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THE "MIRACULOUS" EARLY MODERN SCENIC CHANGE IN COURT THEATRES AND THE VENETIAN PUBLIC OPERA

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ABSTRACT

The seventeenth-century Venetian opera, and, specifically, Giacomo Torelli, has traditionally been credited with the development of the mechanized scene change system that dominated continental theatres from the early modern courts to the mid-nineteenth century. No seventeenth-century theatre has survived with its scene change machinery. Until recently scholars have relied upon the few seventeenth-century publications such as Nicola Sabbatini's *Pratica* to gain an understanding of the theatrical machinery used in early modern theatres, but this machinery was out of date when the books were published. A number of unpublished manuscripts show how the machinery used to change the scenery in Italian court productions was similar to that used in Venetian public opera houses. The comparison indicates more credit should be given to Italian court architects, such as Aleotti and Guitti, than has traditionally been the case. The article shows the elements of the scene change system that were developed in court theatre and ones that were added by designers in the Venetian public theatre. It concludes with a discussion of the modifications to the system used in surviving eighteenth-century court theatres that still retain their machinery.

KEYWORDS

continental mechanized scene change; flat wing; *periaktoi*; Nicola Sabbatini; Joseph Furttenbach; Giulio Parigi; Giovanni Battista Aleotti; Francesco Guitti; Alfonso Rivarola (il Chenda); Giacomo Torelli; Nicodemus Tessin de Younger

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> As to the Decorations and the Machinery it may be safely affirmed, that no Theatre in Europe comes up to the Magnificence of the Venetian Opera; some of them will be handed down to our most distant Posterity. For instance, the Opera entitled *La Divisione del mondo*, which the Marquis Guido Rangoni exhibited in the Year 1675 at his own expense, at the Theatre of our Holy Saviour [Teatro San Salvatore].[1]
>
> Luigi Riccoboni
> *Réflexions historiques et critiques sur les différens théâtres de l'Europe*, 1738

La Divisione del mondo, like other seventeenth-century Venetian operas and the earlier *intermezzi* for which visual evidence exists, was based on mythology and included flying gods, maritime scenes, and celestial displays among other effects, which were all representative of the spectacular machinery that dominated the continental stage for more than two centuries. An important feature of these productions was the rapid transformation of the scenery from one place to another. The machinery used for scenic transformations is often referred to as the pole and chariot system or the clockwork stage, but these are both misnomers. The mechanized scene change system of the early modern period did not use poles and the clocks of the period typically used gears, which the stage machinery did not employ.

Many, if not most, theatre history books credit Giacomo Torelli (1608–1678) with the invention of the mechanized continental scene change based, in part, on a statement in the libretto of the 1641 *La finta pazza*, which was designed by Torelli:

> The artifice of this change was miraculous; for a single boy, fifteen years of age, set it in motion by releasing a counterweight held by a ratchet. This weight caused a revolving drum below the stage to turn, which moved all the scenic wings forward or backward. . . . By this means all the wings shifted in a single quick movement, thus creating great amazement on the part of the spectators.[2]

However, most of the machinery used to create the "miraculous" scenic change had been developed in earlier Italian court theatre productions. No record survives of the actual machinery used by Torelli in the middle of the seventeenth century, other than a few descriptions of the effects and idealized engravings of some of his settings.

Although much of the spectators' amazement was due to special effects such as the flights, displays, and appearances, this article will concentrate on the evolution of scenic change technology from its origins in Italian court theatres through the "miraculous" Venetian public opera productions. Special attention will be paid to the devices used to change the side wings, the overhead "heavens," and the rear of the scene.

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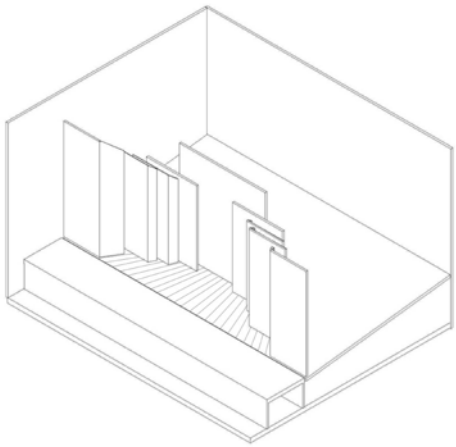
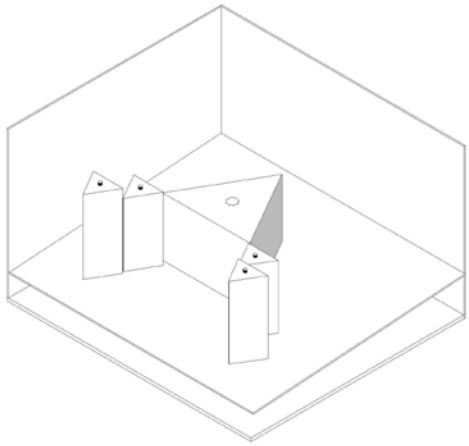
1 A. M. Nagler, *A Source Book in Theatrical History* (New York: Dover Publications, 1952), 269.

2 G. Charles Niemeyer, *The Renaissance and Baroque Theatre in France: The Playhouses and mise en scène (1550–1700)*, PhD diss. (Yale University, 1942), 270.



1. Sebastiano Serlio's stage. Computer drawing by the author.



2. Baldassare Lanci's *periaktoi* stage. Computer drawing by the author.

THE ILLUSIONISTIC SETTING

The Renaissance saw not only a revival of classical plays but also a revival in the staging of the plays. The early modern court architects, who had a wide variety of skills including engineering and machinery design, were responsible for providing temporary theatres and scenery for productions in the great halls of the Italian courts.[3] The interest in perspective and the visual arts led to stage settings creating an illusion of actual places. Sebastiano Serlio (1475–c. 1554) described and provided a plan, section, and illustrations of such illusionistic settings for a temporary theatre in his *Il primo libro d'Architettura*,[4] published in 1545. Vitruvius, who was cited by many Renaissance architects, had said there were three types of scenes, the tragic, the comic, and the satiric.[5] Although he described the settings, he did not provide illustrations. Serlio, however, came up with descriptions and illustrations of them.

Serlio's settings used a forced perspective to create the illusion of a greater depth to the scene and were composed of three-dimensional house units at the sides of the stage consisting of one face parallel to the front of the stage and another face set along a line of perspective leading to a vanishing point (Fig. 1).[6] Serlio actually used single flat wings upstage in his setting, noting that "if the house is set very far to the back, however, one frame will be sufficient, so long as all its parts are skilfully designed and painted."[7] The floor of this scenic stage was raked to

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3 Although the term "architect" will be used in this study, the term "designer" will also be employed when it refers specifically to an activity that includes designing both scenery and machinery and, in some cases, also the theatre building.

4 Bernard Hewitt, ed., *The Renaissance Stage: Documents of Serlio, Sabbattini and Furttenbach* (Coral Gables: University of Miami Press, 1958), 18–36.

5 Vitruvius, *The Ten Books on Architecture*, trans. Morris Hicky Morgan (New York: Dover Publications, 1960), 150.

6 All the figures are computer reconstructions by the author of historic scenery or machinery to allow easier comparisons.

7 Hewitt, *Renaissance Stage*, 29.

lead to the vanishing point, but there was also a flat area in front of the scenic vista where the performance took place, because if a performer stepped into the scenic vista, it would destroy the illusion of greater depth. In later years the vanishing point would be located further back to allow the performer to be present in the scenic vista without destroying the illusion. However, the important actions typically took place downstage near the footlights. The rear of the scene was closed with a panel that was painted to continue the perspective scene to the vanishing point. Serlio did not mention any overhead decoration, although some kind of painted sky would have been necessary to create a convincing illusion.

Illusionistic settings were not required to change during the staging of plays written following the neo-classic unities, since the unity of place rule prohibited changing the location of the dramatic action. Serlio did not provide a proscenium arch to frame the scene or a front curtain; however, he stated that "among all things made by hand few in my opinion bring greater contentment to the eye and satisfaction to the spirit than the unveiling to our view of a stage setting."[8]

SOURCES FOR THE EARLY MODERN COURT SCENIC CHANGE

Early modern Italian courts presented plays on temporary stages built in great halls as a part of festivals celebrating weddings, baptisms, and visits by other nobility. The courts published glowing descriptions of their spectacular productions including the scenic changes, but they tried to keep the methods of creating theatrical effects a closely guarded secret. However, as noted by Jan Lazardzig and Hole Rößler,

> the reasons for keeping secret theatre machines (the cause of the rarity of corresponding sources) were different than those for water, mill, or military technology. The 'invisibility' of theatre machines before, during and after their use, beside their relatively infrequent codification in print and image, was motivated not solely by a fear that inventions could be stolen, but also through the expectation of a specific aesthetic and thus social and political productivity. This is the reason why, in Furttenbach's descriptions of Florentine theatre technology, he repeats again and again that the machines are hidden by decorative elements, with the result that 'one cannot see how it works' at a time when designs of industrial machines were being published.[9]

Joseph Furttenbach the Elder (1591–1667) was one of only two theatrical designers who published drawings and descriptions of theatrical machinery used in court theatres prior to 1688. The other was Nicola Sabbatini (1574–1654), the court architect for Francesco Maria II della Rovere, Duke of Urbino. Like other architects of the period, he was responsible for a

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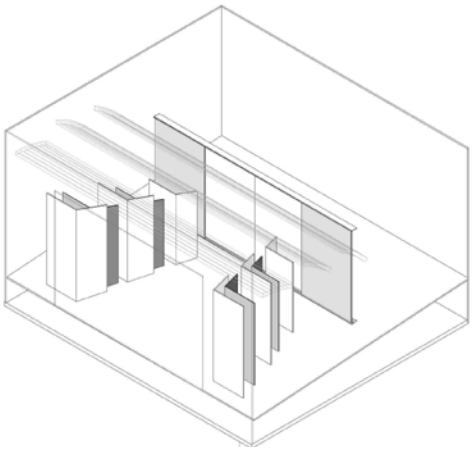
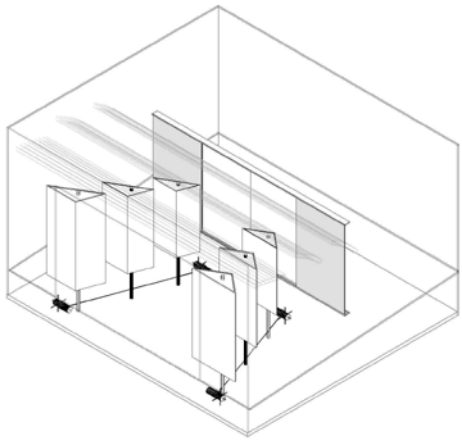
8 Ibid., 24.

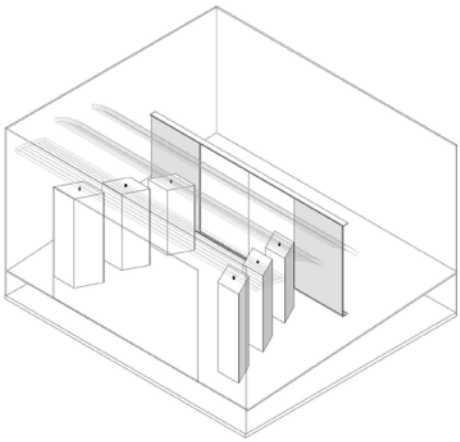
9 Jan Lazardzig and Hole Rößler, "Joseph Furttenbach and the Transfer of Mechanical Knowledge: New Perspectives on Early Modern Theatre Cultures," in *Technologies of Theatre: Joseph Furttenbach and the Transfer of Mechanical Knowledge in Early Modern Theatre Cultures*, ed. Jan Lazardzig and Hole Rößler (Frankfurt: Vittorio Klostermann, 2016), 280.



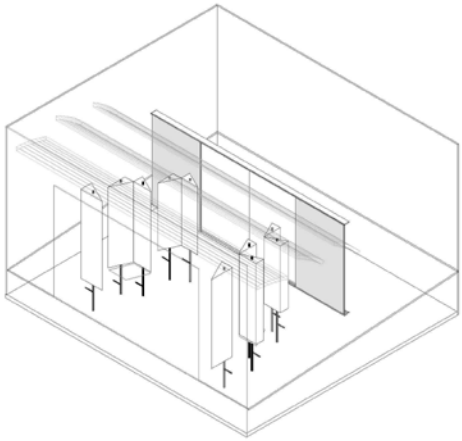
3. Nicola Sabbatini's techniques for changing Serlian-style wings. Computer drawing by the author.



4. Nicola Sabbatini's *periaktoi* wing change. Computer drawing by the author.



5. Quadrilateral *periaktoi* wing change. Computer drawing by the author.



6. Joseph Furttenbach's *periaktoi* wing change. Computer drawing by the author.

variety of projects, including military and theatrical architecture. His 1638 *Pratica de Fabricar Scene e Machine ne' Teatri* is the first publication by a working Italian architect to describe how scene changes and stage effects were done in early modern courts.

In Book One of the *Pratica*, Sabbatini describes how to build a theatre in a great hall. He includes instructions for laying out the forced perspective on permanent scenic houses at the sides of the stage and on the panel closing the rear of the scene. Book Two is devoted to the machinery needed to accommodate the spectacular *intermezzi* that were performed between the acts of the plays at courts. According to Sabbatini, the "discussion of this subject is essential because in practice the disappearance and changing of scenes is a thing which ordinarily arouses great delight and wonder among the spectators, particularly when the change is made so quickly that

no one notices it."[10] However, many of the machines in the *Pratica* were already out of date when the book was published. For instance, the side wing change techniques described used Serlian-style wings and *periaktoi* (three-sided devices described by Vitruvius), which were commonly used in the late sixteenth and early seventeenth centuries. Although the more effective flat wing was being used at some courts by the time the *Pratica* was published, it is not mentioned by Sabbatini.

In the early seventeenth century, a German student, Joseph Furttenbach, visited and studied at the Florentine court, where he undoubtedly learned about the stage machinery used for the Medici court productions. He returned to his native Germany and, working as an architect, published several books, three of which included instructions on how to build theatres and create stage machinery: *Architectura Civile* (1628), *Architectura Recreationis* (1640), and *Mannhaffter Kunstspiegel* (1663).[11] In each book he describes a double *periaktoi* system for the side wings, which may have been based upon what he learned at the Medici court. However, this scene change machinery and most of his other scenic effect machinery was also out of date by the time of publication.

Both Sabbatini and Furttenbach describe and illustrate how to construct the overhead "heavens" and how to use shutters (painted panels sliding in tracks) to close the rear of the scene. They also recommend using an inner stage area upstage of the shutters to preset some effects, such as marine scenes and some flying effects, which could be revealed by opening the shutters.

Although these works are useful when reconstructing early modern productions, of more value are three unpublished manuscripts dating from the first third of the seventeenth century that describe and illustrate the machinery used in some court stagings. The *Codex iconographicus 401* in the Bavarian State Library in Munich, attributed to Furttenbach, records some of the procedures used to present spectacles in Florence in the early seventeenth century and incorporates drawings and descriptions of stage machinery including a section of a Medici stage. The document was probably composed after 1617.[12] Also to be mentioned are two unpublished notebooks showing stage machinery used by Francesco Guitti of Ferrara (1600?–1640), preserved in the private archives of Pietro Paolo Floriani of Macerata (1585–1640). The drawings, mostly by Floriani, depict machines and scenery designed for five shows in Ferrara and Parma between 1625 and 1631. The two notebooks were probably created after 1628 and after 1631.[13] Finally, the Rosenwald 27 notebook in the Lessing J. Rosenwald Collection in the Library of Congress in Washington, DC, contains a variety of drawings which can be attributed to someone associated with Giulio Parigi's academy. The notebook includes a plan and section of a Medici stage and several theatrical machines. It also probably dates within the first three decades of the seventeenth century.[14]

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10 Hewitt, *Renaissance Stage*, 98.

11 Ibid., 178–251.

12 Joseph Furttenbach, "Florentine Festivals and Stage Machinery, *Codex iconographicus* 401 (Bavarian State Library)," in Lazardzig and Rößler, *Technologies of Theatre*, 314.

13 Giuseppe Adami, *Scenografia e Scenotechnica tra Ferrara e Parma (1625–1631)* (Rome: L'Erma di Bretschnieder, 2003), 9.

14 Simon Paulus, "The Engineer's Gaze: Some Remarks on Spatial and Technological Perception and Presentation in the *Codex Iconographicus 401*," in Lazardzig and Rößler, *Technologies of Theatre*, 442–43.

THE SCENIC CHANGE

The Italian courts began to add more exciting *entr'acte* entertainments to five-act plays on special occasions. The *intermezzi* included music, dance, and spectacular effects, often with a theme praising an individual or a family. Not governed by the neoclassical rules, the *intermezzi* could utilize scenic changes and other spectacular effects. Productions at the Medici court in the mid-sixteenth century apparently changed the location of the scene for the *intermezzi* by rolling scenic units onstage or raising them through traps in the stage floor. For example, in the 1565 production of *La Cofanaria* designed by Giorgio Vasari, at the Palazzo Vecchio for the wedding of Francesco de' Medici and Joanna of Austria, the set for the play, a Florentine street scene, did not change for the *intermezzi*, which utilized units rising through traps and the descent of a cloud car.[15] An opening in the sky was needed to allow the latter to descend, but Sabbatini described how to build the sky in sections to accommodate such aerial effects.[16]

The earliest wing changing device was the *scena versatilis* or the *periaktoi* as described by Vitruvius,[17] first used in the early modern period at the court of Pier Luigi Farnese, Duke of Parma, in 1543. The *periaktoi* were rotating devices with three or four decorated sides that could be revealed upon their turning. They were used at the Medici court to change the scenery for the *intermezzi* performed with the play *I Fabii* (1568), staged at the Salon dei Cinquecento in the Palazzo Vecchio to celebrate the baptism of Leonora, the daughter of Francesco and Joanna de' Medici. As stated in the description of the production, designed by court architect Baldassare Lanci (1510–1571), a young boy could turn the *periaktoi* with ease, creating a "marvelous" effect.[18] There are no plans or drawings for these *periaktoi*, but Lanci's next court production, *La Vedova* (1569), presented for the visit of Archduke Karl of Austria, was seen by Ignazio Danti, who included a description and a stage plan in his edition of Vignola's *Le due regoli della prospettiva pratica*. The plan consisted of two three-sided *periaktoi* on each side of the stage and a large *periaktos* to close the rear of the scene, as shown in Figure 2.[19]

The stage arrangement as illustrated by Danti had some drawbacks. His plan shows the corners of the *periaktoi* almost touching each other, allowing no room for entrances onto the stage between the devices. Each scene would have been essentially a perspective vista, similar to that of Serlio, but changeable. Another problem would be that if the stage floor was raked to maintain the perspective, the bottom of each *periaktos* would have to be parallel to the horizon in order to be turned and the audience would have been able to see under the *periaktos*. It would have been even worse for the large *periaktos* at the rear of Lanci's setting, since the axle would have been even more exposed due to the device's large size. The audience would be able to see the vertical axle of the *periaktoi* if the stage was not raked or unless there was

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15 A. M. Nagler, *Theatre Festivals of the Medici 1539–1637* (New Haven: Yale University Press, 1964), 13–21.

16 Hewitt, *Renaissance Stage*, 146.

17 Vitruvius, *Ten Books*, 150.

18 Nagler, *Theatre Festivals*, 40.

19 Ibid. 44–45.

a cloth skirt to mask the bottom of them. Sabbatini recommended such a skirt for another device.[20]

Danti recalled that when the scene change took place, a cloud descended covering the stage; when the rotation was complete, the cloud vanished revealing the new setting.[21] This suggests that the change itself was not "amazing" and needed to be hidden. Sabbatini describing a fast *periaktoi* scene change, stated, "As this is difficult to accomplish, we ordinarily use tricks to distract attention." He suggested having a trumpet or other instrument make a sound at the rear of the hall causing the audience to turn around: "At that very moment the change of scene is made without anyone seeing it."[22]

A lot is known about other Medici court productions from official descriptions and visitor accounts, but few technical drawings, etchings, or pictorial representations of the settings exist and the ones that do are open to interpretation. A notable exception is the famous 1589 production of the comedy *La Pellegrina* with *intermezzi* at the new Teatro Uffizi (Mediceo) in Florence designed by Bernardo Buontalenti for the wedding of Grand Duke Ferdinand I and Christine of Lorraine. Descriptions of the production, court documents, and both drawings and etchings of the sets for the *intermezzi* have survived, but there are no technical drawings and scholars cannot agree on how the scenes were actually changed. The setting for the play consisted of a view of Pisa, which alternated with six different settings for the *intermezzi*: a view of Rome, a garden, a glade with a cavern, an inferno, a sea, and clouds for the finale.

Sabbatini described and illustrated several types of changeable scenic units for the sides of the stage using Serlian-style wings or *periaktoi*.[23] His methods of changing the three-dimensional wings were to pull cloth covers painted to represent the next scene over them or to nest a second set of movable Serlian-style wings behind the permanent ones and slide them upstage to cover the other permanent wings, as shown in Figure 3.[24] Although the permanent wings could serve for the play's setting, it would be very difficult to change the movable Serlian-style wings and the cloth covers to provide a different setting for each of the *intermezzi* in *La Pellegrina*.

Sabbatini also described his preferred method of changing the side wings, i.e., isometric *periaktoi* (Fig. 4). The *periaktoi* had two positions, appearing to the audience either as Serlian-style wings showing two of their faces or as flat wings when the hypotenuse face was shown.[25] The Serlian-style faces could be used for the play and the side appearing as a flat wing could be changed for each *intermezzi* setting while the acts of the play were being performed. Sabbatini gives instructions for wrapping cords around each *periaktos* axle in the sub-stage and connecting them to winches below the stage to turn the *periaktoi* on each side of the stage at the same time. However, he notes that "there is danger of many cords getting entangled

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20 Hewitt, *Renaissance Stage*, 115.

21 Nagler, *Theatre Festivals*, 45.

22 Hewitt, *Renaissance Stage*, 99.

23 Ibid., 100–105.

24 Ibid., 100–103.

25 Ibid., 103–6.

and interfering with the smooth action." He also recommends that to avoid that problem, "one man should attend each triangle, which may be easily turned and reversed without any complications of cords and windlasses."[26]

Bastiano de' Rossi, who wrote the official account of *La Pellegrina*, describes the scene changes as side units being covered or transformed, although other descriptions suggest rotating units.[27] Scholars differ in the interpretation of the textual material. Some support the use of *periaktoi* for all settings[28] and others believe that fixed Serlian-style wing units were used for the play and were "covered" by flat wings sliding in front of them for the *intermezzi*.[29] If sliding flat wings were used for *La Pellegrina*, it would be the first known use of the device. The flat wing was easier to use and became the standard for side wings by the mid-seventeenth century. However, if Buontalenti used flat wings in 1589, it seems unlikely his successors would return to the use of the less efficient *periaktoi* for later court productions. In addition, sliding the flat wings onstage far enough to hide the permanent Serlian wings would significantly reduce the available stage space for the *intermezzi*, which would require more acting space to create the spectacle than would be needed for the play.

Regardless of the type of side wings, it is likely that the rear of the scene was closed by sets of sliding shutters. Sabbatini describes several methods of changing the rear of the scene. His third method consists of two panels painted to continue the perspective scene that were located in upper and lower grooves and would be pulled offstage to reveal the shutters for the next scene or the inner stage area.[30] This is one of Sabbatini's techniques that would be used throughout the seventeenth century. He also suggests the use of an overhead axle to raise a backdrop (or front curtain). The top of the drop is to be wrapped around an overhead axle and ropes connected to counterweights are to be wrapped around the end of the axle (or a drum on the axle) in the opposite direction; when the counterweights are released, the axle revolves, winding the curtain up around it.[31] It is also likely that the production used a divided sky for the heavens as illustrated by Sabbatini[32] and Furttenbach[33] and shown in light lines in Figure 4.

The early seventeenth century saw an important addition to the theatrical genres presented at Italian courts, i.e., the opera. Early opera used the same spectacular devices as the *intermezzi*. Thus, for instance, in 1608 Giulio Parigi (1571–1635), Buontalenti's successor as the Medici court architect, designed the settings for Michelangelo Buonarroti the Younger's pastoral play *Il Giudizio di Paride* and its six *intermezzi* for the wedding of Prince Cosimo and the Habsburg Archduchess Maria Magdalena. Again, the etchings do not help in determining the type of wings used for the production, but a reference in Camillo Rinuccini's description

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26 Ibid., 105.

27 Nagler, *Theatre Festivals*, 79–89.

28 Ibid., 75.

29 James Saslow, *The Medici Wedding of 1589* (New Haven: Yale University Press, 1996), 82–83.

30 Hewitt, *Renaissance Stage*, 116–18.

31 Ibid., 118–19.

32 Ibid., 146–47.

33 Ibid., 201–2.

of the play suggests Parigi used rotating units for the side wings.[34] In addition, two sketches in Buonarroti's manuscript of the play show floor plans for the production with what appear to be quadrilateral wings, as shown in Figure 5. Such rotating quadrilateral wings would work for the settings for the play and *intermezzi*, since the offstage panels could be changed for the *intermezzi* settings during the acts of the play proper.

Arthur Blumenthal suggested another interpretation for Buonarroti's sketches.[35] Furttenbach had been a student in Parigi's academy in 1617 and said he considered Parigi his "patron, master, and teacher."[36] Furttenbach described a unique *periaktoi* system for the side wings using two wedge-shaped *periaktoi* working together. In one position the points of the wedges joined, forming the appearance of a Serlian-style wing; in the other position one wedge appeared as a flat wing, as shown in Figure 6. Furttenbach stated that the *periaktoi* could be rotated using levers on the vertical axles. The quadrilateral sketches in Buonarroti's manuscript could be merely a shorthand version of showing both positions for Furttenbach's wings.

Additional support for the use of the double wedge-shaped *periaktoi* on the Medici stage comes from the Rosenwald manuscript. It includes a plan that incorporates *periaktoi* similar to those presented by Furttenbach and a section that shows the vertical axles for the *periaktoi*. It also encompasses the heavens divided similarly to those described and illustrated by both Sabbatini and Furttenbach.

Since the audience would see the hypotenuse sides of Sabbatini's isosceles *periaktoi* as a flat wing, and the open position of Furttenbach's wedge-shaped *periaktoi* as a flat wing, it seems logical that eventually the designers would begin to use an actual flat wing sliding on and offstage because of its advantages: it was easier to build, easier to shift, and provided more space between the side units for performers and machinery. Indeed, the author of the anonymous treatise *Il Corago*, written between 1628 and 1637, gave six methods for changing the side wings. The fourth was the triangular *periaktoi*, the fifth was the quadrilateral *periaktoi*, and the sixth was flat wings sliding on and offstage in upper and lower grooves.[37] Originally the treatise included illustrations, but they have not survived. There are no drawings of an Italian theatre of the period that clearly show a manually shifted flat wing stage. However, drawings for the 1640 *Salmacida Spolia*, designed by Inigo Jones, depict the manual flat wing and groove system as it was adapted for the Stuart court masques in England. Jones had visited Florence several times and Parigi's influence can be seen in some of his designs.[38] Figure 7 shows scenic flat wings sliding in upper and lower grooves. It also shows shutters and flat borders replacing the earlier curved divided heavens. Some scholars credit Giovan Battista Aleotti (1546–1636) with first use of the flat wing stage. In 1606 he built a theatre for the Accademia

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34 Nagler, *Theatre Festivals*, 108.

35 Arthur Blumenthal, *Giulio Parigi's Stage Designs: Florence and the Early Baroque Spectacle*, PhD diss. (New York University, 1984), 129–30.

36 Hewitt, *Renaissance Stage*, 179.

37 Paolo Fabbri and Angelo Pompilio, eds., *Il Corago, o vero Alcune osservazioni per mettere bene in scena le composizioni drammatiche* (Florence: Olschki, 1983), 117–19.

38 John Orrell, *The Theatres of Inigo Jones and John Webb* (Cambridge: Cambridge University Press, 1985), 16.

degli Intrepidi in Ferrara; a surviving plan shows a perspective stage with lines that have been interpreted as flat wings, [39] but there is no scholarly agreement on this issue.

A unique form of court entertainment, the tournament opera, was developed in the mid-sixteenth century at the court of Alfonso II d'Este, Duke of Ferrara.[40] It combined a tournament with musical interludes featuring elaborate scenery. In 1617 Aleotti was engaged to design a new tournament theatre at the Palazzo della Pilotta in Parma. The plan was to impress Cosimo II de' Medici during a visit to Parma, but the trip was cancelled delaying the theatre's opening for ten years. A letter from Aleotti to Duke Ranuccio I Farnese in 1618 reporting on the construction progress includes the earliest reference to a mechanized flat wing system using an axle under the stage to control the movement of the wings.[41]

The Teatro Farnese was finally opened in 1628 for the wedding of Duke Odoardo Farnese to Margherita de' Medici, which was celebrated with a new tournament opera, *Mercurio e Marte*, composed by Claudio Monteverdi. The libretto was written to make use of Aleotti's machinery,[42] but a Ferrara architect Francesco Guitti (1605–1645) was engaged to design the wedding productions. His theatrical career began in 1625 when he renovated Aleotti's Teatro degli Intrepidi and designed the machines and scenes for a tragedy and five *intermezzi*.[43] In that year he was also placed in charge of the stage preparations for the 1628 wedding in Parma. Guitti designed *Mercurio e Marte* in the Teatro Farnese and *Aminta* in the courtyard of the Church of San Pietro Martire, using flat wings and shutters.

The Floriani notebooks of Guitti's stage machinery illustrate a variety of spectacular machines, including the mechanized flat wing scene change.[44] A plan view shows an axle with drums on the left side of the stage connected by ropes to a series of flat wings. Uniquely, a large drum at the rear of the axle is attached to one of the shutters to change the rear closure at the same time that the side wings change. An axle with drums would be needed on the right side of the stage to change the wings and shutter. The axle was turned by winch handles at each end. Another drawing shows wheeled units (trolleys)[45] under the stage extending up through cuts in the stage floor upon which scenic panels were mounted.[46] Four other drawings show mechanized systems for changing the side wings, including one to rotate the *periaktoi* with a central axle operated by winch handles.[47] Figure 8 shows the mechanized flat wing change as it was probably used in Ferrara and Parma using a central axle under the stage operated

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39 Eugene J. Johnson, *Inventing the Opera House: Theater Architecture in Renaissance and Baroque Italy* (Cambridge: Cambridge University Press, 2018), 173.

40 Ibid., 151.

41 Nagler, *Medici Festivals*, 153.

42 Johnson, *Inventing the Opera House*, 200.

43 Adami, *Scenografia e Scenotechnica*, 19.

44 Ibid., 135–36, Cod. α, fol. 15v.

45 A variety of terms have been used for the wheeled frames upon which the scenic flats were mounted. The seventeenth-century illustrations show a frame with wheels, whereas in the eighteenth century some units consisted of two parts, a rolling unit under the stage and a frame or pole that would be inserted into the understage unit. The term "trolley" will be used for both types.

46 Adami, *Scenografia e Scenotechnica*, 200–201, Cod. β, fol. 13r.

47 Ibid., 139–43, Cod. α, fol. 16v.

with winch handles controlling the trolleys upon which scenic wings were mounted. Guitti's drawings[48] are the first to show permanent flat cloud or sky borders over the stage which were more appropriate for a flat wing stage than the curved heaven sections described by Sabbatini and Furttenbach. Flat borders also provided more space for the flying machines to operate.

Some of these machines may have been invented by Guitti and others may have been adaptations of Aleotti's Teatro Farnese devices. In any case, by the end of the third decade of the seventeenth century almost all of the basic elements of the continental mechanized scene change system were in use:

a. Flat scenic wings were attached to trolleys passing through cuts in the stage floor which rolled or slid in tracks in the understage area and were attached to an axle that would pull the trolleys on and offstage when it was rotated. Although early theatrical machines, such as those used to raise the front curtain, incorporated the use of a counterweight to provide motive force or a rapid movement, it had apparently not yet been applied to the wing change.

b. Shutters were the primary method of changing the rear of the scene, but backdrops rolled up on overhead axles[49] or brailed curtains[50] (curtains gathered from the bottom with small ropes passing through rings attached to the back of the curtain) had also been used.

c. Sky or cloud borders provided the overhead decoration. The only scenes presented onstage at this time were exteriors.

THE VENETIAN PUBLIC THEATRE

The Venetian public opera functioned quite differently from the Italian court productions. In the sixteenth century some Venetian nobility built theatres and rented them to touring *commedia dell'arte* companies. The Tron family, the owners of the Teatro San Cassiano, were given permission in 1636 to reopen their theatre as a "theatro de musica."[51] Its first opera production was *Andromeda*, opening in 1637 with three settings and spectacular effects to rival those in the previous court *intermezzi* and operas.

A link between the machinery used in the *intermezzi* and operas of the Italian courts and the machinery used in the Venetian public operas may be the Ferrarese architect Alfonso Rivarola, called il Chenda (1590–1640), who had worked with Guitti on the Farnese court productions in 1628. In 1636 Chenda designed a temporary tournament theatre with scenery and machinery for a production of *Ermiona* in Padua. The following year the travelling company that presented *Ermiona* in Padua performed in *Andromeda*, the first Venetian public opera, at the Teatro San

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48 Ibid., 142–43, 153–54, Cod. α, fols. 17r and 26v.

49 Ibid., 133, Cod. α, fol. 15r.

50 Fabbri, *Il Corago*, 117.

51 Ellen Rosand, *Opera in Seventeenth-Century Venice: The Creation of a Genre* (Berkeley: University of California Press, 1991), 69.

Cassiano.[52] The designer of the scenery for *Andromeda* is not recorded, but since the *Ermiona* stage machinery was no longer needed and the scenes in *Ermiona* and *Andromeda* were similar, some scholars suggest Chenda's scenery and machinery were used for both. Even if it is not true, the 1637 *Andromeda* was quite spectacular; its scenes and effects[53] could have been achieved by using Guitti's machinery illustrated in the Floriani notebooks, but not by the cruder machinery described in Sabbatini's *Pratica*.

In 1639 Chenda was in Venice to design *La Delia o sia La Sera sposa del Sole*, the inaugural production at the second Venetian opera house, the Teatro SS. Giovani e Paolo. He also designed its second production, *Armida*.[54] Even if the mechanized flat wing scene change had not been installed at the Teatro San Cassiano in 1637, Chenda would have undoubtedly installed it in the new Teatro SS. Giovanni e Paolo two years later.

In 1641 a new theatre and a new designer appeared on the Venetian opera scene: Giacomo Torelli designed *La finta pazza*, the inaugural production at the Teatro Novissimo. Little is known about Torelli's training or previous experience in theatrical design and stage machinery, but he is credited with inventing the mechanized scene change during the five years he was active in Venice. Knowledge of his productions comes mainly from the idealized etchings of his designs that he commissioned and from the descriptions in the libretti. The previously cited description of Torelli's "miraculous" wing change machinery in the libretto of *La finta pazza* indicates that the designer used a counterweight to revolve the central axle instead of the winch handles shown in the Floriani notebooks, thus rapidly moving the trolleys with the scenic wings. The use of the counterweight completed the mechanized wing change machinery that was used in many large European theatres into the nineteenth century.

Torelli's fame may be due, in part, to the etchings of his *La finta pazza*, *Bellerofonte*, *Venere gelosa*, and *Deidamia*, which are the only etchings of seventeenth-century Venetian opera productions.[55] *Bellerofonte* may have included another Torelli innovation. Etchings show a cavern setting with a stone ceiling and another with an architectural ceiling. This may be the earliest documented use of changeable borders as a part of the scenic change. The machinery used to lower clouds to different heights to maintain perspective using an overhead axle with different diameter drums shown in the drawings in the Floriani notebooks[56] could accomplish this border change. It is possible that Torelli also worked at the Teatro SS. Giovanni e Paolo[57] and was aware of Chenda's or Guitti's machinery.

In 1645 Torelli was invited to Paris to work for the French court. In spite of his fame, he did not leave a record of his theatrical machinery in Venice. Fortunately, in 1664, twenty years after Torelli left Venice, an English visitor, Sir Philip Skippon, saw three operas, two at the Teatro

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52 Ibid.

53 Simon Towneley Worsthorne, *Venetian Opera in the Seventeenth Century* (New York: Da Capo Press, 1968), 25–27.

54 Per Bjurström, *Giacomo Torelli and Baroque Stage Design* (Stockholm: Almqvist & Wiksell, 1962), 44–45.

55 Ibid., 52.

56 Adami, *Scenografia e Scenotechnica*, 145, Cod. α, fol. 19v.

57 Bjurström, *Giacomo Torelli*, 52.

SS. Giovanni e Paolo and one at the Teatro San Salvatore. He was impressed by the change of scene and described the machinery in detail with sketches.[58] It involved scenic wings on trolleys that ran in tracks under the stage. Ropes from the trolleys were connected to a drum on a central axle which was rotated by a falling counterweight, thus moving the trolleys. Since adjacent pairs of trolleys were connected by ropes and a pulley, as one trolley was pulled onstage the other was pulled offstage, where it could be changed for the next scene (Fig. 9). This drawing combined the understage central axle and trolley machinery used by Guitti with the falling counterweight used by Torelli.

Skippon also described the border change using a central axle located overhead, shown in lightweight lines in Figure 9. This could well be the machinery installed at the Teatro SS. Giovanni e Paolo by Chenda or by Torelli. Skippon does not mention shutters, which were commonly used by this time, but he describes the operation of the front curtain. It was "drawn up by a great many ropes lapped about an axis, which is also turned by the weight of a great stone."[59] This was a brailed curtain, which had been described and depicted earlier in the Rosenwald manuscript and *Il Corago*, and it could also be used to change a backdrop.

Another important source for seventeenth-century Venetian opera machinery is MS 3708 at the Bibioteca Palatina in Parma. It consists of twenty-four drawings of scenes and fifteen drawings of stage machinery, but it has no descriptive text. Many drawings of the machinery are directly related to the scene drawings. The manuscript has been identified as drawings for the previously mentioned 1675 production of *La Divisione del mondo* at the Teatro San Salvatore, which was probably designed by Gasparo and Domenico Mauro.[60] The wing change machinery is illustrated in two drawings, a plan view, and a frontal view of the stage house. They show the same system as the one in Skippon's sketch, except it does not depict the rope leading from the drum on the axle to a counterweight, but there are no winch handles to suggest an alternate method of rotating the axle. These drawings also represent the shutter cuts and the wing and shutter trolleys. The theatre had permanent sky borders on traveller tracks that could be opened to allow a flying machine to pass downstage, and a machine operated by a counterweight to lower another set of borders into view, as shown in Figure 10. The border axle in MS 3708 was tapered to allow the borders to fall at different heights along a perspective line similar to the cloud machinery in the Floriani notebooks which used drums of different diameters. The manuscript also includes a design for a brailed curtain raised by a falling counterweight and for the machinery on the various levels of the Venetian opera house.[61]

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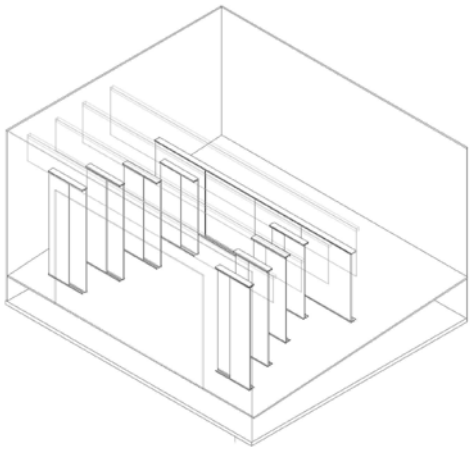
58 Awnsham Churchill, ed., *A Collection of Voyages and Travels . . .* (London: The Golden-Ball, 1732), 6:359–736.

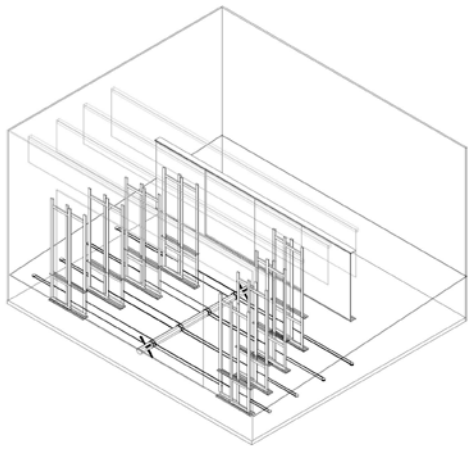
59 Orville Larson, "Giacomo Torelli, Sir Philip Skippon, and Stage Machinery for the Venetian Opera," *Theatre Journal* 32.4 (1980): 456.

60 Cesare Molinari, "Disegni a Parma per uno spettacolo veneziano," *Critica d'Arte* 70 (1965): 47–64. See also Silvia Bracca, "L'arte di dipinger le scene. Scenografi e pittori teatrali nella Venezia del Seicento," in *L'occhio e l'orecchio. Immagini per il drama per musica nella Venezia del'600* (Trevisio: ZeL Edizioni, 2014), 147–250, especially Figs. 241–46, 248–55.

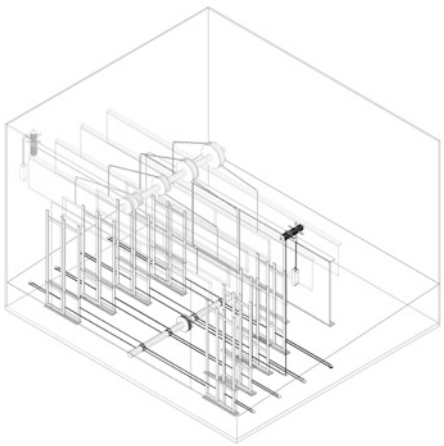
61 Frank Mohler, "The 17th Century Venetian Stage House: The Teatro San Salvatore," *Theatre Design and Technology* 54.3 (2018): 16–29.



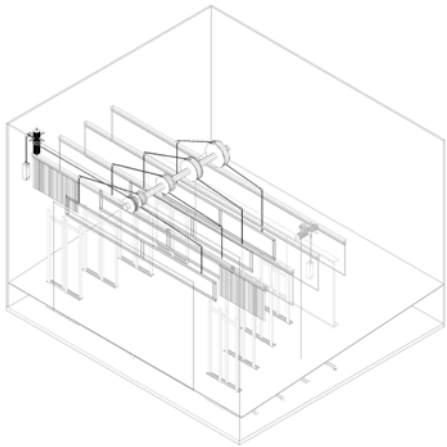
7. Manual flat wing and groove change. Computer drawing by the author.



8. Mechanized flat wing change. Computer drawing by the author.



9. Mechanized wing change system with counterweight. Computer drawing by the author.



10. Mechanized border change system with counterweight. Computer drawing by the author.

Nicodemus Tessin the Younger (1654–1728), who succeeded his father as the Swedish court architect, travelled to Italy and left a description with sketches in his travel journal of the machinery in four Venetian opera houses as they appeared in 1688: the Teatro San Giovanni Crisostomo, the Teatro San Giovanni e Paolo, the Teatro San Salvatore, and the Teatro San Angelo.[62] Tessin describes the procedure used by the stagehands to change the wings on the trolleys. He also relates how flat wings could be placed manually on the inner stage to extend the perspective vista. His sketches and other plans depict additional full stage cuts in the stage floor behind each set of wings and he describes their use to move additional objects on and

[62] Per Bjurström, "Unveröffentlichtes von Nicodemus Tessin d. J.," *Kleine Schriften der Gesellschraft für Theatergeschichte* 21 (1966): 14–41.

offstage. The border changing machinery is similar to that described by Skippon and shown in MS 3708, but is more detailed. Shutters and brailed curtains were used to close the rear of the scene. Tessin, along with Skippon and MS 3708, also provide information about the operation of other spectacular machinery.

There is one other important source related to seventeenth-century stage machinery. Fabrizio Carini Motta (1627–1699), an architect for the Gonzaga court in Mantua, published a book on the layout of theatres and perspective settings, *Trattato sopra la struttura de' teatri e scene*, in 1676. He also prepared a manuscript on stage machinery, *Costruzione de teatri e machine teatrali*, dated 1688. His patron Duke Ferdinando Carlo IV spent as much time in Venice as in Mantua and was an enthusiast of Venetian opera. Motta accompanied him on his trips and was undoubtedly familiar with Venetian theatres and their machinery.[63]

Motta describes and illustrates a variety of methods of changing the side wings, including the use of a central axle turned with winch handles, like that in the Floriani notebooks, and a central axle turned with a vertical capstan; only one method utilizes a counterweight to turn the axle.[64] He also describes the ways of changing the borders using capstans and counterweights, as well as sky border units that could be opened to allow a flying machine to pass through,[65] as did MS 3708 (Fig. 10).

Both Motta and Tessin provide drawings and descriptions for creating a box set on the flat wing stage by closing the openings between the wings. Wall units were hinged to the onstage edge of the scenic wing mounted on the trolleys and were flat against the scenic wing. When the wings were moved to the onstage position, the wall units were pivoted into a position to close the opening between the wings creating the illusion of a wall running from downstage to the upstage shutter. Ceiling units hinged to the borders made it possible to close the openings between the borders, thus creating an enclosed space on stage.[66] There is no evidence of this machinery being used in eighteenth-century court theatres. Unfortunately, Motta does not provide any details about the other spectacular machines such as flying devices, celestial displays, or wave machines.

Although the plans of the court theatres that document the use of flat wings show them parallel to the stage front, as do the Venetian stage plans in Skippon's sketches, MS 3708 drawings, and Motta's manuscript, other plans (Tessin's journal and a late plan of the Teatro SS. Giovanni e Paolo[67]) depict the side wings placed at an oblique angle to the stage front. Andrea Pozzo (1642–1709) observed that with oblique wings, "those who are employ'd to prompt the Actors, and shift the Scenes, etc., are less expos'd to Sight, in the Performance of their Business." However, he also noted that it was easier to shift the scenery when the wings

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63 Orville K. Larson, *The Theatrical Writings of Fabrizio Carini Motta* (Carbondale: Southern Illinois University Press, 1987), 5.

64 Ibid., 84–86.

65 Ibid., 109–11.

66 Ibid., 104–7.

67 Beth L. Glixon and Jonathan E. Glixon, *Inventing the Business of Opera: The Impresario and His World in Seventeenth-Century Venice* (Oxford: Oxford University Press, 2006), 18, Fig. 2.1.

were parallel to the stage front.[68] The wings parallel to the stage front were apparently judged better, since they were used in most eighteenth-century theatres.

Although the marine scene has not been discussed as a part of the continental scene change, it deserves mention since it was a common choice with early modern designers. Many *intermezzi* and early operas included a marine scene with waves and the appearance of ships and various sea creatures. Sabbatini and Furttenbach limited the wave machines to the inner stage, where they could be preset and revealed to the audience by removing the shutters. Furttenbach's theatre section as described in *Codex iconographicus 401* had a pit in front of the shutters that was also used for sea effects.[69] The Floriani notebooks illustrate several ways of raising the waves on the main stage, as does MS 3708. Neither Motta nor Skippon describe the machinery for a marine scene.

EIGHTEENTH-CENTURY COURT THEATRES

By the end of the seventeenth century all the elements of the continental mechanized scene change had been invented and put into practice. Venetian designers spread the technology throughout Europe. Variations of this machinery dominated the continental stage until the mid-nineteenth century. In the eighteenth century the stages and machinery were modified as the dramatic form changed; the mythological subjects used in seventeenth-century opera were replaced by historic and domestic subjects that did not require the same degree of spectacle as the early *intermezzi* and operas.

The best evidence for how the continental scenic change operated is obviously when we have actual theatres and machinery to study. Although no seventeenth-century theatres have survived with their stage machinery intact, there are several extant eighteenth-century theatres with their original stage machinery. The eighteenth-century theatres that have survived with their stages, scenery, and machinery intact are primarily court theatres. Large court theatres that hired professional theatre or opera companies, such as the theatres at Český Krumlov[70] and Drottningholm,[71] still retained the capacity for creating flying effects and marine scenes, but the smaller courts that used their theatres mainly for family entertainment, like the theatre at Litomyšl,[72] limited themselves to the scene change machinery that was needed for their productions. Most of the court theatres did not use a counterweight to assist the scene change, the court theatre at Ludwigsburg being an exception. Typically, these eighteenth-century court theatres survived because

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68 Dunbar H. Ogden, *The Italian Baroque Stage: Documents by Giulio Troili, Andrea Pozzo, Ferdinando Galli-Bibiena, Baldassare Orsini* (Berkeley: University of California Press, 1978), 21.

69 Furttenbach, "Florentine Festivals," 324.

70 Frank Mohler, "The Court Theatre at Český Krumlov and its Machinery," *Theatre Design and Technology* 43.2 (2007): 54–63.

71 Frank Mohler, "The Survival of the Mechanized Flat Wing Scene Change: The Court Theatres of Gripsholm, Český Krumlov, and Drottningholm," *Theatre Design and Technology* 35.1 (1999): 46–55.

72 Frank Mohler and Jiří Bláha, "The Chateau Theatre at Litomyšl and the Scenery of Josef Platzer," *Theatre Design and Technology* 40.4 (2004): 24–32.

the courts lost interest in theatrical performances and their theatres were forgotten or used for storage.

The large eighteenth-century public theatre stages were destroyed or renovated and the historic stage machinery has been lost or is no longer used. Fortunately, there are published descriptions by Cityeon Boullet and in Diderot's *Encyclopedia* of the 1770 Paris Opera stage and its machinery.[73] The Paris Opera used a wing change system similar to that introduced to Paris by Giacomo Torelli, using trolleys, a central axle, and a counterweight. Because the Paris Opera had a high stagehouse, it was possible to fly backdrops and borders without brailing, tripping, or using an overhead roller, perhaps the first such use.

The stage machinery used in the mid-seventeenth-century Venetian opera houses dominated the stages of European continental theatres for over 250 years. Traditionally, Giacomo Torelli has been given credit for the invention of these devices in 1641 at the Teatro Novissimo in Venice. The basic scenic wing change there consisted of flat wings mounted on trolleys moved on and offstage by ropes connected to an axle under the stage. Giovanni Aleotti may have installed this device in the Teatro Farnese. Francesco Guitti used it for court productions in Ferrara in the 1630s and the machinery is illustrated in the Floriani notebooks. Torelli's contribution may have been the addition of a falling counterweight to turn the axle instead of the winch handles used by Guitti. The basic machinery used for the border change was similar, consisting of scenic panels lowered from an overhead axle. Again, Guitti used winch handles to turn the axle and Torelli may have used a counterweight to turn the axle to lower the panels into view. However, unlike Guitti, Torelli left no technical drawings of his machinery.

Several seventeenth-century Venetian designers took the scene change technique to court and public theatres throughout the continent. Large eighteenth-century theatres typically used a system operated by a counterweight, but the machinery has not survived. The machinery at some smaller court theatres like those at Drottningholm and Český Krumlov used the axle turned by a capstan or the winch handles used by Guitti, not the counterweights used by Torelli. This scene change machinery is still used in some productions mounted at those theatres.

[73] C. Thomas Ault, *Design, Operation, and Organization of Stage Machinery at the Paris Opera: 1770–1873*, PhD diss. (University of Michigan, 1983).

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