, the shafts of the successive orders become longer, as illustrated in fig. 22, but if the length is held constant, then the diameters of the shafts decrease. Further, in architectural use columns were often superimposed, with the superior order always highest, thus placing a taller and slimmer column above a shorter and broader one. Just as the

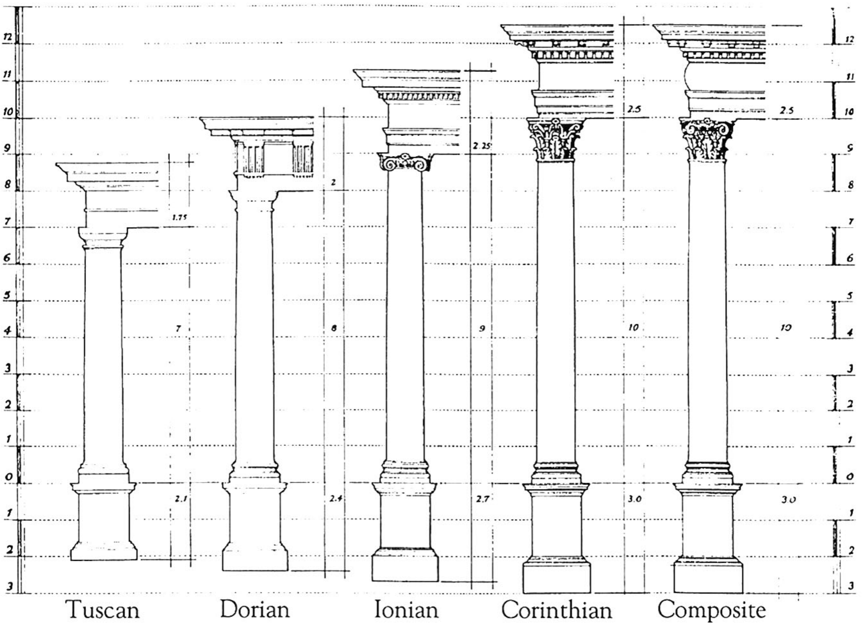


FIGURE 22. The classical orders of columns. Chitham, *The Classical Orders of Architecture,* Plate 9.

order of imposition (the placing of one column above another) progressed from the archaic Classical period (before 500 BC), with the Ionic placed above the simpler Doric, to the Hellenistic (c. 500–349 BC), with its placement of the Corinthian above the Ionic, there is a progression in the shape of the oboe, which became steadily slimmer from the beginning to the end of the eighteenth century.

Figure 22 illustrates the principle of fixed diameter in which the columns increase in length, while fig. 23 shows columns of fixed length, with the later shafts decreasing in diameter. It is of utmost interest here to compare the superimposed columns in the latter illustration to the drawings of oboe segments that have been placed within the architectural frame. On the left in fig. 23 is the outline of a Terton oboe (c. 1700) whose two upper joints approximate the diameters and lengths of the superimposed Tuscan-Ionic shafts, while on the right is a Milhouse instrument (c. 1790–1815) matched to an Ionic-Corinthian pair. One would normally assume that the external narrowing observed in the latter oboe occurred primarily as a response to the increasingly narrower

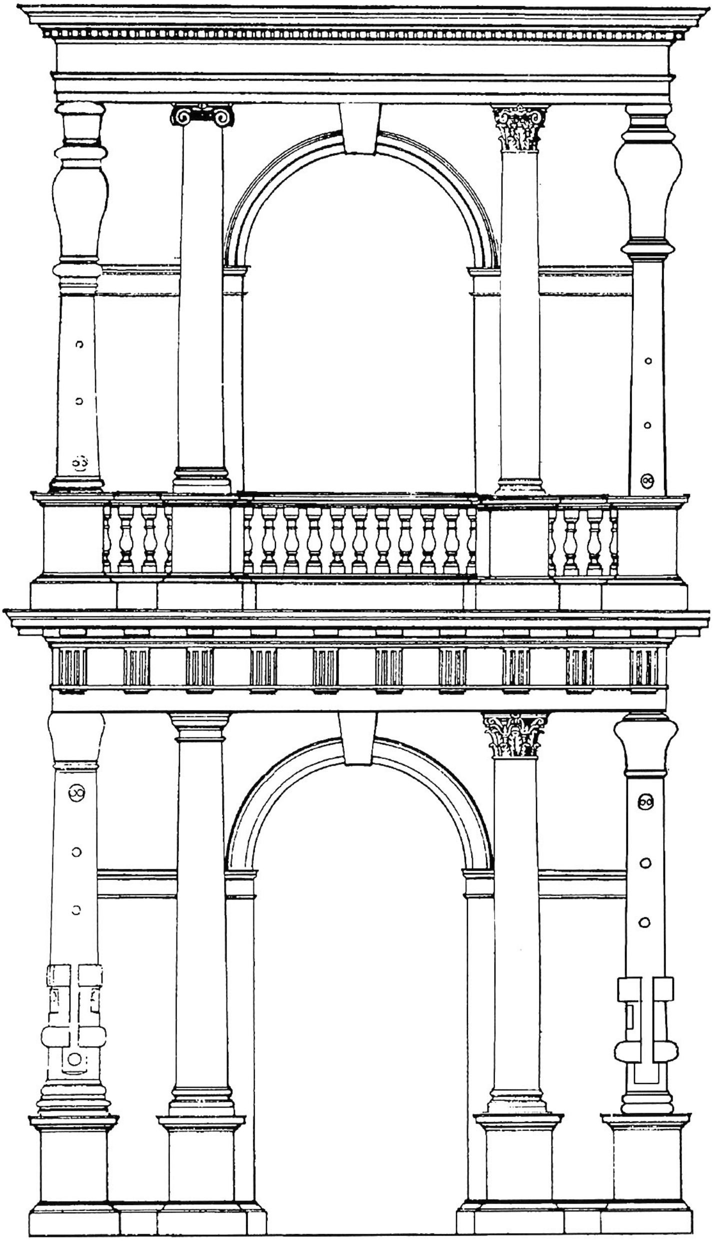


FIGURE 23. Proportions of superimposed Tuscan-Ionic and Ionic-Corinthian columns (after Chitham, *The Classical Orders of Architecture,* Plate 41), compared to those of the top and middle joints of oboes by Terton (Washington, D.C., Smithsonian Institution 208,185 [left]) and Milhouse (Edinburgh, Collection of Historical Musical Instruments 2003 [right]).

bores of the later eighteenth century, but it is intriguing to observe that this trend also reflects the increased interest in classicism during this era. Reinforcement of the idea of classical patterning is also found in the earlier discussion of the baluster design of Collier and Milhouse.

In closing I would like to point out one final analogy between the arrangements of a column and an eighteenth-century oboe. Figure 24 compares an early eighteenth-century oboe by Richard Haka to a superimposed Tuscan-Ionic structure. Here the central and superior entablatures[28] of the architecture match the placement of the middle-joint baluster and the finial, and the bell of the oboe fulfills the function of the pediment of the column. (It is also curious how the shawm-derived pirouette mimics the cornice at the top of the edifice.) It is not likely, however, that eighteenth-century oboe makers strove to slavishly copy the architectural column in their oboes, but rather that the interest in architecture that had been stimulated and passed on by the late Renaissance architects was heightened by the Classical Revival at the end of the eighteenth century. Perhaps more to the point is that the makers were using common features of their everyday world, part of their formal education when they were privileged to have one. Whether it was an oboe or a column, an object provided intellectual as well asesthetic satisfaction when all its parts were pleasingly in order.

28. In classical architecture, an entablature is the decorated wall resting upon the capitals of the columns and supporting the pediment or roof plate (according to its position on the front or the flank of the building), or the pediments of a range of superimposed columns. It is analogous to the lintel in a post and lintel construction.

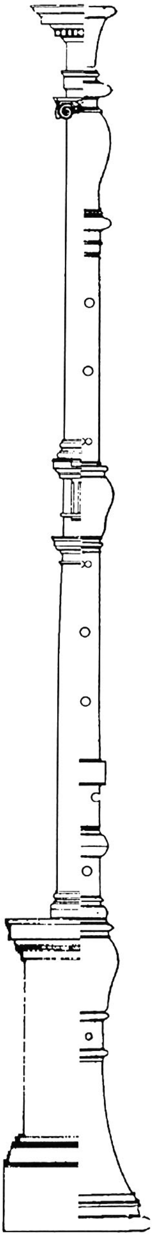
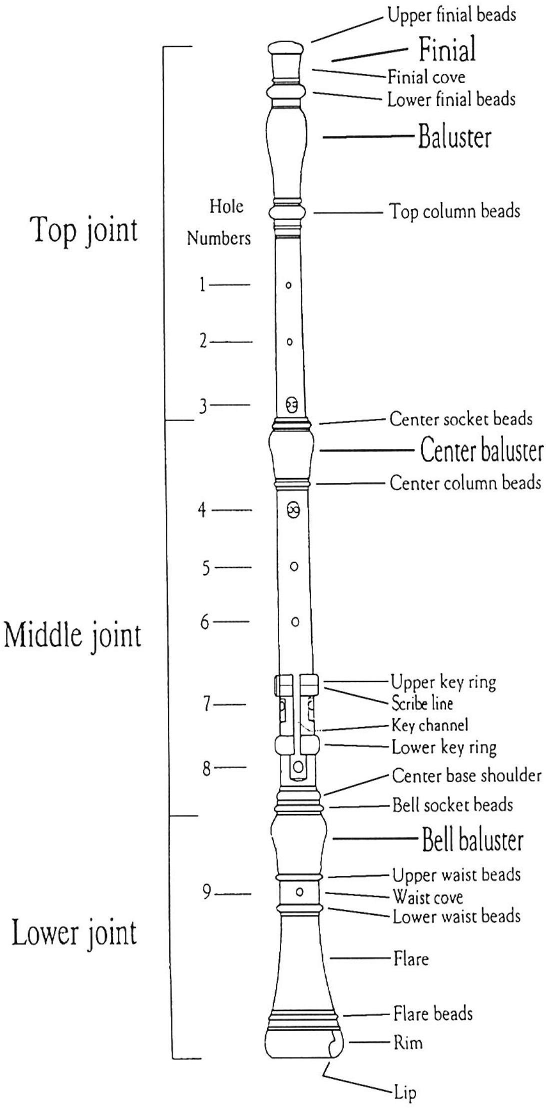


FIGURE 24. Superimposed Tuscan-Ionic columns with base and entablatures, compared to a complete oboe by Haka (Stockholm, Musikhistorisk Museet MM155).

APPENDIX A

Oboe nomenclature



1. This scheme of oboe nomenclature was developed in 1990 by Bruce Haynes and Cecil Adkins.

APPENDIX B

Molding Shapes

This list of moldings, accompanied by simple descriptions and profiles, represents those encountered in the manufacture of eighteenth-century oboes. They have been observed as predominant forms on other early woodwinds as well. All are listed here in their simplest outlines, but when encountered on an instrument they are often combined into a structure consisting of a number of simpler moldings placed adjacent to one another.

Molding shapes are simple or complex, depending upon whether they consist of a single gesture or several. Simple moldings can be convex (projecting), concave (recessed), or plane (flat), while complex moldings will be a combination of two or more of these simple figures. Moldings with curved sections based on a circle derive from the Roman practice, while those elliptical in contour are of Greek origin. Several of the moldings listed here (trigal, trogee, and reverse trogee) are newly designated and are based on combinations of angles and flat planes often observed in oboe profiles; the trigal is included with the convex (curved) figures because it is a projecting molding. Determination of the components of complex structures is aided by the common use of fillets as separators.

Configurations of oboe moldings range from single beads to groups made up of as many as six individual shapes. Although there were many motives shared by oboe makers, each one usually used a distinctive and identifiable combination. The alphabetic characters at the right side of the list are designations used to identify molding clusters in order to search for distinct groupings. For example, a common combination consisting of a bead, an astragal, and a bead is designated BAB. Slightly more complex arrangements can be seen in the finials shown in fig. 14, which are designated, downwards, a: NFF, b: NO, c: NFS; and in fig. 17a: FYACYTCAYF. In the last example the upper fillet and splay are less differentiated at the lower repetition and also might be read as a quirked splay, which would be designated as Y^q, where the superscript is used to designate a figure imposed on another.

General Terms

Arris The sharp edge or angle created by the meeting of two surfaces.

Bead	Often used as a general designation for semispherical projecting figures of the smaller type, as well as for a specific profile.	
Bolection	A variable projecting profile made up of several simple figures. While never a unique pattern, it is a useful term for descriptive purposes. The version shown in the molding examples is composed of a bead, an astragal, and another bead.	
Chamfer	The surface formed by cutting away the arris or angle formed by two surfaces.	
Groove	A generic term for recessed, concave moldings.	
Convex (Projecting)		
Ovolo	Convex step up or down, round or elliptical; on oboes most often a quarter round.[a]	K
Astragal	Semicircular projection above the surface of a flat plane.	A
Bead	Small rounded molding, usually projecting.[b]	B
Torus	Semicircular (or elliptical) projection, often with quirk or cove and square fillet.	T
Trigal	Triangular projection.	U
Nose	A bead, often large, applied at the edge.	N
Reeds	A series of parallel beads (often vertical).	R
Concave (Recessed)		
Cove	Semicircular groove.	C
Vein	V-shaped groove.	V
Quirk	Small groove or channel.	Q
Cavetto	Concave semicircular quarter.[c]	D
Scotia	Concave elliptical quarter.	S
Congé	Concave quarter extending into a fascia or fillet.	E
Flutes	A series of parallel coves (either horizontal or vertical).	H

a. Some ovolo definitions require the addition of steps or fillets at the beginning and end of the figure.

b. Differentiation between beads, astragals, and tori on oboes is often dependent upon their relative size and use. Architecturally, astragals project above the surface and beads are defined from the plane surface by a quirk or other groove.

c. Designations of cavetto, cove, and scotia are often blurred by indistinct and overlapping definitions. Cavetto and scotia are most often interpreted as 90° concaves, while the cove is semicircular, though all three are frequently interchanged. In traditional usage a scotia is said to be an elliptical hollow, named for the shadow it casts when used as a sunken molding at the base of a column.

Plane (Flat)

Fillet	A narrow flat member. In classical use a fillet often separates adjacent moldings.	F
Fascia	A broad fillet.	G
Splay	A flared fascia.	Y

Complex (Composite)

Ogee	Convex above, concave below (*cyma recta*).	O
Reverse ogee	Concave above, convex below (*cyma reversa*).	P
Trogee	Straight slopes with recessed angle; ogee shape with lower part of the figure projecting.[d]	X
Reverse trogee	Straight slopes with projecting angle, reverse ogee shape with upper part of the figure projecting.	J
Beak	Asymetrical convex/concave shape with convex plane on upper surface (hawksbeak).	W
Trough	Asymetrical concave/convex figure with concave plane on upper surface (reverse beak, reverse hawksbeak).	Z

d. The trogee, like the ogee, may be reversed so that the angle is recessed rather than projecting. While this form might be considered a splay, because of its straight surface, its second surface is always flat, as in a fascia or broad fillet, whereas the splay is a single surface and may be finished by any other figure.

MOLDING SHAPES